



## Date stamping bubbles in Real Estate Investment Trusts



Diego Escobari<sup>1</sup>, Mohammad Jafarinejad\*

Department of Economics and Finance, The University of Texas Rio Grande Valley, Edinburg, TX 78539, USA

### ARTICLE INFO

#### Article history:

Received 4 March 2015

Received in revised form

19 September 2015

Accepted 20 October 2015

Available online 30 October 2015

#### Keywords:

Generalized sup ADF

Real estate

REITs

Speculative bubbles

#### JEL classification:

C22

G12

### ABSTRACT

We test for the existence of single and multiple bubble periods in four Real Estate Investment Trust (REIT) indices using the Supremum Augmented Dickey–Fuller (SADF) and the Generalized SADF. These methods allow us to estimate the beginning and the end of bubble periods. Our results provide statistically significant evidence of speculative bubbles in the REIT index and its three components: Equity, Mortgage and Hybrid REITs. These results may be valuable for real estate financial managers and for investors in REITs.

© 2015 The Board of Trustees of the University of Illinois. Published by Elsevier B.V. All rights reserved.

### 1. Introduction

Academics have suggested and employed various time series methods to capture speculative bubbles in asset prices such as integration and cointegration tests (Diba & Grossman, 1988a; Diba & Grossman, 1988b), variance bound tests (LeRoy & Porter, 1981; Shiller, 1981), specification tests (West, 1988) as well as Chow and CUSUM-type tests (Homm & Breitung, 2012). The new recursive flexible window right-tailed ADF testing procedure introduced in Phillips, Wu, and Yu (2011) and further enhanced in Phillips, Shi, and Yu (2015) outperforms preceding methods in detecting and date-stamping bubbles and can serve as a real-time warning signal to monitor the dynamics of asset prices.

In this paper, we employ the Phillips et al. (2015)'s novel Generalized Supremum Augmented Dickey–Fuller (GSADF) to test for the existence of speculative bubbles and to identify the origination and the collapse of bubbles in various Real Estate Investment Trust (REIT) indices.<sup>1</sup> Specifically, we search for explosive

autoregressive behavior in inflation-adjusted REIT indices from January 1980 through September 2013. We also explain the conditions under which empirical evidence of explosive behavior can be interpreted as a bubble in the price of the underlying financial asset.

The literature on testing for speculative bubbles in REITs is limited and the results are mixed. Jirasakuldech, Campbell, and Knight (2006) use unit root and co-integration tests to find that Equity REITs are not affected by rational bubbles. Waters and Payne (2007) use the Residuals-Augmented Dickey–Fuller (RADF) and find no periodically collapsing bubble in total REIT index and Equity REIT index, negative periodically collapsing bubble in Mortgage REIT index and inconclusive results for Hybrid REIT index. Moreover, Payne and Waters (2007) use both Momentum Threshold Autoregressive (MTAR) and RADF to find mixed results for Equity REIT index. Anderson, Brooks, and Tsolacos (2011) use regime switching processes (Evans, 1991; Van Norden & Schaller, 1999) to directly test for the presence of speculative bubbles in REITs. Although they find some evidence of negative bubbles (most notably in mortgage REIT index), the authors could not observe speculative bubbles in Equity, Mortgage and Hybrid REITs.

There exists important work on the link between REITs, stocks and real estate markets as well as on speculative bubbles in real

Commission (SEC) which amount to a collective market capitalization of \$719 billion ([www.nareit.com](http://www.nareit.com)).

\* Corresponding author. Tel.: +956 665 2448.

E-mail addresses: [diego.escobari@utrgv.edu](mailto:diego.escobari@utrgv.edu) (D. Escobari), [mo.jafarinejad01@utrgv.edu](mailto:mo.jafarinejad01@utrgv.edu) (M. Jafarinejad).

<sup>1</sup> Tel.: +956 665 2104. URL: <http://diegoescobari.com>.

<sup>1</sup> With the exception of the period during the 2007–2008 financial crisis, REITs had an upward trend in both number of firms and market capitalization. As of January 31, 2014, 204 publicly-traded REITs were registered with the Securities and Exchange

**Table 1**  
Descriptive statistics.

	Mean	Median	Std. dev.	Min	Max	HHI	Con. ratio (%)
Total REIT index	208.608	141.252	186.007	16.976	719.965	217.649	18.495
Equity REIT index	211.596	140.305	195.704	16.861	756.551	283.533	21.595
Mortgage REIT index	215.222	157.819	148.439	35.761	612.798	1944.359	67.511
Hybrid REIT index	214.127	121.387	210.257	16.199	940.127	4120.406	81.388
Real REIT index	1.129	0.853	0.777	0.212	3.107	–	–
Real equity REIT index	1.136	0.848	0.822	0.210	3.265	–	–
Real mortgage REIT index	1.249	0.982	0.645	0.428	3.123	–	–
Real hybrid REIT index	1.146	0.749	0.864	0.202	4.057	–	–

Notes: The monthly REIT value-weighted indices are obtained from CRSP/Ziman Real Estate Data Series. The database provides stock prices for individual REITs trading on the NASDAQ, New York Stock Exchange (NYSE) and NYSE MKT (formerly known as the American Stock Exchange). The Consumer Price Index (CPI) is obtained from the Federal Reserve Bank of St. Louis. We obtain the real REIT indices by dividing the REIT monthly value-weighted index by CPI to adjust for the inflation over the sample period. Our sample spans from January 1980 to September 2013 with the total number of observations being 405. HHI is the sample mean Herfindahl–Hirschman Index, calculated as the sum of the squares of the market share percentages of all the individual components in an index using beginning-of-period market capitalizations. It can range from 0 to 10,000. The sample mean concentration ratio (Con. ratio) is calculated as the ratio of the market value of the largest four securities in the portfolio versus the market value of the entire portfolio computed using the beginning-of-period market capitalizations. It can range from 0% to 100%. Both HHI and Con. ratio are obtained from the CRSP/Ziman Real Estate Data Series.

estate prices. Goodman and Thibodeau (2008) aim at disentangling the roles of economic fundamentals and speculation on the high house appreciation rates during 2000–2005, while Mikhed and Zemčik (2009) detect bubbles using panel data on price–rent ratios for the 1975–2006 period. Moreover, Himmelberg, Mayer, and Sinai (2005) explain how to assess whether there is a bubble and what underlying factors support housing demand, while Damianov and Escobari (2015) examine the dynamics of price segments during the housing bubble. In a related study, Hendershott, Hendershott, and Ward (2003) summarize some evidence on price movements to present arguments for and against the existence of irrational bubbles.<sup>2</sup>

On the links between REITs, stocks and real estate markets, it is important to keep in mind that REIT is not a pure real estate asset. Glascock, Lu, and So (2000) use cointegration and vector error correction models to show that starting in the early 1990s REITs behave more like stocks and less like bonds. In addition, Clayton and MacKinnon (2003) examine the link between REITs, financial assets and real estate returns. They show that during the 1970s and 1980s the behavior of REITs was closer to large cap stocks but during the 1990s REITs were more strongly related to real-estate related factors and small cap stocks. Nneji, Brooks, and Ward (2013) present a multivariate bubble model to evaluate whether the stock and real estate bubbles spill over into REITs. Their results suggest a transmission of speculative bubbles from real estate into REITs. Although these studies suggest the existence of links between REITs, stocks, bonds and real estate markets, our empirical approach to study bubbles does not allow us to draw inferences on any potential connection.

Our results show evidence of four statistically significant speculative bubbles in the inflation-adjusted REIT value-weighted index (August to November of 1990; February to April of 1993; October 1996 to April 1998; November 2003 to June 2007). When extending the analysis to three components of the total REIT index, we find evidence of speculative bubbles in all three indices. For Equity REIT index, which is the major component of the total REIT index, the results show that the bubble periods are identical to those of the total index. For Mortgage REIT index, we find evidence of four periodic bubbles (January to May 1983; September 1996 to November 1997; May to August 2001; May 2003 to April 2004) while for Hybrid REITs index we find evidence of three periodic bubbles (November 1996 to February 1998; November 2002 to April 2004; August 2006 and collapses May 2007).

In sum, the contribution of this study is twofold. First, it empirically tests for the existence of speculative bubbles in total REIT index as well as its three components (Equity REITs, Mortgage REITs and Hybrid REITs). Second, it estimates the beginning and the end of bubble periods in REITs with the GSADF methodology that allows for the existence of multiple bubbles in a single series.

The remainder of this paper proceeds as follows. Section 2 describes the sample data. Section 3 presents the empirical approach employed to detect and date-stamp periodic bubbles in REITs. Section 4 discusses the results while Section 5 concludes.

## 2. Data

Real Estate Investment Trusts are dividend-paying stocks that mainly invest in real estate. The REIT index is comprised of three components: Equity REITs, Mortgage REITs and Hybrid REITs. The Equity REIT index includes securities backed by the value of real estate assets (e.g., shopping malls, office buildings or apartments) and generates revenues mainly from their properties' rent. The Mortgage REIT index is backed by residential and commercial mortgage obligations and mortgage-backed securities. Since Mortgage REITs do not own real estate assets, their main source of revenues is the interest earned on the mortgage loans. The Hybrid REIT index is a combination of Equity and Mortgage REITs.

The monthly REIT value-weighted index is obtained from CRSP/Ziman Real Estate Data Series. The database provides stock prices for individual REITs trading on the NASDAQ, New York Stock Exchange (NYSE) and NYSE MKT (formerly known as the American Stock Exchange). The Consumer Price Index (CPI) is obtained from the Federal Reserve Bank of St. Louis. We divide the REIT monthly value-weighted index by CPI to adjust for the inflation over the sample period. The sample covers the period from January 1980 to September 2013 comprising 405 monthly observations.

Table 1 reports the descriptive statistics along with two measures of concentration based on market capitalization; the sample mean Herfindahl–Hirschman Index (HHI) and the sample mean concentration ratio (Con. Ratio).<sup>3</sup> Both measured were obtained from CRSP/Ziman Real Estate Data Series. The HHI can range from 0 to 10,000 while the concentration ratio goes from 0% to 100%. Higher values indicate a higher level of concentration. The Total

<sup>3</sup> The HHI is calculated as the sum of the squares of the market share percentages of all the individual components in an index. The concentration ratio is calculated as the ratio of the market value of the largest four securities in the portfolio versus the market value of the entire portfolio. Both concentration measures are based on the beginning-of-period market capitalizations.

<sup>2</sup> For a survey on housing bubbles see Mayer (2011).

Download English Version:

<https://daneshyari.com/en/article/980356>

Download Persian Version:

<https://daneshyari.com/article/980356>

[Daneshyari.com](https://daneshyari.com)