The Journal of Financial Research

RAWLS COLLEGE OF BUSINESS, TEXAS TECH UNIVERSITY
PUBLISHED FOR THE SOUTHERN AND SOUTHWESTERN
FINANCE ASSOCIATIONS BY WILEY-BLACKWELL PUBLISHING

The Journal of Financial Research • Vol. XXXVII, No. 1 • Pages 55–74 • Spring 2014

SPECULATIVE TRADING IN REITS

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Abstract

The recent extremes in the real estate economic cycle have created an ideal setting to investigate the role of speculative trading. Specifically, we focus on speculative trading in real estate investment trusts (REITs) during the recent boom and bust in real estate. Although we find a strong relation between speculative trading in REITs and the economic cycle, we do not find evidence that speculative trading is related to future returns. Our results suggest that although increased speculative trading is apparent in REITs during the boom years, the level of speculative trading in REITs does not appear to affect the quality of markets at large.

JEL Classification: G10, G14, G19

I. Introduction

In both the popular press and academic research, much has been said about speculative trading. With regard to the energy markets, Gary Gensler, chairman of the Commodity Futures Trading Commission, indicated that "every option must be on the table" to curb "excessive speculation."[1] On the other end of the spectrum, Buyuksahin and Harris (2010) state that "speculators provide immediacy and facilitate the needs of hedgers by mitigating price risk, while adding to overall trading volume, which contributes to more liquid and well-functioning markets" (p. 169). A similar conclusion is reached in Friedman (1953). Other research describes both the positive and negative externalities associated with speculation in markets (Stein 1987; Wang 2010). Regardless of which side of the debate has more merit, a better understanding of speculative trading is critical to the design and improvement of financial markets. In this article, we focus on the role of speculative trading in real estate investment trust (REIT) stock during the latest real estate economic cycle.

The recent boom and bust in real estate has created an ideal setting to investigate the role of speculative trading in the marketplace. The U.S. Commodity Futures Trading Commission defines a speculator as "a trader who does not hedge, but who trades with the objective of achieving profits through the successful anticipation of price movements."[2]

We gratefully acknowledge helpful comments by seminar participants at the University of Montana, Utah State University, and the American Real Estate Society Annual Conference. We also thank the Associate Editor David Harrison and an anonymous referee for insightful comments and suggestions.

[1] Commodity Futures Trading Commission Speeches and Testimony, July 29, 2009. http://www.cftc.gov/PressRoom/SpeechesTestimony/genslerstatement072809

[2] "CFTC Glossary: A Guide to the Language of the Futures Industry," Commodity Futures Trading Commission, 2012. Available at cftc.gov.

With respect to real estate, we can think of speculation in several ways. One avenue for speculation in real estate is to buy and sell actual properties to try and profit from changing prices. In recent years, extreme examples were reported of speculators overbuilding and property "flipping" in cities across the United States. Speculators were betting that rapidly rising prices would translate into large profits. Another natural avenue to speculate on real estate is through the equity markets and the purchase of REIT stock. In this article, our use of REIT is always a reference to the equity securities that are traded with respect to the underlying real estate.

REITs are an attractive asset to speculators for several reasons. First, REITs trade in liquid markets, which allows positions to be opened and closed daily if desired. Second, the transaction costs associated with purchasing REITs are smaller than those associated with purchasing real property. Third, although exposure to real estate through REITs is more diversified, the numerous REITs available for purchase allow speculators to focus on specific property types or regions without facing the varying levels of information asymmetry that would be encountered with more direct investments.[3] We focus on speculative trading in REITs, but we acknowledge that the role of speculators in direct real estate markets could be quite different. Although speculative trading in the assets held by REITs would eventually show up in prices and could be related to the speculative trading of REIT securities, the illiquidity, uniqueness, and high transaction costs associated with the underlying assets allows for potentially large deviations between REIT prices and the underlying net asset values.

We focus on two primary questions. First, what is the relation between speculative trading and REIT performance during the recent real estate economic cycle? Given the anecdotal evidence of speculation in real property in recent years as well as the ease and convenience of trading equity REITs, we hypothesize that speculative trading in REITs will increase during the boom periods. Results from our tests show a strong relation between our proxy for speculative trading and the economic cycle in real estate. Although speculative trading in REITs is indistinguishable from speculative trading in non-REITs over our entire sample (1993–2011), we find that speculative trading in REITs was markedly higher than speculative trading in non-REITs during the real estate boom period. These results are supported in both our univariate and multivariate tests.

The second question we examine is whether speculative trading in REITs is related to future returns. Stein (1987) develops a model that shows that although increased speculation can benefit markets through greater risk sharing, it is also possible for increased speculation to change the information content of prices enough to have a destabilizing influence that outweighs the benefits. If speculative trading adversely affects market prices by driving them too high or too low, then speculative trading should have some predictive power with respect to future returns. In other words, if more speculation causes prices to deviate from fundamentals, then REITs with more speculative trading should have larger reversals. Conversely, if speculative trading is unrelated to future returns, then the relation between speculative trading and prices in REITs is less clear. Results in this study do not show that REITs with more speculative trading have larger

[3] Although REIT managers can mitigate some of the informational asymmetries faced by investors looking to gain exposure outside their areas of expertise, additional agency costs arise that could negate much of that benefit.

losses during the bust period than REITs with less speculative trading. Differences between the top and bottom quartiles of firms ranked by speculative trading during the boom period indicate that firms with the most speculative trading actually had higher average returns than firms with the least speculative trading after the market crash. Although average returns for the top and bottom quartiles are not significantly different, they are consistently positive, which does not support the notion that speculators attenuated the dramatic price reversal in REITs after 2007. In other unreported tests, we do not find that speculative trading in REITs adversely affected market quality during the boom period. For example, we do not find that during the real estate boom, speculative trading in REITs caused illiquidity, nor do we find that speculative trading caused an unusual amount of volatility in REITs. Our results seem to suggest that although speculative trading in REITs increased during the recent real estate boom and decreased after the bust, the increase in speculative trading did not adversely affect market quality, at least not with respect to the market for REITs.

II. Related Literature

Speculative trading has been examined from many different perspectives. Stein (1987) develops a model that considers the role of increased speculation in financial markets. He notes that speculation can benefit the marketplace by lowering the aggregate risk aversion or by changing the information content of prices. In some cases, speculators can negatively affect the market by making prices "noisier," or changing the information content in a way that inflicts a negative externality on those already in the market. Wang (2010) considers the case where speculative traders add noise to the market and finds that speculative noise trading increases liquidity but also results in less efficient prices.

While many authors have addressed speculative trading with theoretical models, few have examined the question empirically. Llorente et al. (2002) examine the relation between return and volume for individual stocks and develop a model where returns generated by speculation tend to continue and returns generated by hedging tend to reverse. We use their measure as our proxy for speculative trading. They describe the rationale behind their measure as follows:

> When a subset of investors sell a stock for hedging reasons, the stock's price must decrease to attract other investors to buy. Since the expectation of future stock payoff remains the same, the decrease in the price causes a low return in the current period and a high expected return for the next period. However, when a subset of investors sells a stock for speculative reasons, its price decreases, reflecting the negative private information about its future payoff. Since this information is usually only partially impounded into the price, the low return in the current period will be followed by a low return in the next period, when the negative private information is further reflected in the price. This example shows that hedging trades generate negatively autocorrelated returns and speculative trades generate positively autocorrelated returns. (p. 1005)

A detailed description of how speculative trading is calculated can be found in the Data section of Llorente et al. (2002). Grishchenko, Litov, and Mei (2006) use Llorente et al.'s measure to examine stocks from emerging markets. Han and Kumar (2013) examine the role of speculative trading by retail investors and find that stocks that are dominated by speculative retail trading tend to be overpriced with significantly negative alphas. Buyuksahin and Harris (2010) examine the role of speculative trading in the crude oil futures market and find little evidence that speculators Granger-cause price changes.

The recent volatility in the real estate markets and the associated financial crisis have also been the focus of many studies. Devos et al. (2012) examine the role of institutional investors in REITs during the financial crisis and find that institutional ownership increased before the crisis but declined significantly during the crisis. Huang (2013) investigates the role expectations played in the recent housing boom and bust through a volatility feedback model. She finds a strong positive relation between housing market volatility and expected housing returns. Anderson, Brooks, and Tsolacos (2011) test for periodic, partially collapsing speculative bubbles in U.S. REITs, and Driessen and Van Hemert (2012) study the pricing of commercial real estate derivatives during the financial crisis and find little systematic mispricing relative to REITs.

Although several authors have looked at speculative trading in real estate, we are the first to examine closely the role of speculators in REITs during the recent boom and bust. Tegene and Kuchler (1993) examine speculative trading in farmland and find little evidence that speculative trading affects prices. Bjorklund and Soderberg (1999) look at speculative trading of real estate in Sweden and find that speculation partly explains the real estate bubble during the 1980s. Malpezzi and Wachter (2005) develop a model that examines land speculation. They find that land speculation only affects prices when supply is inelastic. Case, Cotter, and Gabriel (2011) develop a multifactor asset pricing model for housing and conclude that speculative forces are an important determinant for U.S. housing returns. Focusing more on real estate after the financial crisis, Zhou and Anderson (2013) examine the role of herding behavior in the U.S. REIT market and find that investors are more likely to herd in REITs when market conditions are turbulent. They also find that circumstances that lead to herding have evolved since the recent financial crisis.

Our article contributes to the literature in several ways. First, we find clear evidence that speculators used REITs during the housing boom. Understanding the role of speculators in different markets and periods allows for both better market design and regulation. Second, examining speculative trading during both the boom and bust periods allows us to examine whether speculative trading exacerbated the pain felt during the bust. Although we find significant increases in speculative trading, we do not find that more speculative trading resulted in bigger losses or more volatility. Third, although many theoretical models have examined speculative trading, few have documented the role of speculation empirically. Our analysis is focused on the REIT market, but our results have broader implications and support the model developed by Llorente et al. (2002).

III. Data Description

The data used in the analysis are obtained from a variety of sources. From the Center for Research on Security Prices (CRSP), we obtain daily holding-period returns, volume, prices, shares outstanding, and so on.[4] Our sample period extends from 1993 to 2011, and we obtain the universe of REITs that are available on CRSP/Ziman Real Estate. We begin our analysis in 1993 to coincide with the modern REIT era. The total number of unique REITs is 500.[5] The total number of REIT-year observations is 3,814. Similarly, from CRSP we gather data on the universe of non-REITs. In the subsample of non-REITs, we have 17,795 unique securities and 139,031 non-REIT-year observations.

To provide an estimate of speculative trading, we follow Llorente et al. (2002), who examine the dynamic relation between returns and volume of individual securities. They argue that after controlling for volume, hedging trades will generate negatively autocorrelated returns and speculative trades will generate positively autocorrelated returns. We closely follow the empirical methods of Llorente et al. when estimating speculative trading. For instance, we estimate daily turnover, which is equal to the ratio of daily volume to shares outstanding. Lo and Wang (2000) indicate that the daily time series of turnover are nonstationary, so Llorente et al. detrend the time series and take the log of turnover. On days when volume is zero, they add a small constant (0.00000255), which has been shown to maximize the likelihood of normally distributed trading volume at the daily level (Richardson, Sefcik, and Thompson 1986; Ajinkya and Jain 1989; Cready and Ramanan 1991). We calculate our measures of turnover in the following way.

$$\log turnover_{i,t} = \log(turnover_{i,t} + 0.00000255) \tag{1}$$

$$V_{i,t} = \log turnover_{i,t} - \frac{1}{200}\sum_{s=200}^{-1} \log turnover_{i,t}. \tag{2}$$

$V_{i,t}$ is the measure of trading activity we use to estimate speculative trading and is obtained by taking the difference between the log of turnover and mean of the log of turnover from day t–1 to day t–200, where day t is the current trading day. Using CRSP daily returns and $V_{i,t}$, we then estimate the following time-series equation for the universe of securities in our sample:

$$R_{i,t+1} = \beta_0 + \beta_1 R_{i,t} + \beta_2 R_{i,t} \times V_{i,t} + \varepsilon_{i,t+1}. \tag{3}$$

Equation (3) shows a simple autoregressive formula where daily returns for each stock on day $t+1$ are regressed on daily returns for each stock on day t. Llorente et al. (2002) include the interaction between $R_{i,t}$ and $V_{i,t}$ in equation (3) to obtain the estimate for speculative trading. The idea is that the larger (and more positive) the estimate for β_2, the more likely that trading activity increases the return autocorrelation. Therefore, the estimate for β_2 is our estimate for speculative trading according Llorente et al.'s model. Although the argument by Llorente et al. that positively autocorrelated returns proxy for

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[4] The holding-period returns used in this analysis account for dividends.

[5] We also analyze only equity REITs identified by Feng, Price, and Sirmans (2011) and find even stronger results. Results for the full sample are reported so that differences between REIT type can be analyzed in our multivariate analysis.

speculative trading is fairly straightforward, the idea of hedging trades for an individual security is awkward. Llorente et al. also describe hedging trades as allocational shocks, which we think is more representative. In other words, trades are being made for allocation or liquidity reasons, not because of any expectation related to future prices. Regardless of how a negative estimate of β_2 is described, we think Llorente et al. have developed a useful measure that empirically identifies speculative trading for individual securities. We recognize, however, that the relation between speculative trading and hedging might not be as simple as the linear model proposed by Llorente et al., and that using the estimate of β_2 as a proxy for the level of speculative trading assumes a linear relation that, if misspecified, could result in incorrect inferences. Therefore, in unreported tests, we conduct a variety of robustness tests in which we censor the estimate of β_2 to be only positive. That is, we approximate speculative trading using the estimate of β_2 when β_2 is positive, and 0 otherwise. We also use a censored estimate of β_2 to equal this estimate when the estimate is in the 75th percentile (in a particular year), and 0 otherwise. In addition, we use a simple binary specification in which speculative trading is equal to 1 if β_2 is in the 75th percentile, and 0 otherwise. We replicate the analysis below using these censored estimates in various Tobit regressions and find results consistent with the reported findings. We focus on results that use the continuous estimate of β_2 because it is easier to interpret and directly compare to other studies that use Llorente et al.

Table 1 reports statistics that summarize our sample. Panel A reports summary statistics for our sample of REITs, and Panel B reports statistics for our sample of non-REITs. The variables we analyze in the table include *Spec*, which is our measure of speculative trading, or our estimate of β_2 from equation (3) for each stock in each year during our sample period. We also include market capitalization (*Size*), the price of each security (*Price*), and daily turnover (*Turn*). We estimate a daily capital asset pricing model (CAPM) during each year for each stock and obtain an estimate for systematic risk (*Beta*). Using the residual returns from the daily CAPM, we calculate the standard deviation of these residuals to calculate idiosyncratic volatility (*IdioVolt*).

Panel A shows that the average REIT has a *Spec* of 0.0010, an average market capitalization of \$1.13 billion, and an average price is \$21.30. The average REIT has a turnover of 1.1508, suggesting that approximately 115% of shares outstanding are traded during a particular year. The average REIT has a *Beta* of 0.5569 and an average idiosyncratic volatility of 2.23%. Panel B shows that the average non-REIT has a *Spec* of 0.0083, *Size* of \$1.93 billion, *Price* of \$30.04, *Turn* of 1.9723, *Beta* of 1.0851, and *IdioVolt* of 0.0379.

Panel C reports the difference between the means reported in Panels A and B. Comparing *Spec*, we see that *Spec* is more than eight times larger for our sample of non-REITs. However, although the difference is –0.0073, the difference is not statistically different from zero (t-statistic = –0.55). In column [2], we find that the difference in *Size* between Panels A and B is –\$805,204,614 and is statistically different from zero (t-statistic = –4.56), indicating that REITs are generally smaller, in terms of market capitalization, than non-REITs. Column [3] shows that the difference in *Price* is statistically close to zero (difference = –8.74, t-statistic = –0.56). In column [4], the difference in *Turn* is –0.8215 and is statistically significant (t-statistic = –3.66), indicating that non-REITs generally have more trading activity than REITs. Finally, columns [5] and

TABLE 1. Summary Statistics.

	Spec	*Size*	*Price*	*Turn*	*Beta*	*IdioVolt*
	[1]	[2]	[3]	[4]	[5]	[6]
Panel A. REIT Sample						
Mean	0.0010	1,127,715,681	21.30	1.1508	0.5569	0.0223
Median	0.0132	384,689,375	17.36	0.7312	0.4980	0.0155
Panel B. Non-REIT Sample						
Mean	0.0083	1,932,920,295	30.04	1.9723	1.0851	0.0379
Median	0.0150	157,746,938	13.16	0.8445	0.8637	0.0287
Panel C. Difference between Panels A and B						
Difference	−0.0073	−805,204,614***	−8.74	−0.8215***	−0.5282***	−0.0156***
t-statistic	(−0.55)	(−4.56)	(−0.56)	(−3.66)	(−4.72)	(−28.29)

Note: This table reports statistics that describe our samples. Panel A reports the results for our sample of equity real estate investment trusts (REITs), and Panel B shows the results for our sample of non-REITs. In Panel C, we report the difference in means between Panels A and B. *Spec* is the Llorente et al. (2002) measure of speculative trading. *Size* is market capitalization obtained from CRSP. *Price* is the CRSP closing price. *Turn* is share turnover and is calculated by dividing volume by shares outstanding. *Beta* is obtained from estimating a standard capital asset pricing model (CAPM) using daily returns during each year. *IdioVolt* is the standard deviation of daily residual returns (or the residuals from the daily CAPM). We include the universe of REITs and non-REITs with data available on CRSP from 1990 to 2010. The summary statistics reported are means and medians across the entire period. The differences in means in Panel C are accompanied with a *t*-statistic testing whether the differences are significantly different from zero according to a standard two-tailed *t*-test.
***Significant at the 1% level.

[6] show that the differences in systematic risk (*Beta*) and idiosyncratic risk (*IdioVolt*) between Panels A and B are both statistically significant (differences = –0.5282 and –0.0156, with respective *t*-statistics = –4.72 and –28.29), indicating that non-REITs have more systematic and idiosyncratic risk than REITs. The findings from Table 1 indicate that although various characteristics differ between our samples of REITs and non-REITs, the measure of speculative trading is similar between samples from 1993 to 2011.

IV. Empirical Tests

Next, we address our research question examining speculative trading in REITs during the period when real estate prices were the highest. We begin by plotting median real estate prices according to S&P/Case Shiller, the normalized price of the Ziman REIT index, and the normalized price of the NCREIF Commercial Real Estate Index from 1993 to 2011. As seen in Figure I, there is generally an upward trend in both residential and commercial prices from 1993 to 2001. Furthermore, the REIT index prices seem to be more volatile than residential or commercial real estate prices. However, in 2003, median home prices, commercial prices, and prices of the Ziman index were higher than they had been in the previous 10 years. We note that the increase in commercial real estate prices was higher from 2003 to 2004 than from 2002 to 2003. Home prices and the price of the REIT index

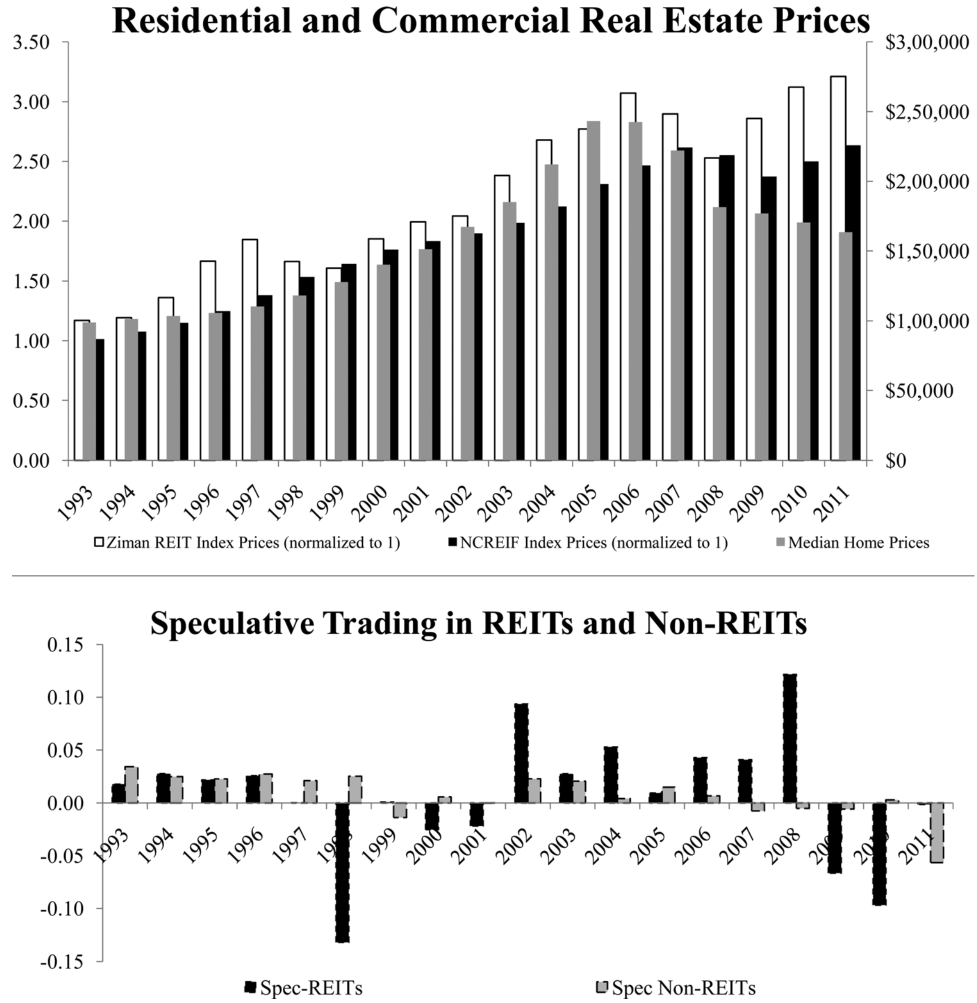

Figure I. Speculative Trading and Real Estate Prices. The figure shows median real estate prices and the prices of the Ziman REIT index (normalized to $1) in the top panel, and the change in median real estate prices and the change in the Ziman REIT index prices in the second panel. These data are obtained from S&P/Case Shiller. The bottom panel shows the time-series properties speculative trading in real estate investment trusts (REITs) obtained from estimating the speculative trading model in Llorente et al. (2002).

seem to have peaked in 2005 and 2006 and then subsequently declined. Commercial real estate prices seem to have peaked in 2007. To the extent that there was a bubble in real estate prices, the top panel of Figure I seems to indicate that it occurred between 2003 and 2007.

The bottom panel of Figure I shows speculative trading for our sample of REITs and non-REITs. Although the results in Table 1 show that the mean estimates of speculative trading between samples are statistically similar when examining the entire period, we find some variation in speculative trading across time. In particular, we find that speculative trading in REITs becomes observationally higher than speculative trading in non-REITs from 2002 to 2008 (with the exception in 2005). We recognize that other

TABLE 2. Speculative Trading in Subperiods.

	Spec for REITs	*Spec* for Non-REITs	Difference between Columns [1] and [2]	*t*-statistics
	[1]	[2]	[3]	[4]
Panel A. Speculative Trading by Year				
1993	0.0220	0.0343	−0.0123	−1.34
1994	0.0345	0.0248	0.0097	1.43
1995	0.0195	0.0229	−0.0034	−0.42
1996	0.0262	0.0274	−0.0012	−0.08
1997	0.0035	0.0211	−0.0176**	−2.42
1998	−0.1260	0.0257	−0.1517	−1.56
1999	0.0003	−0.0140	0.0137	0.76
2000	−0.0160	0.0058	−0.0218**	−2.42
2001	−0.0140	−0.0002	−0.0138	−1.53
2002	0.0845	0.0229	0.0616***	5.72
2003	0.0241	0.0208	0.0033	0.39
2004	0.0430	0.0043	0.0387**	2.52
2005	0.0045	0.0152	−0.0107	−1.08
2006	0.0397	0.0067	0.0330***	3.82
2007	0.0244	−0.0070	0.0314	1.13
2008	0.1051	−0.0050	0.1101***	8.74
2009	−0.0580	−0.0060	−0.0520***	4.59
2010	−0.0850	0.0032	−0.0882***	7.16
2011	−0.1250	−0.0560	−0.0690***	5.72
Panel B. Distinct Periods Relating to the Growth in Real Estate Prices				
2002–2007	0.0363	0.0105	0.0258***	4.13
2004–2006	0.0290	0.0087	0.0203***	3.00
2002–2006	0.0385	0.0142	0.0243***	4.98
2003–2007	0.0272	0.0078	0.0194***	2.68

Note: This table reports the Llorente et al. (2002) measure of speculative trading for various subperiods. In Panel A, we report the coefficient for speculative trading in relatively equal periods. In Panel B, we report subperiods related to the real estate boom period. For instance, from year 2003 to 2007, median home prices and prices of the Ziman REIT index were highest. Column [1] reports speculative trading (*Spec*) from our sample of real estate investment trusts (REITs), and column [2] reports the results for our sample of non-REITs. Column [3] shows the difference between the two samples with corresponding *t*-statistic tests for statistical significance.
***Significant at the 1% level.
**Significant at the 5% level.

security-specific factors might be influencing this variation so we are cautious when inferring anything from Figure I.

Speculative Trading in REITs and Non-REITs during Periods with Increasing Real Estate Prices—Univariate Tests

Next, we test for statistical differences in speculative trading between samples across time. Table 2 reports our estimates for speculative trading. Panel A reports speculative trading for our sample of REITs and non-REITs for each year in our period. Column [3] reports the differences between REITs and non-REITs, and column [4] reports the

t-statistic tests for differences. In the 1990s, we do not find much of a difference in speculative trading between REITs and non-REITs. In 1997, we find that speculative trading for non-REITs was statistically higher than speculative trading for REITs. This might be explained by the impending technology bubble that affected non-REITs more than REITs. In 2000, we again find that non-REITs had higher levels of speculative trading than REITs. However, beginning in 2002, we see that REITs had more speculative trading than non-REITs. Statistically significant differences are found in 2004, 2006, and 2008. We note that REITs had more speculative trading than non-REITs in 2003 and 2007, although the differences are not distinguishable from zero.

Panel B reports time windows that directly correspond to Figure I. When identifying the real estate boom period, we take into account residential real estate prices, commercial prices, and REIT prices. We report the results for four periods. In our first period (2002–2007), we find that speculative trading is markedly higher for REITs than for non-REITs. In economic terms, speculative trading was nearly 3.5 times larger for REITs than for non-REITs during this period. In our second period (2004–2006), we again find a statistically significant difference in speculative trading between REITs and non-RIETs. Again, the difference is economically meaningful. In our third period (2002–2006), we find that speculative trading is again higher for REITs than for non-REITs. In our fourth and final period (2003–2007), we find, similar to the other three "boom" periods, that speculative trading is both statistically and economically larger for REITs than for non-REITs. In unreported tests, we include 2008 in several of the time windows and find the results to be even stronger. This is intuitive given the large difference in speculative trading during 2008 in Panel A. The results from Table 2 indicate that although our estimates for speculative trading are similar across samples when examining the entire period, sample differences in speculative trading occur during the most recent period. Furthermore, the univariate tests in Table 2 seem to indicate that speculative trading in REITs was more prevalent during periods when real estate prices were highest.

Speculative Trading in REITs and Non-REITs during Periods with Increasing Real Estate Prices—Multivariate Tests

Although Table 2 documents important differences in the level of speculative trading in REITs and non-REITs during the real estate boom period, we recognize the need to control for other factors that might influence the level of speculative trading. Therefore, we estimate the following equation using pooled data that include both the REIT-year observations and the non-REIT-year observations.

$$Spec_{i,t} = \beta_0 + \beta_1 \ln(Size_{i,t}) + \beta_2 \ln(Price_{i,t}) + \beta_3 Turn_{i,t} + \beta_4 Beta_{i,t} + \beta_5 IdioVolt_{i,t} + \beta_6 REIT_i + \varepsilon_{i,t}. \quad (4)$$

The dependent variable is *Spec*, which is the Llorente et al. (2002) measure of speculative trading. We include as independent variables the natural log of market capitalization ($\ln(Size_{i,t})$), natural log of price ($\ln(Price_{i,t})$), share turnover ($Turn_{i,t}$), level of systematic risk ($Beta_{i,t}$), and idiosyncratic volatility ($IdioVolt_{i,t}$). The variable of interest is the indicator variable *REIT*, which equals 1 if the security is an REIT, and 0 otherwise. We report *t*-statistics that control for two-dimensional clustering, although we find similar results when we use White (1980) standard errors that control for conditional heteroskedasticity. Furthermore, we include year fixed effects in some of the econometric specifications.[6] We also estimate variance inflation factors to determine whether our results suffer from multicollinearity bias. Variance inflation factors are relatively small and are each under 3, indicating that our findings do not suffer from bias caused by multicollinearity. However, in Table 3, we report various specifications of equation (4) by including different combinations of independent variables to show that our results hold regardless of the control variables we include.

Table 3, Panel A reports the results for the entire sample period. Columns [1] through [3] show the results without controls for year fixed effects. Column [1] shows that *Spec* is negatively related to both the natural logs of *Size* and *Price*. However, the indicator variable *REIT* produces an estimate that is statistically close to zero (estimate = –0.0031, *t*-statistic = –0.47). Column [2] provides evidence that idiosyncratic volatility is directly related to speculative trading activity. However, *Turn* and *Beta* do not provide estimates that are statistically different from zero. The variable of interest, *REIT*, again produces an estimate that is both economically and statistically insignificant (estimate = –0.0022, *t*-statistic = –0.32). In the full model (without year fixed effects), column [3] shows that *Spec* is negatively related to the natural logs of *Size* and *Price* and is unrelated to *Turn*, *Beta*, and *IdioVolt*. Furthermore, the estimate for *REIT* is –0.0024 and is statistically close to zero (*t*-statistic = –0.34). We are able to draw similar conclusions when examining the results in columns [4] through [6] that control for year fixed effects. A few results are noteworthy. First, the natural log of *Size* produces an insignificant estimate in columns [4] and [6]. Second, the estimate for the indicator variable *REIT* is statistically close to zero in all three columns. These findings support the results in columns [1] through [3] and further provide evidence that, when examining the entire sample period, the level of speculative trading in REITs is similar to the level of speculative trading in non-REITs.

Panel B presents the results when examining the period real estate prices and Ziman index prices were highest (2003–2007). We only discuss the findings in column [6] for brevity. During this period, we find that the natural log of *Size* produces a positive and significant estimate (estimate = 0.0034, *t*-statistic = 2.14). *Turn*, on the other hand, produces an estimate that is negative and marginally significant (estimate = –0.0001, *t*-statistic = –1.69). Again, the indicator variable *REIT* produces an estimate that is both positive and significant (estimate = 0.0176, *t*-statistic = 2.29). Relative to the mean estimate for speculative trading for REITs during the entire period, the estimate is more than 17 times greater than the mean. As before, the estimate for *REIT* is positive and significant in each of the columns in Panel B of Table 3 and suggests that the level of speculative trading in REITs was greater than the level of speculative trading in non-REITs during the period when real estate prices were highest. Similar results are found when we use time windows that are similar to those in Panel B of Table 2 to capture the real estate boom years. We also note that the regression results are robust when we

[6] Because we include the variable *REIT*, we cannot include security fixed effects because the variable *REIT* does not vary across the time series, and therefore, cross-sectional fixed-effects estimates will be inconsistent.

TABLE 3. Regression Results.

	[1]	[2]	[3]	[4]	[5]	[6]
Panel A. All Years						
Intercept	0.0688***	−0.0044	0.0624***	0.0671***	0.0203**	0.0612***
	(3.42)	(−0.64)	(3.62)	(3.68)	(2.24)	(3.57)
Ln($Size_{i,t}$)	−0.0021***		−0.0021***	−0.0005		−0.0005
	(−2.76)		(−2.95)	(−0.72)		(−0.69)
Ln($Price_{i,t}$)	−0.0088***		−0.0076***	−0.0104***		−0.0095***
	(−2.80)		(−3.85)	(−3.22)		(−4.69)
$Turn_{i,t}$		−5.78E-5	2.5E-6		−1.89E-6	8.6E-5
		(−0.27)	(0.01)		(−0.09)	(0.38)
$Beta_{i,t}$		−0.0001	−4.1E-6		−3.38E-6	−1.3E-6
		(−0.25)	(−0.03)		(−0.25)	(−0.10)
$IdioVolt_{i,t}$		0.3388*	0.0725		0.3303*	0.0641
		(1.83)	(0.41)		(1.74)	(0.36)
$REIT_i$	−0.0031	−0.0022	−0.0024	−0.0040	−0.0029	−0.0033
	(−0.47)	(−0.32)	(−0.34)	(−0.62)	(−0.42)	(−0.48)
Year fixed effects	No	No	No	Yes	Yes	Yes
Panel B. Years 2003 to 2007						
Intercept	−0.0494	0.0083	−0.0559	−0.0407	0.0221***	−0.0442
	(−1.50)	(0.75)	(−0.94)	(−1.39)	(3.20)	(−0.78)
Ln($Size_{i,t}$)	0.0032		0.0032**	0.0034**		0.0034**
	(0.021)		(2.11)	(2.33)		(2.14)
Ln($Price_{i,t}$)	−0.0020		−0.0008	−0.0018		−0.0012
	(−1.14)		(−0.13)	(−1.01)		(−0.19)
$Turn_{i,t}$		−0.0001*	−0.0001**		−0.0001	−0.0001*
		(−1.67)	(−2.11)		(−1.05)	(−1.69)
$Beta_{i,t}$		−0.0002	−0.0003		−0.0002	−0.0002
		(−0.23)	(−0.34)		(−0.22)	(−0.36)
$IdioVolt_{i,t}$		0.0004	0.1111		−0.0451	0.0579
		(0.01)	(0.24)		(−0.25)	(0.13)
$REIT_i$	0.0179***	0.0192**	0.0183**	0.0174***	0.0185**	0.0176**
	(2.85)	(2.21)	(2.25)	(2.93)	(2.26)	(2.29)
Year fixed effects	No	No	No	Yes	Yes	Yes

Note: This table reports the results from estimating the following equation for all years in the sample period (Panel A) and years 2003 to 2007 (Panel B):

$$Spec_{i,t} = \beta_0 + \beta_1 \ln(Size_{i,t}) + \beta_2 \ln(Price_{i,t}) + \beta_3 Turn_{i,t} + \beta_4 Beta_{i,t} + \beta_5 IdioVolt_{i,t} + \beta_6 REIT_i + \varepsilon_{i,t}.$$

The dependent variable is *Spec*, which is the Llorente et al. (2002) measure of speculative trading. As independent variables, we include the natural log of market capitalization (ln($Size_{i,t}$)), the natural log of price (ln($Price_{i,t}$)), the share turnover ($Turn_{i,t}$), the level of systematic risk ($Beta_{i,t}$), and the idiosyncratic volatility ($IdioVolt_{i,t}$). The variable of interest is the indicator variable *REIT*, which equals 1 if the security is a real estate investment trust, and 0 otherwise. We report *t*-statistics that control for two-dimensional clustering although we find similar results when we use White (1980) standard errors that control for conditional heteroskedasticity. In columns [4] through [6], we also include year fixed effects.

***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.

TABLE 4. Time-Series Properties of Speculative Trading in REITs.

	Boom Period Defined as 2002–2007	Boom Period Defined as 2004–2006	Boom Period Defined as 2002–2006	Boom Period Defined as 2003–2007
	[1]	[2]	[3]	[4]
Boom period	0.0363	0.0290	0.0385	0.0272
Nonboom period	−0.0150	−0.0050	−0.0130	−0.0090
Difference	0.0513***	0.0340***	0.0515***	0.0362***
t-statistic	(5.29)	(3.71)	(5.47)	(3.82)

Note: This table reports the Llorente et al. (2002) measure of speculative trading for real estate investment trusts (REITs) during the real estate boom period, which we define in a number of ways. The nonboom period consists of years outside of the boom period. For instance, in column [1], the nonboom period is 1993 to 2001 and 2008 to 2011. In column [2], the nonboom period is 1993 to 2003 and 2007 to 2011. The last row reports the difference between periods, along with corresponding *t*-statistics testing for statistical significance, between the boom period and nonboom periods, respectively.
***Significant at the 1% level.

redefine the dependent variable as the estimate of β_2 in equation (3) if the estimate is in the 75th percentile in a particular year, and 0 otherwise. The Tobit regression results are qualitatively similar to those reported in Table 4.

Speculative Trading in REITs during the Boom and Bust Periods—Univariate Tests

Thus far, we have documented a distinct difference in speculative trading between REITs and non-REITs during the real estate boom period. Next, we compare the level of speculative trading in REITs across time and particularly during the period when real estate prices were highest. Table 4 reports the level of speculative trading in REITs for the period real estate prices and REIT prices were highest and for the rest of the sample period. As in Table 2, we examine four periods—2002–2007, 2004–2006, 2002–2006, and 2003–2007 — as part of the boom real estate period. The years outside of these periods are considered the nonboom period. In the first column, we find that the mean level of speculative trading is –0.0150 during the nonboom period. However, we find that the mean level of *Spec* is 0.0363 during the boom period. The difference is 0.0513 (*t*-statistic = 5.29). In economic terms, the level of speculative trading in REITs is nearly 3.5 times greater during the boom period than during the nonboom period. In columns [2] through [4], we find qualitatively similar results. For instance, column [4] shows that speculative trading in REITs during the boom period is 0.0272 and –0.0090 during the nonboom period.[7]

[7] In unreported tests, we find that the level of speculative trading in equity REITs during the boom period (2003–2007) is significantly greater than the level of speculative trading in equity REITs during the nonboom period (difference = −0.0457, *t*-statistic = –4.09). Furthermore, we do not find that speculative trading during the boom period is statistically different from speculative trading during the nonboom period for either mortgage REITs or hybrid REITs. These results indicate that equity REITs drive the observed increase in speculative trading during the boom period. In other unreported tests, we examine whether the property focus of REITs plays a role in the level of speculative trading during the boom period. Using the property-type focuses from CRSP/Ziman, we partition the level of speculative trading during the boom period and nonboom period for each of the eight property focuses. Results show that REITs with a property focus of "Diversified," "Residential," "Industrial/Office," and "Hotel/Lodging" have higher levels of speculative trading during the boom period than during the nonboom period.

Speculative Trading in REITs during the Boom and Bust Periods—Multivariate Tests

We recognize the need to control for other factors that influence the level of speculative trading in REITs in a multivariate framework. Therefore, we estimate the following equation using pooled REIT-year observations.

$$Spec_{i,t} = \beta_0 + \beta_1 \ln(Size_{i,t}) + \beta_2 \ln(Price_{i,t}) + \beta_3 Turn_{i,t} + \beta_4 Beta_{i,t} + \beta_5 IdioVolt_{i,t} + \beta_6 DYEAR_t + \varepsilon_{i,t}. \quad (5)$$

Once again, the dependent variable is *Spec*, which is the Llorente et al. (2002) measure of speculative trading. As independent variables, we include the natural log of market capitalization ($\ln(Size_{i,t})$), natural log of price ($\ln(Price_{i,t})$), share turnover ($Turn_{i,t}$), level of systematic risk ($Beta_{i,t}$), and idiosyncratic volatility ($IdioVolt_{i,t}$). The variable of interest is the indicator variable *DYEAR*. *DYEAR* is defined as an indicator variable (*D03-07*) that equals 1 during 2003 through 2007, and 0 otherwise. We report *t*-statistics that control for two-dimensional clustering, although we find similar results when we use White (1980) standard errors that control for conditional heteroskedasticity. To test for the presence of multicollinearity, we again estimate variance inflation factors. We find that inflation factors are each below 3.30, indicating that our results are not subject to multicollinearity bias. When including *DYEAR*, we do not include year fixed effects in order to meet the full rank condition required for consistent estimates. Like previous tables, we estimate different versions of equation (5) to show that the main inferences we can draw from our results are robust to the inclusion of different combinations of control variables. Results are shown in Table 5. As before, our results are qualitatively similar across columns; therefore, for brevity, we only discuss the results of the full model (column [3]).

Column [3] shows that *Turn* produces a negative estimate (estimate = –0.0028, *t*-statistic = –2.47). All of the other control variables produce estimates that are statistically close to zero. We do find, however, that the variable *D03-07* produces a reliably positive estimate (estimate = 0.0411, *t*-statistic = 5.36). In terms of magnitude, the estimate for *D03-07* is more than 40 times greater than the mean estimate for *Spec* for REITs during the entire period (Table 1). These results are similar in sign and magnitude to those in columns [1] and [2] and indicate that the level of speculative trading in REITs was substantially higher during the period when real estate prices and REIT prices were the greatest. We note that dummy variables capturing other related boom periods also produce positive and significant estimates in unreported tests.

Robustness: An Alternative Measure for Speculative Trading

In this subsection, we discuss the results from a variety of tests that examine a different measure of speculative trading that are not reported in this article but are available upon request from the authors. A limitation of the literature is the lack of speculative trading measures. Although the Llorente et al. (2002) measure provides a parametric estimate for speculative trading, the measure is not without its limitations, which we have discussed above. Therefore, as a measure of robustness, we look at the trading activity in the options markets as an additional estimate for speculative trading. Prior research (Black 1975;

TABLE 5. Regression Results.

	[1]	[2]	[3]
Intercept	0.0955	−0.0094	0.0772
	(1.13)	(−0.87)	(0.87)
Ln($Size_{i,t}$)	−0.0056		−0.0044
	(−1.25)		(−1.08)
Ln($Price_{i,t}$)	0.0011		0.0003
	(0.27)		(0.06)
$Turn_{i,t}$		−0.0043*	−0.0028**
		(−1.90)	(−2.47)
$Beta_{i,t}$		−3.3E-5	−4.1E-6
		(−0.28)	(−0.04)
$IdioVolt_{i,t}$		0.2251*	0.0415
		(1.84)	(0.16)
$D03\text{-}07_t$	0.0408***	0.0386***	0.0411***
	(5.59)	(4.16)	(5.36)
Year fixed effects	No	No	No

Note: This table reports the results from estimating the following equation for all years in the sample period using only our sample of real estate investment trusts (REITs).

$$Spec_{i,t} = \beta_0 + \beta_1 \ln(Size_{i,t}) + \beta_2 \ln(Price_{i,t}) + \beta_3 Turn_{i,t} + \beta_4 Beta_{i,t} + \beta_5 IdioVolt_{i,t} + \beta_6 D02-05_t + \beta_7 D03-07_t + \varepsilon_{i,t}.$$

The dependent variable is *Spec*, which is the Llorente et al. (2002) measure of speculative trading. As independent variables, we include the natural log of market capitalization (ln($Size_{i,t}$)), the natural log of price (ln($Price_{i,t}$)), the share turnover ($Turn_{i,t}$), the level of systematic risk ($Beta_{i,t}$), and the idiosyncratic volatility ($IdioVolt_{i,t}$). The variable of interest is the indicator variables *DYEAR*. *DYEAR* is defined as an indicator variable *D03-07*, which equals 1 when the years are between 2003 and 2007, and 0 otherwise. We report *t*-statistics that control for two-dimensional clustering although we find similar results when we use White (1980) standard errors that control for conditional heteroskedasticity.
***Significant at the 1% level.
**Significant at the 5% level.
*Significant at the 10% level.

Stein 1987; among others) has suggested that the option market is natural avenue for speculative traders because of leverage opportunities and limited downside risk. Therefore, we examine the ratio of call option volume relative to total option volume as an additional measure for speculative trading. The reason we scale call volume by total option volume is because option trading activity has been increasing over time. Furthermore, call options are most likely to be used by bullish speculators during the real estate boom period.

In unreported tests, we replicate Tables 2 through 5 using the ratio of call volume to total option volume, which we denote as the call ratio. Our univariate tests show that from 1996 to 2011, the call ratio was significantly lower for REITs than for non-REITs.[8] However, during the boom period, the call ratio was significantly larger for REITs than for non-REITs. Our multivariate results, which replicate Table 3 but use the call ratio as the dependent variable, support our univariate results. When looking strictly at our sample of

[8] Option volume was not available until 1996, so we are unable to obtain option data from 1993 to 1996.

TABLE 6. The Relation between 2008 REIT Returns and Speculative Trading during the Real Estate Boom Period.

	QI	*QII*	*QIII*	*QIV*	*QIV – QI*
	[1]	[2]	[3]	[4]	[5]
Raw Returns	−0.4244	−0.4677	−0.4903	−0.2508	0.1736
					(1.13)
Adj. Returns	−0.7929	−0.8362	−0.8588	−0.6193	0.1736
					(1.13)
FF3F Returns	−0.1110	−0.1444	−0.1614	0.0533	0.2313
					(1.25)
FF4F Returns	−0.1127	−0.1481	−0.1681	0.0497	0.1624
					(1.25)

Note: This table reports different measures of returns during 2008 when real estate investment trusts (REITs) decreased by nearly 36%, on average. We report returns across portfolios based on the level of speculative trading in REITs during the period real estate prices were highest. The table reports the results for portfolios sorted on REIT speculative trading from 2003 to 2007. We report CRSP raw returns (*Raw Returns*) and adjusted returns (*Adj. Returns*), which are defined as the difference between raw returns and Ziman REIT value-weighted index return during 2008. We also report residual returns from a Fama–French three-factor model (*FF3F Returns*) and the residual returns from a Fama–French four-factor model (*FF4F Returns*). In column [5], we report the differences between extreme portfolios along with corresponding *t*-statistics.

REITs, we find that call ratios are markedly higher during the boom period than during the nonboom period. These results hold in both our univariate tests (which replicate Table 4) and our multivariate tests (which replicate Table 5). Results in these unreported tests seem to support the idea that speculative trading was unusually high in REITs during the boom period.

Speculative Trading and Future REIT Returns

Given our results that show that speculative trading in REITs was unusually high during the real estate boom period, we next examine whether the level of speculative trading contributed to the substantial crash in REITs during 2008. The motivation for these tests is based on the notion that regulators are concerned with excessive speculation in financial markets. In this subsection, we test whether REITs with the highest level of speculative trading were the REITs that faced the most severe crash in 2008. To begin, we examine the underperformance of REITs during 2008. Although we do not report these descriptive statistics, we find that the average CRSP raw return for our REIT sample during 2008 was –36.7%. Table 6 provides additional univariate tests. In particular, the table reports the REIT returns in 2008 across four portfolios of REITs that are based on the level of speculative trading from 2003 to 2007. Quartile I (*QI*) contains the REITs with the least speculative trading during the period, and quartile IV (*QIV*) contains the REITs with the most speculative trading during the period. Column [5] reports the difference in 2008 REIT returns between extreme quartiles along with a corresponding *t*-statistic testing for significance of the difference. We report four measures of returns. First, we include CRSP raw returns (*Raw Returns*). Second, we calculate adjusted returns (*Adj. Returns*) as the difference between a particular REIT raw

TABLE 7. Cross-Sectional Regression Results.

	Independent Variables Measured from 2003 to 2007			
	Raw Returns	*Adj. Returns*	*FF3F Returns*	*FF4F Returns*
	[1]	[2]	[3]	[4]
Intercept	0.4350	0.0665	−0.2602	−0.2785
	(0.41)	(0.06)	(−0.30)	(-0.32)
Ln($Size_i$)	−0.0456	−0.0456	0.0090	0.0105
	(−0.79)	(−0.79)	(0.19)	(0.22)
Ln($Price_i$)	0.0956	0.0946	0.0539	0.0509
	(0.86)	(0.86)	(0.59)	(0.56)
$Turn_i$	−0.0406	−0.0406	−0.0312	−0.0283
	(−0.37)	(−0.37)	(−0.35)	(-0.31)
$Beta_i$	0.0575	0.0575	0.0303	0.0195
	(0.50)	(0.50)	(0.32)	(0.20)
$IdioVolt_i$	−17.0888	−17.0888	−13.3003	−13.1968
	(−1.33)	(−1.33)	(−1.25)	(−1.25)
$SPEC_i$	1.1983	1.1983	0.6394	0.5903
	(1.34)	(1.34)	(0.86)	(0.80)
Adjusted R^2	0.0566	0.0566	0.0646	0.0625

Note: This table reports the results from estimating the following equation for the years 2003 to 2007 using the cross-sectional sample of REITs.

$$2008Returns_i = \beta_0 + \beta_1 \ln(Size_i) + \beta_2 \ln(Price_i) + \beta_3 Turn_i + \beta_4 Beta_i + \beta_5 IdioVolt_i + \beta_6 Spec_i + \varepsilon_i.$$

The dependent variables include our four measures of returns during 2008. As independent variables, we include the natural log of market capitalization (ln($Size_i$)), the natural log of price (ln($Price_i$)), the share turnover ($Turn_i$), the level of systematic risk ($Beta_i$), and the idiosyncratic volatility ($IdioVolt_i$). The variable of interest is the variable *Spec*, which is the Llorente et al. (2002) measure of speculative trading from 2003 to 2007. We report *t*-statistics that control conditional heteroskedasticity using White (1980) standard errors.

return and the return of the CRSP Ziman (value-weighted) index. Third, we estimate a daily Fama–French three-factor (FF3F) model and obtain the residual returns. Therefore, *FF3F Returns* are the cumulative 2008 returns from daily FF3F residual returns. Similarly, Fama–French four-factor returns (*FF4F Returns*) are the cumulative 2008 returns from daily FF4F residual returns, where the fourth factor is the momentum factor.

In the first row of Table 6, we find that 2008 CRSP raw returns are neither increasing nor decreasing across speculative trading quartiles. Column [5] shows that the difference between extreme quartiles is statistically close to zero (difference = 0.1736, *t*-statistic = 1.13). Similar results are found when we examine *Adj. Returns*, *FF3F Returns*, and *FF4F Returns*. In each case, the difference between extreme quartiles is effectively zero, indicating that the level of speculative trading during the period when real estate prices grew the most is orthogonal to the large price decline in REITs during 2008.

We recognize the need to control for other factors that possibly influenced the level of 2008 REIT returns. Table 7 reports the results from estimating the following equation using cross-sectional data.

$$2008Returns_i = \beta_0 + \beta_1 \ln(Size_i) + \beta_2 \ln(\mathrm{Pr}ice_i) + \beta_3 Turn_i + \beta_4 Beta_i + \beta_5 IdioVolt_i + \beta_6 Spec_i + \varepsilon_i. \quad (8)$$

The dependent variables include our four measures of returns during 2008 (*Raw Returns*, *Adj. Returns*, *FF3F Returns*, and *FF4F Returns*). As independent variables, we include the natural log of market capitalization ($\ln(Size_i)$), natural log of price ($\ln(Price_i)$), share turnover ($Turn_i$), level of systematic risk ($Beta_i$), and idiosyncratic volatility ($IdioVolt_i$). The variable of interest is *Spec*, which is the Llorente et al. (2002) measure of speculative trading. All independent variables are measured from 2003 to 2007. We report *t*-statistics that control conditional heteroskedasticity using White (1980) standard errors.

The results are qualitatively similar across columns; therefore, for brevity, we will only discuss our findings in column [1]. We find that *Size*, *Price*, *Turn*, *Beta*, and *IdioVolt* produce estimates that are statistically close to zero. These results indicate that none of the control variables, which are measured from 2003 to 2007 in this column, explains the variation in 2008 REIT returns. Furthermore, we find that the estimate for the variable of interest *Spec* is also statistically close to zero (estimate = 1.1983, *t*-statistic = 1.34). The insignificant estimate for *Spec* indicates that although REIT speculative trading levels were unusually high during 2003 to 2007, the high levels of speculative trading did not contribute the substantial price decline of REITs in 2008. In each column, the estimate for *Spec* is statistically close to zero. These results support our univariate tests in Table 6 and suggest that the unusual levels of speculative trading in REITs during the period when real estate prices were increasing did not affect the REIT returns in 2008.

As a measure of robustness, we replicate the analysis in Table 7 but include the call ratio instead of *SPEC*. Again, we find that the estimate for the call ratio is statistically close to zero, indicating that REITs with the highest call ratio did not have the largest subsequent crash in 2008. These results again support the notion that although policy makers and regulators attribute the bubbles and busts to speculators generally, our finding do not support the notion that speculative trading in REITs contributed to the 2008 crash. A natural extension is to look at the affect of speculative trading on other market quality measures. In additional robustness tests, we examine the effect of speculative trading in REITs during the real estate boom period on liquidity. The idea behind these tests is that speculative traders demand liquidity, and therefore REITs might become illiquid during the boom period, which might contribute to the bubble. Our unreported multivariate results show that speculative trading during the boom period is unrelated to bid–ask spreads during the boom period. This is true after holding constant other factors that influence the level of REIT liquidity. These findings suggest that speculative trading during boom periods does not adversely affect liquidity.

We also examine the effect of speculative trading on idiosyncratic volatility during the real estate boom period. These tests are motivated by the idea that speculative trading during boom periods can lead to destabilized prices. However, our results from these unreported tests suggest that speculative trading in REITs during the period real estate prices were highest is unrelated to the level of volatility in REITs, again suggesting that speculative trading does not adversely affect market quality. Combined with our findings in Tables 6 and 7, these additional tests indicate that although speculative trading was unusually high in REITs during the real estate boom period, the abnormal speculative trading did not adversely affect the quality of financial markets. The conclusions we are able to draw have important implications for policy makers and regulators that explore the effects of speculation in financial markets.

V. Conclusion

To examine the role of speculative trading in REITs during the most recent boom and bust periods in real estate, we use a measure of speculative trading developed by Llorente et al. (2002). They argue that hedging trades will generate negatively autocorrelated returns and speculative trades will generate positively autocorrelated returns. Although we find no differences between the speculative trading in REITs and non-REITs from 1993 to 2011, we do find differences in speculative trading for specific subsamples. Corresponding to the period in which median home prices and prices of the Ziman REIT index were highest (2003–2007), we find significant differences in speculative trading between REITs and non-REITs. In unreported results, we find similar results for other various time windows around this period. Furthermore, the differences in speculative trading appear to be driven by equity REITs, but not by any particular property type, although we do find that some property types generally have more speculative trading.

To better understand the impact of speculative trading on market participants, we also examine the relation between speculative trading during the boom years and returns after the bust. Although recently many have criticized the role of speculators in financial markets, we do not find evidence that speculative trading during the real estate boom period attenuated the drastic decline in REIT prices after 2007. That is, REITs with more speculative trading during the boom years did not experience larger losses after the bust. The results in this study are robust to a variety of tests, including additional measures of speculative trading, and indicate that although speculators are an easy target for those worried about increased market volatility, at least in REIT markets, we do not find evidence that increased speculation adversely affected market quality.

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