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Herding behavior, market sentiment and volatility: Will the bubble resume?

Stelios Bekiros [a,*,1], Mouna Jlassi [b,2], Brian Lucey [c,3], Kamel Naoui [d,4], Gazi Salah Uddin [e,5]

[a] European University Institute (EUI), Florence, Italy
[b] Tilburg University, Tilburg, The Netherlands
[c] Trinity College, School of Business Studies, Dublin, Ireland
[d] University of Manouba, Manouba, Tunisia
[e] Linköping University, Linköping, Sweden

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ABSTRACT

This paper aims to investigate herding behavior and its impact on volatility under uncertainty. We apply a cross-sectional absolute deviation approach as well as Quantile Regression methods to capture the herding behavior in daily and monthly frequencies in US markets over several time-periods including the global financial crisis. In a novel attempt we modify the empirical CSAD herding modeling by introducing implied volatility as a measure of agent risk expectations. Our findings indicate that herding tends to be intense under extreme market conditions, as depicted in the upper high quantile range of the conditional distribution of returns. During crisis periods herding is observed at the beginning of the crisis and becomes insignificant towards the end. The US market herding behavior exhibits time-varying dynamic trading patterns that can be attributed e.g., to overconfidence or excessive "flight to quality" features, mostly observed in the aftermath of the global financial crisis. Moreover, implied volatility reveals asymmetric patterns and plays a key role in enforcing irrational behavior.

1. Introduction

Herding is an elusive phenomenon in which investors tend intentionally to ignore their own beliefs to imitate others' thoughts, feelings and actions. As a consequence in financial theory it describes market agents who make their decisions not in reference to fundamental rules but based on others investors' decisions or ignore systematically early warning signals. Keynes (1936) who explicitly rationalized investor decision-making through psychological forces described herding behavior

* Corresponding author.
E-mail addresses: stelios.bekiros@eui.eu (S. Bekiros), mouna.jlassi@gmail.com (M. Jlassi), Brian.Lucey@tcd.ie (B. Lucey), kamelnaoui@gmail.com (K. Naoui), gazi.salah.uddin@liu.se (G.S. Uddin).

[1] Department of Economics, Via della Piazzuola; 43, I-50133 Florence, Italy. IPAG Business School, 184 Boulevard Saint-Germain, 75006 Paris, France. The corresponding author acknowledges funding from the EU Horizon 2020 research and innovation programme under the MS-C Grant No 656136.
[2] Tilburg School of Economics and Management, Tilburg University, The Netherlands, Warandelaan 25037 AB, Tilburg, Netherlands.
[3] School of Business Studies 420, Trinity College, Dublin 2, Ireland.
[4] Business School of Tunis, The University of Manouba, Department of Finance, Campus Universitaire, 2010 La Manouba, Tunisia.
[5] Linköping University, Department of Management and Engineering, SE-581 83 Linköping, Sweden. Gazi Salah Uddin is thankful for the financial support from Jan Wallanders and the Tom Hedelius Foundation.

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as an act imitating "*beauty contest*" and "*animal spirits*". He highlighted that agents under uncertainty and asymmetric flow of information do not select the most plausible assets based on their fundamentals but they opt for assets with high market values in the short term (Akerlof & Shiller, 2009; Diemer, 2010; Sewell, 2011). Moreover, Keynes (1936) animal spirit theory assumed that under uncertainty, panic and fear, individuals are dominated by their instinct and their actions are dictated by their sentiment and impulse and hence they act irrationally. Furthermore, under uncertainty herding may allow for irrational enthusiasm that can develop into a market bubble and can impede individuals from correcting their estimation and fuel market-risk perception (Olsen, 2011). Therefore, herding contributes to the increase of (asymmetric) market volatility.

The notion of herding might be a *double- edged sword* in that it can be highly related to optimal rational decision making as well; suppressing ones' prior judgment and own beliefs to follow market leaders could be a rational learning process. Moreover, herding can also be considered "rational" if the market is over- or under-priced systematically. Keynes (1936) asserts that *it is better to fail conventionally than to succeed unconventionally*. For instance, managers and institutions possess reputational incentive to keep their potential in conformity with collective beliefs. Such a strategy would generate returns at least proportional to competitor returns and hence herding in this case will provide the manager with a highly-esteemed profile (Ben-David, Graham, & Campbell, 2010; Scharfstein & Stein, 1990). Diks and van der Weide (2005, p. 750) in their work assert that *"being too different from the rest can be risky and might jeopardize career perspectives or reputation" or "younger analysts forecast closer to the average forecast"*, as *"they are more likely to be terminated when they deviate from the consensus"*. However most of economic scholars claim that herding is more likely to resemble an irrational behavior while it decreases market efficiency and can even lead to a disastrous impact on markets. More particularly *intentional herding* can be promoted by irrational incentives, namely agents are hostile to uncertainty and behave in conformity with the general trend even if their choices are not supported by any relevant information or by fundamental measures.

Furthermore, there is increasing evidence suggesting that investors are boundedly rational and their trading activity is influenced by their own world perceptions and emotions. Indeed, they often commit systematic decision errors which are manifested in the form of *inefficient prices and bubbles*. Herding behavior is inevitably linked to market' sentiment as reported by Akerlof and Shiller (2009) and Hwang and Salmon (2009), while it can be time-varying as proved by Klein (2013), Zhou and Anderson (2013) and Clements, Hurn, and Shi (2017).

In addition, there is a recent strand of literature highlighting that risk perception can be amplified or attenuated through social, psychological and institutional channels based on communicated information (Olsen, 2011). Risk amplification effect takes place at the information transmission phase through social connectivity based on conversation, sport activity, and media. This phenomenon is known as *Herd mentality* or group-thinking wherein investors tend to be aligned with the "*mind of the market*" which generates significant prices' amplification and a highly clustered and asymmetric volatility (Olsen, 2011). Most informed investors are well connected and integrated through internet, education, social and business associations, thus their analysis of risk estimation is quite homogenous. Therefore herding behavior tends to formulate market risk perception. An interesting feature of herding is specifically that of "*mutual interaction between investors leading to convergent or correlated trading of assets*", as described by Bikhchandani, Hirshleifer, and Welch (1992) and Hirshleifer and Teoh (2009). Other recent behavioral finance studies by Gębka and Wohar (2013), Akerlof and Shiller (2009), Philippas, Economou, Babalos, and Kostakis (2013) and Olsen (2011) conclude that *intentional herding* can be dictated by irrational incentives in investor sentiments.

Another line of active research on herding, utilizes the concept of *entropy*. The concept of entropy is defined by Shannon (1948) in information theory and later on in the form of the dynamic and non-symmetric measure called *transfer entropy,* developed by Schreiber (2000). It has been extensively used in the analysis of financial markets in the works e.g., of Baek, Jung, Kwon, and Moon (2005), Kwon and Yang (2008), Jizba, Kleinert, and Shefaat (2012), however particularly by Gençay and Gradojevic in their works i.e., Gradojevic and Gençay (2008, 2011). Recently, Zhou, Cai, and Tong (2013) provided with a detailed review of the application of entropy in finance, particularly in asset pricing and herding. Additionally, Ou (2005) and Usta and Kantar (2011) applied the measure of *incremental entropy* in optimal portfolio selection and that a mean-variance-skewness-entropy model performs much better vis-à-vis conventional models. Particularly, Gradojevic and Gençay (2011) introduced an entropy-based signal processing technique which goes beyond conventional econometrics methods vis-à-vis modeling of long-memory characteristics in financial markets, and probe into the relationship between the microscopic and macroscopic level of markets in the presence of herding behaviors. For instance, working with "*entropy-based market expectations*" with respect to overnight interest rates in the Turkish 2000–2001 borrowing crisis, Gradojevic and Gençay (2008) suggested that the entropy measure performs well in tracking aggregate market expectations. Furthermore, Gençay and Gradojevic (2010) developed a dynamic framework to identify aggregate market fears ahead of a major market crash through the skewness premium of European options, using q-Gaussian density and a *"maximum entropy"* principle. The authors concluded that the October 19th, 1987 crash could have been predictable. Recently, working on daily data Allen et al. (2013) examined the relationship between the DJIA index and a market sentiment indicator using entropy. They found that there is less uncertainty about the market sentiment news during the global financial crisis period and the behavior of the DJIA return series – in accordance with many previous studies - is much closer to a random walk.

Several herding patterns have been identified in empirical studies such as amongst other the LSV model of Lakonishok, Shleifer, and Vishny (1992), the Portfolio Change Measure (PCM) of Grinblatt, Titman, and Wermers (1995), Cross Sectional Standard Deviation model (CSSD) of Christie and Huang (1995) and the Cross Sectional Absolute Standard Deviation (CSAD) model of Chang, Cheng, and Khorana (2000). Probably the most widely established herding benchmark pattern is the CSAD model of Chang et al. (2000). Basically, it focuses on market-wide herding wherein collective behavior of all market participants is estimated using the cross-sectional return dispersion pattern toward market consensus. Previous research employs