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Dazhi Zheng, Huimin Li, Thomas C. Chia

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Herding within industries: Evidence from Asian stock markets

Dazhi Zheng
West Chester University
dzheng@wcupa.edu

Huimin Li*
West Chester University
hli@wcupa.edu

Thomas C. Chiang
Drexel University
chiangtc@drexel.edu

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Abstract

This paper examines herding behavior at the industry level for nine Asian markets. Using daily data, we find that industry herding generally exists in these markets, but is stronger at industry level as compared with the domestic and international market levels. Within each market, herding activities are stronger in the Technology and Financial industries, but weaker in the Utility industry. The evidence indicates that industry herding is more pronounced in down markets and low trading volume markets for most markets. Herding is also more apparent in both high and low market value industries, in low dividend yield industries and in less concentrated industries.

JEL Classification: G15, G14

Keywords: Herding behavior; Cross-sectional stock dispersion; Asian stock markets; industrial stocks

***corresponding author;** Tel.: +1 610 436 6947; email: hli@wcupa.edu.

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This paper examines herding behavior at the industry level for nine Asian markets. Using daily data, we find that industry herding generally exists in these markets, but is stronger at industry level as compared with the domestic and international market levels. Within each market, herding activities are stronger in the Technology and Financial industries, but weaker in the Utility industry. The evidence indicates that industry herding is more pronounced in down markets and low trading volume markets for most markets. Herding is also more apparent in both high and low market value industries, in low dividend yield industries and in less concentrated industries.

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1. Introduction

Herding behavior among investors has been investigated in numerous studies. The theory posits that investors tend to follow the trading actions of a financial guru and suppress their own private information (Bikhchandani, Hirshleifer, and Welch, 1992; Nofsinger and Sias, 1999). This phenomenon is more likely to be present among amateur investors (Venezia, Nashikkar, and Shapira, 2011). Because investors' trading strategy does not pay particular attention to stock fundamentals, stock prices have a tendency to drift away from their intrinsic values (Lakonishok, Shleifer, and Vishny, 1992) and, in turn, create bias and market volatility (Christie and Huang, 1995; Chang, Cheng and Khorana, 2000). Therefore, examining herding behavior in financial markets helps to identify the degree of price-efficiency, and possibly provides a better understanding of the issue of market stability.

Empirical studies show that herding activities vary in different types of stock markets (Grinblatt et al. 1995; Welch, 2000). For example, the evidence indicates that herding behavior only exists among particular groups of investors in the U.S.,[1] but is more prevalent at the aggregate level in international markets, especially in emerging markets. A pioneering study by Chang, Cheng, and Khorana (2000) finds no evidence of herding at the market level in the U.S. and Hong Kong, partial evidence of herding in Japan, but significant evidence of herding in South Korea and Taiwan. Further tests by Tan et al. (2008) find that herding occurs in both the Chinese A-share and B-share stock markets. Chiang and Zheng (2010), who study 18 international markets, conclude that herding exists in six advanced markets and seven Asian markets, but is absent in four Latin American markets and the U.S. market except during a crisis period. More recently, Balcilar, Demirer, and Hammoudeh (2013, 2014) also detect herding activities in the Gulf Arab stock markets.

While the above-mentioned studies contribute to a better understanding of herding behavior in an international context, their empirical analysis of herding is confined to the aggregate market level and

[1] For example, Grinblatt et al. (1995) find evidence of herding activity in mutual fund markets; Welch (2000) finds that an analyst's investment recommendations are influenced by his/her peers; and Lakonishok et al. (1992) report that pension managers follow a positive-feedback trading strategy by trading the same stocks that other managers buy or sell.

lack of a systematic analysis at the industry level.[2] In fact, we observe that investors, especially amateur participants, are more likely to invest in stocks in industries with which they are familiar. A prime example is the tendency of employees to buy the stock of the companies for which they work or have obtained information from their peers (Huberman, 2001).[3] An aspect of this behavior is explored in Van Nieuwerburgh and Veldkamp's (2009) study, which shows that the tendency of investors to invest in their home country stocks more than in foreign stocks, the phenomenon known as home bias puzzle, may not be fully explained by information asymmetry because nowadays information can be obtained at much lower costs and faster than previously. An alternative 'bias' may be that investors are more familiar with their local market and prefer accessing information on local market to less familiar markets that may entail more risks. Following this line of reasoning, it can be argued that investors tend to invest in industries they are familiar with, focusing on industry-specific information, which may give rise to a tendency to herding within industries rather than with the aggregate market. This phenomenon may also be present among many professional managers / analysts who are inclined to focus on managing industry/sector portfolios and therefore concentrate on industry-specific information within their field of expertise (Choi and Sias, 2009). As a result, industry herding is likely to be more prevalent than aggregate market level herding.

Recent empirical evidence suggests that herding behavior tends to vary across different industries. Lee, Chen, and Hsieh (2013) show that stock return dispersions on the information technology sector play a significant role in explaining the other sectors' herding activity in China. Gebka and Wohar (2013) report that investors exhibit stronger irrationality in the Basic Materials, Consumer Services, and Oil & Gas industries in the global equity markets. Although these studies' findings reveal some industry characteristics, they do not provide an in-depth understanding of industry herding. Specifically, the

[2] The existing literature finds only a few studies that investigate herding behavior at industry level, for example, Yao, Ma, and He (2014) find that herding behavior is more prevalent at the industry level in China.

[3] Huberman (2001) finds that investors exhibit psychological biases when they make trading decisions. They tend to invest in familiar entities and ignore the principles of portfolio management. Other than the industry choice preferred by employees mentioned here, it also cites home country bias as an example of behavior biases on investors.

studies by both Yao, et al. (2014) and Lee, et al. (2013) are confined to Chinese stock market, and while Gebka and Wohar's (2013) research is based on pooling estimations from 32 markets, it ignores the country-specific effect on herding behavior. Thus, some questions about herding behavior at the industry level in international financial markets remain unanswered. Particularly, when analyzing herding activities over international stock markets, we question whether investors herd within industries as well. Do different industries exhibit different herding behavior? Does industry-herding behavior differ under different market conditions? How do fundamental factors affect the industry herding?

Motivated by existing studies and the above questions, this study contributes to the literature in the following six aspects. First, instead of studying whether investors herd only within a domestic market as most previous studies do (Chang, et al., 2000; Demirer and Kutan, 2006; Tan, et al., 2008; etc.), we test whether herding activities exist at the industry level. As noted by Huberman (2001), it can be hypothesized that investors' herding behavior occurs not only within the overall market, but also is displayed within industries. Specifically, investors who are familiar with certain industries tend to follow the herd in trading stocks mostly within those industries.[4] Second, unlike Yao, et al. (2014) and Lee, et al. (2013), who only study a specific market, our study sample includes nine major Asian stock markets[5] (China, Japan, Korea, Taiwan, Hong Kong, Singapore, Malaysia, Thailand and Indonesia). Of this sample, one group (e.g. Japan, Hong Kong, Singapore) has been experiencing a relatively long history and is considered to be more developed market, while the other group (China, Thailand, Indonesia, etc.) has a relatively short history and is less developed. Some markets are also more open than the others. For example, Chinese stock market is still largely inaccessible to foreign investors even though foreign investors can purchase shares of Chinese corporations through QFII (qualified foreign institutional investors), through B shares (available for fewer stocks and less liquid compared with A shares) or

[4] See Massa and Simonov (2006).
[5] According to Chiang and Zheng (2010), Asian stock markets exhibit stronger herding activities than markets in other regions. The Asia-Pacific market is also the fastest growing region in the world. According to World Federation of Exchanges 2014 Market Highlights report published in March 2015, the Asia-Pacific equity market capitalization has reached $21 trillion at the end of 2014 and was 31% of the world market capitalization. It grew by 13.8% in 2014 compared with 7% in Americas market and -9.6% in Europe-Middle East-Africa market.

through H shares (listed on Hong Kong Stock Exchange). In contrast, foreign investors account for 50% of the trading in markets like Japan and Hong Kong.[6] For even less developed markets such as Malaysia, the concentration of foreign investors trading in the market lies between 30% and 40%.[7] The diversity of our sample coverage enables us to make comparisons across different markets despite variations in culture and institutional settings. Third, by incorporating the U.S. stock market in the herding measure, we can examine herding behavior involving three different levels[8]: the industry level, the domestic market level, and the international (U.S.) level. Fourth, we explore herding activities under different market conditions by dividing the sample into three segments: up markets (positive excess industry returns) vs. down markets (negative excess industry returns), active markets (top 25% detrended market trading volume) vs. inactive markets (bottom 25% detrended market trading volume), and markets operating during crisis periods vs. tranquil periods.[9] Fifth, this study extends the work of the current research by investigating whether herding activity presents a cross-industry effect, i.e., investors not only herd within a certain industry, but also are influenced by other industries' activities. Finally, by analyzing industry portfolios grouped by industry characteristics, such as market value, P/E ratio, dividend yield, and Herfindahl Index, we can explain why different industries exhibit different herding behavior, i.e. why herding activities are stronger in certain industries and weaker in other industries?

The empirical evidence supports our hypothesis that herding within industries generally exists in Asian stock markets. Herding activities are detected in 9 of 10 industries in China, Japan, Korea, and Hong Kong, 8 of 10 industries in Taiwan and Malaysia, 7 of 10 industries in Indonesia, 6 of 10 industries in Singapore, and 3 of 10 industries in Thailand. Within each market, herding activities are stronger for

[6] Data are from Japan Exchange Group (http://www.jpx.co.jp/english/markets/statistics-equities/investor-type/b5b4pj000000v4g3-att/stock_val_1_y15.pdf) and from Hong Kong Exchanges and Clearing Limited (https://www.hkex.com.hk/eng/stat/research/Documents/cmts2015.pdf).
[7] Data are from Bursa Malaysia Berhad (http://www.bursamalaysia.com/misc/system/equity_market_statistics/securities_equities_trading_participation_investor2012.pdf).
[8] Chiang and Zheng (2010) examine two levels, domestic market and international market.
[9] We define the Asian crisis (1997-1998), the dot-com crisis (2000-2001), and the sub-prime mortgage crisis (2007-2009) as crisis periods and the remaining time periods as tranquil periods. For a more detailed explanation, see section 4.

the Technology industry but weaker for the Utility industry, especially in larger markets (China, Japan, Korea, and Hong Kong). When domestic market return variables are included in the test equation, we find that *industry-level* herding is more prominent than *market-level* herding. This is particularly true for China, Japan, Korea, Taiwan, Hong Kong, Thailand and Malaysia, where market-level herding activities are insignificant in many cases. By incorporating U.S. stock market variables into the model, we find that the herding coefficient for the international market is generally weaker as compared with *industry-level* herding and *domestic-market-level* herding. When we compare industry-herding activities under different market conditions, evidence suggests that herding is more pronounced in down markets for Japan, Korea, and Taiwan, but the opposite is the case for China, Malaysia, and Indonesia. Industry herding is more likely to occur when trading volume is low. The industry-herding pattern during crisis and tranquil periods is mixed for nine Asian markets, with Japan, Korea and Taiwan showing more herding during the crises. The cross-industry herding analysis shows that industry herding occurs more often in Telecom and Financial industries, but less often in Industrial and Consumer Services industries. The portfolio analysis suggests that herding tends to be stronger in both high and low market value industries, but weaker for mid-sized industries; stronger in low dividend yield industries, weaker for mid and high dividend yield industries, and slightly stronger in high PE ratio industries. Furthermore, less concentrated industries tend to show more herding behavior, while more concentrated industries tend to show less.

The remainder of this paper is organized as follows. Section 2 explains the estimation model for testing herding behavior. Section 3 describes the data. Section 4 reports the empirical evidence of herding behavior at the industry level and estimations of the cross-market effects. Section 5 examines industry-herding behavior under different market conditions. Section 6 analyzes the herding effect for different industry portfolios sorted by fundamental factors. Section 7 summarizes and concludes the analyses.

2. Research methodology and estimation models

Since herding cannot be measured directly from financial markets, the literature has developed different proxies for detecting herding activities, which can be summarizes as following one of two lines of research. The first employs the asymmetric buy and sell trading orders to measure herding, e.g., when more buy orders than sell orders are placed for a stock, herding is detected on the buy side, and vice versa. This line of research focuses on herding activity at the investor level.[10] The second line of research is based on the asset-pricing model and measures herding by using a regression relation that links the cross-sectional dispersion of stock returns to the extreme movements of stock market returns. This approach usually focuses on herding activities at the aggregate level. Most of the research cited in the previous section falls into this category. Our study also follows this methodology, which was first introduced by Christie and Huang (1995) who use the cross-sectional standard deviation (CSSD) method that calculates the cross-sectional dispersion of stock returns as:

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

where N is the number of firms in the portfolio, $R_{i,t}$ is the return of stock i at time t, and $R_{m,t}$ is the equally weighted returns of the portfolio at time t. Christie and Huang (1995) find empirical evidence that during periods of extreme price movements, when the presence of herding is expected to be most prevalent, equity return dispersions (CSSD) are significantly lower. In a later study, Chang, et al. (2000) use the CAPM to generalize the method for detecting herding under all market conditions and modify the measure of stock return dispersion as the cross-sectional absolute deviation of returns (CSAD):

$$CSAD_t = \frac{1}{N}\sum_{i=1}^{N}\left|R_{i,t} - R_{m,t}\right| \tag{2}$$

Chang, et al. (2000) suggest that stock return dispersion (CSAD) should have a linear correlation with the absolute value of the stock market return. However, when herding occurs, investors trade in the same direction as the market, and individual stock returns tend to cluster around the overall stock returns. Therefore, the linear relation between the CSAD and the absolute value of stock market returns no longer holds true. Under these conditions, we should detect a negative and significant nonlinear correlation

[10] See Lakonishok, et al. (1992); Grinblatt, et al. (1995).

between the CSAD and stock market returns. Hence, the model for detecting herding activities is constructed as follows:

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

When γ_2 is negative and statistically significant, herding activity occurs.

Since our study focuses on examining herding at the industry level rather than the market level, we revise the above specification and develop a series of estimation models as follows:

$$CSAD_{ind,t} = \frac{1}{N}\sum_{i=1}^{N} |R_{i,t} - R_{ind,t}| \quad (2)'$$

$$CSAD_{ind,t} = \alpha + \gamma_1 |R_{ind\_market,t}| + \gamma_2 R_{ind\_market,t}^2 + \varepsilon_{ind,t} \quad (3)'$$

In equation (2)', the stock return dispersion ($CSAD_{ind,t}$) is calculated based on all N firms' stock returns within the industry.[11] We use the average return $R_{ind,t}$ for each of the 10 industries in each market to replace the stock market return in the original equation (2). In equation (3)', $R_{ind\_market,t} = R_{ind,t} - E(R_{ind,t})$, where $E(R_{ind,t})$ is the expected industry return for the 10 industries in each market and is calculated by the CAPM: $E(R_{ind,t}) = \alpha + \beta R_{m,t}$.[12] Since herding activities are detected at the industry level, we employ only the innovation term of each industry's returns to test equation (3)'. If γ_2 is negative and significant, then the evidence supports our hypothesis that investors herd at the industry level. This specification is consistent with Yao, Ma, and He (2014) in their herding study of the Chinese stock market.

Based on equation (3)', we further test whether investors herd both within industries and within the aggregate market. To investigate this possibility, we incorporate the absolute value of market-returns and the return-squared terms into an updated model given as:

[11] $CSAD_{ind,t} = \frac{1}{N}\sum_{i=1}^{N} |R_{i,t} - R_{ind,t}|$, i is the ith firm in the industry with a total of N firms. For each market, 10 industries are defined according to Thomson Datastream. See next section.

[12] α and β for each industry of each market are estimated by using the industry return, regressing them on the market return for the entire data set of each market.

$$CSAD_{ind,t} = \alpha + \gamma_1 |R_{ind\_market,t}| + \gamma_2 R^2_{ind\_market,t} + \gamma_3 |R_{m,t}| + \gamma_4 R^2_{m,t} + \varepsilon_{ind,t} \quad (4)$$

The model in equation (4) suggests that if the estimated γ_2 is negative and significant, then the evidence supports the view that investors herd at the industry level; if the estimated γ_4 is negative and significant, then the evidence supports the notion that investors herd at the market level; if both γ_2 and γ_4 are negative and significant, then the evidence supports the hypothesis that investors herd at both the industry and the market level. Finally, to test whether investors herd not only within domestic markets but also within international markets, we follow an approach similar to Chiang and Zheng (2010) and include U.S. stock market return variables in the equation, which is rewritten as:

$$CSAD_{ind,t} = \alpha + \gamma_1 |R_{ind\_market,t}| + \gamma_2 R^2_{ind\_market,t} + \gamma_3 |R_{m,t}| + \gamma_4 R^2_{m,t} + \gamma_5 R^2_{US,t-1} + \gamma_6 CSAD_{US,t-1} + \varepsilon_t, \quad (5)$$

where $R^2_{US,t-1}$ is the lagged U.S. stock market return squared and $CSAD_{US,t-1}$ is the lagged stock return dispersion in the U.S. market.[13] All other variables are the same as in the previous equations. With the same rationale used for equation (4), we estimate the values of γ_2, γ_4 and γ_5, which represent an industry, the domestic market, and the U.S. market herding coefficients, respectively. If all of these parameters are negative and significant, then the evidence supports the view that investors herd at all of these levels.

3. Data

The data, which are collected exclusively from Thomson Datastream, consist of price and trading volume for individual stocks, industry indexes and stock market indexes. At the market level, the sample covers nine Asian stock markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). Data are also collected for the United States (U.S.) market to test equation (5). Within each market, all stocks are divided into 10 industries according to Thomson Datastream's classification: Oil & Gas, Basic Materials, Industrials,

[13] Because of the time lag, we use lagged U.S. stock market variables.

Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology.

The data period ranges from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for the U.S., Japan, Malaysia, Thailand, and Indonesia. All stock and stock index returns are calculated as $R_t = 100 \times (\log(P_t) - \log(P_{t-1}))$, where P_t denotes either the individual stock price, the industry index, or the stock market index. All trading volume data are expressed as logged trading volumes and are detrended using the one-year moving average of logged trading volumes. Consideration for outliers is handled by trimming the return data and trading volume data at the 99th percentile.[14]

Table 1 provides descriptive statistics of the CSAD for all industries in each market. Because Asian markets have experienced rapid growth in the past two decades, data for the early years are not entirely valid and not consistently available. Therefore, for any industry data, which consists of less than 10 stocks, the data point is dropped. The number of observations ranges from 2000 to 5000 points across different industries in those markets.[15] The values of the CSAD are also different across different industries and different markets. On average, industries in Korea, Hong Kong and Singapore have relatively higher average CSAD values, while China, Taiwan, and Thailand have relatively lower CSAD values, indicating that stock markets are more volatile in Korea, Hong Kong and Singapore than in China, Taiwan, and Thailand. For the same industry across those markets, the Technology industry has the highest CSAD value, while the Utilities industry has the lowest CSAD on average, highlighting the fact that there is more volatility in trading Technology stocks than in trading Utility stocks.

[14] As a result, the data for Oil & Gas industry are not sufficient in Taiwan and prevent further analysis.
[15] An exception is the Oil & Gas industry for Taiwan. Since the industry has insufficient valid data points, we drop the whole industry in the empirical tests.

Table 1. Descriptive Statistics

China	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	1.300	1.548	1.577	1.527	1.576	1.511	1.514	1.454	1.561	1.701
Maximum	9.180	9.268	7.374	8.060	8.187	7.133	14.908	34.066	6.591	23.390
Minimum	0.001	0.009	0.030	0.006	0.014	0.012	0.019	0.007	0.008	0.013
Std. Dev.	0.922	0.717	0.689	0.719	0.719	0.701	1.016	0.952	0.724	0.951
Skewness	1.642	1.265	1.005	1.214	1.548	1.316	1.980	13.996	1.132	6.450
Kurtosis	7.840	9.072	7.082	8.873	9.217	8.571	15.481	415.321	6.584	105.648
Jarque-Bera	5221	9110	4396	8638	10092	8006	19404	36015762	3792	2247631
Obs.	3663	5053	5096	5133	5022	5062	2716	5061	5064	5040

Japan	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	1.424	1.652	1.731	1.577	1.589	1.554	1.866	1.102	1.602	1.986
Maximum	8.412	6.247	8.975	6.099	10.018	5.894	19.443	5.639	6.573	6.194
Minimum	0.236	0.006	0.005	0.091	0.419	0.058	0.019	0.155	0.062	0.049
Std. Dev.	0.776	0.541	0.535	0.517	0.554	0.472	1.257	0.505	0.559	0.604
Skewness	2.235	1.701	2.235	1.951	2.481	1.755	2.881	2.073	2.133	1.420
Kurtosis	11.950	9.360	15.944	10.449	19.972	8.864	24.714	11.112	11.827	6.416
Jarque-Bera	20519	10706	38467	14502	64109	9578	103464	17017	19712	4047
Obs.	4921	4939	4923	4922	4921	4922	4920	4921	4922	4922

Korea	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	2.034	2.325	2.532	2.471	2.356	2.600	1.875	1.620	2.056	2.737
Maximum	27.125	6.914	8.078	8.299	11.647	22.141	10.247	16.960	12.235	14.003
Minimum	0.126	0.000	0.000	0.043	0.000	0.198	0.102	0.079	0.111	0.386
Std. Dev.	1.276	0.852	0.862	0.882	0.897	1.233	1.084	0.877	1.045	1.011
Skewness	4.338	1.548	1.643	1.719	1.727	3.029	1.723	3.109	2.035	2.096
Kurtosis	57.792	6.051	6.969	7.004	8.708	31.404	8.104	33.305	10.157	12.996
Jarque-Bera	634201	3891	5469	5738	9157	173507	5742	196830	13951	24164
Obs.	4946	4942	4942	4943	4938	4937	3633	4936	4939	4936

Hong Kong	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	2.562	2.481	2.295	2.139	2.647	2.228	2.196	2.200	2.140	2.684
Maximum	50.683	11.583	10.443	8.423	28.618	10.165	56.547	16.655	11.188	17.400
Minimum	0.101	0.031	0.002	0.006	0.016	0.003	0.009	0.217	0.001	0.040
Std. Dev.	2.259	1.038	0.883	0.746	1.435	0.900	1.886	1.323	0.841	1.147
Skewness	6.836	2.107	2.013	2.159	3.571	1.663	8.096	3.168	1.888	2.110
Kurtosis	101.880	11.516	11.687	12.712	38.911	11.098	172.567	21.767	11.506	14.845
Jarque-Bera	2052203	18608	19049	23385	277669	16166	5784894	80778	18011	33089
Obs.	4943	4947	4987	4968	4971	5063	4785	4941	4991	5023

Taiwan	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	1.221	1.593	1.729	1.611	1.543	1.500	0.737	1.163	1.551	1.848
Maximum	7.117	4.792	5.445	4.865	8.273	4.691	9.556	21.060	4.843	5.318
Minimum	0.028	0.002	0.003	0.001	0.000	0.149	0.004	0.000	0.001	0.000
Std. Dev.	1.280	0.552	0.575	0.508	0.778	0.554	0.610	0.758	0.593	0.614
Skewness	2.353	0.689	0.559	0.503	1.032	0.903	3.049	4.757	0.805	0.580
Kurtosis	10.208	4.355	5.396	4.774	6.237	4.345	23.987	104.818	4.035	5.267
Jarque-Bera	225	771	1450	860	3043	1037	62269	2051390	752	1341
Obs.	73	4952	4977	4966	4955	4906	3129	4708	4927	4962

Singapore	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	2.236	2.084	2.312	2.274	2.422	1.950	1.338	3.309	1.454	2.722
Maximum	17.424	23.529	9.483	9.668	31.474	7.964	57.821	85.320	33.114	17.758
Minimum	0.056	0.092	0.001	0.010	0.004	0.013	0.000	0.114	0.247	0.008
Std. Dev.	2.200	1.312	0.983	1.072	1.931	0.948	1.664	4.188	0.950	1.420
Skewness	2.366	3.005	1.155	1.388	3.214	1.261	11.055	5.316	15.306	1.495
Kurtosis	10.722	30.565	7.245	6.787	26.642	6.147	294.826	62.889	472.284	8.096
Jarque-Bera	5479	166385	4955	4635	100496	3427	17337221	469256	46278615	7247
Obs.	1603	5017	5092	5043	4018	5056	4858	3044	5022	4982

Malaysia	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	0.975	2.046	2.138	1.938	1.735	1.943	2.045	1.726	1.896	2.501
Maximum	11.441	13.275	10.325	9.881	25.139	13.277	77.585	19.526	10.578	15.330
Minimum	0.002	0.538	0.692	0.605	0.001	0.492	0.007	0.048	0.737	0.004
Std. Dev.	0.803	0.883	0.792	0.767	1.233	0.818	2.410	1.169	0.783	1.221
Skewness	3.795	2.838	2.479	2.762	4.250	2.700	14.648	3.400	2.725	2.117
Kurtosis	29.805	18.404	15.169	17.320	47.073	19.803	401.262	27.316	17.029	12.402
Jarque-Bera	157813	55392	35483	48421	413353	64026	25907348	131007	46545	21853
Obs.	4880	4933	4932	4933	4924	4933	3899	4932	4932	4933

Thailand	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	1.543	1.620	1.610	1.215	1.262	1.255	1.720	1.261	1.595	1.730
Maximum	56.772	10.155	11.117	7.078	27.379	13.511	42.721	15.084	10.792	32.091
Minimum	0.089	0.186	0.130	0.307	0.060	0.129	0.101	0.012	0.416	0.083
Std. Dev.	1.746	1.000	0.966	0.643	1.249	0.761	1.642	1.232	1.071	1.539
Skewness	13.585	2.787	3.201	2.645	7.304	3.465	7.079	3.737	2.707	6.314
Kurtosis	341.078	14.625	19.826	14.364	106.198	29.321	118.919	23.326	14.026	86.861
Jarque-Bera	23447914	33948	66207	32097	2189839	151345	2778089	90073	30815	1468712
Obs.	4892	4902	4903	4903	4838	4903	4889	4609	4902	4901

Indonesia	Oil&Gas	Basic Mat.	Indus-trials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Techno-logy
Mean	1.718	2.427	2.342	2.154	2.058	2.205	1.693	1.350	2.546	2.994
Maximum	20.244	13.884	14.562	16.010	44.746	18.843	33.260	11.661	16.163	34.329
Minimum	0.033	0.000	0.040	0.115	0.009	0.060	0.030	0.002	0.036	0.003
Std. Dev.	1.603	1.335	1.476	1.255	2.035	1.494	1.661	1.680	1.644	2.929
Skewness	3.644	1.754	2.281	2.693	5.733	2.318	6.055	3.364	2.103	3.061
Kurtosis	24.586	8.264	11.017	16.350	89.004	12.531	82.162	16.709	9.436	18.095
Jarque-Bera	57138	8157	17334	42251	1457005	22864	530429	8900	12045	48078
Obs.	2642	4892	4890	4893	4645	4885	1985	916	4890	4349

Note: This table lists descriptive statistics of daily, equally weighted cross-sectional absolute deviations ($CSAD_t$) for 10 industries:[16] Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Financials, Telecommunications, Utilities, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. The stock return dispersion is defined as $CSAD_t = \frac{1}{N}\sum_{i=1}^{N}\left|R_{i,t} - R_{ind,t}\right|$. All stock and stock index returns are calculated as $R_t = 100 \times ((\log(P_t) - \log(P_{t-1}))$, where P_t denotes either individual stock price, industry index, or stock market index.

[16] Industries are defined according to Thomson Datastream: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Financials, Telecommunications, Utilities, and Technology.

4. Empirical evidence

In this section, we present the empirical results for industry herding from estimated models (3)', (4), and (5). To carry out this process, we first regress the stock return dispersion measure CSAD only on the absolute value of excess industry returns and the squared term of excess industry returns to test whether herding exists at the industry level for nine Asian markets. Second, domestic absolute market returns and market return squared variables are incorporated into the equation to test whether herding exists at both industry and market levels. From the testing results, we observe the relative strength of herding effects. Third, we add the U.S. CSAD and the U.S. market return squared variables to the model in order to test whether herding exists at the industry, domestic market and international market levels; the estimated results will help us observe the magnitude of the herding effects at different levels. It also allows us to investigate whether industry herding and domestic herding are affected by the U.S. market. All tests are conducted using the Newey–West consistent estimator (1987) to control for autocorrelation and heteroskedasticity.

4.1 Herding with industry

As stated earlier, when herding occurs, the linear relation between stock return dispersion (CSAD) and the absolute value of stock market (industry) returns no longer holds and individual stock returns cluster around market (industry) returns. Therefore, a negative and significant γ_2 (herding coefficient) shows evidence of herding activities. The estimates of Equation (3)' are reported in Table 2. The results generally support the hypothesis that investors herd along industry returns in most Asian stock markets. γ_2 (herding coefficient) is negative and statistically significant in 9 of 10 industries in China, Japan, Korea, Hong Kong, 8 of 9 industries in Taiwan[17] and Malaysia, and 7 of 10 industries in Indonesia. More specifically, herding activities are detected in all industries except Utilities in China and Japan, all industries except Telecommunications in Korea, all industries except Oil and Gas in Hong Kong, all industries except Oil and Gas and Telecommunications in Taiwan and Malaysia, and all industries except

[17] The Oil and Gas industry lacks data for the Taiwan stock market.

Healthcare, Telecommunications, and Utilities in Indonesia. The results for Singapore and Thailand are mixed. Only 6 of 10 industries (Basic Materials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, and Utilities) exhibit herding behavior in Singapore, and 3 of 10 industries (Consumer Goods, Telecommunications, and Technology) in Thailand. The results are also in line with the Lee, et al.'s (2013) study of the Chinese stock market, which found that within each market, herding activities are generally stronger (more significant and/or have a larger herding coefficient) for the Technology industry (China, Japan, Korea, and Hong Kong) and weaker (less significant and/or have a lower herding coefficient) for the Utilities industry. This finding combined with the results in Table 1, which show more volatility in trading Technology stocks and less volatility in trading Utilities stocks, seems to suggest that herding behavior is more likely to occur in more volatile industries.

Table 2. Estimates of herding with industries

China	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.6476***	1.0705***	1.1217***	1.0772***	1.0930***	1.0590***	0.5127***	1.1242***	1.0810***	1.2028***
	(29.59)	(79.19)	(86.95)	(81.32)	(78.24)	(79.35)	(23.52)	(63.59)	(79.49)	(62.86)
γ_1	0.5759***	0.8280***	0.8284***	0.8317***	0.8209***	0.8033***	0.5119***	0.3462***	0.8554***	0.8675***
	(13.11)	(37.48)	(39.29)	(38.42)	(35.95)	(36.82)	(14.37)	(11.98)	(38.48)	(27.74)
γ_2	-0.0772***	-0.0635***	-0.0769***	-0.0728***	-0.0695***	-0.0699***	-0.0527***	0.1201***	-0.0735***	-0.0831***
	(-5.41)	(-11.96)	(-15.18)	(-14.01)	(-12.66)	(-13.34)	(-6.16)	(17.31)	(-13.77)	(-11.06)
Adj. R^2	0.0595	0.2967	0.2959	0.2931	0.2699	0.2765	0.0500	0.2744	0.2959	0.1706

Japan	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	1.0574***	1.2393***	1.2929***	1.1767***	1.1727***	1.1650***	1.3496***	0.8527***	1.1882***	1.4859***
	(62.90)	(103.66)	(108.73)	(102.82)	(99.15)	(108.77)	(49.73)	(78.19)	(97.14)	(106.21)
γ_1	0.9707***	1.1221***	1.1286***	1.0569***	0.9826***	1.0073***	1.3878***	0.5250***	1.0511***	1.3002***
	(20.33)	(33.05)	(33.42)	(32.51)	(29.25)	(33.11)	(18.00)	(16.95)	(30.25)	(32.72)
γ_2	-0.0567***	-0.0802***	-0.0457***	-0.0582***	-0.0545***	-0.0624***	-0.1539***	0.0042	-0.0618***	-0.1204***
	(-3.37)	(-6.69)	(-3.83)	(-5.08)	(-4.60)	(-5.82)	(-5.66)	(0.38)	(-5.05)	(-8.59)
Adj. R^2	0.1373	0.2846	0.3180	0.2927	0.2506	0.2940	0.0904	0.1290	0.2606	0.2624

Korea	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	1.4474***	1.6381***	1.8200***	1.7646***	1.7143***	1.8174***	1.1248***	1.1603***	1.3891***	1.9996***
	(53.28)	(93.52)	(99.03)	(95.89)	(87.26)	(70.30)	(41.36)	(61.79)	(65.42)	(88.43)
γ_1	0.7173***	0.8971***	0.9142***	0.9002***	0.7962***	1.0165***	0.1662***	0.5624***	0.8702***	0.9575***
	(17.43)	(33.81)	(32.84)	(32.30)	(26.76)	(25.96)	(4.03)	(19.77)	(27.05)	(27.96)
γ_2	-0.0273***	-0.0591***	-0.0612***	-0.0534***	-0.0496***	-0.0641***	0.0359***	-0.0260***	-0.0495***	-0.0790***
	(-2.98)	(-9.99)	(-9.88)	(-8.60)	(-7.48)	(-7.35)	(3.91)	(-4.11)	(-6.91)	(-10.35)
Adj. R^2	0.1551	0.3509	0.3355	0.3435	0.2590	0.2463	0.0462	0.1803	0.2727	0.2409

Taiwan	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	.	1.1641***	1.2774***	1.1808***	1.1213***	1.1005***	0.5874***	0.8190***	1.0982***	1.3986***
		(85.91)	(91.62)	(95.34)	(60.09)	(79.48)	(30.64)	(43.94)	(77.59)	(90.49)
γ_1	.	0.7679***	0.8137***	0.7700***	0.7088***	0.6734***	0.2242***	0.4849***	0.8114***	0.7693***
		(24.53)	(25.27)	(26.92)	(16.44)	(21.05)	(4.71)	(11.26)	(24.82)	(21.55)
γ_2	.	-0.0968***	-0.0958***	-0.0918***	-0.0803***	-0.0693***	-0.0284	-0.0436**	-0.0971***	-0.0799***

		(-7.78)	(-7.49)	(-8.08)	(-4.69)	(-5.46)	(-1.38)	(-2.55)	(-7.47)	(-5.64)
Adj. R^2	.	0.2325	0.2515	0.2745	0.1269	0.2013	0.0197	0.0714	0.2428	0.2081

HongKong	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	1.9354***	1.8055***	1.6574***	1.5999***	2.0334***	1.6739***	1.5126***	1.5624***	1.5453***	2.0027***
	(40.74)	(86.54)	(98.75)	(106.91)	(66.77)	(98.94)	(38.32)	(58.71)	(97.62)	(87.26)
γ_1	1.1269***	1.2895***	1.2580***	1.0003***	1.1869***	1.1428***	1.2007***	1.2003***	1.1839***	1.3940***
	(10.85)	(28.27)	(34.28)	(30.57)	(17.83)	(30.89)	(13.91)	(20.63)	(34.21)	(27.78)
γ_2	-0.0152	-0.0637***	-0.0662***	-0.0362***	-0.0759***	-0.0528***	-0.0735***	-0.0327**	-0.0600***	-0.0967***
	(-0.54)	(-5.16)	(-6.67)	(-4.09)	(-4.21)	(-5.27)	(-3.15)	(-2.08)	(-6.41)	(-7.13)
Adj. R^2	0.0729	0.2965	0.3774	0.3504	0.1314	0.3398	0.0857	0.2068	0.3796	0.2615

Singapore	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.9252***	1.6553***	0.2345	1.7116***	1.4914***	1.5132***	0.8989***	2.4676***	1.0518***	2.2285***
	(16.42)	(56.35)	(0.23)	(75.73)	(34.00)	(74.78)	(24.81)	(23.83)	(52.27)	(69.11)
γ_1	0.3252**	0.6765***	0.2345	0.9110***	0.7729***	0.6968***	0.7051***	0.3820**	0.6488***	0.6748***
	(2.50)	(12.53)	(0.23)	(21.94)	(9.59)	(18.74)	(10.59)	(2.03)	(17.55)	(11.39)
γ_2	0.0713	-0.0495***	0.2345	-0.0355***	-0.0839***	-0.0159*	-0.0562***	-0.1204***	-0.0149	-0.0140
	(1.57)	(-3.64)	(0.23)	(-3.39)	(-4.13)	(-1.69)	(-3.35)	(-2.64)	(-1.60)	(-0.94)
Adj. R^2	0.0182	0.0614	0.2345	0.2058	0.0284	0.1751	0.0424	0.0014	0.1566	0.0734

Malaysia	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.7430***	1.4682***	1.5418***	1.3727***	1.2317***	1.4123***	1.4230***	1.1244***	1.3036***	1.9569***
	(46.85)	(91.40)	(104.59)	(99.85)	(52.17)	(91.26)	(31.18)	(53.20)	(94.25)	(79.11)
γ_1	0.2913***	0.8116***	0.8640***	0.8182***	0.7168***	0.7590***	0.1787**	0.9031***	0.8885***	0.7185***
	(11.73)	(32.26)	(37.42)	(38.00)	(19.38)	(31.31)	(2.50)	(27.28)	(41.01)	(18.54)
γ_2	-0.0052	-0.0183***	-0.0370***	-0.0290***	-0.0229***	-0.0290***	-0.0018	-0.0321***	-0.0431***	-0.0220***
	(-1.17)	(-4.08)	(-8.99)	(-7.55)	(-3.48)	(-6.71)	(-0.14)	(-5.43)	(-11.15)	(-3.18)
Adj. R^2	0.0651	0.3356	0.3577	0.3819	0.1425	0.2898	0.0030	0.2413	0.3875	0.1335

Thailand	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.9746***	1.0149***	0.9853***	0.7647***	0.8521***	0.8167***	1.1785***	0.8171***	0.9424***	1.0663***
	(26.41)	(51.01)	(53.18)	(60.49)	(31.63)	(53.60)	(33.05)	(30.68)	(45.71)	(33.03)
γ_1	1.7874***	1.9885***	2.0435***	1.5163***	1.2784***	1.3732***	1.8391***	1.3852***	2.1547***	2.2885***
	(11.55)	(23.82)	(26.29)	(28.59)	(11.31)	(21.48)	(12.30)	(12.41)	(24.91)	(16.90)

γ_2	0.0509 (0.55)	-0.0619 (-1.24)	-0.0186 (-0.40)	-0.1105*** (-3.49)	-0.0935 (-1.38)	0.0405 (1.06)	-0.2959*** (-3.31)	0.0114 (0.17)	-0.0210 (-0.41)	-0.2342*** (-2.89)
Adj. R^2	0.0964	0.2771	0.3325	0.3274	0.0704	0.2707	0.0635	0.1093	0.3086	0.1341

Indonesia	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.9511*** (31.18)	1.5659*** (64.20)	1.4860*** (55.43)	1.3098*** (59.61)	1.3422*** (33.97)	1.4161*** (50.78)	0.8038*** (27.28)	0.5038*** (13.60)	1.4454*** (52.57)	1.9276*** (32.94)
γ_1	-0.0544 (-0.87)	1.5817*** (31.30)	1.5366*** (27.67)	1.5895*** (34.92)	0.9529*** (11.64)	1.4133*** (24.46)	-0.1952*** (-3.26)	-0.1153 (-1.01)	2.0734*** (36.40)	1.2388*** (10.22)
γ_2	-0.0278* (-1.76)	-0.0948*** (-7.41)	-0.0609*** (-4.33)	-0.0998*** (-8.66)	0.0425** (2.05)	-0.0613*** (-4.19)	0.0079 (0.53)	0.0349 (0.63)	-0.1076*** (-7.46)	-0.0547* (-1.78)
Adj. R^2	0.0045	0.3143	0.2940	0.3583	0.1148	0.2405	0.0060	-0.0003	0.3970	0.0518

Notes: This table reports the regression results of the CSAD based on the following equation:

$$CSAD_{ind,t} = \alpha + \gamma_1 |R_{ind\_market,t}| + \gamma_2 R^2_{ind\_market,t} + \varepsilon_{ind,t} \quad (3')$$

where $R_{ind\_excess,t} = R_{ind,t} - E(R_{ind,t})$, and $E(R_{ind,t})$ is the expected industry return calculated by CAPM: $E(R_{ind,t}) = \alpha + \beta R_{m,t}$.[18]

The equation is estimated for each of the 10 industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. Taiwan's Oil & Gas industry was dropped, because it has too few firms. The numbers in parentheses are t-statistics. *,**,*** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

[18] α and β for each industry of each market are estimated by using the industry return, regressing them on market returns for the entire data set of 20 years.

4.2 Herding within industry and domestic market

Previous studies document that herding behavior generally exists in Asian stock markets (Chang, et al., 2000; Chiang and Zheng, 2010). Therefore, it is important to test whether industry herding is still significant after we extend the data sample and control for market return variables. To save space, we report the results in Appendix A. The results show that even when the stock market absolute return and return squared are included as control variables, the industry herding effect is still consistent with that in Table 2. The consistency in results indicates that market-level herding doesn't affect investors who herd based on industries. When we compare industry-level herding with market-level herding, it is evident that for most industries in most markets, the negative industry-level herding coefficients (γ_2) have greater absolute values than those of the negative market-level herding coefficients (γ_4). This suggests that investors trade more uniformly under the former condition. Therefore, we can conclude that industry-level herding is stronger than market-level herding in general. More specifically, industry herding is stronger than market herding for all 10 industries in Japan, Hong Kong, and Malaysia, for 9 of 10 industries in China and Korea, for 7 of 9 industries in Taiwan, for 6 of 10 industries in Singapore and Indonesia, and for 4 of 10 industries in Thailand. Within each market, the results are consistent with those in the previous table that shows herding activities are generally stronger for the Technology industry but weaker for the Utility industry. This is particularly true for the larger markets in Asia (China, Japan, Korea, and Hong Kong).

An interesting point worth noting is that when both industry return variables and market return variables are included in the test equation, the market-herding coefficient is also insignificant for some industries. For example, the market herding coefficients (γ_4) are either positive and/or not significant in most industries in Hong Kong, Singapore, Indonesia, and Thailand. In addition, the values of the market herding coefficients (γ_4) are also generally lower than those of the industry herding coefficients (γ_2). This might indicate that some of the market herding evidence reported by previous studies actually stems from investors' herding activities within an industry rather than within the overall stock market. This finding opens a new path for studies in herding behavior, since previous studies mostly focus only on herding at the market level. The industry-level herding could be associated with a bias of investors who tend to invest in certain industries they are familiar with. This tendency would allow the herding effect to be stronger within industries than with the aggregate market.

4.3 Herding within industry, domestic market, and international market

As markets become more internationally integrated, international influence on investors' herding behavior should be factored in (Longin and Solnik, 2001; Connolly and Wang, 2003). Since the U.S. market plays a dominating role in global financial markets, studies on herding (Chiang and Zheng, 2010; Gebka and Wohar, 2013) adopt U.S. market variables as proxies for global factors. The literature reports that investors do herd within the U.S. stock market, although the magnitude is lower as compared with domestic herding. To test the international influence, we follow Chiang and Zheng (2010) and include the U.S. market CSAD and market return squared terms in the model.

The estimated results of equation (5) are reported in Appendix B,[19] which includes all industry index return variables, domestic market stock return variables and the U.S. stock return variables. The results for industry-level herding are mostly consistent with previous tests in section 4.1 and 4.2. When we compare the U.S. market-herding coefficient (γ_5) with the industry-herding coefficients (γ_2) and domestic market-herding coefficients (γ_4), the results show that for Asian stock markets, herding activities are generally less pronounced with the U.S. market information than with industry indexes and domestic market information. Yet, the results for Japan and Korea are the exceptions. With herding coefficients in 7 (Japan) and 8 (Korea) of 10 industries, their herding activities are most significant among all markets when U.S. stock market information is included,[20] but the magnitudes are still much smaller as compared with industry-level herding. These findings suggest that among all major Asian markets, Japanese and Korean investors follow the U.S. stock market more closely than investors in other markets. It is also

[19] To save space, we report the results in Appendix B as suggested by a referee.
[20] The Utilities industry is insignificant for both Japan and Korea.

possible that the financial information from the U.S. market is more widely available in these two markets since they have closer economic and political ties with the U.S.[21]

5. Industry herding under different market conditions

In this section, we examine whether industry herding exhibits different behaviors under different market conditions. We start by dividing the whole sample into two subsamples based on industry index returns: positive and negative industry index returns. We then divide the whole sample into three subsamples using market trading volumes: highest quantile trading volume turnover, lowest quantile trading volume turnover, and normal trading volume turnover. Finally, we divide the whole sample into two subsamples according to regime changes: crisis periods and tranquil periods. Then equation (5) is applied to estimate the herding coefficients in different subsamples. In part 4 of this section, we also investigate the cross-industry herding effect by adding additional (influential) industry's return variables as independent variables. All tests use the Newey–West consistent estimator (1987).

5.1 Up and down markets

The existing literature documents that the herding effect is asymmetric based on stock market returns. Tan, et al. (2008) and Lee, et al. (2013) report that herding is stronger during rising markets. Chiang and Zheng (2010) find that herding asymmetry is more apparent in five Asian markets. Therefore, in this part, we divide the whole sample into two subsamples based on positive and negative excess industry index returns and examine whether industry herding is also different in up and down market conditions. Following Chiang and Zheng (2010), we re-write equation (5) as:

$$CSAD_{ind,t} = \alpha + \gamma_1(1-D)\left|R_{ind\_market,t}\right| + \gamma_2 D\left|R_{ind\_market,t}\right| + \gamma_3(1-D)R^2_{ind\_market,t} + \gamma_4 DR^2_{ind\_market,t} + \gamma_5\left|R_{m,t}\right| + \gamma_6 R^2_{m,t} + \gamma_7 R^2_{US,t-1} + \gamma_8 CSAD_{US,t-1} + \varepsilon_t \quad (6)$$

[21] We also test the influence of the same industry return from the U.S. and the world market on industry herding in domestic market with the modified equation below:

$$CSAD_{ind,t} = \alpha + \gamma_1\left|R_{ind\_maket,t}\right| + \gamma_2 R^2_{ind\_market,,t} + \gamma_3\left|R_{m,t}\right| + \gamma_4 R^2_{m,t} + \gamma_5\left|R_{US,int,t-1}\right| + \gamma_6 R^2_{US,int,t-1} + \varepsilon_{ind,t} \quad (5)'$$

where $R_{US,int,t-1}$ is the lagged corresponding industry return in the U.S. market (or $R_{World,int,t}$ for the world market). The effects, however, are not as significant as using the U.S. market return square as an independent variable. To save space, the results are not reported, but are available upon request.

where D is a dummy variable that equals one when $R_{ind\_market,t} < 0$, and 0 otherwise. The other variables are defined in the same way as in previous equations. Table 3 reports the results of equation (6), where γ_3 is the industry-herding coefficient during an up market and γ_4 is the industry-herding coefficient during a down market. To save space, we shall only report the industry herding coefficients in Table 3.[22]

The results show that in the Chinese stock market, herding is dominant during up markets. This is the case for 7 of 10 industries that exhibit stronger herding during up markets (absolute values of γ_3 are higher than those of γ_4). But industry herding is more pronounced during down markets (absolute values of γ_4 are higher than those of γ_3) for 8 of 10 industries in Japan and Korea and 6 of 9 markets in Taiwan. The results are mixed for other markets, as the herding coefficient values are generally clustered together. One possible explanation for the difference is that the financial markets in Japan, Korea, and Taiwan are better developed in Asia, while other markets such as China impose restraint on short sales, minimizing the effect of downside-herding effect. Our results are in line with those of Tan, et al. (2008), Lee, et al. (2013) and Chiang and Zheng (2010), who study herding in overall markets.

5.2 High and low trading volume turnover

Trading volume has been considered one of the important determinants in explaining stock returns (Chordia and Swaminathan, 2000; Amihud, 2002; Lee and Rui, 2002). However, the impact of trading volume on investors' herding behavior is inconclusive in the literature. For example, Chiang and Zheng (2010) state that they can find no significant evidence to support the notion that excess trading volume plays an important role in determining the movements of the cross-sectional stock return dispersions. On the other hand, Tan, et al. (2008) find evidence of herding for A-share and B-share stocks in both Shanghai and Shenzhen markets in high trading volume. Yao, et al. (2014) find that herding exists on both high and low trading volume days in Shanghai's B-market but only on high trading volume days in Shanghai's A-market.

[22] The market herding coefficients and U.S. herding coefficients have patterns similar to those of the industry herding coefficients. The results are available upon request.

To examine whether industry herding is affected by extreme trading volumes, we divide the whole sample into three subsamples according to market trading volume value:[23] the high trading volume market (top 25% trading volume value), the low trading volume market (bottom 25% trading volume value), and the normal trading volume market (trading volume value in the middle 50%). We then apply equation (5) to each subsample and estimate the herding coefficients. To save space, we report only the industry herding coefficients in Table 4.[24]

The results show that industry herding becomes less significant when trading volume is high, and it is more significant for most industries when trading volume is low. As shown in Panel A, when the market is in a high trading volume state, only 6 of 10 industries in China and 8 of 10 in Japan exhibit herding activities (many are marginally significant) while other markets have fewer than five industries with herding.

Panel B further shows that when the market is in a low trading volume state, all markets have more than five industries which exhibit herding activities. The absolute values of the herding coefficients are much larger during low trading volume periods. The results indicate that investors are more likely to trade uniformly when markets are relatively inactive. It is possible that in low trading volume days, not much information is disclosed publicly and private information tends to dominate, causing more herding to occur due to information asymmetry.

[23] All trading volume data are logged and smoothed by using the one-year market trading volume moving average.
[24] The market herding coefficients and U.S. herding coefficients have patterns similar to those of the industry herding coefficients. The results are available upon request.

Table 3. Estimates of industry herding based on up and down industry index returns

Market	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Technology
CN_ γ_3	-0.079***	-0.088***	-0.095***	-0.105***	-0.094***	-0.110***	-0.051***	-0.097***	-0.113***	-0.127***
	(-4.75)	(-8.63)	(-9.81)	(-10.66)	(-9.06)	(-11.03)	(-2.79)	(-9.56)	(-10.90)	(-11.29)
CN_γ_4	-0.075**	-0.098***	-0.104***	-0.081***	-0.093***	-0.084***	-0.082**	-0.070***	-0.080***	-0.102***
	(-2.43)	(-5.25)	(-5.83)	(-4.53)	(-4.93)	(-4.62)	(-2.44)	(-3.78)	(-4.25)	(-4.95)
JP_ γ_3	-0.034*	-0.067***	-0.032***	-0.054***	-0.042***	-0.040***	-0.106***	-0.003	-0.067***	-0.081***
	(-1.81)	(-5.41)	(-2.77)	(-4.76)	(-3.49)	(-3.73)	(-3.42)	(-0.25)	(-5.63)	(-5.57)
JP_γ_4	-0.026	-0.129***	-0.099***	-0.066**	-0.153***	-0.101***	-0.221***	0.002	-0.070**	-0.206***
	(-0.60)	(-4.46)	(-3.56)	(-2.49)	(-5.45)	(-3.99)	(-3.03)	(0.06)	(-2.54)	(-6.08)
KO_ γ_3	-0.023**	-0.036***	-0.043***	-0.035***	-0.031***	-0.053***	0.037***	-0.008	-0.035***	-0.067***
	(-2.11)	(-5.58)	(-6.37)	(-5.11)	(-4.13)	(-5.35)	(3.45)	(-1.05)	(-4.62)	(-7.80)
KO_γ_4	-0.007	-0.065***	-0.064***	-0.061***	-0.064***	-0.057***	0.024*	-0.050***	-0.048***	-0.075***
	(-0.50)	(-7.79)	(-7.31)	(-6.86)	(-6.44)	(-4.48)	(1.74)	(-5.20)	(-4.85)	(-6.70)
TW_ γ_3		-0.056***	-0.057***	-0.052***	-0.047**	-0.015	-0.034	-0.012	-0.070***	-0.045**
	-	(-3.41)	(-3.44)	(-3.49)	(-2.04)	(-0.90)	(-1.35)	(-0.51)	(-4.13)	(-2.35)
TW_γ_4		-0.070***	-0.059***	-0.065***	-0.053***	-0.058***	-0.012	-0.016	-0.048***	-0.049***
	-	(-4.71)	(-3.97)	(-4.87)	(-2.59)	(-3.85)	(-0.41)	(-0.73)	(-3.20)	(-2.88)
HK_ γ_3	0.0060	-0.003	-0.016	0.006	-0.007	0.004	-0.013	0.0092	-0.010	-0.042***
	(0.19)	(-0.26)	(-1.59)	(0.65)	(-0.32)	(0.35)	(-0.48)	(0.52)	(-1.09)	(-2.87)
HK_ γ_4	0.142**	-0.016	0.011	0.022	-0.113***	-0.011	-0.108**	0.058*	-0.017	0.005
	(2.44)	(-0.67)	(0.60)	(1.29)	(-3.03)	(-0.58)	(-2.20)	(1.78)	(-0.99)	(0.18)
SG_ γ_3	0.056	-0.041**	-0.032**	-0.029*	-0.084***	-0.003	0.033	-0.088	-0.004	-0.044**
	(0.94)	(-1.97)	(-2.40)	(-1.95)	(-2.68)	(-0.18)	(1.30)	(-1.31)	(-0.33)	(-2.00)
SG_ γ_4	0.102*	-0.029*	-0.021**	-0.006	-0.057**	0.007	-0.050**	-0.110**	0.018	0.033*
	(1.77)	(-1.81)	(-1.99)	(-0.47)	(-2.37)	(0.64)	(-2.52)	(-2.03)	(1.64)	(1.94)
TH_ γ_3	0.416***	-0.061	0.135**	-0.194***	-0.115	0.037	-0.456***	0.072	-0.031	-0.209*
	(3.19)	(-0.87)	(2.12)	(-4.34)	(-1.14)	(0.67)	(-3.60)	(0.75)	(-0.47)	(-1.75)
TH_γ_4	0.060	0.077	0.019	-0.049	0.032	0.101**	-0.108	0.081	0.163***	-0.145
	(0.55)	(1.32)	(0.35)	(-1.30)	(0.38)	(2.22)	(-1.02)	(1.00)	(3.00)	(-1.45)
MY_ γ_3	-0.020***	-0.021***	-0.042***	-0.036***	-0.038***	-0.039***	-0.024	-0.032***	-0.047***	-0.038***
	(-3.07)	(-3.27)	(-7.02)	(-6.55)	(-3.95)	(-6.24)	(-1.20)	(-3.61)	(-8.87)	(-3.62)
MY_γ_4	-0.003	-0.018***	-0.041***	-0.026***	-0.031***	-0.027***	-0.021	-0.028***	-0.044***	-0.030***
	(-0.58)	(-3.39)	(-8.61)	(-5.98)	(-4.04)	(-5.49)	(-1.30)	(-4.01)	(-10.51)	(-3.51)

ID_γ_3	-0.011	-0.080***	-0.076***	-0.076***	0.009	-0.060**	0.047*	0.075	-0.134***	-0.092
	(-0.39)	(-3.57)	(-3.13)	(-3.94)	(0.23)	(-2.24)	(1.71)	(1.24)	(-5.35)	(-1.64)
ID_γ_4	-0.016	-0.065***	-0.020	-0.066***	0.068***	-0.038**	0.004	-0.113	-0.041***	-0.041
	(-0.89)	(-4.71)	(-1.34)	(-5.53)	(2.84)	(-2.33)	(0.23)	(-0.76)	(-2.67)	(-1.18)

Note: This table reports the regression results of the CSAD based on the following equation:

$$CSAD_{ind,t} = \alpha + \gamma_1(1-D)\left|R_{ind\_market,t}\right| + \gamma_2 D\left|R_{ind\_market,t}\right| + \gamma_3(1-D)R^2_{ind\_market,t} + \gamma_4 D R^2_{ind\_market,t} + \gamma_5\left|R_{m,t}\right| + \gamma_6 R^2_{m,t} + \gamma_7 R^2_{US,t-1} + \gamma_8 CSAD_{US,t-1} + \varepsilon_{ind,t} \quad (6)$$

where $R_{ind\_market,t} = R_{ind,t} - E(R_{ind,t})$, and $E(R_{ind,t})$ is the expected industry return calculated by CAPM: $E(R_{ind,t}) = \alpha + \beta R_{m,t}$.[25] $R^2_{US,t-1}$ is the lagged U.S. stock market return squared and $CSAD_{US,t-1}$ is the lagged stock return dispersion in the U.S. market[26]. D is a dummy variable that equals one when $R_{in\_market,t} < 0$, and 0 otherwise. To save space, only the industry herding coefficients γ_3 and γ_4 are reported.

The equation is estimated for each of the 10 industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. Taiwan's Oil & Gas industry was dropped because it has too few firms. The numbers in parentheses are t-statistics. *,**,*** denote statistical significance at the 10%, 5%, and 1% levels, respectively.

[25] α and β for each industry of each market are estimated by using the industry return, regressing them on market returns for the entire data set of 20 years.

[26] Because of the time lag, we use lagged U.S. stock market variables.

Table 4. Estimates of industry herding based on high and low trading volume

Panel A. High trading volume market

Market	Oil&Gas	Basic Mat	Industrials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Technology
CN_γ_2	-0.022	-0.009	-0.025*	-0.032**	-0.024	-0.045***	0.011	-0.032**	-0.058***	-0.067***
	(-0.85)	(-0.56)	(-1.65)	(-2.04)	(-1.49)	(-2.83)	(0.38)	(-1.99)	(-3.57)	(-3.58)
JP_γ_2	-0.025	-0.060***	-0.027**	-0.044***	-0.036***	-0.022*	-0.063*	0.016	-0.034**	-0.050***
	(-1.04)	(-4.21)	(-1.99)	(-3.41)	(-2.66)	(-1.85)	(-1.66)	(1.17)	(-2.47)	(-3.07)
KO_γ_2	-0.006	-0.016*	-0.017**	-0.009	-0.008	-0.031**	0.063***	0.010	-0.011	-0.044***
	(-0.38)	(-1.95)	(-1.97)	(-0.99)	(-0.89)	(-2.38)	(3.99)	(0.94)	(-0.85)	(-4.04)
TW_γ_2		0.041**	0.069***	0.054***	0.082***	0.044**	0.071*	0.066**	0.050**	0.081***
	-	(2.20)	(3.74)	(3.47)	(2.77)	(2.17)	(1.72)	(2.49)	(2.56)	(3.69)
HK_γ_2	0.033	0.002	-0.031**	-0.010	0.014	-0.019	-0.054	0.002	-0.015	-0.086***
	(0.61)	(0.13)	(-2.32)	(-0.83)	(0.54)	(-1.23)	(-1.24)	(0.07)	(-1.13)	(-4.12)
SG_γ_2	0.037	0.021	0.032**	0.041**	0.006	0.031**	-0.012	-0.012	0.028**	0.126***
	(0.60)	(0.89)	(2.10)	(2.37)	(0.17)	(1.97)	(-0.32)	(-0.17)	(2.49)	(5.44)
TH_γ_2	0.343***	0.192**	0.119	0.074	-0.001	0.264***	-0.052	0.279**	0.153*	-0.001
	(2.81)	(2.29)	(1.47)	(1.52)	(-0.01)	(4.02)	(-0.32)	(2.35)	(1.79)	(-0.01)
MY_γ_2	0.007	0.017**	-0.003	0.006	-0.007	-0.002	0.009	-0.001	-0.023***	0.006
	(1.09)	(2.56)	(-0.56)	(1.15)	(-0.71)	(-0.40)	(0.61)	(-0.11)	(-4.22)	(0.59)
ID_γ_2	-0.023	0.014	0.002	-0.033*	0.067**	-0.049**	-0.002	0.027	-0.024	-0.114*
	(-0.94)	(0.71)	(0.07)	(-1.89)	(2.13)	(-2.01)	(-0.09)	(1.09)	(-1.01)	(-1.95)

Panel B. Low trading volume market

Market	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Technology
CN_γ_2	0.116***	-0.241***	-0.248***	-0.253***	-0.248***	-0.233***	0.098**	-0.228***	-0.173***	-0.254***
	(2.60)	(-9.35)	(-9.90)	(-10.06)	(-9.54)	(-9.14)	(2.07)	(-9.05)	(-6.81)	(-8.95)
JP_γ_2	-1.336***	-1.183***	-1.244***	-1.101***	-0.945***	-1.029***	-1.276***	-0.790***	-1.128***	-1.278***
	(-7.60)	(-8.64)	(-9.30)	(-8.60)	(-7.11)	(-8.25)	(-3.87)	(-6.10)	(-8.88)	(-7.82)
KO_γ_2	-0.014	-0.057***	-0.068***	-0.057***	-0.072***	-0.030	-0.025	-0.058***	-0.058***	-0.059***
	(-0.70)	(-3.84)	(-4.22)	(-3.43)	(-3.80)	(-1.54)	(-1.05)	(-3.77)	(-4.07)	(-2.98)
TW_γ_2		-0.177***	-0.227***	-0.191***	-0.251***	-0.124***	-0.168***	-0.073**	-0.166***	-0.239***
	-	(-6.14)	(-7.60)	(-7.08)	(-6.52)	(-4.26)	(-2.63)	(-1.98)	(-6.17)	(-7.11)
HK_γ_2	-0.378**	-0.360***	-0.245***	-0.273***	-0.447***	-0.257***	-0.076	-0.093	-0.214***	-0.296***
	(-2.07)	(-4.12)	(-3.74)	(-4.59)	(-3.80)	(-3.98)	(-0.65)	(-0.98)	(-3.70)	(-3.50)

*SG*_ γ_2	-0.069	-0.170***	-0.131***	-0.089**	-0.208**	-0.073*	-0.126*	-0.537***	0.017	-0.260***
	(-0.30)	(-3.42)	(-3.36)	(-1.97)	(-2.46)	(-1.84)	(-1.95)	(-2.68)	(0.34)	(-4.42)
*TH*_ γ_2	-0.956**	0.084	-0.594**	-0.599***	-0.652*	-0.575**	-2.609***	0.061	-0.233	-0.074
	(-2.35)	(0.28)	(-2.31)	(-3.25)	(-1.65)	(-2.56)	(-4.08)	(0.17)	(-1.02)	(-0.17)
*MY*_ γ_2	-0.095***	-0.013	-0.072***	-0.065***	-0.038	-0.060**	-0.324***	-0.007	-0.033	-0.096**
	(-3.46)	(-0.50)	(-2.94)	(-2.85)	(-1.05)	(-2.18)	(-3.56)	(-0.19)	(-1.60)	(-2.41)
*ID*_ γ_2	-0.291***	-0.290***	-0.216***	-0.107**	-0.212*	-0.116*	-0.143*	-0.724**	-0.304***	-0.351***
	(-4.02)	(-4.86)	(-3.32)	(-2.22)	(-1.80)	(-1.79)	(-1.71)	(-2.02)	(-4.61)	(-3.11)

Note: This table reports the regression results of the CSAD based on the following equation:

$$CSAD_{ind,t} = \alpha + \gamma_1|R_{ind\_market,t}| + \gamma_2 R^2_{ind\_market,t} + \gamma_3|R_{m,t}| + \gamma_4 R^2_{m,t} + \gamma_5 R^2_{US,t-1} + \gamma_6 CSAD_{US,t-1} + \varepsilon_{ind,t} \quad (5)$$

where $R_{ind\_market,t} = R_{ind,t} - E(R_{ind,t})$, and $E(R_{ind,t})$ is the expected industry return calculated by CAPM: $E(R_{ind,t}) = \alpha + \beta R_{m,t}$.[27] $R^2_{US,t-1}$ is the lagged U.S. stock market return squared, and $CSAD_{US,t-1}$ is the lagged stock return dispersion in the U.S. market.[28] Panel A reports the estimates of the high trading volume (top 25% trading volume value) market subsample, and Panel B reports the estimates of the low trading volume (bottom 25% trading volume value) market subsample. To save space, only the industry herding coefficients γ_2 and γ_4 are reported.

The equation is estimated for each of the 10 industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. Taiwan's Oil & Gas industry was dropped because it has too few firms. The numbers in parentheses are t-statistics. *,**,*** denote statistical significance at the 10%,5%, and 1% levels, respectively.

[27] α and β for each industry of each market are estimated by using the industry return, regressing them on market returns for the entire data set of 20 years.

[28] Because of the time lag, we use lagged U.S. stock market variables.

5.3 Crisis and tranquil periods

The original approach for detecting herding introduced by Christie and Huang (1995) suggests that herding is more inclined to occur when the market is under stress. However, later studies report mixed results on the herding effect during crisis periods. For example, Balcilar, et al. (2013) confirm herding behavior under crash market conditions for the Gulf Arab stock markets, while Yao, et al. (2014) suggest that Chinese stock market does not exhibit herding behavior during crisis periods. Chiang and Zheng (2010) find that investors display herding behavior differently across international stock markets under crisis.

In our study, we follow Chiang and Zheng (2010) in defining three crisis periods that are related to the Asian stock markets: the Asian crisis (7/1997 through 12/1998), the dot-com crisis (3/2000 through 3/2001) and the subprime crisis period (7/2007 through 6/2009). We divide the whole sample into two subsamples so that the crisis subsample includes all data points of the three crisis periods and the tranquil subsample includes the remaining data points. Equation (5) is then applied to each subsample to estimate the herding coefficients. To save space, only the industry herding coefficients are reported in Table 5.[29]

The results are somewhat mixed among the Asian stock markets. With the exceptions of Japan, Korea and Taiwan, more industries exhibit herding during the tranquil period compared with the crisis period. The herding coefficients also appear to be larger in most cases during the tranquil period. However, for Japan, Korea and Taiwan, the herding coefficients are larger during the crisis period. This finding seems to indicate these three markets tend to herd more when market sentiment is pessimistic. It is also possible that because these three markets are more integrated with the world stock markets, they were negatively affected by the crises.

[29] The market herding coefficients and U.S. herding coefficients have patterns similar to those of the industry herding coefficients. The results are available upon request.

Table 5. Estimates of industry herding based on crisis and tranquil periods

Panel A. Crisis periods

Market	Oil&Gas	Basic Mat	Industrials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Technology
*CN*_ γ_2	0.091**	-0.084***	-0.073***	-0.081***	-0.073***	-0.076***	0.058	-0.072***	-0.042**	-0.074***
	(2.56)	(-4.58)	(-4.21)	(-4.56)	(-4.01)	(-4.32)	(1.58)	(-3.74)	(-2.23)	(-3.66)
*JP*_ γ_2	-0.037	-0.069*	-0.064*	-0.039	-0.081**	-0.056	-0.328***	-0.074**	-0.081*	-0.212***
	(-0.57)	(-1.68)	(-1.65)	(-1.02)	(-2.11)	(-1.63)	(-3.18)	(-2.03)	(-1.91)	(-4.82)
*KO*_ γ_2	-0.044**	-0.063***	-0.067***	-0.063***	-0.074***	-0.085***	0.013	-0.016	-0.059***	-0.076***
	(-2.25)	(-6.00)	(-6.18)	(-5.58)	(-6.34)	(-4.88)	(0.81)	(-1.61)	(-4.90)	(-6.03)
*TW*_ γ_2		-0.070***	-0.077***	-0.081***	-0.098***	-0.057**	0.019	0.013	-0.070***	-0.036
	-	(-3.33)	(-3.41)	(-4.13)	(-3.01)	(-2.56)	(0.55)	(0.35)	(-3.24)	(-1.36)
*HK*_ γ_2	-0.005	-0.032	-0.042***	-0.025*	-0.015	-0.032**	-0.021	-0.021	-0.019	-0.070***
	(-0.12)	(-1.62)	(-2.62)	(-1.71)	(-0.48)	(-2.09)	(-0.46)	(-0.83)	(-1.36)	(-3.12)
*SG*_ γ_2	-0.098	0.001	0.035**	0.029	-0.009	0.025	-0.050	-0.066	-0.005	0.097***
	(-1.53)	(0.04)	(2.05)	(1.44)	(-0.26)	(1.43)	(-1.61)	(-0.70)	(-0.41)	(3.27)
*TH*_ γ_2	0.204	-0.039	-0.151	-0.145**	-0.193	0.150**	-0.228	0.256*	-0.101	-0.256
	(1.07)	(-0.38)	(-1.53)	(-2.23)	(-1.46)	(1.99)	(-1.31)	(1.77)	(-0.97)	(-1.53)
*MY*_ γ_2	-0.010	0.002	-0.015*	-0.005	0.007	-0.002	-0.027	-0.001	-0.026***	0.005
	(-1.17)	(0.21)	(-1.79)	(-0.63)	(0.61)	(-0.21)	(-0.79)	(-0.12)	(-3.76)	(0.36)
*ID*_ γ_2	0.016	-0.004	-0.042*	-0.063***	0.132***	-0.034	0.019		-0.081***	0.091**
	(0.65)	(-0.19)	(-1.69)	(-3.28)	(3.98)	(-1.26)	(0.84)		(-3.23)	(2.13)

Panel B. Tranquil periods

Market	Oil&Gas	Basic Mat	Industrials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Technology
*CN*_ γ_2	-0.102***	-0.085***	-0.101***	-0.104***	-0.098***	-0.113***	-0.063***	-0.090***	-0.120***	-0.134***
	(-6.26)	(-8.22)	(-10.18)	(-10.27)	(-9.14)	(-10.93)	(-3.54)	(-8.83)	(-11.36)	(-11.51)
*JP*_ γ_2	-0.023	-0.035**	-0.012	-0.020	-0.010	-0.037***	-0.046	0.025	-0.029**	-0.042**
	(-1.00)	(-2.38)	(-0.85)	(-1.49)	(-0.63)	(-2.69)	(-1.19)	(1.61)	(-2.14)	(-2.23)
*KO*_ γ_2	0.003	-0.034***	-0.037***	-0.030***	-0.024***	-0.030***	0.058***	-0.022**	-0.023***	-0.059***
	(0.29)	(-5.26)	(-5.45)	(-4.33)	(-2.99)	(-3.24)	(4.91)	(-2.55)	(-2.95)	(-6.38)
*TW*_ γ_2		-0.058***	-0.047***	-0.047***	-0.024	-0.035**	-0.025	-0.030	-0.051***	-0.055***
	-	(-3.87)	(-3.20)	(-3.57)	(-1.19)	(-2.33)	(-0.86)	(-1.60)	(-3.34)	(-3.33)
*HK*_ γ_2	0.012	-0.035**	-0.030**	0.005	-0.057**	-0.006	-0.051*	0.020	-0.044***	-0.044**
	(0.27)	(-2.18)	(-2.46)	(0.46)	(-2.29)	(-0.44)	(-1.65)	(0.91)	(-3.76)	(-2.52)

SG_γ_2	-0.055	-0.049***	-0.042***	-0.024**	-0.091***	0.006	-0.025	-0.126**	0.028**	-0.031*
	(-0.57)	(-2.98)	(-4.05)	(-2.13)	(-3.56)	(0.55)	(-1.23)	(-2.46)	(2.39)	(-1.85)
TH_γ_2	0.185*	0.084	0.257***	-0.047	0.056	-0.008	-0.267**	-0.202***	0.189***	-0.118
	(1.76)	(1.57)	(5.47)	(-1.30)	(0.65)	(-0.18)	(-2.46)	(-2.77)	(4.27)	(-1.17)
MY_γ_2	-0.008	-0.022***	-0.049***	-0.042***	-0.059***	-0.040***	-0.004	-0.050***	-0.045***	-0.052***
	(-1.27)	(-4.05)	(-9.69)	(-8.97)	(-6.46)	(-7.13)	(-0.29)	(-6.03)	(-9.54)	(-5.44)
ID_γ_2	-0.034	-0.102***	0.004	-0.073***	0.009	-0.047**	0.021	0.102	-0.016	-0.149***
	(-1.50)	(-6.10)	(0.25)	(-5.25)	(0.31)	(-2.45)	(0.95)	(0.87)	(-0.89)	(-3.27)

Note: This table reports the regression results of the CSAD based on the following equation:

$$CSAD_{ind,t} = \alpha + \gamma_1 |R_{ind\_market,t}| + \gamma_2 R^2_{ind\_market,t} + \gamma_3 |R_{m,t}| + \gamma_4 R^2_{m,t} + \gamma_5 R^2_{US,t-1} + \gamma_6 CSAD_{US,t-1} + \varepsilon_{ind,t} \quad (5)$$

where $R_{ind\_excess,t} = R_{ind,t} - E(R_{ind,t})$, and $E(R_{ind,t})$ is the expected industry return calculated by CAPM: $E(R_{ind,t}) = \alpha + \beta R_{m,t}$.[30] $R^2_{US,t-1}$ is the lagged U.S. stock market return squared, and $CSAD_{US,t-1}$ is the lagged stock return dispersion in the U.S. market.[31] Panel A reports the estimates of the subsample of three crisis periods: the Asian crisis (7/1997 through 12/1998), the dot-com crisis (3/2000 through 3/2001) and the subprime crisis period (7/2007 to 6/2009), and Panel B reports the tranquil period subsample. To save space, only the industry herding coefficients γ_2 are reported.
The equation is estimated for each of the 10 industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. Taiwan's Oil & Gas industry was dropped because it has too few firms. The numbers in parentheses are t-statistics. *,**,*** denote statistical significance at the 10%,5%, and 1% levels, respectively.

[30] α and β for each industry of each market are estimated by using the industry return, regressing them on market returns for the entire data set of 20 years.
[31] Because of the time lag, we use lagged U.S. stock market variables.

5.4 Herding across industries

The previous results suggest that investors herd not only at the market level, but also at the industry level. The findings of a few recent studies raise the question of whether investors might herd across industries. For example, Lee, et al. (2013) report that the IT industry has a dominant impact on return dispersions in Chinese A-share markets. Hence, the high-tech sector's impact cannot be ruled out in analyzing non-high-tech industries' herding activity. Generalizing this point, it can be hypothesized that herding behavior in one industry could be attributable to cross-industry market conditions.

It follows that empirical estimations can be extended to a more comprehensive study of the cross-industry effects on industry herding. To incorporate this thought process, we rewrite Equation (5) as follows:

$$CSAD_{ind_i,t} = \alpha + \gamma_1 \left|R_{ind_i\_market,t}\right| + \gamma_2 R^2_{ind_i\_market,t} + \gamma_3 \left|R_{m,t}\right| + \gamma_4 R^2_{m,t} + \gamma_5 R^2_{US,t-1} + \gamma_6 CSAD_{US,t-1} + \gamma_7 \left|R_{ind_j\_market,t}\right| + \gamma_8 R^2_{ind_j\_market,t} + \varepsilon_{ind_i,t} \quad (7)$$

where $R_{ind_i\_market,t} = R_{ind_i,t} - R_{m,t}$, and $R_{ind_j\_market,t} = R_{ind_j,t} - R_{m,t}$ $(i \neq j)$ are the difference between industry *i* (the focal industry) or industry *j* (the influential industry) returns and market returns at time *t*. All other variables are the same as defined in Equation (5). We investigate all 10 industries as the influential industry *j*,[32] and we add the return variables of the influential industry into the equation one at a time. A negative and significant herding coefficient γ_8 indicates that investors not only herd with the focal industry but also with the influential industries.

For most markets, cross-industry herding is more prominent (most herding coefficients γ_8 are negative and significant) from Telecom and Financial industries and less (most herding coefficients γ_8 are not significant) from Industrials and Consumer Services industries. To save space, we shall only report the industry herding coefficients γ_2 and γ_8 from the regression results, with the Telecom industry as the influential industry in Table 6. The regression results show that the cross-industry effect from the

[32] The 10 industries are defined by Datastream: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology.

Telecom industry is for the most part significant for all countries except for Singapore. The results for the other industries are available upon request. These results, which found the Telecom industry has an impact on herding activities in other industries, are in line with Lee, et al. (2013). However, we provide more comprehensive evidence of cross-industry herding for all 10 industries. The inconsistencies among the 10 industries are worth further investigation. For example, the results from the Financial industry might corroborate the observed widespread contagion effect from financial stocks during the sub-prime mortgage crisis from 2007 through 2009.

6. Industry characteristics and herding

As results from previous tables show, different industries exhibit a different magnitude of herding. Some industries such as Technology tend to show stronger herding, while others such as Utilities tend to show weaker herding. These findings raise the next question is: what factors cause different herding behavior in different industries? Are there any industry characteristics that play a role?

6.1 Industry fundamentals and herding

Extensive research has documented that the fundamentals explain stock returns. Fama and French (1993) propose a three-factor model and point out that the U.S. cross-sectional stock returns are associated with size and book-to-market equity factors. Later, Carhart (1997) adds momentum as another common factor in explaining stock return. In a more recent paper, Fama and French (2012) test the three factors (size, book- to-market, and momentum) in four regions (North America, Europe, Japan, and Asia Pacific). Evidence from their study suggests that the three factors capture stock return premiums in all those international markets. Besides the three factors, other fundamental variables have also been studied in the literature. For example, Chan, Hamao, and Lakonishok (1991) find that earnings yield and cash flow yield have significant impact on expected returns. To investigate why different industries exhibit different herding behavior, we collect three fundamental variables (market value, P/E, and dividend yield) for each of the 10 industries across all nine Asian stock markets. Table 7 shows the summary statistics.[33]

[33] Taiwan's Healthcare and Utilities industries do not have data for these fundamental variables.

Panel A reports the daily average logged market value for each industry in every market during the whole sample period; Panel B reports the daily average P/E ratio for each industry; Panel C reports the daily average dividend yield for each industry.

Table 6. Estimates of cross-industry herding from Telecom industry

Market	Oil&Gas	Basic Mat	Industrials	Consumer Goods	Health care	Consumer Services	Utilities	Financial	Technology
CN_γ_2	-0.0587***	-0.0828***	-0.0905***	-0.0952***	-0.0881***	-0.0995***	-0.0817***	-0.0996***	-0.1127***
	(-3.87)	(-9.06)	(-0.41)	(-10.78)	(-9.53)	(-11.15)	(-8.98)	(-10.73)	(-11.28)
CN_γ_8	-0.0090**	-0.0091***	-0.0059***	-0.0073***	-0.0086***	-0.0057***	-0.0060***	-0.0063***	-0.0085***
	(-3.52)	(-5.92)	(-4.04)	(-4.92)	(-5.55)	(-3.82)	(-3.90)	(-4.03)	(-5.08)
JP_γ_2	-0.0137**	-0.0490***	-0.0180	-0.0322***	-0.0332***	-0.0272***	0.0080	-0.0489***	-0.0716***
	(-0.75)	(-4.19)	(-1.60)	(-3.00)	(-2.90)	(-2.68)	(0.69)	(-4.28)	(-5.35)
JP_γ_8	-0.0187***	-0.0186***	-0.0175***	-0.0178***	-0.0156***	-0.0157***	-0.0064***	-0.0125***	-0.0167***
	(-6.60)	(-10.27)	(-10.04)	(-10.69)	(-8.81)	(-10.00)	(-3.54)	(-7.03)	(-8.03)
KO_γ_2	-0.0166*	-0.0438***	-0.0468***	-0.0408***	-0.0403***	-0.0510**	-0.0180***	-0.0359***	-0.0659***
	(-1.80)	(-8.10)	(-8.34)	(-7.16)	(-6.23)	(-6.19)	(-2.87)	(-5.55)	(-9.19)
KO_γ_8	-0.0061**	-0.0101***	-0.0118***	-0.0098***	-0.0093***	-0.0111***	-0.0085***	-0.0105***	-0.0142***
	(-2.19)	(-6.25)	(-7.03)	(-5.74)	(-4.84)	(-4.52)	(-4.52)	(-5.44)	(-6.64)
TW_γ_2		-0.1376***	-0.1213***	-0.1225***	-0.0857***	-0.0825***	-0.0417**	-0.1001***	-0.0747***
	.	(-8.09)	(-7.79)	(-8.20)	(-3.99)	(-4.97)	(-2.05)	(-5.79)	(-4.26)
TW_γ_8		-0.0144***	-0.0117***	-0.0152***	-0.0111***	-0.0157***	-0.0113***	-0.0183***	-0.0150***
	.	(-4.57)	(-4.06)	(-5.49)	(-2.80)	(-5.13)	(-3.00)	(-5.72)	(-4.64)
HK_γ_2	-0.0050	-0.0494***	-0.0503***	-0.0226***	-0.0537***	-0.0343***	-0.0167	-0.0430***	-0.0780***
	(-0.18)	(-4.21)	(-5.59)	(-2.72)	(-2.96)	(-3.65)	(-1.06)	(-5.15)	(-6.04)
HK_γ_8	-0.0042***	-0.0030***	-0.0027***	-0.0019***	-0.0033***	-0.0028***	-0.0023***	-0.0028***	-0.0039***
	(-3.16)	(-5.46)	(-6.42)	(-4.86)	(-3.86)	(-6.37)	(-3.06)	(-7.20)	(-6.47)
SG_γ_2	0.0789*	-0.0269**	-0.0162*	-0.0075	-0.0600*	0.0098	-0.1058**	0.0111	0.0128
	(1.77)	(-1.98)	(-1.83)	(-0.76)	(-2.93)	(1.09)	(-2.32)	(1.22)	(0.88)
SG_γ_8	0.0209**	0.0005	-0.0011***	-0.0003	-0.0013*	-0.0004	0.0008	-0.0002	-0.0006
	(1.99)	(1.05)	(-3.27)	(-0.76)	(-1.70)	(-1.14)	(0.51)	(-0.63)	(-1.08)
TH_γ_2	0.2046**	-0.0361	0.0724*	-0.0948***	-0.0212	0.0863**	0.0936	0.1031**	-0.1495*
	(2.24)	(-0.74)	(1.65)	(-3.05)	(-0.30)	(2.29)	(1.40)	(2.31)	(-1.82)
TH_γ_8	-0.0041	-0.0059***	-0.0066***	-0.0041***	-0.0067***	-0.0049***	0.0027	-0.0010	-0.0123***
	(-1.57)	(-4.21)	(-5.20)	(-4.58)	(-3.34)	(-4.57)	(1.34)	(-0.81)	(-5.21)
MY_γ_2	-0.0089**	-0.0156***	-0.0366***	-0.0263***	-0.0311***	-0.0274***	-0.0262***	-0.0411***	-0.0256***
	(-2.01)	(-3.56)	(-9.30)	(-7.16)	(-4.81)	(-6.63)	(-4.41)	(-11.77)	(-3.66)
MY_γ_8	-0.0009**	-0.0024***	-0.0024***	-0.0023***	-0.0019**	-0.0030***	-0.0023***	-0.0026***	-0.0041***
	(-2.21)	(-6.11)	(-6.60)	(-7.03)	(-3.27)	(-7.95)	(-4.23)	(-8.10)	(-6.43)

*ID_* γ_2	-0.0120**	-0.0514***	-0.0137	-0.0505***	0.0650**	-0.0263*	0.0586	-0.0542***	-0.0246
	(-2.61)	(-4.12)	(-1.03)	(-4.87)	(2.96)	(-1.84)	(1.02)	(-3.91)	(-0.79)
*ID_* γ_8	-0.0051**	-0.0072***	-0.0067***	-0.0074***	-0.0055**	-0.0090***	0.0056*	-0.0104***	-0.0131***
	(-2.54)	(-4.75)	(-4.17)	(-5.89)	(-2.08)	(-5.19)	(1.93)	(-6.17)	(-3.51)

Note: This table reports the regression results of the CSAD based on the following equation[34]:

$$CSAD_{ind_i,t} = \alpha + \gamma_1 \left|R_{ind_i\_market,t}\right| + \gamma_2 R^2_{ind_i\_market\_,t} + \gamma_3 \left|R_{m,t}\right| + \gamma_4 R^2_{m,t} + \gamma_5 R^2_{US,t-1} + \gamma_6 CSAD_{US,t-1} + \gamma_7 \left|R_{ind_j\_market,t}\right| + \gamma_8 R^2_{ind_j\_,t} market + \varepsilon_{ind_i,t} \quad (7)$$

where $R_{ind_i\_market,t} = R_{ind_i,t} - E(R_{ind_i,t})$, and $R_{ind_j\_market,t} = R_{ind_j,t} - E(R_{ind_j,t})$ are the difference between industry i or industry j returns and their expected returns at time t. $R^2_{US,t-1}$ is the lagged U.S. stock market return squared and $CSAD_{US,t-1}$ is the lagged stock return dispersion in the U.S. market.[35] To save space, only the industry herding coefficients γ_2 and γ_8 are reported. The equation is estimated for each of the 10 industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. Taiwan's Oil & Gas industry was dropped because it has too few firms. The numbers in parentheses are t-statistics.*,**,*** denote statistical significance at the 10%,5%, and 1% levels, respectively.

[34] To save space, we report only the results of herding with the Telecom industry. The results of herding with other industries are available upon request.

[35] Because of the time lag, we use lagged U.S. stock market variables.

Table 7 shows that among all 10 industries, Financial and Industrials industries, which rank among the top 3 industries in size for 9 of 9 markets and 6 of 9 markets, respectively, tend to have higher market value, while Technology and Healthcare industries - both of which rank among the bottom 3 industries in size for 6 of 9 markets, tend to have lower market value. Technology and Telecom industries, which both rank among the top 3 industries in P/E ratio for 6 of 9 markets, tend to have higher P/E ratio, while low P/E ratio industries are more diversified among the nine markets. Oil & Gas industry, which rank among the top 3 industries in dividend yield for 6 of 9 markets, tend to have higher dividend yield, while Consumer Services and Technology industries, which both rank among the bottom 3 industries in dividend yield for 6 of 9 markets, tend to have lower dividend yield. When we compare these results with our previous findings, the evidence suggests that herding behavior tends to be stronger in lower market value, higher P/E ratio and lower dividend yield industries (such as the Technology industry). These industries usually have more small-size, high-growth companies that pay few dividends. One possible explanation is that investors know less about the intrinsic value of these firms and therefore to display more herding behavior.

Since the findings from the descriptive statistics are preliminary, we use multivariate regression to investigation further. We follow Fama and French (1993) and sort the 10 industries into three industry portfolios every calendar year for each market. The breakpoints are the 30th and 70th percentiles of the industry market value, P/E ratio, and dividend yield for each market. We combine the portfolios of all nine markets and form a total of nine portfolios: a large, neutral, and small size portfolio; a high, neutral, and low PE portfolio; a high dividend yield, neutral dividend yield, and low dividend yield portfolio. We then re-run Equation (5) using these portfolio returns and replacing industry index returns in the previous estimations. The estimated results are reported in Table 8.

By comparing the herding coefficients γ_2 of the nine portfolios in Table 8, we find that herding tends to be stronger in both high and low market value industries and weaker for mid-sized industries. Information asymmetry could explain the greater herding in smaller industries such as Technology. For larger industries such as Financial and Industrials, investors possibly tend to herd more because those industries'

Table 7. Fundamentals of ten industries for nine Asian markets

Panel A: Daily average value of logged market value

MV	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
CN	13.9917	13.9600	13.7398	13.2460	12.2093	12.6749	10.8644	12.6350	14.6091	11.7907
JP	15.2082	17.2069	17.8356	17.9482	17.0380	17.5635	17.0145	16.3986	18.0274	17.1664
KO	16.2701	17.6462	18.3254	18.0167	14.2499	16.7731	17.2662	16.8366	18.1495	18.1689
TW	13.4601	14.1074	14.1824	12.9844	.	12.3562	13.7449	.	14.5475	15.1609
HK	12.5988	11.8682	13.5474	12.7508	8.7449	13.1388	13.9592	12.7792	14.8229	12.2954
SG	9.4416	8.1546	11.1471	10.1693	8.8371	10.7932	10.7815	7.0500	11.7747	8.7281
TH	13.6491	12.8034	12.5005	11.8786	11.2333	12.7008	12.7684	11.6273	13.8420	11.5295
MY	10.0663	10.2558	11.2475	11.0886	8.8396	11.2860	11.1224	11.1185	11.9492	7.5538
ID	16.5283	18.6389	18.2543	19.4025	17.7156	17.6249	18.7431	18.0033	19.4827	17.1009

Panel B: Daily average value of P/E ratio

PE	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
CN	38.2130	28.1602	32.4952	34.3958	34.9519	54.3901	108.5501	29.0800	25.6176	43.8564
JP	36.9290	38.3296	37.8749	35.5453	28.4941	34.6603	60.8972	29.8737	40.9417	56.6148
KO	13.8790	9.7494	16.9467	12.3364	20.1501	14.0661	25.6304	33.6993	18.7315	29.5598
TW	37.3911	26.3186	19.3262	17.6180	.	31.6210	12.6023	.	22.8157	21.6849
HK	29.6644	16.0726	15.3386	15.7272	18.0591	16.6256	21.9707	14.4088	13.8090	27.7387
SG	10.2495	17.5724	16.9658	18.1957	21.1159	15.5919	16.9403	36.6651	15.6375	56.9012
TH	19.0359	14.6595	12.2387	11.9305	18.7293	18.9081	24.7950	11.3358	35.2120	13.2491
MY	20.4919	14.5335	16.4722	14.0107	18.5346	15.6611	24.0739	18.6424	16.5606	12.2612
ID	28.0033	17.7114	14.3565	91.7361	18.6769	21.1947	19.3194	14.9282	29.9488	60.1155

Panel C: Daily average value of Dividend Yield

DY	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
CN	1.5656	1.7955	0.9608	1.1176	0.7034	0.7307	0.9881	1.8795	1.7100	0.6840
JP	2.0453	1.4445	1.1985	1.2169	1.6086	1.1190	1.3940	2.4163	1.3437	1.1787
KO	4.0702	1.9991	1.3611	1.6284	1.0270	1.5325	2.5387	2.1346	1.8550	0.9868
TW	4.4546	4.7354	1.9393	2.7675	.	2.0678	6.0116	.	2.3748	2.0159
HK	2.0428	2.3028	2.7547	2.4932	3.8778	2.4948	2.4956	3.6608	3.5185	1.4509
SG	3.2098	2.7127	1.9593	2.3097	2.8999	2.7248	3.4222	0.9207	2.6997	.
TH	2.6577	3.4859	3.6515	4.4661	2.9558	2.6866	3.5632	3.7093	2.4719	5.1695
MY	3.6923	2.5102	3.2256	3.0514	1.8504	2.4270	2.5423	2.2558	3.0249	6.7641
ID	3.0700	2.4215	1.9981	2.3018	1.7580	1.1611	2.8528	2.3130	2.3424	0.4778

Note: This table shows summary statistics of daily average fundamental variables (Market Value, P/E ratio, and Dividend Yield) value for the 10 industries:[36] Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. There are no data available for all three fundamental variables of Healthcare and Utilities industries in Taiwan and for the dividend yield of Technology industry in Singapore.

[36] Industries are defined according to Thomson Datastream.

Table 8. Estimates of herding for industry portfolios

Market	*MV_Low*	*MV_Neutral*	*MV_high*	*PE_Low*	*PE_Neutral*	*PE_high*	*DY_Low*	*DY_Neutral*	*DY_high*
α	1.1173***	0.9765***	0.9854***	1.1076***	0.9791***	1.0114***	1.1389***	0.9690***	1.0064***
	(9.37)	(12.81)	(10.45)	(8.47)	(11.65)	(12.74)	(7.25)	(12.67)	(14.05)
γ_1	0.7186***	0.6966***	0.7174***	0.7350***	0.7132***	0.6613***	0.7340***	0.7208***	0.6720***
	(6.17)	(7.25)	(8.24)	(6.04)	(6.51)	(8.98)	(5.16)	(6.16)	(7.90)
γ_2	-0.0432**	-0.0307*	-0.0461***	-0.0379**	-0.0358**	-0.0393***	-0.0559**	-0.0346**	-0.0316**
	(-2.42)	(-1.95)	(-3.09)	(-1.96)	(-2.16)	(-3.28)	(-2.37)	(-2.00)	(-2.11)
γ_3	0.2270***	0.2364***	0.2953***	0.2182***	0.2427***	0.2612***	0.2118***	0.2410***	0.2641***
	(9.90)	(13.22)	(16.16)	(7.40)	(11.08)	(15.00)	(6.40)	(9.53)	(11.54)
γ_4	-0.0022	-0.0042	-0.0066***	-0.0019	-0.0039*	-0.0055*	-0.0033	-0.0037*	-0.0042
	(-0.59)	(-1.63)	(-2.67)	(-0.41)	(-1.74)	(-1.81)	(-0.52)	(-1.76)	(-1.28)
γ_5	0.0072	-0.0017	0.0000	0.0072	-0.0024	0.0028	0.0099	-0.0015	-0.0007
	(0.95)	(-0.45)	(0.01)	(0.98)	(-0.57)	(0.79)	(1.32)	(-0.32)	(-0.19)
γ_6	0.0978*	0.2260***	0.2129***	0.1231**	0.2244***	0.1873***	0.1514***	0.1829***	0.1835***
	(1.67)	(4.95)	(4.64)	(2.57)	(4.75)	(3.91)	(2.99)	(3.20)	(3.32)
Adj. R^2	0.1185	0.1684	0.2408	0.1169	0.1693	0.1827	0.1156	0.1482	0.1926

Note: This table reports the regression results of the CSAD for nine industry portfolios based on the following equation:

$$CSAD_{ind,t} = \alpha + \gamma_1 \left| R_{ind\_maket,t} \right| + \gamma_2 R^2_{ind\_market,,t} + \gamma_3 \left| R_{m,t} \right| + \gamma_4 R^2_{m,t} + \gamma_5 R^2_{US,t-1} + \gamma_6 CSAD_{US,t-1} + \varepsilon_{ind,t} \quad (5)$$

where $R_{ind\_market,t} = R_{ind,t} - E(R_{ind,t})$, and $E(R_{ind,t})$ is the expected industry return calculated by CAPM: $E(R_{ind,t}) = \alpha + \beta R_{m,t}$.[37] $R^2_{US,t-1}$ is the lagged U.S. stock market return squared, and $CSAD_{US,t-1}$ is the lagged stock return dispersion in the U.S. market.[38] We form three portfolios at the end of previous calendar year t-1 by sorting industry stocks of all nine Asian markets. The breakpoints are the 30th and 70th percentiles of industry market value, P/E ratio, and dividend yield for each market.

The equation is estimated for each of the 10 industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia.

The numbers in parentheses are t-statistics. *,**,*** denote statistical significance at the 10%,5%, and 1% levels, respectively.

[37] α and β for each industry of each market are estimated by using the industry return, regressing them on market returns for the entire data set of 20 years.

[38] Because of the time lag, we use lagged U.S. stock market variables.

stocks are held more by institutional investors, who herd due to reputation and peer pressure. Herding tends to be stronger in low dividend yield industries and weaker for mid and high dividend yield industries. Growth stocks tend to pay out smaller dividends, but the future earnings capability of these industries could also be more uncertain or riskier, which increases the possibility of herding. The herding effect is slightly stronger in high PE ratio industries, but the difference between high and neutral industries or high and low PE industries is not very large. The same is true in the growth stocks example.

From Table 7, we can see that the Technology industry generally has either high or low average market value in different countries. It also has high PE ratio and low dividend yield. This observation suggests that these three fundamental factors may contribute to the high herding coefficients for the Technology industry. Technology firms usually have high growth and pay out small dividends and are usually large firms as is the case with monopolistic firms in Korea and Taiwan or small, start-up firms such as those in China and other Southeast Asian economies. As the industry has more uncertainty related to its product release and technology trends, investors tend to herd more in technology stocks. This is also consistent with our findings shown in Table 2, which indicates that in all markets, except for Singapore, the Technology industry has a very strong herding effect at the industry level. Another notable industry is the Utilities industry. This industry, which is moderate or small in size in most countries, has low PE ratios in 5 of 8 countries, pays high dividends in 5 of 8 countries and tends to attract income-seeking investors. Trading is less active and herding is much less pronounced. In Table 2, only 5 of 9 countries have a significant herding in the Utilities industry. These results confirm that some fundamental factors such as market value, PE ratio and dividend yield are important industry characteristics that are related to the herding behavior of investors.

6.2 Industry concentration and herding

Other than the price-based fundamentals examined above, we also study the possible relationship between industry concentration and herding. Hou and Robinson (2006) argue that firms in more concentrated industries tend to have less distress risk or tend to be less innovative so that their stock returns are significantly lower than those in more competitive industries even after controlling for firm fundamentals. Using Herfindahl index to measure the industry concentration[39] across countries, we find that Oil & Gas, Utilities and Telecommunication industries are industries with high concentrations (see descriptive statistics in Panel A of Table 9). These industries are usually industries that have some monopolistic power whether it is due to regulations (e.g. Telecommunication) or high fixed cost of investment (e.g. Oil & Gas, Utilities). On the other hand, Industrials, Consumer Goods and Financials have the lowest concentration, which may indicate more competition and innovation in the industry.

To investigate further the relationship between herding and industry concentrations, as we did in section 6.1, every month we form three portfolios for each market according to the value of Herfindahl Index for each industry. Equation (5) then is applied to the portfolio returns, replacing industry index returns in previous estimations. Results in Panel B of Table 9 indicate that less concentrated industries tend to have more herding, while more concentrated industries tend to have less herding. Industries such as Oil & Gas typically consist of a few large companies, which are sometimes state-owned like in China. These companies are less likely to be innovative, which may indicate less uncertainty with their products. Information is easier to collect on these few companies that have less risk in the product development; therefore, there is less information asymmetry. On the contrary, an industry that has relatively more companies (such as Industrials) will be more competitive and face more uncertainty with the success of their products. Investors have fewer clues about each company's product and this uncertainty leads to herding. This is consistent with results in Table 2 where only 4 of 8 countries have significant herding in the Oil & Gas industry but 7 out of 9 countries have significant herding in the Industrials industry.

6.3 Further discussions

Beside the industry characteristics that we have examined, there may be other factors that could result in herding in different industries or markets. One of these factors could be the composition of investors in different markets. The literature provides evidence that institutional investors have more industry- and

[39] Herfindahl-Hirschman Index is calculated by: HHI = s1^2 + s2^2 + s3^2 + ... + sn^2, where s is the percentage market share of each firm in its corresponding industry expressed as a whole number, not a decimal.

Table 9 Industry Concentration and Herding

Panel A Descriptive Statistics on Herfindahl Index

	Oil & Gas	Basic Materials	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financials	Technology
China	1991	829	739	829	929	954	2225	1094	956	970
Japan	1369	891	720	816	942	811	1669	1200	857	871
Korea	1655	910	815	851	979	986	1785	1380	951	887
Taiwan	5085	1018	844	943	.	1109	2789	.	1058	886
HK	1501	918	890	850	1182	839	1514	1324	866	1000
Singapore	3573	1184	1077	1073	1638	1171	3564	2979	1120	1234
Thailand	4796	982	923	968	1262	963	1621	1481	965	1188
Malaysia	2043	1101	955	976	1415	1119	1783	1725	1021	1073
Indonesia	2087	1213	1217	1225	1966	1241	2225	5123	1164	1912
Average	2678	1005	909	948	1289	1021	2131	2038	995	1113

Panel B Relationship between Herfindahl Index and Herding

Market	*HI_Low*	*HI_Neutral*	*HI_high*
α	1.1028***	1.1002***	0.9532***
	(10.33)	(11.30)	(10.98)
γ_1	0.8821***	0.8258***	0.5562***
	(6.61)	(6.83)	(7.14)
γ_2	-0.0549***	-0.0476***	-0.0341**
	(-2.71)	(-2.58)	(-2.50)
γ_3	0.2720***	0.2705***	0.2171***
	(9.50)	(11.32)	(9.58)
γ_4	-0.0042	-0.0045	-0.0015
	(-1.24)	(-1.33)	(-0.43)
γ_5	-0.0006	-0.0004	0.0044
	(-0.16)	(-0.10)	(0.79)
γ_6	0.1612***	0.1672***	0.1578**
	(4.87)	(4.06)	(2.42)
Adj. R^2	0.3367	0.2721	0.0842

Note: This table reports the industry concentration measure Herfindahl Index (HI)[40] and its relation with herding activities.

Panel A shows summary statistics of the average daily HI for 10 industries:[41] Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH).
Panel B reports the regression results of the CSAD for three industry portfolios based on the following equation:

$$CSAD_{ind,t} = \alpha + \gamma_1 \left|R_{ind\_maket,t}\right| + \gamma_2 R^2_{ind\_market,,t} + \gamma_3 \left|R_{m,t}\right| + \gamma_4 R^2_{m,t} + \gamma_5 R^2_{US,t-1} + \gamma_6 CSAD_{US,t-1} + \varepsilon_{ind,t} \quad (5)$$

where $R_{ind\_market,t} = R_{ind,t} - E(R_{ind,t})$, and $E\left(R_{ind,t}\right)$ is the expected industry return calculated by CAPM: $E\left(R_{ind,t}\right) = \alpha + \beta R_{m,t}$.[42] $R^2_{US,t-1}$ is the lagged U.S. stock market return squared, and $CSAD_{US,t-1}$ is the lagged stock return dispersion in the U.S. market.[43] We form three portfolios at the end of previous calendar year t-1 by sorting industry stocks of all nine Asian markets. The breakpoints are the 30th and 70th percentiles of HI for each market.
The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. The numbers in parentheses are t-statistics.*,**,*** denote statistical significance at the 10%,5%, and 1% levels, respectively.

[40] Herfindahl-Hirschman Index is calculated by: HHI = s1^2 + s2^2 + s3^2 + ... + sn^2, where s is the percentage market share of each firm in its corresponding industry expressed as a whole number, not a decimal.
[41] Industries are defined according to Thomson Datastream.
[42] α and β for each industry of each market are estimated by using the industry return, regressing them on market returns for the entire data set of 20 years.
[43] Because of the time lag, we use lagged U.S. stock market variables.

market-wide information than firm-specific information (Preress, 2010; Irvine and Pontiff, 2009). Institutional investors are also thought to be more experienced or have more educational background in related fields (Venezia et al., 2011). Therefore, markets or industries that have more institutional investors tend to have less information asymmetry. On one hand, markets that have more amateur investors may have more herding due to information asymmetry, and markets or industries that have more institutional investors may herd more because of reputation or career related reasons (Venezia et al., 2011). Since we do not have data on industry-level institutional investor holdings, we can only look at country level data. Around 75% of the trading turnover in Japan and Malaysia come from institutional investors. This number is around 65% in Hong Kong and 50% in Taiwan and Korea. In Thailand, only about 35% of the trading turnover comes from institutional investors while in China this number is lowest at 12%.[44] In Chinese market, individual investors dominate and herding is significant due to information asymmetry. However, in Thailand's market where individual investors also dominate, the herding effect is mostly insignificant. This may suggest less information asymmetry in Thailand's market.

Other factors contributing to herding activity may have to do with foreign ownership, state ownership, and the level of market development. For example, even though Japan and Malaysia have a similar percentage of institutional investors, the majority of the institutional investors in Japan are from foreign countries, while majority of the institutional investors in Malaysia are local institutions. Obviously Japan has a stronger herding effect compared with Malaysia, which may indicate that foreign institutional investors herd more due to their career-related factors while domestic institutional investors in Malaysia

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Data for Japan are from Japan Exchange Group (http://www.jpx.co.jp/english/markets/statistics-equities/investor-type/b5b4pj000000v4g3-att/stock_val_1_y15.pdf), for Hong Kong from Hong Kong Exchanges and Clearing Limited (https://www.hkex.com.hk/eng/stat/research/Documents/cmts2015.pdf), for Malaysia from Bursa Malaysia Berhad (http://www.bursamalaysia.com/misc/system/equity_market_statistics/securities_equities_trading_participation_investor2012.pdf), for Taiwan from news article http://focustaiwan.tw/news/aeco/201602180027.aspx, for Thailand from the Stock Exchange of Thailand (http://marketdata.set.or.th/mkt/investortype.do?language=en&country=US), for Korea from Korea Exchange (https://global.krx.co.kr/contents/GLB/05/0501/0501030000/GLB0501030000.jsp), and for China from China Securities Regulatory Commission (http://www.csrc.gov.cn/pub/csrc_en/about/annual/201506/P020150612564204379767.pdf).

may not herd as much since their compensation is not performance-tied. This hypothesis can be further investigated if more data is available on institutional investors' compensation structure.

Many Chinese stocks, on the other hand, are state-owned. Even though reform has been implemented to reduce state ownership, the state still has significant influence on the performance of many companies or industries. Oil & Gas and Financial industries are examples of these industries. Government policies and regulations bring uncertainty to these industries, which is consistent with the information cascading hypothesis. However, these factors need to be investigated in more depth on country-by-country or industry-by-industry cases.

7. Conclusion

This paper investigates investors' herding behavior at the industry level, using 10 industries as defined by Thomson Datastream (see footnote 16). Daily stock data from 7/19/1993 through 12/19/2013 are collected from Thomson Datastream for nine Asian markets (Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH)). Following Chang et al. (2000) and Chiang and Zheng (2010), we develop estimation models to detect herding behavior. The estimated evidence supports our hypothesis that herding within industry indexes exists in all nine Asian markets for the majority of industries. The results are consistent with Lee, et al. (2013)'s study of the Chinese stock market. Within each market, herding activities are stronger for the Technology industry than it is for the Utilities industry, especially in the larger markets (China, Japan, Korea, and Hong Kong).

By incorporating domestic market stock return variables and U.S. market stock return variables, we examine whether investors herd at all three levels, namely, the industry, the domestic market, and international markets. The results show that for most Asian markets, investors herd more within industries than within domestic markets, especially for China, Japan, Korea, Hong Kong, and Malaysia. The U.S. market has the weakest influence on investors' herding behavior among the three levels. Only Japan and Korea exhibit some herding behavior with the U.S. stock market. The results indicate that investors in Japan and Korea follow the U.S. market more closely than investors in the other major Asian markets.

When testing industry-herding behavior under different market conditions, we find that industry herding is more pronounced in down markets for most Asian markets, especially for Japan, Korea and Taiwan. Evidence indicates that industry herding is more significant when market trading volume is relatively low. Industry herding patterns during crisis and tranquil periods are mixed for the nine Asian markets, though Japan, Korea and Taiwan show more herding during the crises.

When testing whether investors herd across industries in addition to herding within an industry in the market, we find that cross-industry herding occurs more often in Telecom and Financial industries than it does in Industrial and Consumer Services sectors. This result is consistent with those of Lee, et al. (2013), which found that the Telecom industry has an effect on herding activities in other industries. It also corroborates the observed widespread contagion effect from financial stocks during the sub-prime mortgage crisis of 2007 through 2009.

The portfolio analysis suggests that herding tends to be stronger in both high and low market value industries and weaker for mid-sized industries, stronger in low dividend yield industries and weaker for mid and high dividend yield industries, and slightly stronger in high PE ratio industries. Furthermore, less concentrated industries tend to have more herding than concentrated industries.

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Appendix A. Estimates of herding with industries and markets

China	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.6229***	0.9214***	0.9706***	0.9187***	0.9460***	0.9080***	0.4823***	0.9630***	0.9103***	1.0432***
	(26.18)	(65.74)	(73.66)	(68.59)	(65.49)	(65.87)	(19.94)	(51.17)	(65.61)	(50.67)
γ_1	0.5604***	0.6886***	0.6844***	0.6778***	0.6777***	0.6621***	0.4971***	0.1994***	0.6998***	0.7280***
	(12.52)	(32.43)	(34.28)	(33.40)	(30.96)	(31.70)	(13.56)	(6.99)	(33.29)	(23.34)
γ_2	-0.0718***	-0.0593***	-0.0729***	-0.0690***	-0.0659***	-0.0657***	-0.0506***	0.1250***	-0.0683***	-0.0777***
	(-5.04)	(-11.96)	(-15.64)	(-14.55)	(-12.89)	(-13.46)	(-5.91)	(18.77)	(-13.92)	(-10.66)
γ_3	0.0407***	0.1964***	0.1982***	0.2071***	0.1920***	0.1991***	0.0443***	0.2136***	0.2262***	0.2133***
	(3.01)	(23.54)	(25.26)	(25.96)	(22.32)	(24.26)	(3.07)	(19.06)	(27.37)	(17.40)
γ_4	-0.0052***	-0.0047***	-0.0041***	-0.0035***	-0.0032***	-0.0048***	-0.0044***	-0.0061***	-0.0064***	-0.0075***
	(-5.46)	(-7.98)	(-7.30)	(-6.27)	(-5.21)	(-8.27)	(-4.35)	(-7.67)	(-10.96)	(-8.67)
Adj. R^2	0.0652	0.3882	0.4055	0.4149	0.3682	0.3754	0.0532	0.3345	0.4068	0.2231

Japan	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.9138***	1.0459***	1.0745***	0.9728***	1.0051***	0.9775***	1.1528***	0.7169***	0.9514***	1.2593***
	(46.17)	(80.11)	(85.67)	(80.47)	(76.53)	(84.36)	(35.68)	(58.05)	(76.03)	(81.27)
γ_1	0.8184***	0.9176***	0.8978***	0.8430***	0.8081***	0.8067***	1.1719***	0.3838***	0.8034***	1.0553***
	(16.92)	(28.77)	(29.30)	(28.54)	(25.18)	(28.50)	(14.85)	(12.72)	(26.28)	(27.88)
γ_2	-0.0655***	-0.0944***	-0.0626***	-0.0799***	-0.0762***	-0.0677***	-0.1401***	-0.0142	-0.0893***	-0.1183***
	(-3.66)	(-8.00)	(-5.53)	(-7.32)	(-6.42)	(-6.47)	(-4.80)	(-1.27)	(-7.90)	(-8.45)
γ_3	0.2303***	0.3082***	0.3474***	0.3194***	0.2591***	0.3059***	0.3375***	0.2093***	0.3690***	0.3769***
	(10.43)	(21.16)	(24.83)	(23.68)	(17.69)	(23.67)	(9.36)	(15.19)	(26.43)	(21.80)
γ_4	-0.0071	-0.0082***	-0.0088***	-0.0050*	-0.0020	-0.0126***	-0.0239***	-0.0012	-0.0046	-0.0199***
	(-1.60)	(-2.83)	(-3.15)	(-1.85)	(-0.68)	(-4.88)	(-3.31)	(-0.43)	(-1.63)	(-5.75)
Adj. R^2	0.1800	0.4151	0.4798	0.4589	0.3665	0.4335	0.1165	0.2340	0.4694	0.3796

Korea	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	1.1988***	1.3747***	1.5382***	1.4995***	1.4897***	1.4920***	0.9680***	1.0011***	1.0736***	1.6931***
	(38.43)	(71.60)	(76.80)	(73.88)	(66.40)	(51.31)	(30.03)	(45.98)	(47.16)	(66.65)
γ_1	0.5200***	0.7073***	0.7096***	0.7079***	0.6379***	0.7796***	0.0711*	0.4408***	0.6227***	0.7459***
	(12.74)	(28.16)	(27.08)	(26.66)	(21.73)	(20.50)	(1.69)	(15.48)	(20.91)	(22.45)
γ_2	-0.0143	-0.0438***	-0.0450***	-0.0381***	-0.0363***	-0.0454***	0.0463***	-0.0173***	-0.0328***	-0.0605***
	(-1.60)	(-8.00)	(-7.88)	(-6.58)	(-5.67)	(-5.47)	(5.03)	(-2.79)	(-5.05)	(-8.35)
γ_3	0.3273***	0.3611***	0.3851***	0.3624***	0.3106***	0.4444***	0.2284***	0.2131***	0.4175***	0.4272***

	(12.52)	(22.44)	(22.94)	(21.30)	(16.52)	(18.23)	(8.45)	(11.68)	(21.88)	(20.06)
γ_4	-0.0120***	-0.0223***	-0.0230***	-0.0217***	-0.0207***	-0.0263***	-0.0222***	-0.0100***	-0.0167***	-0.0306***
	(-3.11)	(-9.37)	(-9.28)	(-8.65)	(-7.46)	(-7.31)	(-5.55)	(-3.72)	(-5.92)	(-9.72)
Adj. R^2	0.2197	0.4539	0.4474	0.4408	0.3233	0.3323	0.0618	0.2284	0.4147	0.3290

Taiwan	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	.	0.9850***	1.0845***	1.0074***	0.9840***	0.9357***	0.5220***	0.6880***	0.8825***	1.2092***
		(64.22)	(69.48)	(73.13)	(45.19)	(60.04)	(23.39)	(31.52)	(56.58)	(68.36)
γ_1	.	0.6212***	0.6474***	0.6159***	0.5841***	0.5192***	0.1615***	0.3712***	0.6235***	0.6267***
		(20.37)	(20.86)	(22.49)	(13.49)	(16.76)	(3.36)	(8.55)	(20.10)	(17.82)
γ_2	.	-0.0671***	-0.0641***	-0.0634***	-0.0579***	-0.0426***	-0.0178	-0.0221	-0.0617***	-0.0483***
		(-5.63)	(-5.28)	(-5.92)	(-3.42)	(-3.51)	(-0.87)	(-1.30)	(-5.09)	(-3.51)
γ_3	.	0.3113***	0.3246***	0.2858***	0.2230***	0.2617***	0.0963***	0.2191***	0.3602***	0.3451***
		(19.65)	(20.13)	(20.08)	(9.91)	(16.25)	(4.20)	(9.72)	(22.35)	(18.88)
γ_4	.	-0.0409***	-0.0375***	-0.0301***	-0.0217***	-0.0224***	-0.0039	-0.0248***	-0.0403***	-0.0532***
		(-12.54)	(-11.29)	(-10.25)	(-4.69)	(-6.76)	(-0.80)	(-5.34)	(-12.14)	(-14.12)
Adj. R^2	.	0.3040	0.3359	0.3646	0.1584	0.2837	0.0375	0.0986	0.3491	0.2657

HongKong	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Health care	Consumer Services	Telecom	Utilities	Financial	Technology
α	1.7999***	1.6263***	1.4608***	1.4303***	1.8415***	1.4851***	1.2916***	1.3958***	1.3448***	1.7888***
	(32.80)	(70.01)	(81.74)	(88.44)	(52.94)	(81.03)	(28.59)	(46.19)	(81.72)	(69.78)
γ_1	0.9198***	1.0465***	0.9878***	0.7749***	0.9465***	0.8919***	0.9115***	0.9703***	0.9032***	1.1257***
	(8.60)	(23.10)	(28.34)	(24.57)	(13.95)	(24.95)	(10.35)	(16.47)	(28.14)	(22.52)
γ_2	-0.0048	-0.0449***	-0.0462***	-0.0177**	-0.0525***	-0.0322***	-0.0486**	-0.0159	-0.0404***	-0.0708***
	(-0.17)	(-3.74)	(-5.00)	(-2.11)	(-2.92)	(-3.39)	(-2.08)	(-1.01)	(-4.74)	(-5.34)
γ_3	0.1998***	0.2755***	0.3011***	0.2625***	0.3024***	0.2922***	0.3435***	0.2548***	0.3051***	0.3368***
	(4.19)	(13.64)	(19.37)	(18.66)	(10.00)	(18.33)	(8.74)	(9.69)	(21.32)	(15.11)
γ_4	0.0057	-0.0039	-0.0030	-0.0054***	-0.0116***	-0.0060***	-0.0087	-0.0022	-0.0011	-0.0127***
	(0.83)	(-1.35)	(-1.34)	(-2.69)	(-2.67)	(-2.63)	(-1.54)	(-0.57)	(-0.55)	(-3.98)
Adj. R^2	0.0851	0.3551	0.4782	0.4390	0.1619	0.4272	0.1145	0.2437	0.5042	0.3189

Singapore	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.7033***	1.4948***	1.5564***	1.4989***	1.3255***	1.3128***	0.7377***	2.4320***	0.8739***	2.0115***
	(10.46)	(43.29)	(67.95)	(58.13)	(25.22)	(56.46)	(17.13)	(19.18)	(38.32)	(52.64)
γ_1	0.1333	0.4728***	0.6999***	0.6820***	0.5888***	0.5005***	0.5069***	0.2223	0.4392***	0.4713***
	(1.02)	(8.77)	(19.56)	(16.93)	(7.17)	(13.78)	(7.54)	(1.15)	(12.33)	(7.90)

γ_2	0.0793*	-0.0300**	-0.0229***	-0.0124	-0.0655***	0.0046	-0.0371**	-0.1057**	0.0056	0.0076
	(1.76)	(-2.26)	(-2.60)	(-1.25)	(-3.24)	(0.51)	(-2.24)	(-2.31)	(0.64)	(0.51)
γ_3	0.4104***	0.2808***	0.4087***	0.3937***	0.3043***	0.3813***	0.2855***	-0.0197	0.3199***	0.4178***
	(4.76)	(6.67)	(14.62)	(12.51)	(4.74)	(13.44)	(5.43)	(-0.12)	(11.50)	(8.96)
γ_4	0.0009	0.0249***	-0.0009	0.0051	0.0077	-0.0085	0.0207*	0.0930**	0.0166***	-0.0155
	(0.04)	(2.75)	(-0.15)	(0.75)	(0.56)	(-1.39)	(1.83)	(2.56)	(2.76)	(-1.54)
Adj. R^2	0.0462	0.1144	0.3355	0.2941	0.0468	0.2559	0.0754	0.0072	0.2602	0.1111

Malaysia	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.6576***	1.3222***	1.4077***	1.2507***	1.1460***	1.2720***	1.4141***	0.9786***	1.1528***	1.8505***
	(40.12)	(81.44)	(95.32)	(90.35)	(46.28)	(82.40)	(28.65)	(44.38)	(87.46)	(70.78)
γ_1	0.1611***	0.6165***	0.6809***	0.6519***	0.5746***	0.5652***	0.1380*	0.7087***	0.6795***	0.5605***
	(6.49)	(25.07)	(30.44)	(31.09)	(15.32)	(24.17)	(1.85)	(21.22)	(34.03)	(14.16)
γ_2	-0.0086**	-0.0158***	-0.0359***	-0.0279***	-0.0298***	-0.0285***	-0.0103	-0.0295***	-0.0428***	-0.0250***
	(-2.01)	(-3.74)	(-9.32)	(-7.72)	(-4.61)	(-7.07)	(-0.80)	(-5.12)	(-12.44)	(-3.66)
γ_3	0.2160***	0.3703***	0.3399***	0.3095***	0.2165***	0.3557***	0.0216	0.3699***	0.3823***	0.2692***
	(13.36)	(23.12)	(23.33)	(22.66)	(8.86)	(23.35)	(0.44)	(17.00)	(29.40)	(10.43)
γ_4	0.0029**	-0.0094***	-0.0066***	-0.0062***	0.0089***	-0.0057***	0.0144***	-0.0096***	-0.0057***	0.0015
	(2.15)	(-6.97)	(-5.35)	(-5.38)	(4.33)	(-4.49)	(3.52)	(-5.26)	(-5.26)	(0.67)
Adj. R^2	0.1515	0.4235	0.4522	0.4676	0.1984	0.3997	0.0093	0.2983	0.5274	0.1777

Thailand	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.7047***	0.7766***	0.7477***	0.6206***	0.7239***	0.6657***	0.8732***	0.6064***	0.6184***	0.8033***
	(17.15)	(37.17)	(39.72)	(46.62)	(23.65)	(41.54)	(22.60)	(20.67)	(32.16)	(22.78)
γ_1	1.1422***	1.4178***	1.4548***	1.1655***	0.9787***	0.9789***	1.0571***	0.8783***	1.3449***	1.6213***
	(7.37)	(18.01)	(20.51)	(23.23)	(8.48)	(16.21)	(7.26)	(7.98)	(18.56)	(12.20)
γ_2	0.1270	0.0047	0.0340	-0.0744**	-0.0526	0.0599*	-0.2460***	0.0513	0.0458	-0.1868**
	(1.39)	(0.10)	(0.82)	(-2.52)	(-0.78)	(1.69)	(-2.87)	(0.80)	(1.07)	(-2.39)
γ_3	0.3732***	0.3293***	0.3221***	0.1972***	0.1794***	0.1984***	0.4060***	0.2813***	0.4370***	0.3517***
	(11.71)	(20.33)	(22.07)	(19.10)	(7.56)	(15.97)	(13.56)	(12.39)	(29.31)	(12.86)
γ_4	-0.0067	-0.0057***	-0.0011	-0.0021	-0.0048	0.0040**	0.0046	-0.0004	0.0002	0.0024
	(-1.58)	(-2.65)	(-0.54)	(-1.50)	(-1.51)	(2.42)	(1.14)	(-0.14)	(0.09)	(0.67)
Adj. R^2	0.1518	0.3971	0.4789	0.4358	0.0923	0.3897	0.1686	0.1866	0.5449	0.2185

Indonesia	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.8173***	1.3104***	1.2130***	1.0899***	1.1480***	1.2505***	0.7290***	0.4432***	1.1244***	1.7213***

	(22.81)	(48.86)	(41.41)	(45.55)	(24.97)	(39.27)	(20.88)	(10.15)	(37.17)	(25.01)
γ_1	-0.2263***	1.2044***	1.1123***	1.2380***	0.6577***	1.1242***	-0.2991***	-0.1795	1.6400***	0.9687***
	(-3.50)	(24.62)	(20.82)	(28.36)	(7.84)	(19.35)	(-4.81)	(-1.53)	(29.72)	(7.72)
γ_2	-0.0101	-0.0585***	-0.0210	-0.0672***	0.0706***	-0.0356**	0.0185	0.0471	-0.0639***	-0.0271
	(-0.64)	(-4.88)	(-1.61)	(-6.28)	(3.43)	(-2.50)	(1.23)	(0.84)	(-4.73)	(-0.88)
γ_3	0.2022***	0.3833***	0.4053***	0.3244***	0.2896***	0.2395***	0.1088***	0.1075**	0.4899***	0.3166***
	(6.46)	(16.23)	(15.71)	(15.40)	(7.15)	(8.54)	(3.61)	(2.57)	(18.39)	(5.22)
γ_4	-0.0076*	-0.0043	0.0003	0.0025	-0.0013	0.0076**	-0.0023	-0.0128*	-0.0149***	-0.0115
	(-1.80)	(-1.34)	(0.09)	(0.89)	(-0.24)	(1.99)	(-0.57)	(-1.88)	(-4.12)	(-1.40)
Adj. R^2	0.0220	0.4074	0.3975	0.4561	0.1431	0.2919	0.0131	0.0015	0.4783	0.0623

Note: This table reports the regression results of the CSAD based on the following equation:

$$CSAD_{ind,t} = \alpha + \gamma_1 \left|R_{ind\_market,t}\right| + \gamma_2 R^2_{ind\_market,t} + \gamma_3 \left|R_{m,t}\right| + \gamma_4 R^2_{m,t} + \varepsilon_{ind,t} \tag{4}$$

where $R_{ind\_market,t} = R_{ind,t} - E(R_{ind,t})$, and $E(R_{ind,t})$ is the expected industry return calculated by CAPM: $E(R_{ind,t}) = \alpha + \beta R_{m,t}$.[45]
The equation is estimated for each of the 10 industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Healthcare, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and s from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. Taiwan's Oil & Gas industry was dropped because it has too few firms. The numbers in parentheses are t-statistics. *,**,*** denote statistical significance at the 10%,5%, and 1% levels, respectively.

[45] α and β for each industry of each market are estimated by using the industry return, regressing them on market returns for the entire data set of 20 years.

Appendix B. Estimates of herding with industries, domestic markets, and the US market

China	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.4394***	0.8721***	0.9111***	0.9046***	0.9375***	0.8173***	0.7167***	0.7699***	0.8324***	0.9393***
	(12.56)	(41.14)	(45.02)	(44.13)	(43.63)	(39.30)	(18.85)	(36.53)	(38.68)	(40.23)
γ_1	0.6149***	0.7586***	0.7585***	0.7718***	0.7462***	0.7582***	0.5535***	0.6862***	0.8069***	0.8130***
	(13.29)	(27.02)	(28.30)	(28.43)	(26.23)	(27.53)	(10.99)	(24.59)	(28.31)	(26.29)
γ_2	-0.0653***	-0.0912***	-0.0995***	-0.1036***	-0.0974***	-0.1093***	-0.0455***	-0.0900***	-0.1082***	-0.1245***
	(-4.31)	(-9.88)	(-11.30)	(-11.61)	(-10.41)	(-12.07)	(-2.75)	(-9.81)	(-11.55)	(-12.24)
γ_3	0.0861***	0.2001***	0.2043***	0.2025***	0.1943***	0.2016***	0.0829***	0.2116***	0.2363***	0.2417***
	(5.82)	(22.32)	(23.86)	(23.36)	(21.38)	(22.92)	(5.15)	(23.74)	(25.96)	(24.47)
γ_4	-0.0075***	-0.0048***	-0.0052***	-0.0055***	-0.0041***	-0.0056***	-0.0060***	-0.0065***	-0.0078***	-0.0090***
	(-5.97)	(-6.24)	(-7.12)	(-7.46)	(-5.30)	(-7.52)	(-4.37)	(-8.56)	(-10.11)	(-10.68)
γ_5	0.0018	0.0039*	0.0040**	0.0062***	0.0056***	0.0025	0.0418***	0.0017	0.0044**	0.0051**
	(0.54)	(1.95)	(2.14)	(3.26)	(2.80)	(1.26)	(11.79)	(0.87)	(2.21)	(2.34)
γ_6	0.2005***	0.0277	0.0434**	-0.0183	-0.0240	0.0785***	-0.3915***	0.0856***	0.0518**	0.0439*
	(5.87)	(1.34)	(2.20)	(-0.91)	(-1.14)	(3.87)	(-10.56)	(4.17)	(2.47)	(1.93)
Adj. R^2	0.1015	0.3905	0.4047	0.3979	0.3692	0.3747	0.1123	0.3576	0.4085	0.3557

Japan	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.6769***	0.8552***	0.9000***	0.7731***	0.8428***	0.8032***	0.8340***	0.6201***	0.7925***	1.0083***
	(26.01)	(50.56)	(55.33)	(49.73)	(51.10)	(53.78)	(19.60)	(37.76)	(48.68)	(50.74)
γ_1	0.7466***	0.8641***	0.8420***	0.7845***	0.7564***	0.7524***	1.0673***	0.3467***	0.7490***	0.9823***
	(15.45)	(27.51)	(27.88)	(27.18)	(24.70)	(27.13)	(13.51)	(11.37)	(24.78)	(26.62)
γ_2	-0.0424**	-0.0776***	-0.0448***	-0.0595***	-0.0572***	-0.0516***	-0.1087***	-0.0018	-0.0680***	-0.0978***
	(-2.36)	(-6.65)	(-3.99)	(-5.54)	(-5.03)	(-5.00)	(-3.70)	(-0.16)	(-6.05)	(-7.13)
γ_3	0.1829***	0.2736***	0.3116***	0.2847***	-0.0035	0.2686***	0.2637***	0.1883***	0.3390***	0.3248***
	(8.19)	(18.84)	(22.31)	(21.34)	(-1.17)	(20.95)	(7.22)	(13.36)	(24.26)	(19.04)
γ_4	-0.0061	-0.0070**	-0.0081***	-0.0055*	-0.0027	-0.0109***	-0.0210***	-0.0015	-0.0071**	-0.0165***
	(-1.28)	(-2.28)	(-2.72)	(-1.94)	(-1.42)	(-3.99)	(-2.70)	(-0.50)	(-2.37)	(-4.54)
γ_5	-0.0079***	-0.0073***	-0.0058***	-0.0049***	-0.0027	-0.0073***	-0.0127***	-0.0021	-0.0002	-0.0123***
	(-2.68)	(-3.82)	(-3.16)	(-2.77)	(-1.42)	(-4.30)	(-2.64)	(-1.11)	(-0.10)	(-5.46)
γ_6	0.4082***	0.3194***	0.3051***	0.3325***	0.2772***	0.3066***	0.5785***	0.1750***	0.2726***	0.4366***
	(14.68)	(17.67)	(17.55)	(20.02)	(15.73)	(19.22)	(12.73)	(9.97)	(15.67)	(20.56)
Adj. R^2	0.2150	0.4529	0.5110	0.5032	0.4167	0.4731	0.1437	0.2470	0.4978	0.4293

Korea	Oil&Gas	Basic Mat.	Industrials	Consumer	Healthcare	Consumer	Telecom	Utilities	Financial	Technology

				Goods		Services				
α	1.1236***	1.1759***	1.3622***	1.3240***	1.3784***	1.2609***	0.8283***	0.9515***	0.8740***	1.5509***
	(26.78)	(47.10)	(52.66)	(50.25)	(46.66)	(33.26)	(19.75)	(33.25)	(29.50)	(47.10)
γ_1	0.5357***	0.7088***	0.7243***	0.7259***	0.6666***	0.8100***	0.1151***	0.4470***	0.6391***	0.7876***
	(12.39)	(27.55)	(27.16)	(26.73)	(21.89)	(20.73)	(2.66)	(15.16)	(20.93)	(23.21)
γ_2	-0.0178*	-0.0462***	-0.0498***	-0.0431***	-0.0426***	-0.0534***	0.0347***	-0.0202***	-0.0384***	-0.0696***
	(-1.92)	(-8.41)	(-8.75)	(-7.43)	(-6.55)	(-6.40)	(3.76)	(-3.21)	(-5.89)	(-9.60)
γ_3	0.3061***	0.3304***	0.3506***	0.3304***	0.2817***	0.4056***	0.1890***	0.2017***	0.3904***	0.4002***
	(11.16)	(20.24)	(20.73)	(19.18)	(14.58)	(16.36)	(6.89)	(10.78)	(20.15)	(18.59)
γ_4	-0.0110***	-0.0207***	-0.0212***	-0.0199***	-0.0193***	-0.0243***	-0.0231***	-0.0098***	-0.0160***	-0.0295***
	(-2.75)	(-8.73)	(-8.62)	(-7.94)	(-6.86)	(-6.73)	(-5.79)	(-3.60)	(-5.66)	(-9.41)
γ_5	-0.0070*	-0.0138***	-0.0141***	-0.0169***	0.0101***	-0.0290***	0.0063	-0.0012	-0.0139***	-0.0166***
	(-1.66)	(-5.49)	(-5.41)	(-6.36)	(-3.40)	(-7.57)	(1.49)	(-0.43)	(-4.64)	(-4.98)
γ_6	0.1668***	0.3593***	0.3453***	0.3381***	0.2379***	0.4726***	0.3400***	0.1162***	0.3751***	0.3031***
	(3.70)	(13.39)	(12.42)	(11.94)	(7.49)	(11.60)	(7.54)	(3.78)	(11.78)	(8.56)
Adj. R^2	0.2218	0.4848	0.4792	0.4711	0.3412	0.3626	0.0819	0.2385	0.4454	0.3578

Taiwan	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	.	0.8667***	0.9639***	0.9250***	0.9675***	0.8792***	0.5310***	0.5910***	0.7634***	1.1152***
		(44.30)	(49.02)	(52.19)	(35.40)	(44.12)	(19.29)	(21.44)	(38.17)	(49.67)
γ_1	.	0.5928***	0.6020***	0.5890***	0.5450***	0.4976***	0.1639***	0.3269***	0.5825***	0.5959***
		(19.19)	(19.39)	(21.04)	(12.63)	(15.81)	(3.41)	(7.51)	(18.44)	(16.81)
γ_2	.	-0.0654***	-0.0605***	-0.0614***	-0.0525***	-0.0405***	-0.0181	-0.0153	-0.0593***	-0.0480***
		(-5.43)	(-5.00)	(-5.62)	(-3.12)	(-3.30)	(-0.88)	(-0.90)	(-4.82)	(-3.47)
γ_3	.	0.2900***	0.3123***	0.2726***	0.1986***	0.2575***	0.0984***	0.2073***	0.3490***	0.3272***
		(17.89)	(19.17)	(18.56)	(8.77)	(15.60)	(4.27)	(9.08)	(21.06)	(17.59)
γ_4	.	-0.0397***	-0.0379***	-0.0297***	-0.0163***	-0.0224***	-0.0036	-0.0197***	-0.0418***	-0.0540***
		(-11.70)	(-11.12)	(-9.66)	(-3.44)	(-6.46)	(-0.75)	(-4.11)	(-12.03)	(-13.86)
γ_5	.	-0.0015	-0.0029	0.0002	0.0063**	0.0051***	-0.0017	-0.0066**	-0.0027	0.0010
		(-0.82)	(-1.59)	(0.12)	(2.43)	(2.72)	(-0.73)	(-2.54)	(-1.42)	(0.47)
γ_6	.	0.2216***	0.2558***	0.1676***	0.1069***	0.1023***	-0.0130	0.2366***	0.2269***	0.2066***
		(11.33)	(13.01)	(9.46)	(3.91)	(5.13)	(-0.46)	(8.59)	(11.35)	(9.20)
Adj. R^2	.	0.3282	0.3668	0.3792	0.1736	0.3024	0.0374	0.1271	0.3637	0.2843

Hong Kong	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	1.7685***	1.4339***	1.3147***	1.3406***	1.5711***	1.3552***	1.0849***	1.1181***	1.2086***	1.5529***
	(24.40)	(46.79)	(56.06)	(62.32)	(33.57)	(55.58)	(17.65)	(27.52)	(55.47)	(46.29)

γ_1	0.8837***	1.0034***	0.9582***	0.7646***	0.8827***	0.8596***	0.8543***	0.9187***	0.8701***	1.0961***
	(8.14)	(21.86)	(27.27)	(23.73)	(12.59)	(23.53)	(9.28)	(15.09)	(26.66)	(21.81)
γ_2	-0.0029	-0.0436***	-0.0462***	-0.0191**	-0.0470**	-0.0304***	-0.0449*	-0.0127	-0.0390***	-0.0724***
	(-0.10)	(-3.65)	(-5.04)	(-2.27)	(-2.57)	(-3.19)	(-1.87)	(-0.80)	(-4.58)	(-5.53)
γ_3	0.2355***	0.2650***	0.2935***	0.2527***	0.2660***	0.2799***	0.3274***	0.2266***	0.2959***	0.3192***
	(4.74)	(12.61)	(18.24)	(17.13)	(8.29)	(16.73)	(7.77)	(8.13)	(19.80)	(13.87)
γ_4	0.0034	-0.0035	-0.0033	-0.0059***	-0.0095**	-0.0061***	-0.0086	-0.0001	-0.0011	-0.0127***
	(0.50)	(-1.20)	(-1.47)	(-2.90)	(-2.16)	(-2.67)	(-1.48)	(-0.04)	(-0.51)	(-4.01)
γ_5	0.0025	-0.0040	0.0018	0.0067***	-0.0059	0.0036	-0.0031	-0.0136***	-0.0013	0.0006
	(0.32)	(-1.23)	(0.73)	(2.92)	(-1.18)	(1.37)	(-0.47)	(-3.14)	(-0.57)	(0.18)
γ_6	0.0700	0.3667***	0.2715***	0.1687***	0.4887***	0.2448***	0.4071***	0.4947***	0.2595***	0.4205***
	(0.86)	(10.65)	(10.30)	(6.98)	(9.29)	(8.94)	(5.90)	(10.84)	(10.60)	(11.16)
Adj. R^2	0.0944	0.3933	0.5163	0.4679	0.1858	0.4563	0.1263	0.2722	0.5344	0.3667

Singapore	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.4557***	1.5908***	1.5436***	1.4634***	1.3216***	1.2169***	0.4708***	2.5254***	0.7215***	2.1290***
	(5.21)	(34.78)	(51.98)	(43.70)	(19.15)	(40.13)	(8.23)	(16.20)	(23.65)	(43.58)
γ_1	0.1097	0.4491***	0.6620***	0.6533***	0.5413***	0.4687***	0.4191***	0.2428	0.4088***	0.4420***
	(0.85)	(8.02)	(18.22)	(15.94)	(6.41)	(12.63)	(5.98)	(1.26)	(10.95)	(7.39)
γ_2	0.0792*	-0.0261*	-0.0171*	-0.0077	-0.0605***	0.0092	-0.0266	-0.1020**	0.0109	0.0130
	(1.77)	(-1.92)	(-1.94)	(-0.77)	(-2.95)	(1.02)	(-1.57)	(-2.24)	(1.20)	(0.90)
γ_3	0.3565***	0.2686***	0.3777***	0.3789***	0.2612***	0.3458***	0.2114***	-0.0024	0.2904***	0.4280***
	(4.14)	(6.10)	(13.22)	(11.76)	(3.93)	(11.85)	(3.84)	(-0.02)	(9.89)	(9.10)
γ_4	-0.0107	0.0177*	-0.0044	0.0026	0.0013	-0.0111*	0.0250**	0.0598	0.0162***	-0.0295***
	(-0.52)	(1.90)	(-0.73)	(0.38)	(0.09)	(-1.80)	(2.15)	(1.64)	(2.60)	(-2.96)
γ_5	0.0122*	0.0350***	-0.0044	0.0101***	0.0255***	0.0117***	-0.0122**	0.1030***	0.0054*	0.0469***
	(1.67)	(7.62)	(-0.73)	(3.01	(3.69)	(3.84)	(-2.12)	(7.14)	(1.76)	(9.57)
γ_6	0.4129***	-0.0875*	-0.0044	0.1168***	0.2169***	0.2170***	0.5093***	-0.3129**	0.2334***	-0.0987*
	(4.05)	(-1.81)	(-0.73)	(3.29)	(2.96)	(6.75)	(8.39)	(-2.01)	(7.21)	(-1.91)
Adj. R^2	0.0576	0.1199	0.3494	0.3078	0.0528	0.2739	0.0845	0.0205	0.2729	0.1323

Malaysia	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.6610***	1.2519***	1.3493***	1.2612***	1.0089***	1.2016***	1.2855***	0.8623***	1.1059***	1.7989***
	(26.35)	(50.11)	(59.69)	(59.94)	(27.50)	(50.75)	(16.67)	(25.50)	(55.11)	(44.80)
γ_1	0.1623***	0.6271***	0.7073***	0.6555***	0.5799***	0.5733***	0.2067**	0.6930***	0.6844***	0.5960***
	(6.20)	(24.05)	(29.97)	(29.84)	(15.14)	(23.20)	(2.57)	(19.63)	(32.67)	(14.22)
γ_2	-0.0098**	-0.0176***	-0.0393***	-0.0286***	-0.0323***	-0.0299***	-0.0214	-0.0287***	-0.0434***	-0.0306***

	(-2.21)	(-4.01)	(-9.87)	(-7.72)	(-5.00)	(-7.16)	(-1.57)	(-4.83)	(-12.29)	(-4.32)
γ_3	0.2496***	0.3777***	0.3345***	0.2999***	0.2319***	0.3497***	0.0302	0.3700***	0.3721***	0.2683***
	(14.32)	(21.76)	(21.29)	(20.51)	(9.10)	(21.26)	(0.56)	(15.75)	(26.69)	(9.61)
γ_4	0.0017	-0.0097***	-0.0063***	-0.0060***	0.0080***	-0.0054***	0.0136***	-0.0094***	-0.0052***	0.0009
	(1.21)	(-6.93)	(-4.99)	(-5.09)	(3.87)	(-4.05)	(3.14)	(-4.98)	(-4.62)	(0.42)
γ_5	-0.0005	0.0043	0.0124***	0.0126***	-0.0011	0.0046*	0.0481***	-0.0046	0.0019	0.0256***
	(-0.19)	(1.64)	(5.18)	(5.66)	(-0.27)	(1.83)	(5.89)	(-1.29)	(0.91)	(6.03)
γ_6	-0.0247	0.0765***	0.0539**	-0.0298	0.1950***	0.0975***	0.1182	0.1696***	0.0758***	0.0179
	(-0.88)	(2.75)	(2.14)	(-1.27)	(4.77)	(3.70)	(1.38)	(4.51)	(3.39)	(0.40)
Adj. R^2	0.1674	0.4308	0.4647	0.4691	0.2211	0.4049	0.0237	0.2989	0.5300	0.1913

Thailand	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.5340***	0.6632***	0.6100***	0.5777***	0.7416***	0.6347***	0.8591***	0.5305***	0.4968***	0.6971***
	(9.78)	(22.60)	(22.86)	(30.77)	(17.64)	(27.91)	(16.17)	(13.09)	(18.27)	(13.99)
γ_1	1.1042***	1.4915***	1.4826***	1.2383***	0.9981***	0.9399***	1.0576***	0.8873***	1.3915***	1.6244***
	(7.07)	(17.79)	(19.44)	(23.08)	(8.31)	(14.46)	(6.97)	(7.68)	(17.90)	(11.41)
γ_2	0.2005**	0.0294	0.0629	-0.0999***	-0.0265	0.0801**	-0.2526***	0.0736	0.0887*	-0.1648**
	(2.20)	(0.60)	(1.41)	(-3.18)	(-0.38)	(2.11)	(-2.85)	(1.09)	(1.95)	(-1.98)
γ_3	0.3710***	0.3344***	0.3214***	0.1943***	0.1866***	0.2032***	0.4144***	0.2807***	0.4435***	0.3563***
	(11.63)	(19.51)	(20.62)	(17.72)	(7.60)	(15.30)	(13.36)	(11.85)	(27.92)	(12.24)
γ_4	-0.0072*	-0.0069***	-0.0019	-0.0021	-0.0056*	0.0037**	0.0043	-0.0009	-0.0014	0.0021
	(-1.73)	(-3.10)	(-0.91)	(-1.48)	(-1.75)	(2.12)	(1.07)	(-0.30)	(-0.69)	(0.55)
γ_5	-0.0046	-0.0027	0.0029	0.0019	0.0012	0.0041*	-0.0073	-0.0042	-0.0054**	-0.0056
	(-0.87)	(-0.95)	(1.10)	(1.02	(0.29)	(1.85)	(-1.40)	(-1.06)	(-2.05)	(-1.14)
γ_6	0.2394***	0.1405***	0.1743***	0.0416**	-0.0487	0.0248	0.0426	0.1142***	0.1665***	0.1288**
	(4.25)	(4.65)	(6.34)	(2.15)	(-1.12)	(1.06)	(0.78)	(2.74)	(5.94)	(2.51)
Adj. R^2	0.1768	0.4162	0.4895	0.4391	0.0998	0.3858	0.1777	0.1898	0.5570	0.2225

Indonesia	Oil&Gas	Basic Mat.	Industrials	Consumer Goods	Healthcare	Consumer Services	Telecom	Utilities	Financial	Technology
α	0.9443***	1.1775***	1.1071***	1.0729***	1.2280***	1.2974***	0.8112***	0.6693***	0.8449***	1.9741***
	(18.94)	(30.63)	(26.52)	(32.31)	(18.48)	(28.29)	(16.82)	(10.81)	(19.68)	(20.52)
γ_1	-0.2013***	1.1693***	1.0979***	1.1901***	0.6723***	1.1397***	-0.2675***	-0.2294*	1.5786***	0.9878***
	(-3.02)	(22.77)	(19.69)	(26.83)	(7.58)	(18.61)	(-4.2	(-1.87)	(27.53)	(7.69)
γ_2	-0.0103	-0.0541***	-0.0201	-0.0651***	0.0648***	-0.0388***	0.0178	0.0609	-0.0572***	-0.0307
	(-0.4)	(-4.36)	(-1.49)	(-6.08)	(3.02)	(-2.62)	(1.16)	(1.06)	(-4.13)	(-0.99)
γ_3	0.2027***	0.3602***	0.3889***	0.3196***	0.2729***	0.2232***	0.0901***	0.0912**	0.4665***	0.3581***
	(6.22)	(14.33)	(14.25)	(14.72)	(6.28)	(7.44)	(2.88)	(2.05)	(16.62)	(5.69)

γ_4	-0.0092**	-0.0027	0.0015	0.0036	0.0004	0.0095**	-0.0019	-0.0077	-0.0131***	-0.0142*
	(-2.14)	(-0.81)	(0.41)	(1.24)	(0.06)	(2.41)	(-0.47)	(-1.09)	(-3.53)	(-1.70)
γ_5	0.0400***	-0.0074*	-0.0128***	-0.0069**	-0.0034	-0.0137***	0.0329***	0.0149***	-0.0312***	-0.0029
	(7.85)	(-1.88)	(-2.99)	(-2.03)	(-0.49)	(-2.92)	(6.84)	(2.95)	(-7.11)	(-0.29)
γ_6	-0.2782***	0.2725***	0.2387***	0.1007***	-0.0363	0.0083	-0.2089***	-0.4186***	0.5543***	-0.3274***
	(-5.19)	(6.59)	(5.32)	(2.82)	(-0.51)	(0.17)	(-4.10)	(-5.69)	(12.01)	(-3.16)
Adj. R^2	0.0347	0.4136	0.4077	0.4699	0.1408	0.2943	0.0220	0.0135	0.4962	0.0690

Note: This table reports the regression results of the CSAD based on the following equation:

$$CSAD_{ind,t} = \alpha + \gamma_1 \left|R_{ind\_maket,t}\right| + \gamma_2 R^2_{ind\_market,,t} + \gamma_3 \left|R_{m,t}\right| + \gamma_4 R^2_{m,t} + \gamma_5 R^2_{US,t-1} + \gamma_6 CSAD_{US,t-1} + \varepsilon_{ind,t} \quad (5)$$

where $R_{ind\_excess,t} = R_{ind,t} - E(R_{ind,t})$, and $E\left(R_{ind,t}\right)$ is the expected industry return calculated by CAPM: $E\left(R_{ind,t}\right) = \alpha + \beta R_{m,t}$.[46] $R^2_{US,t-1}$ is the lagged US stock market return squared and $CSAD_{US,t-1}$ is the lagged stock return dispersion in the US market.[47]

The equation is estimated for each of the 10 industries: Oil & Gas, Basic Materials, Industrials, Consumer Goods, Health care, Consumer Services, Telecommunications, Utilities, Financials, and Technology in nine Asian markets: Japan (JP), China (CN), South Korea (KR), Hong Kong (HK), Taiwan (TW), Singapore (SG), Indonesia (ID), Malaysia (MY), and Thailand (TH). The data range from 7/19/1993 through 7/17/2013 for China, Korea, Hong Kong, Singapore and Taiwan and from 12/20/1993 through 12/19/2013 for Japan, Malaysia, Thailand, and Indonesia. Taiwan's Oil & Gas industry was dropped because it has too few firms. The numbers in parentheses are t-statistics. *,**,*** denote statistical significance at the 10%,5%, and 1% levels, respectively.

[46] α and β for each industry of each market are estimated by using the industry return, regressing them on market returns for the entire data set of 20 years.

[47] Because of the time lag, we use lagged U.S. stock market variables.