住宅學報　第二十四卷第一期　民國一〇四年六月　學術論著　第1頁—28頁
JOURNAL OF HOUSING STUDIES, VOLUME 24 NO. 1, JUNE 2015

學術論著

不動產投資信託基金的發行時機：以投資情緒分析

Market Timing and REITs: A Sentimental Analysis

盧秋玲*　楊曉瑩**

Chiuling Lu*, Ann Shawing Yang**

摘　要

本文在探討市場時機對美國不動產投資信託基金(REIT)初次發行上市之影響。本研究結果發現，在1993年至1998年間REIT初次發行上市熱絡期，投資人情緒並未影響REIT初次發行上市之頻率及收益。但在1998年後逐漸成熟REIT市場中，經理人採市場時機策略，依市場情緒作判斷發行上市與否。REIT初次發行上市頻率與投資人情緒呈正向顯著關係。REIT初次發行頻率和收益，與貸款利率呈負面顯著關係。經理人會在REIT市場發展較為成熟後，才會參考投資人情緒作為初次發行上市的時機。本研究亦比較不動產市場和總體經濟相關變數，以分析投資人情緒和其來源對REIT初次發行上市之影響。

關鍵詞：市場時機、投資人情緒、不動產投資信託基金、初次發行上市

ABSTRACT

This study analyzes the influence of market timing on the initial public offerings (IPOs) of real estate investment trusts (REITs). We use the ordinary least-squares method to identify the responses of housing, macroeconomic, and market sentiment indicators to REIT IPOs to demonstrate the differences in how investor sentiment affects REIT IPOs before and after the hot REIT IPO market. In regard to REIT issuances during the hot IPO period (1993 to 1998), investor sentiment did not influence IPO frequency or proceeds. However, after the market matured in 1998, managers timed IPO decisions based on market sentiment. IPO frequency is positively related to investor sentiment, that is, managers time IPOs for when investors are bullish. Moreover, IPO frequency or proceeds are always negatively related to the mortgage rate, which serves as a proxy for real estate holding costs. Managers consider investor sentiment only after the REIT industry becomes well developed and must constantly consider mortgage rates. This study compares the housing market and the macroeconomy to analyze the sources and effects of sentiments toward REIT IPOs.

Key words: market timing, investor sentiment, real estate investment trusts, initial public offering

(本文於2013年10月23日收稿，2014年5月13日審查通過，實際出版日期2015年6月)

* 國立台灣大學國際企業學系暨研究所教授
Professor, Department of International Business, National Taiwan University, Taipei, Taiwan.
E-mail: chiulinglu@ntu.edu.tw

** 國立成功大學國際經營管理研究所副教授，聯絡作者
Associate Professor, Institute of International Management, National Cheng Kung University, Tainan, Taiwan.
E-mail: annsyang@mail.ncku.edu.tw

本研究感謝國科會研究計畫經費補助(計畫編號：NSC 100-2410-H-002-054-MY3)和國科會社會科學研究中心年輕學者學術輔導與諮詢經費補助(99年)

1. Introduction

Real estate investment trusts (REITs) have gained widespread popularity and are primarily used by managers to provide insightful information regarding property market movements and listed stock markets (Pagliari et al., 2003; Giliberto, 2003). Consequently, REITs promote short-term trading expected to be accompanied by high risks and increased returns (Feldman, 2003). As an indirect investment in the property market, REITs are positively correlated with the stock market and are accompanied by volatile returns represented by stock market sentiment (Georgiev et al., 2003; Brounen & Eichholtz, 2003). However, the sentimental and volatile movements of REITs counteract direct investment in the real estate market where the smoothing effect of property appraisals encourages long-term trading (Brounen & Eichholtz, 2003; Marcato & Key, 2005). Nevertheless, REITs can maintain good performance in terms of reducing risks and can provide diversification effects to assist in asset allocation (Hudson-Wilson et al., 2005; Chen et al., 2005). Therefore, the timing of the market for REIT financing decisions related to the stock market requires investigation to determine the influence of investor sentiments.

Market timing thus determines managerial financing decisions (Baker & Wurgler, 2002; Ooi et al., 2010). Managers adopt market timing strategies to maximize the values of REITs during market movements (Buttimer et al., 2012; Compton et al., 2006; Kaushik et al., 2010). In addition, managers seek low-cost equity by selling securities during bull market periods or when stocks are overvalued. Equity issuance, such as managers' issuance of stocks based on historical price patterns, is closely related to equity market conditions. Literature confirms the market timing of the capital-raising activities of seasoned firms. However, without reference to past stock performance, how managers time the market for initial public offerings (IPOs) remains an interesting question. Previous studies, such as Pâster & Veronesi (2005) and Buttimer et al. (2005), have examined the underlying causes of IPO waves. Literature has explored possible explanations, such as market inefficiency, industry clustering, and capital demand, but has obtained mixed results.

The financing decisions of REITs have been intensively analyzed. Boudry et al. (2010) demonstrated that REITs issue equity after experiencing large price increases, similar to what happens in the general industry. Apart from seasoned equity offerings, literature has examined the causes of REIT IPOs. Buttimer et al. (2005) investigated REIT IPO waves and concluded that the capital demand hypothesis explains IPO decisions better than the investor sentiment hypothesis.

The influence of investor sentiment on equity issuance has attracted significant attention. However, investor sentiment is usually difficult to measure directly. Researchers have applied several proxies, such as turnover ratio and closed-ended fund discounts. Given that these measures reflect only trading behavior, they may bias the relationship between IPO decisions and investor sentiment. Buttimer et al.(2005) confirmed the causes of REIT IPO waves, although they did not directly measure sentiment. After analyzing both initial return and long-term performance, those researchers concluded that investor sentiment does not drive the IPO market. In contrast to previous studies, this study aims

to directly measure investor sentiment to determine whether REIT managers time IPO decisions based on investor or market sentiment. In particular, we examine whether market timing behavior changes over time. Thus, our central research question is, what is the effect of investor sentiment on REIT IPOs for a behavioral analysis on irrationality?

Empirical results demonstrate that managers time REIT IPOs only during periods when investors become rational and cautious after periods of intense activity in the REIT IPO market. When the IPO market is hot because optimistic investors dominate the stock market, managers can disregard overall market sentiment. Consequently, managers consider only the holding cost (that is, the mortgage market), which negatively affects IPO frequency. However, when the REIT market matures, investors pay attention to the overall outlook of the economy, and managers time IPO decisions based on market sentiment. Furthermore, our empirical results identify the relationship between new home sales, the Case–Shiller index, and sentiment variables to obtain economic and behavioral finance explanations. Whereas previous studies have depended on mortgage rates for REIT IPO decisions, our study shows that adopting investor sentiment indices is appropriate for indicating the timing of REIT IPO issuance.

This study provides further evidence regarding IPO timing by examining a transparent industry, namely, REITs. Depending on the developmental stage of the industry under consideration, IPO timing is influenced by both fundamental factors and investor sentiment. In the early stages of industrial development, managers follow industry standards and disregard market sentiment. However, as the industry develops, investors' willingness to pay for new equity becomes crucial, and the significance of investor sentiment increases.

The remainder of this paper is organized as follows: The next section reviews literature on IPO timing. Subsequently, data are presented, and the relationship between IPO volume and investor sentiment is discussed. Finally, conclusions are given.

2. Literature

Equity market timing is essential to corporate financial policy. Numerous studies have examined whether managers exploit temporary fluctuations in the stock market for capital issuance. Baker & Wurgler (2002) analyzed changes in leverage and the market-to-book ratio after firm IPOs and concluded that capital structure is the cumulative outcome of continuous managerial attempts to time equity markets. Alti (2006) and Buttimer et al. (2012) also examined the implications of market timing for capital structure. Baker & Wurgler (2002) showed that hot-market IPO firms issue substantially higher equity and lower their leverage ratios than cold-market firms. In addition to market timing with respect to seasoned equity offerings, several studies have focused on IPO timing. Pâster & Veronesi (2005) argued that the number of listed firms changes in response to time variation in market conditions and found that IPO volume is more closely related to stock price volatility than it is to stock price level. Aside from relating market timing to stock return performance, several studies have examined investor sentiment. Helwege & Liang (2004) proposed that hot IPO markets are not primarily driven by changes in adverse selection costs, managerial opportunism, or technological

innovations but rather reflect great investor optimism. Ljungqvist et al. (2006) devised an IPO that relates IPO anomalies, such as underpricing, hot issue markets, and long-run underperformance, to the presence of a class of irrationally exuberant investors. Derrien & Kecskés (2009) studied the importance of investor sentiment to aggregate equity issuance activities. The proxies for sentiment explained roughly 10% of the time-series variation of equity issuance beyond the roughly 40% explained by fundamentals, indicating that investor sentiment only slightly influences aggregate equity issuance activity.

Aside from presenting results from general industries, several studies have investigated the equity market timing of REITs. Buttimer et al. (2005) examined the underpricing and long-term performance of three REIT IPO waves, and found that the capital demand hypothesis best describes the REIT IPO market, followed by the information asymmetry hypothesis. However, their results failed to support the investor sentiment hypothesis. Boudry et al. (2010) examined REIT issuance decisions and found strong support for the market timing theory of capital structure. That is, REITs issue equity in public markets when the cost of equity capital is lower in public markets than in private markets. Additionally, REITs issue equity after experiencing large price increases. Ooi et al. (2010) examined the influence of capital market conditions and target leverage on REIT marginal financing decisions and found that REITs demonstrate market timing behavior in terms of the timing and type of capital issues or reductions. Other studies have analyzed the influence of investor sentiment on the return behavior of REITs. Clayton et al. (2009) investigated the role of fundamentals and investor sentiment in commercial real estate valuation and found that investor sentiment influences pricing, even after controlling for changes in expected rental growth, equity risk premiums, T-bond yields, and lagged adjustments intended to maintain long-term equilibrium. Lin et al. (2009) examined the effect of investor sentiment on REIT returns and found an increase in REIT returns when investors are optimistic. In general, a relationship exists between REIT return behavior and investor sentiment. However, whether REIT managers time IPOs in reference to investor sentiment remains unclear. Most studies in this area have applied stock market performance as the proxy for investor sentiment, but recent studies have instead used direct measures of investor sentiment. For example, Kurov (2010) applied the Baker & Wurgler (BW) Sentiment Index and Investor Intelligence to examine investor sentiment and stock market reaction to monetary policy. Derrien & Kecskés (2009) also used the BW Sentiment Index to study the influence of investor sentiment on equity issuance activities. The present study directly measures investor sentiment to examine whether REIT managers refer to market sentiment to time IPOs. Moreover, this study considers whether housing holding costs and overall stock market performance influence IPO decisions. We develop our hypothesis 1 as follows:

Hypothesis One: REIT IPOs are closely related to market conditions and refer to investor sentiment to time equity issuance.

2.1 REIT and behavioral finance: hot and cold markets

Investor sentiment related to REITs as observed from short-selling activities and IPO returns

evidences the strong influence of behavioral trading affecting REIT price volatilities (Blau et al., 2011). Factors such as operating efficiency and market-to-book ratio have a significantly negative or positive influence on REITs (Li & Yung, 2004). Therefore, the effects of investor sentiment on REITs demonstrate an investment bubble in mortgage and lodging REITs (Waters & Payne, 2007; Payne & Waters, 2007). Abnormal returns derived from behavioral trading also influence retail REITs and thus indirectly influence the multifamily, office, and industrial sub-sectors (Connors et al., 2002). Similarly, REIT returns demonstrate significant overreaction (Liao, 2012). Although behavioral trading for REITs is observed from stock market transactions, the relationship between macroeconomic indicators and REIT returns shows a lack of irrational behavior for equity REITs (Jirasakuldech et al., 2006).

Allen & Faulhaber (1989) proposed one of the first signaling models related to the underpricing of IPOs. In hot IPO markets, investors benefit from information asymmetry by gaining profits through the large number of new issuances and apparent underpricing (Hartzell et al., 2005; Brailsford et al., 2000). In contrast, cold markets show few IPOs and instances of underpricing (Helwege & Liang, 2004; Brailsford et al., 2000). Ljungqvist et al. (2006) developed a model relating the hot market to IPOs and evidenced that investor sentiment leads to the underperformance of IPOs. Moreover, hot IPO issues have a leading effect on IPO underpricing and their volumes where investor sentiment exists (Brailsford et al., 2000). Helwege & Liang (2004) observed investor sentiment in hot markets, where investors are willing to purchase. We develop our second hypothesis as follows:

Hypothesis Two: A hot market generates greater investor sentiment and irrationality for REIT IPOs than a cold market.

3. Methodology

This study follows Brown & Cliff(2004), Chui et al.(2003a), Chui et al. (2003b), and Derrien & Kecskés (2009) to select appropriate variables to understand the relationship between REIT IPOs and investor sentiments. The variables are categorized by IPO frequency and proceeds, macroeconomic indicators, housing market outlook, and stock market sentiment. This study employs four categories and seven variables for each of 12 individual regression analyses, as listed in Table 1.

REIT capital-raising activities are viewed as a signal to favor investments in the real estate market (Akhigbe et al., 2004). Remarkably, IPOs reflect strong investor sentiment. We follow Derrien & Kecskés(2009), Ooi et al. (2010), and Buttimer et al. (2005) in adopting IPO frequency and proceeds amounts (IPO_f and IPO_p) to analyze the effects of capital raising on investor sentiment. Macroeconomic indicators, such as the interest rates of bonds, mortgages, and treasury bills, are adopted as measurements of the costs related to debt capital(Ooi et al., 2010). Short-term interest rates more considerably affect REIT returns and sensitivity than long-term interest rates (Swanson et al., 2002; Bredin et al., 2011). We select the three-month treasury bill rate (TB) to represent the short-term interest rate. Mortgage flows are regarded as common sentiment for the real estate market (Clayton et al., 2009). We also select the 15-year fixed mortgage rate (MR_{15}) to represent the intermediate-term interest rate and the 30-year fixed mortgage rate (MR_{30}) to represent long-term interest rates. The

Table 1. Variable Definitions

Category	Variables* (monthly frequency)	Symbol	Definition
Capital raising activities	IPO frequency	IPO_f	*ln(1+IPO frequency)*
	IPO proceed (mil.)	IPO_p	*ln(1+IPO proceed)*
Housing market outlook	New home sales (thousand units)	*NH*	*ln(new home sales unit)*
	Case-Shiller Index	*CS*	*ln(Case-Shiller index)*
Macroeconomic indicators	3-month Treasury bill rate	*TB*	*ln(3-month Treasury bill rate)*
	15-year fixed mortgage rate	MR_{15}	*ln(15-year fixed mortgage rate)*
	30-year fixed mortgage rate	MR_{30}	*ln(30-year fixed mortgage rate)*
Stock market sentiments	New York Stock Exchange index	*NYSE*	*ln(New York Stock Exchange index)*
	American Association of Individual Investors (AAII)	$Sentiment_{AAII}$	Total percentage of Bull minus total percentage of Bear on a monthly basis using AAII data
	Investor Intelligence (II)	$Sentiment_{II}$	Total percentage of Bull minus total percentage of Bear on a monthly basis using II data

Note: This table lists the variables categorized as capital raising activities, housing market outlook, macroeconomic indicators, and stock market sentiment. Capital raising activities include IPO frequency (IPO_f) and IPO proceeds (IPO_p). Housing market outlook includes new home sales (*NH*) and the Case-Shiller index (*CS*). Macroeconomic indicators include the three-month treasury bill rate (*TB*), the 15-year fixed mortgage rate (MR_{15}), and the 30-year fixed mortgage rate (MR_{30}). Market sentiments include the New York Stock Exchange index (NYSE), the American Association of Individual Investors index ($Sentiment_{AAII}$) and the Investor Intelligence index ($Sentiment_{II}$). All variables are collected on a monthly basis.

number of properties sold is used to represent market liquidity containing investor sentiment toward the real estate market (Clayton et al., 2009). The variable of new home sales units (*NH*) is adopted to determine developments in the property and real estate market. The Case–Shiller house price index (*CS*) is adopted to represent one of the best indicators of housing market transactions (Schindler, 2013). Investor sentiment indices are adopted from the survey by the American Association of Individual Investors (AAII) and the Investor Intelligence (II) survey to represent individual and institutional investor sentiment, respectively (Brown & Cliff, 2004). Individual investor sentiment ($Sentiment_{AAII}$) is measured by the percentage of bullish investors minus the percentage of bearish ones on a monthly basis, taken from the AAII survey as the spread between bull and bear individual investor sentimental predictions. Institutional investor sentiment ($Sentiment_{II}$) is measured by the bull-bear spread derived

from the II data. Stock market performance is generally viewed as an appropriate investor sentiment index that influences the returns of listed companies and capital-raising activities (Kurov, 2010; Derrien & Kecskés, 2009). The New York Stock Exchange (NYSE) index is applied to observe the effect of stock market performance on REIT capital-raising activities. Table 1 presents the details of the variable selections on REIT IPOs and sentiments.

The REITs newly listed from 1993 to 2010, available in either daily or monthly frequencies, are obtained from the CRSP/Ziman Real Estate Database. Buttimer et al. (2005) identified three waves of IPO issuance: 1985, 1993 to 1994, and 1997 to 1998. Because modern REITs (see Jirasakuldech et al., 2009) date from 1993, our sample period begins from 1993 and ends in 2010. Figure 1 shows the IPO frequency by year. We observe two IPO waves, which cluster in 1993 to 1998 and in 1999 to 2010. The modern REIT ended in 1998, followed by the post-modern REIT. The IPO frequency is also closely related to interest rates, particularly mortgage rates. Thus, we collect 15-year and 30-year fixed mortgage rates from the Federal Home Loan Mortgage Corporation and the three-month treasury bill rate from the Federal Reserve. Interest rates serve as a proxy for property holding cost, which influences the REIT capital cost. In Figure 1, all variables are indicated on a monthly basis dated by year from 1993 to 2010. The number of IPO frequencies on a monthly basis is represented by a thick line (▬). The interest rates for three-month TBs are represented by a dashed line (---). The interest rates for the 15-year and 30-year mortgage rates are represented by a thin line (—) and dotted lines (…), respectively. The x-axis represents the study period (1993 to 2010). The y-axis on the right-hand side (frequency) indicates the number of IPOs on a monthly basis throughout the study period. The y-axis

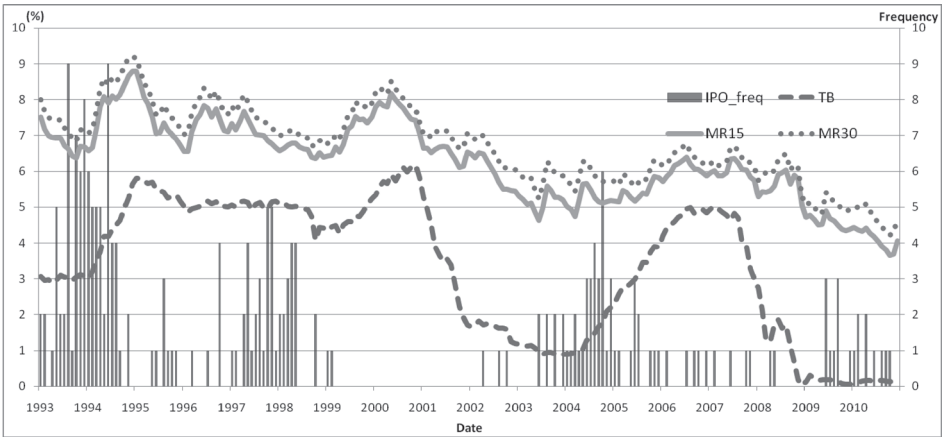

Figure 1. IPO frequency and Interest Rates

Note: This figure shows two IPO waves between 1993 and 1998 for modern period and between 1999 and 2010 for post-modern period. The x-axis represents the study period (1993 to 2010). The y-axis on the right-hand side (frequency) indicates the number of IPOs on a monthly basis throughout the study period. The y-axis on the left-hand side (%) reports the three-month treasury bill rate, the 15-year mortgage rate, and the 30-year mortgage rate. For example, the starting IPO frequency in 1993 is approximately 2, compared with the three-month treasury bill at approximately 3%, the 15-year mortgage rate at approximately 7.5%, and the 30-year mortgage rate at approximately 8%.

on the left-hand side (%) reports the three-month treasury bill rate, the 15-year mortgage rate, and the 30-year mortgage rate. For example, the starting IPO frequency in 1993 is approximately 2, compared with the three-month treasury bill at approximately 3%, the 15-year mortgage rate at approximately 7.5%, and the 30-year mortgage rate at approximately 8%.

Another reference that managers use to time IPO decisions is the overall stock market performance. We apply the NYSE index as the benchmark and use data from the CRSP. In addition to stock market performance, the Case–Shiller index is adopted in this study to assess the conditions of the real estate market. Given that the underlying private real estate market influences market perceptions of the securitized real estate market, this variable is used to control for the unique character of REITs. The S&P/Case–Shiller Home Price Indices are obtained from the S&P Indices as a proxy for the secondary real estate market. Another variable related to real estate market outlook is new house sales. Data on the sales of new single-family houses are collected from the US Department of Commerce to proxy for current house market conditions.

This study applies two direct measures of changes in investor sentiment to examine the role of investor sentiment in IPO timing. The first measure is a survey conducted by AAII, and the other is from II. The AAII Investor Sentiment Survey measures the weekly percentage of individual investors that are bullish, bearish, and neutral on the stock market with respect to investors' expectations for the six subsequent months. Meanwhile, the II survey, released every Friday, represents the outlook of more than 120 independent market newsletters. This outlook is classified into bullish, bearish, and predicting a correction. Following Brown & Cliff (2004), the present study measures investment sentiment by determining the difference between the percentages of bullish and bearish investors.

Figure 2 shows the IPO frequency and percentage of bullish investors obtained using two measures of investor sentiment. Figure 2 shows that in the modern REIT period (1993 to 1998), these IPO frequencies and bullish sentiment measures are not closely related. However, in the post-modern REIT era (1999 to 2010), periods of high investor interest correspond to periods with frequent IPO issuances. In Figure 2, all variables indicate a monthly basis dated by year from 1993 to 2010. The number of IPO frequencies on a monthly basis is represented by a thick line (▬). Market volatility for bullish individual investor sentiment (Bull_AAII) is represented by a dashed line (---), whereas bullish institutional investor sentiment (Bull_II) is represented by a thin line (—). The x-axis lists the study period from 1993 to 2010. The y-axis on the right-hand side (frequency) indicates the number of IPOs on a monthly basis throughout our study period. The y-axis on the left-hand side (%) presents the bullish individual investor sentiment (Bull_AAII) and bullish institutional investor sentiment (Bull_II). For example, the starting IPO frequency in 1993 is approximately 2, compared with the bullish individual investor sentiment at approximately 43% and the bullish institutional investor sentiment at approximately 42%.

Subsequently, we conduct a test of the cumulative sum (CUSUM) of recursive residuals, proposed by Brown et al. (1975), to identify a possible structural break in our raw data. The CUSUM test estimates the recursive residuals via continuous Gaussian process according to significance levels

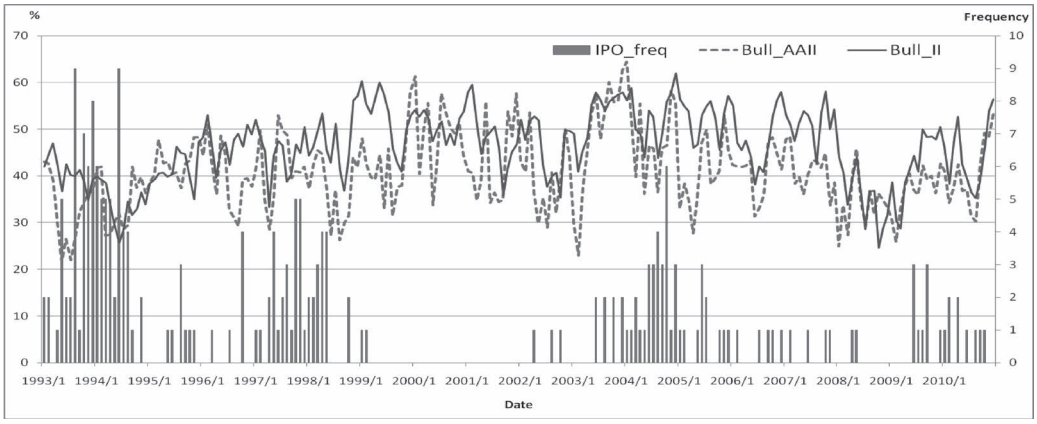

Figure 2. IPO frequency and investor sentiment

Note: This figure shows the IPO frequency and percentage of bullish investors. The x-axis lists the study period from 1993 to 2010. The y-axis on the right-hand side (frequency) indicates the number of IPOs on a monthly basis throughout our study period. The y-axis on the left-hand side (%) presents the bullish individual investor sentiment (Bull_AAII) and bullish institutional investor sentiment (Bull_II). For example, the starting IPO frequency in 1993 is approximately 2, compared with the bullish individual investor sentiment at approximately 43% and the bullish institutional investor sentiment at approximately 42%.

and deviations from zero mean value line for upper and lower bound limits (Brown et al., 1975). Figure 3 indicates a structural break between 1998 and 1999. With a significance level under 5%, the time series of our variables is beyond the critical boundary. Therefore, we conduct the CUSUM test for the study period between 1999 and 2010. Figure 4 indicates that all data fit within the critical boundaries and present no autocorrelation. Therefore, we divide our data into two subsamples for the study period between 1993 and 1998 (modern era) and between 1999 and 2010 (post-modern era).

Therefore, the former cluster of REITs from 1993 to 1998 is denoted as the modern REIT era, whereas the latter cluster of REITs from 1999 to 2010 is denoted as the post-modern REIT era. The year 1993 is generally recognized as a turning point for REITs (see Mueller & Anikeeff, 2001; Clayton & MacKinnon, 2001; Below et al., 1995; Glascock et al., 2000; Ott et al., 2005; Wang et al., 1995; Jirasakuldech et al., 2009). After 1993, REITs start to boom along with new structures in tax, finance, and investments. Therefore, 1993 is the year that demarcates the “old” and “new” REITs and is the starting point of modern REITs. However, up to 1999, the market becomes mature and cools down. We observe few IPOs, and the structure break test shows that the REITs differ from those before. Therefore, we define the period after 1999 as the post-modern REIT era.

3.1 Research design

This study uses ordinary least-squares (OLS) regression analysis to determine the influence of investor sentiment on the IPO issuances of REITs. Macroeconomic factors are also controlled by including both short- and long-term interest rates, such as the treasury bill rate and 15-year or 30-year

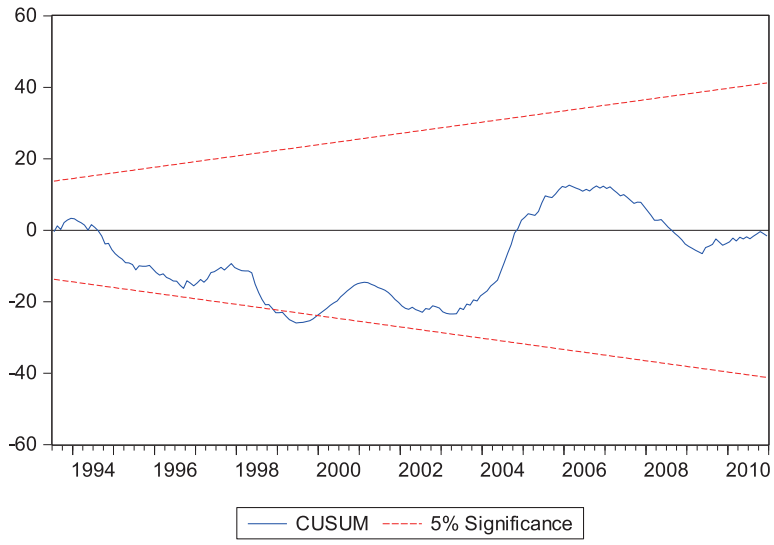

Figure 3. CUSUM test 1993-2010

Note: This figure indicates a structure break between 1998 and 1999. With a significance level under 5%, the time series of our variables is beyond the critical boundary.

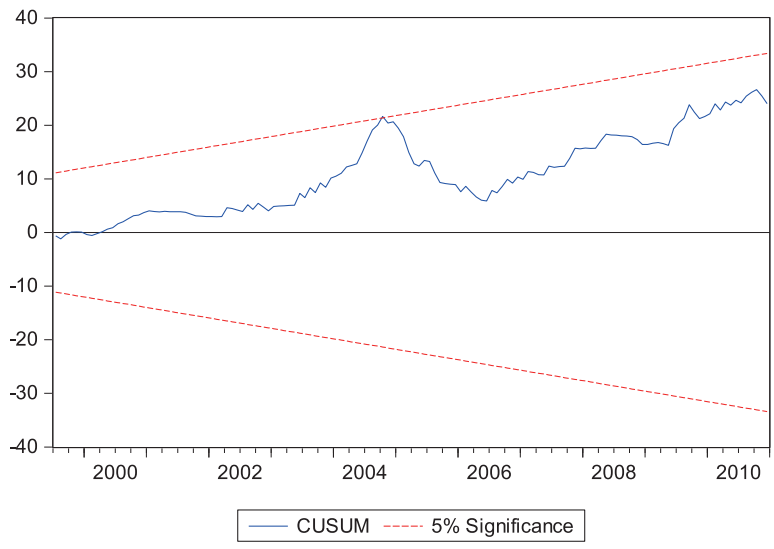

Figure 4. CUSUM test 1999-2010

Note: This figure indicates that all data fit within the critical boundaries and present no autocorrelation. Therefore, we divide our data into two subsamples for the study period between 1993 and 1998 (modern era) and between 1999 and 2010 (post-modern era).

mortgage rates. The NYSE index is included to control for the overall capital market. The controls for the real estate market are the Case–Shiller index and new residential sales. This study adopts monthly frequency. IPO frequency, IPO proceeds, new home sales, the Case–Shiller index, the treasury bill rate, mortgage rates, the NYSE index, AAII, and II are all presented in monthly frequencies.

OLS regression analysis is conducted according to different time periods and sentiment measures. The full sample OLS regression, comprising data from 1993 to 2010, is followed by subsample period 1 with data from 1993 to 1998 to represent the modern REIT IPO wave and by subsample period 2 with data from 1998 to 2010 to represent the post-modern REIT IPO wave. The OLS regressions are conducted based on AAII data for individual investor sentiment during the full sample period, subsample period 1, and subsample period 2. The II data on institutional investor sentiment are similarly processed. Finally, this study uses IPO frequency and proceeds as the dependent variables. All variables are presented in terms of monthly frequency. The regression functions of the selected variables for IPO frequency and proceeds are as follows:

$$IPO_f = \alpha + \beta_1 NH + \beta_2 CS + \beta_3 Macroeconomic\ indicators_i + \beta_4 NYSE + \beta_5 Market\ sentiments_i + \varepsilon_i \quad (1)$$

$$IPO_p = \alpha + \beta_1 NH + \beta_2 CS + \beta_3 Macroeconomic\ indicators_i + \beta_4 NYSE + \beta_5 Market\ sentiments_i + \varepsilon_i \quad (2)$$

where IPO_f represents IPO frequency; IPO_p represents IPO proceeds; *NH* represents new home sales; *CS* represents the Case–Shiller index; macroeconomic indicators include the three-month treasury bill rate (*TB*), the 15-year fixed mortgage rate (MR_{15}), and the 30-year fixed mortgage rate (MR_{30}); and market sentiments include individual investor sentiment ($Sentiment_{AAII}$) and institutional investor sentiment ($Sentiment_{II}$). The AAII conducts a weekly survey of individual investors to identify public opinions and expectations of a bull, bear, or neutral market over the following six months. In our empirical analysis, we adopt a monthly $Sentiment_{AAII}$ variable to correspond to the housing outlook and macroeconomic variables. $Sentiment_{AAII}$ is calculated by taking bull percentages minus bear percentages on a monthly basis. The II also conducts a weekly survey of institutional investors for opinions of a bull, bear, or neutral market. We take the monthly average of the survey responses in terms of a bull market, a bear market, and a neutral market. We subtract the bear market percentage from the bull market percentage to measure the sentiment of institutional investors ($Sentiment_{II}$).

4. Results

4.1 Summary statistics and correlations

Table 1 defines the variables. This study employs four types of variables. The dependent variable is the IPO event, which is proxied either by IPO frequency or by IPO proceeds. The independent variables include the housing market outlook, macroeconomic indicators, and market sentiment. Table 2 lists the summary statistics for each variable from 1993 to 2010. The average monthly sales of new houses are 0.815 million units, with a maximum and minimum of 1.389 million and 0.275 million, respectively. The average treasury bill rate is approximately 3.31% (range = 6.18% to 0.03%). The average 15-year mortgage rate is 6.26% (range = 8.80% to 3.66%). The average 30-year mortgage rate exceeds the 15-year mortgage rate by around 46 basis points, with a mean of 6.72%, a maximum of 9.20%, and a minimum of 4.23%. The Case–Shiller index varies from 226.29 to 75.63. The NYSE index fluctuates from 10311.61 to 241.92. The individual investor sentiment index $Sentiment_{AAII}$ shows that the average difference between bullish and bearish investor opinion is 0.10, smaller than the institutional investor sentiment index $Sentiment_{II}$, which is 0.15. Table 3 lists the annual distribution of each variable. Only two IPOs are launched in 1999 and none in 2000 and 2001, indicating a structural break in 1999. Therefore, this study treats 1999 as a cutoff point for examining IPO timing.

Table 2. Summary Statistics for Investor Sentiment and IPO

Variable	N	Mean	Min.	Max.	Median	S.D.
IPO frequency	216	1.05	0.00	9.00	0.00	1.70
IPO proceeds	216	223.13	0.00	2,643.00	0.00	391.46
New Home Sales	216	815.03	275.00	1,389.00	841.50	260.15
Case-Shiller Index	216	133.45	75.63	226.29	123.86	51.10
3-month Treasury Bill rate	216	3.31	0.03	6.18	3.82	1.91
15-year fixed mortgage rate	216	6.26	3.66	8.80	6.38	1.12
30-year fixed mortgage rate	216	6.72	4.23	9.20	6.78	1.08
NYSE index	216	3,524.36	241.92	10,311.61	641.15	3,567.18
$Sentiment_{AAII}$	216	0.10	-0.30	0.51	0.11	0.16
$Sentiment_{II}$	216	0.15	-0.28	0.41	0.17	0.15

Note: This table lists the summary statistics for each variable in 1993-2010. The average monthly sales of new houses are 0.815 million units, with a maximum and minimum of 1.389 million and 0.275 million, respectively. The average treasury bill rate is approximately 3.31% (range = 6.18% to 0.03%). The average 15-year mortgage rate is 6.26% (range = 8.80% to 3.66%). The average 30-year mortgage rate exceeds the 15-year mortgage rate by around 46 basis points, with a mean of 6.72%, a maximum of 9.20%, and a minimum of 4.23%. The Case–Shiller index varies from 226.29 to 75.63. The NYSE index fluctuates from 10311.61 to 241.92. The individual investor sentiment index $Sentiment_{AAII}$ shows that the average difference between bullish and bearish investor opinion is 0.10, smaller than the institutional investor sentiment index $Sentiment_{II}$, which is 0.15.

Table 3. Summary Statistics

Year	IPO Freq.	IPO proceed (mil.)	New Home Sales (000s)	3-month TB rate (%)	15yr. Mortgage rate (%)	30yr. Mortgage rate (%)	CS	NYSE	$Sentiment_{AAII}$ (%)	$Sentiment_{II}$ (%)
1993	45	8,041	8,093	3.02	6.83	7.33	76.23	250.87	1.25	5.13
1994	43	5,745	8,007	4.27	7.86	8.36	76.75	254.11	3.84	-13.69
1995	8	885	8,034	5.51	7.50	7.96	76.90	293.87	16.35	3.34
1996	6	1,100	9,069	5.04	7.32	7.81	77.58	360.44	13.78	12.53
1997	26	5,552	9,676	5.07	7.13	7.60	80.23	458.44	19.94	12.29
1998	17	2,068	10,673	4.82	6.59	6.95	86.94	550.84	12.24	15.18
1999	2	12	10,542	4.66	7.05	7.43	95.14	619.44	19.45	22.32
2000	0	0	10,563	5.84	7.73	8.06	107.40	643.64	24.94	20.46
2001	0	0	10,887	3.45	6.51	6.97	120.03	604.04	14.22	15.87
2002	3	608	11,714	1.61	5.98	6.54	133.30	525.75	7.56	14.66
2003	8	2,646	13,072	1.01	5.16	5.82	151.26	5,478.86	21.37	28.75
2004	29	8,271	14,410	1.38	5.21	5.84	178.90	6,645.53	23.13	30.50
2005	11	3,790	15,347	3.17	5.42	5.87	209.16	7,364.76	9.89	28.05
2006	5	2,272	12,592	4.72	6.07	6.41	224.56	8,434.44	4.63	18.77
2007	4	1,821	9,224	4.41	6.03	6.34	214.62	9,685.00	3.41	27.12
2008	2	491	5,814	1.37	5.62	6.04	178.72	8,001.50	-11.06	-5.11
2009	9	2,992	4,487	0.15	4.58	5.04	155.58	6,100.80	-5.38	12.90
2010	9	1,903	3,842	0.14	4.10	4.69	158.87	7,166.23	7.55	18.80

Note: This table lists the annual distribution of each variable. Only two IPOs are launched in 1999 and none in 2000 and 2001, indicating a structural break in 1999.

Table 4 presents the correlation matrix of the independent variables. Correlations are observed between sentiment measures and with other variables, although the correlation coefficients are less than 0.52.

However, NYSE and CS are closely related to other variables, suggesting multicollinearity problems. To further test for multicollinearity, we calculate the variance inflation factor (VIF) for the independent variables and find that the VIF of the NYSE exceeds 10.0, the cutoff for multiple regression models (Kennedy, 1998). We thus apply a two-step procedure to eliminate collinearity: we regress the NYSE variable on other independent variables and then enter the residuals of this regression into the OLS regression in place of the original NYSE. Table 5 presents the correlation matrix with an orthogonalized NYSE variable. The collinearity is now less severe than is the case with the original NYSE index. The model is then estimated using the second step of the procedure for both the full sample and two sub-sample periods.

Table 4. Correlation Coefficients

	NH	TB	MR_{15}	MR_{30}	CS	NYSE	$Sentiment_{AAII}$	$Sentiment_{II}$
NH	1.00							
TB	0.63 ***	1.00						
	(0.00)							
MR_{15}	0.31 ***	0.83 ***	1.00					
	(0.00)	(0.00)						
MR_{30}	0.32 ***	0.81 ***	1.00 ***	1.00				
	(0.00)	(0.00)	(0.00)					
CS	0.09	-0.39 ***	-0.68 ***	-0.71 ***	1.00			
	(0.19)	(0.00)	(0.00)	(0.00)				
NYSE	-0.08	-0.51 ***	-0.77 ***	-0.79 ***	0.94 ***	1.00		
	(0.24)	(0.00)	(0.00)	(0.00)	(0.00)			
$Sentiment_{AAII}$	0.36 ***	0.22 ***	0.17 ***	0.20 ***	-0.18 ***	-0.17 ***	1.00	
	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(0.01)		
$Sentiment_{II}$	0.40 ***	-0.05	-0.34 ***	-0.33 ***	0.40 ***	0.40 ***	0.51 ***	1.00
	(0.00)	(0.43)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively, and the p-value is shown in parenthesis. This table presents the correlation matrix of the independent variables. We observe a majority of variables with 1% of significance. However, NYSE and CS indicate a highly significant correlation at 0.94*** for potential multicollinearity problem.

4.2 Individual investor sentiment: $Sentiment_{AAII}$

Table 6 indicates the influence of individual investor sentiment factors $Sentiment_{AAII}$ on IPO frequency and proceeds for the full sample period from 1993 to 2010. The three models of IPO frequency reveal that individual investor sentiment negatively, albeit insignificantly, influences IPO issuances. However, new house sales and the NYSE index display a significantly positive influence, which indicates that many new houses are sold and enhanced stock market performance induces REIT managers to launch IPOs to time the market. By contrast, all interest rates, including both short-term and long-term rates, adversely affect IPO issuances. High interest rates reduce profitability and hinder REIT growth, thus discouraging managers' decisions to go public. The Case–Shiller indices contradict those obtained from the new housing market. All models exhibit negative and significant coefficients of the Case–Shiller index, indicating that IPO frequency declines with an increasing index. REIT managers perceive new and secondary housing markets differently. This result is puzzling in relation to why managers keep placing new REITs in the market when the performance of the real estate secondary market steadily declines. This phenomenon is explained by the results shown in Tables 7 and 8. The results for the IPO proceeds are the same as those for IPO frequency; namely, high new house sales, a high NYSE index, low interest rates, and a low CS index increase IPO proceeds.

Table 5. Correlation Coefficient with Orthogonalized Variable NYSE

	NH	TB	MR_{15}	MR_{30}	CS	$NYSE_{AAII_orthg}$	$NYSE_{II_orthg}$	$Sentiment_{AAII}$	$Sentiment_{II}$
NH	1.00								
TB	0.63 ***	1.00							
	(0.00)								
MR_{15}	0.31 ***	0.83 ***	1.00						
	(0.00)	(0.00)							
MR_{30}	0.32 ***	0.81 ***	1.00 ***	1.00					
	(0.00)	(0.00)	(0.00)						
CS	0.09	-0.39 ***	-0.68 ***	-0.71 ***	1.00				
	(0.19)	(0.00)	(0.00)	(0.00)					
$NYSE_{AAII_orthg}$	0.00	0.00	-0.12 *	-0.11	0.00	1.00			
	(1.00)	(1.00)	(0.08)	(0.09)*	(1.00)				
$NYSE_{II_orthg}$	0.00	0.00	-0.09	-0.08	0.00	0.97 ***	1.00		
	(1.00)	(1.00)	(0.18)	(0.22)	(1.00)	(0.00)			
$Sentiment_{AAII}$	0.40 ***	-0.05	-0.34 ***	-0.33	0.40 ***	0.15 **	0.00	1.00	
	(0.00)	(0.43)	(0.00)	(0.00)	(0.00)	(0.03)	(1.00)		
$Sentiment_{II}$	0.36 ***	0.22 ***	0.17 ***	0.20 ***	-0.18 ***	0.00	0.02	0.51 ***	1.00
	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)	(1.00)	(0.78)	(0.00)	

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively, and the p-value is shown in parenthesis. This table presents the correlation matrix with an orthogonalized NYSE variable.

Figure 1 shows two REIT IPO waves. We hypothesize that REITs behave differently in the earlier era; thus, Tables 7 and 8 show results from the two subsample periods. Table 7 shows that the results for modern REITs (REITs from 1993 to 1998) differ from those of the full sample period. The individual sentiment index still does not affect IPO frequency. Thus, the coefficients of new house sales and the CS index become insignificant. Only the short-term and long-term interest rates negatively affect IPO frequency. Similar results are observed for IPO proceeds, except that the CS index is significantly negative. We conjecture that in the modern REIT era, REIT managers exhibit herding behavior, waiting for IPO waves to intensify and ignoring macroeconomic factors, such as overall stock market performance, the real estate secondary market, and new house sales. However, REIT managers must still take caution with regard to borrowing costs given that REIT is a high-leverage industry. Consequently, the coefficients of interest rate, namely, TB, MR_{15}, and MR_{30}, are always significant and negative.

Table 8 lists the results of individual investor sentiment toward IPO frequency and proceeds during subsample period 2 (from 1999 to 2010). In the post-modern REIT era, individual investor sentiment significantly and positively affects IPO frequency and proceeds. The high percentage of

Table 6. AAII data for Full Sample Period 1993 – 2010

	IPO frequency			IPO Proceeds		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	2.48 **	4.92 ***	5.16 ***	8.55	19.88 ***	20.79 ***
	(2.27)	(4.26)	(4.06)	(1.61)	(3.55)	(3.37)
NH	0.37 **	0.34 ***	0.33 **	1.44 *	1.36 **	1.32 **
	(2.18)	(2.49)	(2.39)	(1.75)	(2.06)	(1.95)
TB	-0.12 **			-0.57 **		
	(-2.31)			(-2.22)		
MR_{15}		-1.23 ***			-6.02 ***	
		(-3.56)			(-3.61)	
MR_{30}			-1.34 ***			-6.51 ***
			(-3.25)			(-3.25)
CS	-0.54 ***	-0.80 ***	-0.80 ***	-1.24 **	-2.54 ***	-2.53 ***
	(-4.10)	(-4.93)	(-4.66)	(-1.93)	(-3.23)	(-3.03)
NYSE	0.29 ***	0.24 **	0.25 ***	1.55 ***	1.28 ***	1.34 ***
	(3.06)	(2.42)	(2.52)	(3.36)	(2.70)	(2.82)
$Sentiment_{AAII}$	-0.18	-0.22	-0.19	0.66	0.43	0.61
	(-0.63)	(-0.77)	(-0.65)	(0.47)	(0.31)	(0.44)
Observations	216	216	216	216	216	216
F-statistic	5.32	6.13	5.79	3.65	4.47	4.11
R square	11.24%	12.73%	12.11%	7.99%	9.62%	8.91%
adj R square	9.13%	10.65%	10.02%	5.80%	7.47%	6.74%

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively, and the t-statistic is shown in parenthesis. This table indicates the influences of individual investor sentiment factors $Sentiment_{AAII}$ on IPO frequency and proceeds for the full sample period from 1993 to 2010. The three models of IPO frequency reveal that individual investor sentiment negatively influences IPO issuances. Whereas, all three models of IPO proceeds reveal positive investor sentiment influences.

bullish investors in relation to bearish investors induces REIT managers to launch IPOs. After the IPO wave, the REIT industry matures, and IPO decisions revert to investor sentiment. New house sales and the secondary house market, proxied by the CS index, positively influence IPO decisions. REIT managers launch their initial offerings when the overall housing market is bullish. Again, the capital cost, including both short-term and long-term rates, negatively influences IPO frequency and proceeds. However, the overall equity market does not influence REIT IPO decisions. Therefore, REIT managers place greater value on investor sentiment in the real estate market than on such sentiment in the stock market.

For individual investor sentiment, we observe greater and more significant sentiment response in the post-modern period (1999-2010) than that in the modern period (1993-1998). Although the

Table 7. AAII Data for Subsample Period 1993 – 1998

	IPO frequency			IPO Proceeds		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	27.03**	27.00*	29.01*	138.36***	137.67**	143.79**
	(1.99)	(1.76)	(1.83)	(2.57)	(2.29)	(2.32)
NH	-1.87	-1.03	-0.94	-6.34	-3.28	-2.87
	(-1.16)	(-0.60)	(-0.55)	(-0.99)	(-0.49)	(-0.43)
TB	-2.04***			-7.46***		
	(-4.25)			(-3.91)		
MR_{15}		-3.11**			-13.38**	
		(-1.96)			(-2.15)	
MR_{30}			-3.26*			-14.16**
			(-1.83)			(-2.03)
CS	-0.47	-2.86	-3.38	-8.98	-18.00*	-19.86*
	(-0.18)	(-1.04)	(-1.22)	(-0.87)	(-1.68)	(-1.83)
NYSE	1.51*	0.25	0.26	7.34**	2.89	2.89
	(1.80)	(0.30)	(0.30)	(2.21)	(0.87)	(0.87)
$Sentiment_{AAII}$	-0.05	-1.27*	-1.28*	0.47	-3.99	-3.98
	(-0.07)	(-1.79)	(-1.80)	(0.16)	(-1.44)	(-1.43)
Observations	72	72	72	72	72	72
F-Statistic	5.03	2.3	2.22	4.24	2.06	1.96
R square	27.61%	14.86%	14.38%	24.29%	13.48%	12.91%
adj R square	22.12%	8.41%	7.89%	18.56%	6.93%	6.31%

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively, and the t-statistic is shown in parenthesis. This table indicates the influences of individual investor sentiment factors $Sentiment_{AAII}$ on IPO frequency and proceeds for the subsample period from 1993 to 1998. This table shows individual sentiment index still does not affect IPO frequency.

NYSE variable remains positively significant for both sub-periods, new home sales and the Case–Shiller index show a positively significant influence in the post-modern period, whereas no significant response or negatively significant influence is found in the modern period. However, the mortgage and treasury bill rates show a constant negatively significant influence on REIT IPOs and proceeds in both sub-periods. Therefore, individual investor sentiment responses are significant in the post-modern period with significant responses from new home sales and the Case–Shiller index.

4.3 Institutional investor sentiment: $Sentiment_{II}$

We also examine institutional investor sentiment regarding REIT IPOs in both the full sample and subsample periods (Tables 9, 10, and 11). The results in Table 9 are similar to those in Table 6,

Table 8. AAII Data for Subsample Period 1999 – 2010

	IPO frequency			IPO Proceeds		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	-4.02 ***	-0.23	0.32	-27.01 ***	-6.91	-4.07
	(-3.64)	(-0.23)	(0.30)	(-4.09)	(-1.16)	(-0.63)
NH	0.39 ***	0.27 ***	0.29 ***	1.71 **	1.06 *	1.14 *
	(3.21)	(2.66)	(2.69)	(2.32)	(1.74)	(1.78)
TB	-0.17 ***			-0.89 ***		
	(-4.43)			(-3.84)		
MR_{15}		-1.25 ***			-6.44 ***	
		(-4.73)			(-4.08)	
MR_{30}			-1.47 ***			-7.55 ***
			(-4.45)			(-3.82)
CS	0.50 ***	0.23	0.18	4.15 ***	2.73 ***	2.53 **
	(3.56)	(1.38)	(1.07)	(4.92)	(2.78)	(2.45)
NYSE	0.14 *	0.12	0.12 *	0.56	0.45	0.50
	(1.88)	(1.57)	(1.68)	(1.29)	(1.01)	(1.12)
$Sentiment_{AAII}$	0.64 ***	0.63 ***	0.66 ***	4.43 ***	4.37 ***	4.54 ***
	(2.78)	(2.73)	(2.85)	(3.20)	(3.15)	(3.26)
N	144	144	144	144	144	144
F	12.16	12.22	11.72	13.02	13.12	12.66
R square	30.59%	30.69%	29.81%	32.05%	32.22%	31.44%
adj R square	28.08%	28.18%	27.27%	29.59%	29.76%	28.96%

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively, and the t-statistic is shown in parenthesis. This table indicates the influences of individual investor sentiment factors $Sentiment_{AAII}$ on IPO frequency and proceeds for the subsample period from 1999 to 2010. Individual investor sentiment significantly and positively affects IPO frequency and proceeds.

except that the sentiment index becomes negative and significant in models 2 and 3. This negative effect indicates that although more institutional investors are bearish than bullish, REIT managers still launch IPOs to catch the wave of IPO activity. However, this result is primarily a feature of the modern REIT era.

Table 10 indicates that institutional investor sentiment negatively affects IPO frequency and proceeds in the subsample period between 1993 and 1998. During this period, the coefficient of new house sales becomes either negative or insignificant. However, the secondary house market, proxied by the CS index, still negatively affects IPO frequency and proceeds.

Table 11 shows how institutional investor sentiment influences IPO frequency and proceeds during the second subsample period, between 1999 and 2010. In the post-modern REIT era, the

Table 9. II data for Full Sample Period 1993 – 2010

	IPO frequency			IPO Proceeds		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	1.67	4.53 ***	4.93 ***	6.72	18.89 ***	20.25 ***
	(1.43)	(3.93)	(3.91)	(1.18)	(3.36)	(3.28)
NH	0.42 **	0.45 ***	0.45 ***	1.53 *	1.72 **	1.65 **
	(2.41)	(3.13)	(3.01)	(1.80)	(2.42)	(2.26)
TB	-0.13 ***			-0.59 **		
	(-2.49)			(-2.22)		
MR_{15}		-1.47 ***			-6.60 ***	
		(-4.05)			(-3.70)	
MR_{30}			-1.63 ***			-7.09 ***
			(-3.72)			(-3.31)
CS	-0.49 ***	-0.77 ***	-0.79 ***	-1.34 **	-2.61 ***	-2.63 ***
	(-3.79)	(-4.97)	(-4.76)	(-2.14)	(-3.45)	(-3.26)
NYSE	0.33 ***	0.27 ***	0.28 ***	1.65 ***	1.41 ***	1.47 ***
	(3.39)	(2.80)	(2.89)	(3.50)	(2.96)	(3.06)
$Sentiment_{II}$	-0.39	-0.71 **	-0.67 *	0.23	-1.21	-0.95
	(-1.17)	(-2.05)	(-1.92)	(0.14)	(-0.71)	(-0.56)
N	216	216	216	216	216	216
F	5.99	7.37	6.95	3.8	4.86	4.43
R square	12.49%	14.92%	14.19%	8.30%	10.38%	9.55%
adj R square	10.40%	12.89%	12.15%	6.12%	8.24%	7.40%

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively, and the t-statistic is shown in parenthesis. This table indicates the influences of institutional investor sentiment factors $Sentiment_{II}$ on IPO frequency and proceeds for the full sample period from 1993 to 2010. Institutional investor sentiment significantly and negatively affects IPO frequency in model 2 and model 3.

coefficient of sentiment becomes significantly positive, as do new house sales. REIT managers base their IPO decisions on the outlook of institutional investors with regard to the stock market and the housing market situation. Furthermore, the secondary housing market, proxied by the CS index, positively and significantly affects IPO frequency and proceeds, with the exception of models 2 and 3. Again, the NYSE overall stock market condition is insignificant.

For institutional investor sentiment, we find a positively significant influence in the post-modern period (1998-2010) and a negatively significant influence in the modern period (1993-1998). Although the NYSE shows a positively significant influence in the modern period, all other variables, including new home sales, the Case–Shiller index, mortgage rates, and the treasury bill rate, indicate a negatively significant influence. However, during the post-modern period, the mortgage and treasury

Table 10. II Data for Subsample Period 1993 – 1998

	IPO frequency			IPO Proceeds		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	43.04 ***	42.58 ***	46.35 ***	190.64 ***	186.86 ***	198.28 ***
	(3.61)	(2.86)	(2.96)	(3.88)	(3.14)	(3.17)
NH	-3.27 **	-1.55	-1.37	-11.12 *	-4.78	-4.01
	(-2.24)	(-0.97)	(-0.86)	(-1.85)	(-0.75)	(-0.63)
TB	-3.03 ***			-10.89 ***		
	(-6.54)			(-5.70)		
MR_{15}		-6.47 ***			-24.17 ***	
		(-3.73)			(-3.48)	
MR_{30}			-6.85 ***			-25.44 ***
			(-3.57)			(-3.31)
CS	-0.22	-3.73	-4.74 *	-8.40	-21.13 **	-24.61 **
	(-0.10)	(-1.46)	(-1.82)	(-0.90)	(-2.06)	(-2.36)
NYSE	3.47 ***	1.17	1.14	13.91 ***	5.69 *	5.55 *
	(4.16)	(1.47)	(1.43)	(4.06)	(1.79)	(1.73)
$Sentiment_{II}$	-0.22	-2.72 ***	-2.69 ***	1.12	-8.06 **	-7.88 **
	(-0.31)	(-3.37)	(-3.30)	(0.38)	(-2.49)	(-2.41)
N	72	72	72	72	72	72
F	10.33	4.66	4.44	7.75	3.64	3.41
R square	43.89%	26.10%	25.18%	37.00%	21.61%	20.51%
adj R square	39.64%	20.51%	19.51%	32.23%	15.67%	14.49%

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively, and the t-statistic is shown in parenthesis. This table indicates the influences of institutional investor sentiment factors $Sentiment_{II}$ on IPO frequency and proceeds for the full sample period from 1993 to 1998. Institutional investor sentiment significantly and negatively affects IPO frequency and proceeds in model 2 and model 3.

bill rates remain negatively significant. We also find that new home sales and the Case–Shiller index have a positively significant influence on IPO frequency and proceeds. Thus, we find more significant institutional investor sentiment in the post-modern period than that in the modern period, indicating a gradual shift in the importance of investor sentiment from the modern period to the post-modern period.

4.4 Overall empirical analysis and result comparison

We therefore review our results against Jirasakuldech et al. (2006) for the absence of irrationality between the macroeconomic indicators and REITs. The results of this study correspond to Clayton et al. (2009) in terms of the existence of housing market sentiments. Our results further correspond to Chen et al. (2011), Below et al. (1995), and Glascock et al. (1998) in showing the effects of investor

Table 11. II Data for Subsample Period 1999 – 2010

	IPO frequency			IPO Proceeds		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Intercept	-3.57 ***	0.13	0.65	-23.71 ***	-4.37	-1.85
	(-3.22)	(0.13)	(0.60)	(-3.58)	(-0.74)	(-0.29)
NH	0.37 ***	0.27 **	0.28 **	1.58 **	0.97	1.01
	(2.99)	(2.46)	(2.43)	(2.11)	(1.50)	(1.48)
TB	-0.16 ***			-0.85 ***		
	(-4.22)			(-3.65)		
MR_{15}		-1.17 ***			-5.82 ***	
		(-4.22)			(-3.52)	
MR_{30}			-1.35 ***			-6.67 ***
			(-3.91)			(-3.22)
CS	0.37 ***	0.11	0.07	3.24 ***	1.97 **	1.80 *
	(2.76)	(0.71)	(0.44)	(4.09)	(2.12)	(1.83)
NYSE	0.12	0.11	0.12	0.40	0.38	0.43
	(1.56)	(1.46)	(1.57)	(0.90)	(0.83)	(0.94)
$Sentiment_{II}$	0.79 ***	0.66 **	0.70 **	5.50 ***	4.87 ***	5.08 ***
	(2.84)	(2.27)	(2.38)	(3.29)	(2.80)	(2.92)
N	144	144	144	144	144	144
F	12.01	11.57	11.05	12.97	12.51	12.04
R square	30.32%	29.55%	28.59%	31.98%	31.18%	30.37%
adj R square	27.79%	26.99%	26.01%	29.51%	28.69%	27.84%

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively, and the t-statistic is shown in parenthesis. This table indicates the influences of institutional investor sentiment factors $Sentiment_{II}$ on IPO frequency and proceeds for the subsample period from 1999 to 2010. Institutional investor sentiment significantly and positively affects IPO frequency and proceeds in all three models.

sentiment toward REIT IPOs. The market timing hypothesis also seems to influence institutional investors more than it does individual investors, consistent with Baker & Wurgler (2002) and Ooi et al. (2010).

Overall, this study focuses on the dynamic reactions of macroeconomic indicators, housing market outlook, and stock market sentiments to REIT IPOs. Whereas previous studies have focused on the relationship between interest rates, the property market, and stock markets and REIT returns, the present study serves as an extension by analyzing the reactions of investor sentiment to IPOs. Institutional and individual investor sentiments are directly measured and incorporated into our analysis for the reactions of sentiments toward various timings of IPO issuance activities. The macroeconomic indicators comprised treasury bill rates, 15-year mortgage rates, and 30-year mortgage

rates, which had a consistent significantly negative reaction for all IPO frequency and proceeds during all sample periods, regardless of the sentimental influence of the institutional or individual investors. This observation indicates that the decreases in interest rates increase IPO activity with statistical significance, regardless of market timing for IPO issuance. This result corresponds to Jirasakuldech et al. (2006), who reported the lack of irrationality between macroeconomic indicators and REITs.

For the housing market, new home sales units during the entire sample period and cold market had a significantly positive reaction to IPO frequency and proceeds for both institutional and individual investors. In a hot market, new home sales units have an insignificantly negative response to IPO frequency and proceeds for both institutional and individual investors. This observation indicates that an increase in new home sales intensifies IPO activity with statistical significance in a cold market. The Case–Shiller index during the full sample and hot market periods for individual and institutional investors had a significantly negative response to IPO frequency and proceeds, except in the hot market period for individual investors, which had an insignificantly negative response. The Case–Shiller index responds insignificantly to IPO frequency and proceeds on the basis of institutional and individual investors' data sources during the cold market period. This observation indicates that an increase in the Case–Shiller index decreases IPO activity during a hot market period. Therefore, an inverse relationship exists between new home sales units and the Case–Shiller index, consistent with Clayton et al. (2009), who reported on the existence of housing market sentiments.

As regards the stock market, the NYSE index has a significantly positive response during the entire sample period and the majority of the hot market period for both institutional and individual investor data sources. The NYSE index had an insignificantly positive response only in the cold market period for institutional investor data source. This observation indicates that an increase in the NYSE index increases IPO activity during the hot market period, consistent with Helwege & Liang (2004).

Individual investor sentiment has an insignificantly negative response to IPO activities during the entire sample period and the hot market period, with only a significantly positive response during the cold market period. Institutional investor sentiment has a significantly negative response to IPO activity during the entire sample period (for IPO frequency) and the hot market period, as well as a significantly positive response during the cold market period. Therefore, institutional investors respond more strongly to IPOs than individual investors. This result indicates investor sentiment for both hot and cold markets where institutional investors exert stronger sentiment than individual investors, contradicting Buttimer et al. (2005), who observed investor sentiment for IPOs. However, this result corresponds to Chen et al. (2005), Below et al. (1995), and Glascock et al. (1998), evidencing the effects of investor sentiment toward REIT IPOs.

The market timing hypothesis and investor sentiment for REIT IPOs are tested, with strong support from previous studies. The absence of investor sentiment in the macroeconomic indicator shows the rational reactions of interest rates to REIT IPOs. However, empirical analysis shows that the housing market, stock market, and investor sentiments are influenced by significant sentiments. In

particular, institutional investors react more irrationally and in a longer duration to REIT IPOs than individual investors. Thus, the market timing hypothesis more considerably influences institutional investors than it does individual investors, consistent with Baker & Wurgler (2002) and Ooi et al. (2010).

The present investigation suggests differentiated REIT IPO strategies for individual and institutional investors. Although new home sales units and individual investors have a significantly positive response to REIT IPOs during the cold market period, the Case–Shiller index and institutional investors' reactions are negatively significant in the hot market period. However, the NYSE index has a significantly positive reaction to REIT IPOs in the hot market period. Likewise, institutional investors have a significantly positive response in a cold market. Therefore, real estate developers may promote REIT IPOs in a cold market by primarily targeting individual investors when new home sales decline, with secondary priority for institutional investors. In addition, real estate developers may promote REIT IPOs in a hot market to target institutional investors when the stock market index increases and the Case–Shiller index decreases. The government may refer to this investigation to decrease the degree of sentiment behavior among institutional investors to enhance the protection of the stock market from irrationality with regard to REIT IPOs.

5. Conclusion

This study examines how REIT managers time their IPO decisions based on investor sentiment by using a proxy directly measured from survey data. The results indicate that individual investor sentiment affects IPO frequency and proceeds only during the post-modern IPO era (from 1999 to 2010), when the REIT industry has matured and fully developed. During the modern REIT era (from 1993 to 1998), managers herd into IPO waves while ignoring market sentiment.

Considering that institutional investor sentiment only slightly alters the results, we present the following conclusions:

1. During the first subsample period, sentiment negatively affects IPO frequency and proceeds. IPO frequency and proceeds increase when bearish institutional investors outnumber bullish ones. During the hot REIT IPO period, even though the institutional investors are bearish about the overall stock market, investors still intend to purchase REIT for diversification or defensive purposes or simply because of herding effects. Nonetheless, following the IPO wave, given that the investors are already familiar with the REIT industry and a selection of listed REITs is already available, the investors become cautious in choosing. Consequently, in the post-modern REIT era, managers have timed IPOs based on institutional investors' perceptions of the market.
2. In both the modern and post-modern REIT eras, the cost of capital is always the foremost priority that companies must consider in IPOs. High interest rates hinder REIT profitability and future growth opportunities and consequently slow down IPO activities.
3. Overall, this study concludes that investor sentiment affects the REIT IPO market and that managers time IPO decisions when the REIT industry is well developed.

4. From an economic perspective, our empirical results highlight the usefulness of investor sentiment for REIT IPOs. Rather than relying on mortgage or treasury bill rates, investor sentiment identification can distinguish the influence noise for REIT IPOs and allow managers to make better IPO decisions. New home sales, the Case–Shiller index, and sentiment variables work together as indicators for investor sentiment in providing appropriate IPO decisions.

This study also contributes in the following ways:

1. We successfully use direct investor sentiment measurements for both institutional and individual investors to analyze their influence on REIT IPO issuance activities.
2. We compare the relationships among macroeconomic indicators, the housing market, and the stock market and compare and analyze sentiment indicators during both hot and cold market periods. Instead of focusing on the responses of the stock market to REIT IPOs, this study extends the scope of comparison to the housing market and macroeconomics for a comprehensive and in-depth analysis of the sources and effects of sentiments toward REIT IPOs.
3. Our findings strongly support literature on this topic in terms of identifying the relationship between the market timing hypothesis and investor sentiment in relation to REIT IPOs. The results of this study can serve as reference for real estate developers in making decisions related to REIT IPOs as well as to the government with regard to improving the protection of investors from irrational investment behavior.

References

Akhigbe, A., J. Johnston, J. Madura & T. M. Springer
2004 "Market Signals Associated with REIT IPOs," *Journal of Real Estate Finance and Economics*. 28(4): 355-367.

Allen, F. & G. R. Faulhaber
1989 "Signaling by Underpricing in the IPO Market," *Journal of Financial Economics*. 23(2): 303-323.

Alti, A.
2006 "How Persistent is the Impact of Market Timing on Capital Structure?" *Journal of Finance*. 61(4): 1681-1710.

Baker, M. & J. Wurgler
2002 "Market Timing and Capital Structure," *Journal of Finance*. 57(1): 1-32.

Below, S., M. A. Zaman & W. Mcintosh
1995 "The Pricing of Real Estate Investment Trust Initial Public Offerings," *Journal of Real Estate Finance and Economics*. 11(1): 55-64.

Blau, B. M., M. D. Hill & H. Wang
2011 "REIT Short Sales and Return Predictability," *Journal of Real Estate Finance and Economics*. 42(4): 481-503.

Boudry, W. I., J. G. Kallberg & C. H. Liu
2010 "An Analysis of REIT Security Issuance Decisions," *Real Estate Economics*. 38(1): 91-120.

Brailsford, T., R. Heaney, J. Powell & J. Shi
2000 "Hot and Cold IPO Markets: Identification Using a Regime Switching Model," *Multinational Finance Journal*. 4(1-2): 35-68.

Bredin, D., G. O'Reilly & S. Stevenson
2011 "Monetary Policy Transmission and Real Estate Investment Trusts," *International Journal of Finance and Economics*. 16(1): 92-102.

Brounen, D. & P. Eichholtz
2003 "Property, Common Stock and Property Shares," *Journal of Portfolio Management*. 29(5): 129-137.

Brown, G. W. & M. T. Cliff
2004 "Investor Sentiment and the Near-Term Stock Market," *Journal of Empirical Finance*. 11(1): 1-27.

Brown, R. L., J. Durbin & J. M. Evans
1975 "Techniques for Testing the Constancy of Regression Relationship over Time," *Journal of the Royal Statistical Society*. Series B: 149-192.

Buttimer, R. J., J. Chen & I. H. E. Chiang
2012 "REIT Performance and Market Timing Ability," *Managerial Finance*. 38(3): 249-279.

Buttimer, R. J., D. C. Hyland & A. B. Sanders
2005 "REITs, IPO Waves and Long-Run Performance," *Real Estate Economics*. 33(1): 51-87.

Chen, H. C., R. Fok & C. Lu
2011 "An Analysis of Lockups in REIT IPOs," *Journal of Real Estate Finance and Economics*. 43(3): 359-384.

Chen, H. C., C. K. Ho, C. Lu & C. H. Wu
2005 "Real Estate Investment Trusts," *Journal of Portfolio Management*. 31(5): 46-54.

Chui, A. C. W., S. Titman & K. C. J. Wei
2003a "Intra-Industry Momentum: The Case of REITs," *Journal of Financial Markets*. 6(3): 363-387.

Chui, A. C. W., S. Titman & K. C. J. Wei
2003b "The Cross Section of Expected REIT Returns," *Real Estate Economics*. 31(3): 451-479.

Clayton, J., D. C. Ling & A. Naranjo
2009 "Commercial Real Estate Valuation: Fundamentals versus Investor Sentiment," *Journal of Real Estate Finance and Economics*. 38(1): 5-37.

Clayton, J. & G. MacKinnon
2001 "The Time-Varying Nature of the Link between REIT, Real Estate and Financial Asset Returns," *Journal of Real Estate Portfolio Management*. 7(1): 43-54.

Compton, W. S., D. T. Johnson & R. A. Kunkel
2006 "The Turn-of-the-Month Effect in Real Estate Investment Trusts (REITs)," *Managerial Finance*. 32(12): 969-980.

Connors, D. N., M. L. Jackman, R. P. Lamb & S. B. Rosenberg
2002 "Calendar Anomalies in the Stock Returns of Real Estate Investment Trusts," *Briefings in Real Estate Finance*. 2(1): 61-71.

Derrien, F. & A. Kecskés
2009 "How Much Does Investor Sentiment Really Matter for Equity Issuance Activity?" *European Financial Management*. 15(4): 787-813.

Feldman, B. E.
2003 "Investment Policy for Securitized and Direct Real Estate," *Journal of Portfolio Management*. 29(5): 112-121.

Georgiev, G., B. Gupta & T. Kunkel
2003 "Benefits of Real Estate Investment," *Journal of Portfolio Management*. 29(5): 28-33.

Giliberto, M.
2003 "Assessing Real Estate Volatility," *Journal of Portfolio Management*. 29(5): 122-128.

Glascock, J. L., W. T. Hughes & S. B. Varshney
1998 "Analysis of REIT IPOs Using a Market Microstructure Approach: Anomalous Behavior or Asset Structure," *Journal of Real Estate Finance and Economics*. 16(3): 243-256.

Glascock, J. L., C. Lu & R. W. So
2000 "Further Evidence on the Integration of REIT, Bond and Stock Returns," *Journal of Real Estate Finance and Economics*. 20(2): 177-194.

Hartzell, J. C., J. G. Kallberg & C. H. Liu
2005 "The Role of the Underlying Real Asset Market in REIT IPOs," *Real Estate Economics*. 33(1): 27-50.

Helwege, J. & N. Liang
2004 "Initial Public Offerings in Hot and Cold Markets," *Journal of Financial and Quantitative Analysis*. 39(3): 541-569.

Hudson-Wilson, S., J. Gordon, F. Fabozzi, M. Anson & S. Giliberto
2005 "Why Real Estate?" *Journal of Portfolio Management*. 31(5): 12-21.

Jirasakuldech, B., R. D. Campbell & J. R. Knight
2006 "Are There Rational Speculative Bubbles in REITs?" *Journal of Real Estate Finance and Economics*. 32(2): 105-127.

Jirasakuldech, B., R. Campbell & R. Emekter
2009 "Conditional Volatility of Equity Real Estate Investment Trust Returns: A Pre- and Post-1993 Comparison," *Journal of Real Estate Finance and Economics*. 38(2): 137-154.

Kaushik, A., A. Pennathur & S. Barnhart
2010 "Market Timing and the Determinants of Performance of Sector Funds over the Business Cycle," *Managerial Finance*. 36(7): 583-602.

Kennedy, P.
1998 *A Guide to Econometrics*. Oxford: Blackwell Publishing.

Kurov, A.
2010 "Investor Sentiment and the Stock Market's Reaction to Monetary Policy," *Journal of Banking and Finance*. 34(1): 139-149.

Liao, Y. C.
2012 "Contrarian Effects of REITs and the Sources of Their Profitability," *Journal of Housing Studies*. 21(2): 29-46.

Lin, C. Y., H. Rahman & K. Yung
2009 "Investor Sentiment and REIT Returns," *Journal of Real Estate Finance and Economics*. 39(4): 450-471.

Li, D. D. & K. Yung
2004 "Short Interests in Real Estate Investment Trusts," *International Real Estate Review*. 7(1): 56-70.

Ljungqvist, A., V. Nanda & R. Singh
2006 "Hot Markets, Investor Sentiment, and IPO Pricing," *Journal of Business*. 79(4): 1667-1702.

Marcato, G. & T. Key
2005 "Direct Investment in Real Estate," *Journal of Portfolio Management*. 31(5): 55-69.

Mueller, G. R. & M. A. Anikeeff
2001 "Real Estate Ownership and Operating Businesses: Does Combining Them Make Sense for REITs?" *Journal of Real Estate Portfolio Management*. 7(1): 55-65.

Ooi, J. T. L., S. E. Ong & L. Lin
2010 "An Analysis of the Financing Decisions of REITs: The Role of Market Timing and Target Leverage," *Journal of Real Estate Finance and Economics*. 40(2): 130-160.

Ott, S. H., T. J. Riddiough & H. C. Yi
2005 "Finance, Investment and Investment Performance: Evidence from the REIT Sector," *Real Estate Economics*. 33(1): 203-235.

Pagliari, Jr. J. L., K. Scherer & R. Monopoli
2003 "Public versus Private Real Estate Equities," *Journal of Portfolio Management*. 29(5): 101-111.

Pâster, L. & P. Veronesi
2005 "Rational IPO Waves," *Journal of Finance*. 60(4): 1713-1757.

Payne, J. E. & G. A. Waters
2007 "Have Equity REITs Experienced Periodically Collapsing Bubbles?" *Journal of Real Estate Finance and Economics*. 34(2): 207-224.

Schindler, F.
2013 "Predictability and Persistence of the Price Movements of the S&P/Case-Shiller House Price Indices," *Journal of Real Estate Finance and Economics*. 46(1): 44-90.

Swanson, Z., J. Theis & K. M. Casey
2002 "REIT Risk Premium Sensitivity and Interest Rates," *Journal of Real Estate Finance and Economics*. 24(3): 319-330.

Wang, K., J. Erickson & S. H. Chan
1995 "Does the REIT Stock Market Resemble the General Stock Market?" *Journal of Real Estate Research*. 10(4): 445-460.

Waters, G. A. & J. E. Payne
2007 "REIT Markets and Rational Speculative Bubbles: An Empirical Investigation," *Applied Financial Economics*. 17(9): 747-753.