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An Examination of Herd Behavior in the Indonesian Stock Market

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We examine herd behavior in Indonesian Stock Exchange, using daily and weekly stocks return from 2007 until 2010. We employ the cross sectional standard deviation of returns (CSSD) methodology developed by Christie and Huang (1995) and cross sectional absolute dispersion (CSAD) methodology developed by Chang et al. (2000) to detect the presence of herd behavior. Using daily and weekly CSSD, we document the nonexistence of herding behavior in Indonesian stock market. However, using CSAD of either data frequency the result demonstrates the presence of herding behavior, particularly on big capitalization and liquid stocks. The result differs from Chang et al. (2000) who find no different impact of herding behavior across size-based portfolios.

Keywords: *Herd behavior, equity return dispersion*

Introduction

Although it has been strongly argued that Indonesian economy is relatively strong compared to major developed economies, the 2008 global economic shock apparently has caused a bigger price decline in Indonesian stock market compared to the US stock market, where the root of the problem is. The credit and housing crisis suppress the US economy which in turn cause a plunge in the stock market which is started on October 2007 – when the Dow Jones Index reached its highest level – and reached (or presumably has reached) its bottom in March 2009. It took around one and a half year for the index a decline of 51.1 percent from its top. In contrast with Indonesia, Indonesian composite index (ICI) unpredictably dropped 60.7 percent in just less than ten months, from its top in January 2008 to October 2008 when it reached its bottom.

During the global economic downturn, Indonesia evidently exhibits a strong domestic growth where it still experiences a moderate positive growth while major economies suffer recession. Indonesia's strong resistance to global economic crisis is because its GDP structure, which is composed majorly of domestic consumptions, accounts around 65 percent of its GDP. This fact in some means support the idea of economic decoupling which attracted many economist interest just before the crisis. However, as mentioned before, there was a perplexing reality regarding the Indonesian stock market movement at some point in the global economic downturn.

One way to argue with this, there is a high probability that Indonesian stock market has

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experienced a herd behavior. Banerjee (1992) defines herd behavior as how investors make investment decision by mimicking other investors rather base on their own information. However, it is still not clear what causes herd behavior. Some academic researches argue that it is rational and intrinsic, while others say that it violated the rational capital asset pricing theory.

In this paper, we study the possibility of herd behavior during a market crash by examining Indonesian stock market in 2008 financial crisis and aftermath. We rework the study conducted by Christie and Huang (1995) and Chang et al. (1999) that use the dispersion of individual stock returns to the market return as a measure of herd behavior.

We use both cross sectional standard deviations (CSSD) and cross sectional absolute deviations (CSAD) measures to identify the existence of herd behavior in Indonesian equity market. We focus on the 2008 financial crisis and the aftermath. Examining herd behavior in that period of time is interesting since when the market crash in 2008 happened, major macroeconomic factors showed strong fundamental. There was a strong argumentation suggesting that the market decline was caused by herd behavior following the action of foreign investors that pull out their investment to raise more capital to fulfill regulatory requirements.

We also expanded the work of Christie and Huang (1995) and Chang et al. (1999) by using not only daily returns, but also weekly returns. We use a lower frequency data to explore the extension of time of herd behavior should it occurs. In addition, we perform the tests over liquid (big size) stocks as part of the rework of Chang et al. (1999), that investigate asymmetric effect of herd behavior based on the findings documented by McQueen et al. (1996), who discover that small stocks tend to react slower to response good news.

Literature Review

Bikhchandani and Sharma (2000) documented several studies that suggest herd behavior is rational: Banerjee (1992), Bikhchandani et al. (1992), and Welch (1992), who suggest herd behavior is information based and cascade; Scharfstein and Stein (1990) argue that investment managers who engaged in herding suppress their confidence on their ability in managing portfolio and follow other actions instead; and Maug and Naik (1996) that explore the possibility of investors or investment agents whose compensation is tied on their performance over a benchmark(s) could make investment decisions solely to mimic the benchmark portfolio.

Christie and Huang (1995) carried out an empirical test over herd behavior in the US equity market, employing cross sectional standard deviations (CSSD) of returns. They suggest that when herding takes place, that is, when investors create investment decisions by following others and curb their own beliefs or their own information, individual stock returns will not deviate considerably from the overall market return, indicated by smaller CSSD than normal.

Chang et al. (1999) extended the work of Christie and Huang (1995) in at least two ways. *First*, instead of using CSSD, Chang et al. (1999) use cross sectional absolute deviations (CSAD) of returns to measure the existence of herd behavior. The basic idea of CSAD is to calculate the deviation of expected market return and expected individual stock returns that calculated using the Black (1972) CAPM. *Secondly*, they introduce a non-linear regression specification to describe the occurrence of extreme herding.

Research Method

Method

In this section, we use the empirical methodology proposed by Christie and Huang (1995), henceforth referred as CH, and by Chang et al. (1999), henceforth referred as CKK, to detect the presence of herd behavior in Indonesian equity market. CH propose the use of cross sectional standard deviation of returns to detect herd behavior, whereas CKK suggest the use of cross sectional absolute deviation of returns. CKK has came to the conclusion that the two methods are analogous in spirit, but do not always reach the similar conclusion.

The rational of asset pricing models suggest that the dispersion of individual stock returns and market return is determined by its sensitivity to the market return. On the contrary, CH argue that in the event of herding, investors tend to curb their own belief on the performance of individual stock and emphasize their investment decisions on collective actions of the market. Hence, individual returns will not diverge too far from the market return. To quantify the dispersions of individual returns from market return, CH suggest the use of CSSD, which measure is defined as:

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

where N is the number of stocks in the aggregate market portfolio, $R_{i,t}$ is the observed individual stock return i at time t, and $R_{m,t}$ is the cross sectional average of the returns in the market portfolio. Throughout herding event, the dispersion of cross sectional returns is expected to increase at a decreasing rate and may lead to the decrease in the case of extreme herding. Thus, to empirically scrutinize the presence of herd behavior, CH make use of the following formulation:

$$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + e_t \quad (2)$$

where D is a dummy variable set to represent market extreme condition, where D_t^L will equal to 1 if the market return lies in the extreme lower tail of the distribution and equal to 0 otherwise; and D_t^U will equal to 1 when the market return lies in the extreme upper tail of the distribution and equal to 0 otherwise. CH uses one and five percentiles of the distributions to define extreme market price movements.

A negative and statistically significant β^L suggests an increasing at decreasing rate of cross sectional returns dispersion during extreme market downtrend whilst negative and statistically significant β^U suggest an increasing at decreasing rate of cross sectional returns dispersion at the time of extreme market uptrend. Both β^L and β^U in the empirical model indicate linear relationships between market return and cross sectional returns dispersion.

In line with the work of CH, CKK based their examination of herd behavior on the measure of dispersion. Having said that, CKK employ cross sectional absolute deviation (CSAD) of returns as the measure of dispersion. To demonstrate the relationship between CSAD and the market return, CKK use the conditional version of Black (1972) CAPM expressed as follows:

$$E_t(R_i) = r_f + \beta_i E_t(R_m - r_f) \quad (3)$$

where r_f is the return of risk free rate and β_i measures the sensitivity of individual stock returns to market movement. Using the same formulation, we can approximate the market return as follows:

$$E_t(R_m) = r_f + \beta_m E_t(R_m - r_f) \quad (4)$$

The dispersion of individual returns and market return can be expressed as the absolute difference between both equations (3) and (4):

$$\textit{Absolute Value of the Deviation } (AVD_{i,t}) = |\beta_i - \beta_m| \, E_t(R_m - r_f) \quad (5)$$

The expected cross sectional absolute deviation (ECSAD) of returns in period t can then be expressed as:

$$ECSAD_t = \frac{1}{N}\sum_{i=1}^{N} AVD_{i,t} \quad (6)$$

CKK differentiated their work from that of CH by relaxing the assumption of linear relationship between market return and the ECSAD and add a non-linear term in their empirical model. Moreover, to capture the possibility of asymmetric responses from market participants in the event of herding, CKK suggest that empirical test should be carried out both respectively at the time of market up-movement and at the time of down-movement. To perform such assessment, CKK advise the following specification:

$$ECSAD_t^{UP} = \alpha + \beta_1^{UP} R_{m,t}^{UP} + \beta_2^{UP}(R_{m,t}^{UP})^2 + e_t \quad (7a)$$

Table 1. Summary statistics of daily market return (R_m) and CSSD and CSAD measures

Variables	Mean (%)	Standard deviation (%)	Minimum (%) (Date)	Maximum (%) (Date)
Rm	0.34	1.25	-5.06 (13 Oct 08)	4.88 (25 May 10)
CSSD	8.43	2.04	3.78 (25 Sep 09)	16.57 (13 Oct 08)
CSAD	0.15	0.05	0.07 (04 Feb 09)	0.23 (10 Mar 10)

Table 2. Summary statistics of weekly market return (R_m) and CSSD and CSAD measures

Variables	Mean (%)	Standard deviation (%)	Minimum (%) (Date)	Maximum (%) (Date)
Rm	0.73	2.90	-10.39 (10 Oct 08)	8.05 (8 May 10)
CSSD	12.46	2.97	5.55 (2 Jan 2009)	27.42 (01 Aug 08)
CSAD	0.29	0.31	0.23 (12 Dec 08)	0.74 (24 Mar 10)

$$ECSAD_t^{DOWN} = \alpha + \beta_1^{DOWN} R_{m,t}^{DOWN} + \beta_2^{DOWN} (R_{m,t}^{DOWN})^2 + e_t \quad (7b)$$

The test suggests that negative and statistically significant β_1 and β_2 coefficients indicate that the dispersion of stock returns increase at a decreasing rate in either during market uptrend and/or market downtrend. The non-linear term of the empirical model facilitate the identification of herd behavior in the period of market rallies and/or market sell-offs.

Even though both the methods proposed by CH and CKK share the similar main idea, the two methods may reach different conclusion.

Data

In their paper, both CH and CKK use daily data to examine the presence of herd behavior in the international equity market. To extend their findings, we use weekly data in addition to daily data. We gather stock prices data for the entire population of listed Indonesian firms in the Indonesian Stock Exchange (IDX) from Yahoo Finance. We choose the period of July 2007–June 2010 mainly to capture the recent market turmoil (2008) and examine whether herd behavior took place. In determining the sample for our analysis we include stocks that satisfy the following criteria: (i) stocks that exist during the period of the observation (July 2007–June 2010) and (ii) data availability; and we found 282 stocks that satisfied the above-mentioned criteria. We use the 282 samples portfolio as proxy for the market portfolio – calculated as an equally-weighted index return. We use the first year data to calculate ECSAD and use the ex post data to examine herd behavior. For the sake of comparison, we use the same ex post data to evaluate herd behavior using CSSD measure.

On top of that, we also investigate the existence of herd behavior in big market capitalization portfolio using stocks listed in the LQ45 consists of 45 companies with the highest market capitalization and with the highest transaction value. Because the LQ45 index is updated every six month, we only select stocks that existed in the LQ45 list during the period of observation. Given the consideration, there were only 16 firms that remained in the list during the observation. As the proxy for risk-free instrument we choose the one-month *Sertifikat Bank Indonesia* (SBI) – discounted fixed income instrument issued regularly by the central bank of Indonesia.

Result and Discussion

Descriptive statistics

In this section we present descriptive statistics for market returns, CSSD, and CSAD measures both for daily and weekly data. From the summary in Table 1 we can see that market sell-off in Indonesian Stock Exchange in 2008 happened on October 13th 2008, when the market portfolio experienced the worst daily decline (in the observation period) for about 5.06 percent. Along with this extreme market downturn, CSSD measure also recorded at the

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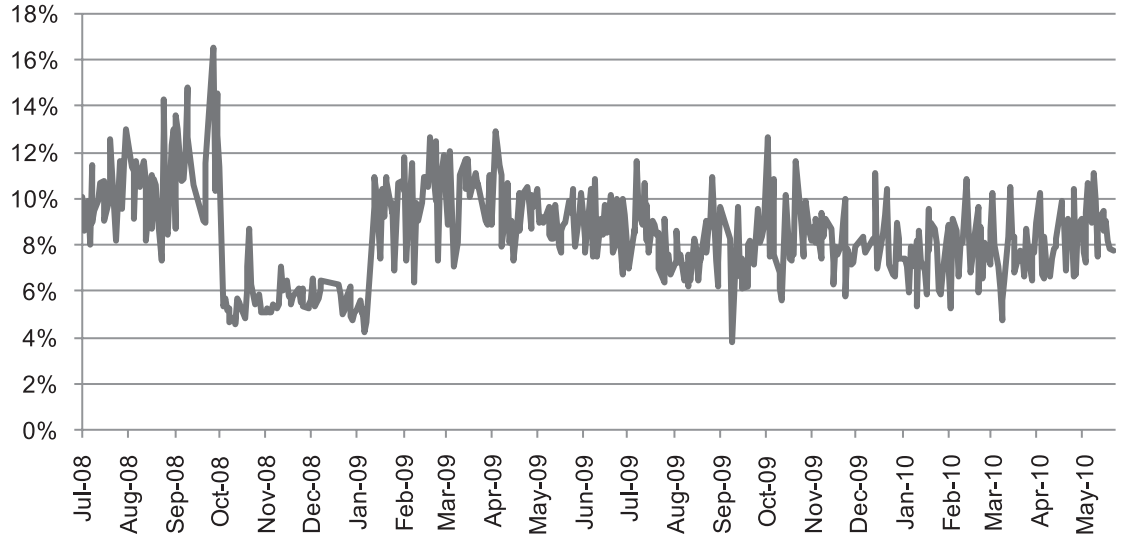

Figure 1. Cross sectional standard deviations (CSSD) of market returns from July 2008 until June 2010

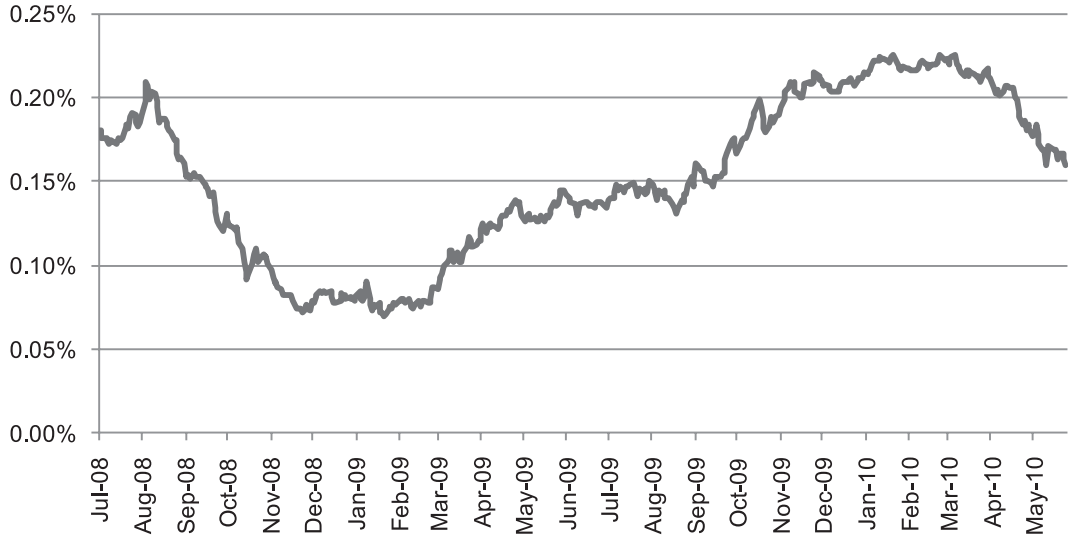

Figure 2. Cross sectional absolute deviations (CSAD) of returns from July 2008 until June 2010

Table 3. Summary statistics of daily liquid stocks' return and CSSD and CSAD measures

Variables	Mean (%)	Standard deviation (%)	Minimum (%) (Date)	Maximum (%) (Date)
Rm	0.17	2.95	-9.78 (03 Feb 09)	13.62 (11 Nov 09)
CSSD	4.83	2.89	1.06 (03 Mar 10)	22.18 (14 Aug 08)
CSAD	0.10	0.08	-0.08 (02 Dec 08)	0.27 (28 Oct 09)

Table 4. Summary statistics of weekly liquid stocks' return and CSSD and CSAD measures

Variables	Mean (%)	Standard deviation (%)	Minimum (%) (Date)	Maximum (%) (Date)
Rm	14.00	7.87	-21.40 (18 Jul 08)	20.92 (09 Jan 09)
CSSD	5.32	2.78	1.46 (09 Jan 09)	16.00 (15 May 09)
CSAD	0.22	3.80	-8.78 (19 Jul 08)	16.73 (07 Nov 08)

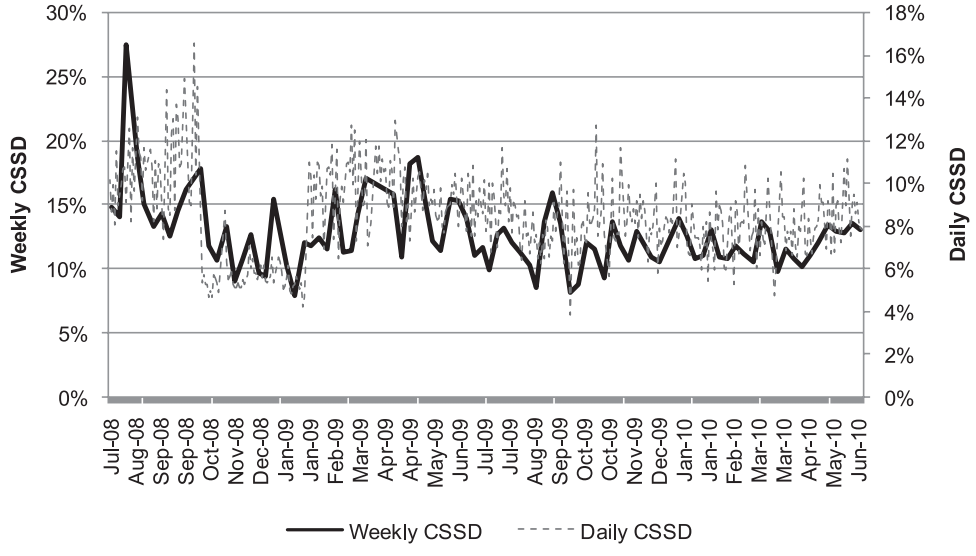

Figure 3. Comparison of daily and weekly cross sectional standard deviations (CSSD) of return from July 2008 until June 2010

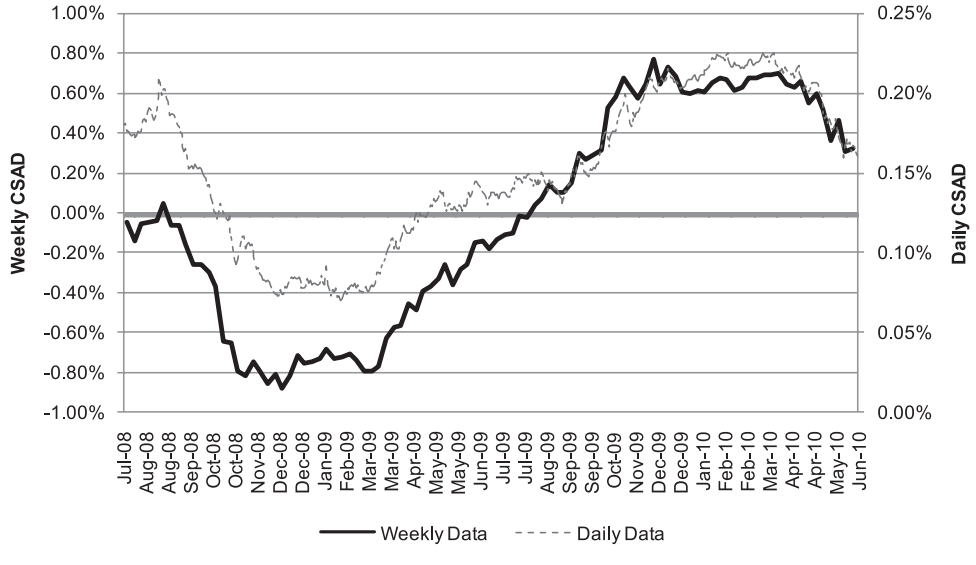

Figure 4. Comparison of daily and weekly cross sectional absolute deviations (CSAD) of return from July 2008 until June 2010

highest on October 13th 2008 (16.57 percent), which tell us that the market sell-off was not caused by herd behavior.

However, this is not the case with liquid stocks when a deep market correction in February 2009 is preceded with a herding as indicated by the lowest daily CSAD in December 2008 (Table 3). But as can be seen in Table 3, there is a conflicting result between CSAD and CSSD measures, where the highest CSSD measure is recorded in August 2008. Hence, a statistical analysis plays an important role in determining whether the corresponding measure is valid.

Furthermore, as we can observe in Figure 1, prior to the market crash, CSSD measures were rising, indicating that investors had a strong confidence regarding individual stock performance over market portfolio performance. We also can see in post market crash, CSSD measures fell at their lowest level until January 2009, suggesting that investors had suppressed their confidence on individual stock performance

Table 5. Regression results of the daily and weekly cross sectional standard deviations (CSSD) of market returns and liquid stocks portfolio returns

Data frequency	Market portfolio			Liquid stocks portfolio		
	α	β^L	β^U	α	β^L	β^U
Daily returns	0.080	0.020	0.020	0.042	0.040	0.093
	(87.56)*	(2.74)*	(2.48)*	(32.86)*	(3.29)*	(7.64)*
Weekly returns	0.120	0.080	0.060	0.050	0.030	-0.040
	(42.91)*	(2.95)*	(2.23)*	(18.16)*	-1.17	(-1.36)

This table reports the estimated parameters of the following regression model:

$CSSD_t = \alpha + \beta^L D_t^L + \beta^U D_t^U + e_t$

where D_L=1 if market returns on day t lies below the 1% percentile of the returns distribution and equals to zero otherwise and in the same manner D_U=1 if market returns on day t lies above 99% percentile of the distribution and equals to zero otherwise.

* denotes that the coefficient is significant at the 5% level

** denotes that the coefficient is significant at the 10% level.

and focus their concentration to market reaction instead.

The same finding can also be seen from the observation of the CSAD measures (Figure 2). Prior to the market fallback, investors' confidence regarding individual stocks was mounting as indicated by the increasing CSAD measures. Subsequently, investors' confidence on individual stocks deteriorated until March 2009. Albeit graphical analysis advises the ability of dispersion measures to predict the presence of herd behavior, proper statistical test should be carried out. Formal statistical test result will be discussed in the next section.

In this paper, we also examine whether using weekly returns instead of daily returns will result in different outcome. Graphically, as can be seen in Figure 3 and Figure 4, both data frequency suggest the same result that both daily and weekly exhibit similar pattern over time.

Statistical results

Regression analysis on cross sectional standard deviations (CSSD) of returns

We exercise the method proposed by CH to investigate the existence of herd behavior in Indonesian stock market by introducing dummy variables of extreme market uptrend and extreme market downtrend. We analyze the dummy variables coefficients to determine whether the dispersions of returns had increased with a decreasing rate as suggested in the event of herding. Using both daily and weekly data frequency, we document positive and statistically significant β^L and β^U, demonstrating that stock returns dispersions empirically increase rather than decrease in both directions of extreme market movement. This outcome tells us that there was no herding during the market crash in Indonesia in 2008 even though graphical interpretation suggest otherwise.

The regression analysis result on the daily returns of liquid stocks portfolio does not differ from that of market portfolio. This result suggests that there is no relationship between portfolio size (or liquidity) and herd behavior. We documented all the CSSD regression model parameter estimates in Table 5.

Regression analysis on cross sectional absolute deviations (CSAD) of returns

The key in estimating CSAD lies in the estimation of the portfolio beta. In this paper we use the single index model to estimate beta of each portfolio. Due to the difference in data frequency, the estimated individual betas and portfolio betas using daily returns also different from that of weekly returns. The estimated beta of the market portfolio using daily data is 0.78 while the estimated beta of the market portfolio using weekly returns is 0.86.

To pursue further analysis, we estimate the beta of the stocks in the liquid stocks portfolio using the portfolio return as market proxy. The estimated beta using this approach results in higher betas than that of market portfolio. The estimated portfolio beta for both daily and weekly data is equal to 1.00. For that reason, as we can see in Table 3 and Table 4, the estimated CSAD measure using liquid stocks portfolio tends to greater than the one estimated using market portfolio.

Table 6. Regression results of the daily and weekly cross sectional absolute deviations (CSAD) of market returns

Data frequency	Up			Down		
	α	β^L	β^U	α	β^L	β^U
Daily returns	0.002	-0.016	0.222	0.002	-0.006	0.115
	(27.48)*	(-1.80)**	-0.85	(23.08)*	(-0.59)	-0.39
Weekly returns	0.003	0.020	-0.856	0.003	0.003	-0.223
	(3.94)*	(0.32)	(-0.98)	(2.81)*	-0.05	(-0.32)

This table reports the estimated parameters of the following regression model:

$ECSAD_t^{UP} = \alpha + \beta_1^{UP}\left|R_{m,t}^{UP}\right| + \beta_2^{UP}(R_{m,t}^{UP})^2 + e_t$

$ECSAD_t^{DOWN} = \alpha + \beta_1^{DOWN}\left|R_{m,t}^{DOWN}\right| + \beta_2^{DOWN}(R_{m,t}^{DOWN})^2 + e_t$

where

$\left|R_{m,t}^{UP}\right|$ is the absolute value of an equally-weighted return of all available securities† on day *t* when market is up;

$\left|R_{m,t}^{DOWN}\right|$ is the absolute value of an equally-weighted return of all available securities† on day *t* when market is down;

$(R_{m,t}^{UP})^2$ is the squared value of $\left|R_{m,t}^{UP}\right|$ term and $(R_{m,t}^{DOWN})^2$ is the squared value of $\left|R_{m,t}^{DOWN}\right|$ term.

* denotes that the coefficient is significant at the 5% level

** denotes that the coefficient is significant at the 10% level.

† denotes all securities that existed in the list of Indonesian Composite Index (ICI) during the observation period (July 2007 – June 2010)

Table 7. Regression results of the daily and weekly cross sectional absolute deviations (CSAD) of liquid stocks portfolio

Data frequency	Up			Down		
	α	β^L	β^U	α	β^L	β^U
Daily returns	0.001	0.014	-0.053	0.001	0.002	0.024
	(9.46)*	(3.94)*	(-3.28)*	(10.12)*	(0.36)	0.41
Weekly returns	0.013	1.073	-4.046	-0.004	-0.465	-0.148
	(-1.95)**	(5.49)*	(-4.07)*	(-0.79)	(-3.29)*	(-0.25)

This table reports the estimated parameters of the following regression model:

$ECSAD_t^{UP} = \alpha + \beta_1^{UP}\left|R_{m,t}^{UP}\right| + \beta_2^{UP}(R_{m,t}^{UP})^2 + e_t$

$ECSAD_t^{DOWN} = \alpha + \beta_1^{DOWN}\left|R_{m,t}^{DOWN}\right| + \beta_2^{DOWN}(R_{m,t}^{DOWN})^2 + e_t$

where

$\left|R_{m,t}^{UP}\right|$ is the absolute value of an equally-weighted return of all available liquid stocks †† on day *t* when the portfolio return is positive;

$\left|R_{m,t}^{DOWN}\right|$ is the absolute value of an equally-weighted return of all available liquid stocks †† on day *t* when the portfolio return is negative;

$(R_{m,t}^{UP})^2$ is the squared value of $\left|R_{m,t}^{UP}\right|$ term and $(R_{m,t}^{DOWN})^2$ is the squared value of $\left|R_{m,t}^{DOWN}\right|$ term.

* denotes that the coefficient is significant at the 5% level

** denotes that the coefficient is significant at the 10% level.

†† denotes all securities that existed in the list of LQ45 Index during the observation period (July 2007 – June 2010)

During the beta estimation, we also found several stocks which beta regression results are not significant. In these cases, we assume for those stocks that fail to reject the hypothesis, their returns depend on the market return, measured by beta as a sensitivity measure, to have beta equals to zero.

Table 6 provides empirical results using the regression analysis of CSAD of market returns as formulated in equation (7a) and (7b). The formula incorporated non-linearity in dispersions of returns. A negative and statistically significant parameter coefficient suggests the evidence in favor of herd behavior in the market. As we can see, during the market uptrend, β_1^{UP} is significant at ten percent level, indicating that investors tend to stem their credence on individual stocks performance and weigh more on market directions. Having said that, the parameter estimate of β_2^{UP} is statistically insignificant, providing no confirmation of any non-linearity in the dispersions and market return relationships. This means that herd behavior might exist during relatively normal upward market direction but not in the event of market rallies.

Even though there is an evidence that herd behavior happened throughout the observation period using daily data, the regression results of β_1^{UP} and β_2^{UP} of weekly returns are not significant, which advise that herd behavior occurs in a very short period of time.

During market correction, however, both parameter of linear (β_1^{UP}) and non-linear (β_2^{UP}) terms of the regression model are not significant, suggesting that the rational capital asset pricing model holds. In line with CKK findings, the average level of individual stocks deviations to market returns (as measured by parameter α) is near zero (0.2 percent for daily returns and 0.3 percent for weekly returns).

McQueen et al. (1996) examined and discovered in their research that stock's market

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capitalization has no influence on how quick investors react on bad news. However, they found evidence indicating that responses on good news is more rapid on big companies. Therefore, we expect that the result of the regression analysis of large cap stocks portfolio, using liquid stocks in LQ45 index as a proxy, during market downtrend will not provide conflicting result with that of regression analysis on market portfolio. Table 7 shows that both β_1^{DOWN} and β_2^{DOWN} are not statistically significant, which is similar to the case of the relationship between market portfolio and the corresponding CSAD.

On the contrary, in market upward direction, big size stocks are supposed to react more rapidly on news rather than smaller size stocks. Hence, when the market is up, investors are expected to emphasize their decision on individual stocks performance, which means the absence of herd behavior. We see in Table 6 that β_1^{UP} parameter for liquid stocks portfolio $CSAD_t$ is not statistically significant, suggesting that has not increased at a decreasing rate as the average portfolio price movement increases. That being said, herd behavior was present in the event of market rally as indicated by a negative and statistically significant β_2^{UP}.

We also find that the event of herding precedes a longer period of time for big size stocks. The parameter of linear and non-linear term of the regression model during market up using weekly returns are both negative and statistically significant which contradicts the previous explanations of McQueen et al. (1996). The regression result suggests that weekly returns exhibited herd behavior during normal market uptrend as well as during market rally.

Conclusion

This study analyzes the herd behavior of market participants in Indonesia in the financial crisis in 2008 and aftermath. We use two empirical models cross sectional standard deviations (CSSD) and cross sectional absolute deviations (CSAD) which are proposed by Christie and Huang (1995) and Chang et al. (1999), respectively.

Our empirical test using CSSD method suggests the absence of herd behavior during the crisis in 2008 and aftermath even though graphical interpretations of $CSSD_t$ indicated otherwise. The result is consistent in both of daily and weekly data. Our result also shows that $CSSD_t$ has neither linear nor non-linear relationships with liquid stocks portfolio as it is with market portfolio.

Our empirical test also aligned with that of Chang et al. (1999) which suggests that the analysis using $CSSD_t$ and $CSAD_t$ can provide conflicting results. Using daily $CSAD_t$, we provide evidence of herd behavior of composite stocks during normal market uptrend. Nevertheless, liquid or big size stocks do not exhibit herd behavior during both market downtrend and uptrend, as suggested by the findings of McQueen et al. (1996) that big size stocks react more rapidly on good or bad news. Hence, in either market directions, in making investment decisions on big size stocks, an investor tends to weigh more on individual performance over market sentiment.

Nonetheless, we also arrive to contradictive result for the herd behavior in a longer analysis horizon. We found that in an upward direction, big size stocks experienced herd behavior in normal and intense up movement. Herd behavior was also present during normal market downturn, but not existed during extreme one. Regression results using CSAD on weekly returns introduce the possibility of herd behavior occurs in a longer investment horizon. But this findings needs further confirmation either using greater frequency or longer observation period.

References

Banerjee, A.V. (1992), A Simple Model of Herd Behavior, *The Quarterly Journal of Economics*, 1992, 797–817.

Bikhchandani, S. and Sharma, S. (2000), Herd Behavior in Financial Markets: A Review, *IMF Working Paper*, WP/00/48.

Bikhchandani, S., Hirshleifer, D., and Welch, I. (1992), A Theory of Fads, Fashion, Custom and Cultural Change as Informational Cascades, *Journal of Political Economy*, 992–1026.

Black, F. (1972), Capital Market Equilibrium with Restricted Borrowing, *Journal of Business*, 45, 444-454.

Chang, E.C., Cheng, J.W., and Khorana, A. (2000), An Examination of Herd Behavior in Equity Markets: An International Perspective, *Journal of Banking & Finance*, 165-1679.

Christie, W.G. and Huang, R.D. (1995), Following the Pied Piper: Do Individual Returns Herd around the Market?, *Financial Analysts Journal*, July-August, 31-37.

Maug, E. and Naik, N. (1996), *Herding and Delegated Portfolio Management*, mimeo, London Business School.

McQueen, G., Pinegar, M.A., and Thorley, S. (1996), Delayed Reaction to Good News and the Cross-autocorrelation of Portfolio Returns, *Journal of Finance*, 51, 889-919.

Scharfstein, D. and Stein, J. (1990), Herd Behavior and Investment, *American Economic Review*, 465-479.

Welch, I. (1992), Sequential Sales, Learning and Cascades, *Journal of Finance,* 695-732.

https://scholarhub.ui.ac.id/icmr/vol4/iss1/1
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