Herding behavior in real estate markets: Novel evidence from a Markov-switching model

Vassilios Babalos\textsuperscript{a,b,*}, Mehmet Balcilar\textsuperscript{c,d}, Rangan Gupta\textsuperscript{d}

\textsuperscript{a} Department of Accounting & Finance, Technological Educational Institute of Peloponnese, Kalamata, 24100, Greece
\textsuperscript{b} Department of Banking & Financial Management, University of Piraeus, Greece
\textsuperscript{c} Department of Economics, Eastern Mediterranean University, Famagusta, Turkish Republic of Northern Cyprus, via Mersin 10, Turkey
\textsuperscript{d} Department of Economics, University of Pretoria, Pretoria, 0002, South Africa

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\textbf{A B S T R A C T}

Employing a dynamic model that captures herding under different market regimes we provide novel evidence on the herding behavior of US-listed Real Estate Investment Trusts (REITs). Estimates of herding behavior are derived using a Markov regime-switching model. Although static herding model rejects the existence of herding in REITs markets estimates of the regime-switching model reveal substantial evidence of herding behavior under the crash regime for almost all sectors. Most interestingly we observe a shift from negative herding behavior during low and high volatility regimes to positive herding behavior under crash regime for almost all REITs sectors.

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1. Introduction

It has long been recognized that housing developments are irrevocably associated with the crisis that has severely hit financial markets and global economy since August 2007. Starting in late 1990s the housing market in USA and in other developed countries experienced an unprecedented housing boom coupled with loose monetary policy and credit expansion. A series of market developments such as vigorous financial innovation, improper risk management, lack of transparency, moral hazard and increasing leverage have favored in one or another way the creation and the bust of the bubble. Asset price bubbles can be the result of herding behavior by institutional investors as several studies point out (see inter alia Friedman, 1984; Dreman, 1979). Herding is broadly perceived as an exuberant and irrational synchronized movement of asset prices which is not justified by their fundamental values.

Literature on herding behavior maps its way into two different paths. On the one hand there are studies that examine group-wide herding that is correlated actions among certain groups of investors, such as mutual fund managers and financial analysts. Measuring herding in this way requires detailed data on the transactions of

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\* Corresponding author at: Department of Accounting & Finance, Technological Educational Institute of Peloponnese, Kalamata, 24100, Greece.

E-mail addresses: vbabalos@teikal.gr (V. Babalos), mehmet@mmbalcilar.net (M. Balcilar), rangan.gupta@up.ac.za (R. Gupta).
specific group of investors (Lakonishok et al., 1992; Wermers, 1999; Kremer and Nautz, 2013). However, the majority of the relevant studies explores the existence of herding behavior by monitoring the shifts of stock returns dispersion in response to market movements (Christie and Huang, 1995; Chiang et al., 2010; Chiang and Zheng, 2010; Economou et al., 2011; Balcilar et al., 2013; Zhou and Anderson, 2013; Philippas et al., 2013; Galariotis et al., 2015).

Our analysis is different from earlier studies in a methodological sense, as we propose a Markov-switching (MS hereafter) herding model, where the cross sectional absolute dispersion of REITs returns is allowed to follow multiple regimes, which allows us to capture nonlinearity in the relationship, i.e., likely to occur due to structural breaks in high-frequency financial data. The rest of the paper is organized as follows: Section 2 presents the methodology. Section 3 discusses the results and Section 4 concludes.

2. Methodology

2.1. Methodology

2.1.1. Static model of herding behavior

In our baseline model we employ the most widely used measure of dispersion of returns in the literature, the CSAD measure that is calculated as follows:

\[ \text{CSAD}_t = \frac{1}{N} \sum_{i=1}^{N} |R_{i,t} - R_{m,t}| \]

(1)

where \( R_{m,t} \) is the value of an equally weighted average of all REITs returns. The nonlinear relationship, in case of herding phenomena is described by the following equation:

\[ \text{CSAD}_t = \alpha_0 + \alpha_1 |\text{CSAD}_{t-1}| + \alpha_2 \text{CSAD}_{t-1}^2 + \epsilon_t. \]

(2)

Negative values of \( \alpha_2 \) in the above equation constitute herding behavior.

2.1.2. Herding behavior under regime switching

After examining any herding behavior of the US REITs assuming constant parameters throughout the estimation period we distinguish between the different market phases. To this end, the following three-state Markov switching model of the cross sectional returns dispersions is estimated:

\[ \text{CSAD}_t = \alpha_{0,s_t} + \alpha_{1,s_t} |\text{CSAD}_{t-1}| + \alpha_{2,s_t} \text{CSAD}_{t-1}^2 + \epsilon_t. \]

(3)

where \( \epsilon_t \sim i.i.d. (0, \sigma^2) \) and \( S_t \) is a discrete regime variable taking values in \{0, 1, 2\} and following a three-state Markov process. Thus, the random variable \( S_t \) is defined as a 3-state first order Markov chain. The specification is fulfilled by defining the transition probabilities of the Markov chain as

\[ p_{ij} = P(S_{t+1} = i | S_t = j). \]

Thus, \( p_{ij} \) is the probability of being in regime \( i \) at time \( t+1 \) given that the market was in regime \( j \) at time \( t \), where \( i \) and \( j \) take values in \{0, 1, 2\}. The transition probabilities satisfy \( \sum_{i=0}^{2} p_{ij} = 1 \).

The superiority of MS models compared to linear models lies in their advantage to track patterns beyond traditional stylized facts, which only nonlinear models can generate.

3. Empirical results

3.1. Herding based on the static model

We begin our analysis with the first set of empirical tests examining the existence of herding effects in REITs in the context of model (2). Daily returns of US REITs listed on NYSE, AMEX and NASDAQ have been calculated for the period 2/1/2004–28/6/2013. The source for the closing prices is Thomson Reuters Datastream.

Estimation results for the static model are reported in Table 1. When all equity REITs are considered the cross-sectional absolute deviation of REITs returns with respect to the market return is increasing with the absolute magnitude of market returns. Stated differently, the results of the nonlinear model reveal the absence of herding behavior as illustrated by the statistically insignificant coefficient \( \alpha_2 \). Our finding contradicts that reported by Philippas et al. (2013). The results for the various sectors reveal an interesting degree of heterogeneity in the case of the estimates for the herding coefficient (\( \alpha_2 \)). In particular, the static model yields statistically significant negative estimates of the \( \alpha_2 \) coefficient for several sectors. Our results for the individual REITs sectors are again in contrast to those of Philippas et al. (2013).

3.2. Herding under different regimes

In this section, we examine the herding behavior of US REITs assuming three different regimes of the market. It should be noted that according to formal tests conducted\(^1\) there is substantial evidence in favor of the regime-dependent variance (heteroskedastic) models for all REITs sectors, confirming the existence of three market regimes for these US REITs stock returns.

Estimates for the three-regime herding model are reported in Table 2. Significant evidence of herding is detected for all REITs sectors during the crash regime. A possible explanation is that investors discard their own information and choose to mimic institutional investors during high market stress periods and thus herding is more prevalent during the crash regime than in the other two regimes. Comparing the results of the regime-switching model to those reported for the static model we infer that the static model fails to capture herding under periods of high market stress. Our findings are aligned with previous studies such as Christie and Huang (1995) and Chang et al. (2000). Therefore, the regime-switching framework appears to capture the dynamic behavior of herding phenomenon and fits into the logic behind the testing methodology of herding which is built on the relationship between return dispersions and market returns during periods of market stress. The other noteworthy observation from the estimates of the regime-switching model is the detection of significant evidence of negative herding (or anti-herding behavior) for almost all REITs sectors at regime 1 and 2 as illustrated by the statistically significant positive coefficients \( \alpha_{0,2} \) and \( \alpha_{1,2} \).

\(^1\) Results are available from the authors upon request.
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