



## Herd behavior of the overall market: Evidence based on the cross-sectional comovement of returns

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### ABSTRACT

Employing the cross-sectional dispersion of returns as a measure detecting the herd behavior of the overall market, previous studies have reported mixed evidence of herding during periods of large price movements in the US stock markets. We reexamine the herd behavior of the overall market by employing a new measure of herding based on the cross-sectional comovement of returns in excess of its expected value under an assumed asset pricing model. Employing the proposed measure based on either the capital asset pricing model or the Fama-French three factor model during the period 7/1963–12/2014, we find strong evidence of herding during periods of mid to large negative price movements, but weak or no evidence of herding during periods of positive price movements. The recent US sub-prime crisis period is an exception because during the period no significant evidence of herding is found. We also find evidence that properly accounting for the effects of an assumed asset pricing model when calculating the herding measure is important and that the herding behavior of the overall market is likely to be driven by the contemporaneous market-wide information.

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### 1. Introduction

The herding behavior of market participants has long been of particular interest to academics, practitioners, and policy makers because it may drive security prices away from their equilibrium values and lead to excess volatility and market instability<sup>1</sup>. There have been two strands of empirical studies on the herding behavior in equity markets. One strand of study has focused on the herding behavior of a certain group of market participants—institutional investors and analysts—by analyzing either institutional investors' security holding or trading data or analysts' earnings forecast or recommendation data. The other strand of study, dating back to Christie and Huang (1995) (CH hereafter), has focused on the herding behavior of the overall market by using a measure of the cross-sectional *dispersion* of individual stock returns. This paper falls within the latter strand. In this paper, we propose a new measure of herding of the overall market, which is based on the cross-sectional excess *comovement* of individual stock returns. Employing the proposed measure, we reexamine the herding behavior of the United States (US) stock market during the period of July 1963 to December 2014.

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<sup>1</sup> Herding can be considered rational or irrational (e.g., Bikhchandani & Sharma, 2001; Devenow & Welch, 1996). Herding based on non-informational reasons, such as herding due to career concerns or reputation (e.g., Scharfstein & Stein, 1990; Trueman, 1994), is considered an irrational investment behavior. On the other hand, herding based on informational reasons, such as herding due to correlated signals (e.g., Froot, Scharfstein, & Stein, 1992; Hirshleifer, Subrahmanyam, & Titman, 1994) or information cascade (e.g., Welch, 1992), is considered a rational investment behavior.

In the literature, the two most widely used measures of herding of the overall market are the cross-sectional standard deviation of returns (CSSD hereafter) defined by

$$\text{CSSD} = \sqrt{\frac{\sum_{i=1}^n (r_i - \bar{r})^2}{n-1}}, \quad (1)$$

where  $r_i$  is the observed return on stock  $i$  and  $\bar{r}$  is the cross-sectional average of the  $n$  stock returns, and the cross-sectional mean absolute deviation of returns (CSAD hereafter) defined by

$$\text{CSAD} = \frac{\sum_{i=1}^n |r_i - \bar{r}|}{n}. \quad (2)$$

CH argue that the capital asset pricing model (CAPM) predicts that the CSSD will increase with the absolute value of the market return because the predicted individual security return is the market beta times the market return, assuming a zero risk-free rate; on the other hand, in the presence of herding, where investors are willing to suppress their own beliefs in favor of the market consensus, security returns will be swept along with the market, so the CSSD is predicted to be significantly lower than the CAPM predicts it should be. Using the CSSD as a measure of herding during the period 7/1962–12/1988, CH find that both daily and monthly stock returns in the US are inconsistent with the presence of herding during periods of both large positive and large negative price movements.

Chang, Cheng, and Khorana (2000) (hereafter CCK) extend the work of CH and argue that, when the assumed rational asset pricing model is the CAPM and there is no herding in the market, the CSAD should be linear in the absolute value of the market return; on the other hand, in the presence of herding, the CSAD will increase at a decreasing rate (or decrease) with an increase in the absolute value of the market return. Using the CSAD as a measure of herding during the period of 1/1963–12/1997, CCK also find no evidence of herding in US daily stock returns during periods of both large positive and large negative price movements.

Using the CSSD and CSAD measures, many subsequent studies have reexamined evidence of herding in the US stock markets during periods of large price movements and reported mixed evidence. Some find evidence of herding including: Chiang, Li, Tan, and Nelling (2013) for daily stock returns during the period 7/1997–12/2008; and Galariotis, Rong, and Spyrou (2015) for daily stock returns during the period 10/1989–4/2011, when important macroeconomic information is released.<sup>2,3</sup> However, others find no evidence of herding including: Gleason, Mathur, and Peterson (2004) for tick by tick intraday returns of nine sector ETFs during the period 1/1999–9/2002; Chiang and Zheng (2010) for daily industry returns during the period 4/1988–4/2009; Chen (2013) for daily stock returns during the period 1/2000–12/2009; and Bohl, Klein, and Siklos (2014) for daily stock returns during the period 7/2008–8/2008, when there was a ban on naked short-selling.<sup>4</sup>

One reason for the inconclusive empirical evidence would be that no evidence of herding based on either the CSSD measure or the CSAD measure should be interpreted as meaning that what is rejected is *herding towards the market*, which is one form of herding (Bikhchandani & Sharma, 2001; Spyrou, 2013). For example, Bikhchandani and Sharma (2001) argue that the CH test (and the CCK test)<sup>5</sup> should be regarded as a gauge of a particular form of herding and the absence of evidence against this form of herding should not be construed as showing that other types of herding do not exist.

In the literature, herding is defined as investors *trading in the same direction* following each other over a certain period of time (e.g., Lakonishok, Shleifer, & Vishny, 1992; Nofsinger & Sias, 1999; Sias, 2004; Wermers, 1999). That is, herding is usually defined in terms of the *direction of trades* of investors. This suggests that the presence of herding is likely to manifest itself in the form of the synchronicity of stock price movements. Following this line of reasoning, we propose a new measure of herding of the overall market defined as the difference between the fraction of stocks whose prices rise (or fall) and the expected value of that fraction based on an assumed rational asset pricing model.<sup>6</sup> We call this the cross-sectional excess comovement of returns, or simply the CSC hereafter.

<sup>2</sup> In Galariotis et al. (2015), important macroeconomic events include: changes in the federal funds rate; the release of the unemployment rate; the release of the inflation rate, etc.

<sup>3</sup> Hwang and Salmon (2004) is another notable study. Employing the cross-sectional dispersion of stock sensitivities to common risk factors as a measure of herding, they find evidence of herding towards the market in both bull and bear markets.

<sup>4</sup> Other studies that use the CSSD and CSAD measures to examine evidence of herding in the non-US or international stock markets include: Blasco and Ferreruela (2008) in seven international markets; Demirel, Kutun, and Chen (2010) in the Taiwanese market; Economou, Kostakis, and Philippos (2011) in four south European markets; Gebka and Wohar (2013) in 32 international markets; Klein (2013) in the US and Eurozone markets; Lee, Chen, and Hsieh (2013) in the Chinese market; Mobarek, Mollah, and Keasey (2014) in the eleven European markets; Chang and Lin (2015) in 50 international markets; Economou, Gavrilidis, Goyal, and Kallinterakis (2015) in four European markets; Lam and Qiao (2015) in the Hong Kong market; Luo and Schinckus (2015a) in the Chinese market; Luo and Schinckus (2015b) in the US and Chinese markets; and Yang and Chen (2015) in China, Hong Kong, and Taiwan markets.

<sup>5</sup> Spyrou (2013) also notes that there are limitations to the existing measures of herding in financial markets and that defining clearly what form of herding is tested and devising an appropriate method for testing each form of herding would resolve the issue of the inconclusive empirical evidence. In addition, some studies, including Connolly and Stivers (2003), Stivers (2003), and Stivers and Sun (2010), refer to the CSSD as the return dispersion or the cross-sectional volatility and do not associate it with the herd behavior in equity markets.

<sup>6</sup> In the subsequent section, we provide our rationale behind the proposed CSC measure in order to better support it.

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