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Real estate as a new equity market sector: Market responses and return comovement

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Abstract

This study examines the market responses and return comovement between real estate and financial stocks around the reclassification of real estate firms from the financial sector to a standalone new real estate sector. We find that real estate stocks experience positive abnormal returns at the announcement of new sector creation, and attract more investor attention after the announcement. In addition, the comovement between real estate and financial stocks decreases dramatically after the new sector creation. These findings demonstrate the market impact of new real estate sector creation and provide important implications for real estate investors, portfolio managers, and policy makers.

1 | INTRODUCTION

Since 1960s, the creation and public listing of Real Estate Investment Trusts (REITs) have brought liquidity and transparency to real estate investments through securitization, which enables greater participation in real estate by equity investors (Fei, Ding, & Deng, 2010; Francis & Ibbotson, 2009). Since 2001, publicly traded REITs have been added to S&P indices, signifying growing investor recognition of REITs in equity portfolio management (Ambrose, Lee, & Peek, 2007; Case, Yang, & Yildirim, 2012). On March 13, 2015, S&P and Morgan Stanley Capital International (MSCI) officially announced that the Global Industry Classification Standard (GICS)[1] would reclassify equity REITs and real estate management & development companies from the financial sector into a standalone new real

[1]The GICS originally grouped all firms into 10 broad equity market sectors, and REITs and other real estate firms were grouped with banks and insurance companies into the financial sector, which was one of the 10 original GICS sectors.

estate sector after the market close of August 31, 2016.[2] Widely perceived as a reflection of the growing popularity and importance of real estate in the equity market, this reclassification effectively elevates *Real Estate* from a market niche to a standalone headline sector, making it the 11th equity market sector and the first new sector since the creation of GICS in 1999. As conjectured by Pavlov, Steiner, and Wachter (2018), the initiation of real estate as a separate GICS sector, as the biggest development for REITs since 2001, may improve REITs' visibility, pricing efficiency, and diversification. We document the impact of this event by examining the market responses as well as the comovement between real estate and financial stocks at both the index level and the stock level.

This event of the real estate sector reclassification provides a unique opportunity to test the fundamental-based versus style-investing views of stock returns. Based on a frictionless market with rational investors, the classical fundamental-based view argues that the return of a stock should reflect the change in its fundamental value and the return correlation of stocks should be driven by the correlated changes in fundamental values. The fundamental-based view predicts that the stock return of a firm should not depend on its sector label, and the sector reclassification itself should not have significant impact on stock returns, return comovement, or investor behaviors. On the other hand, based on a market with frictions and irrational investors, the style-investing view of Barberis and Shleifer (2003) argues that investors group stocks into different styles,[3] and as a result, stocks in the same style comove too much and those in different styles comove too little. The style-investing view predicts an increase in investor attention on real estate stocks, and a decrease in return comovement between real estate and financial stocks. In particular, the creation of a new sector should allow real estate stocks to attract more investor attention. Before the creation of real estate sector, real estate stocks were housed within the financial sector and consequently comoved more with financial stocks. After the new sector creation, the comovements between real estate stocks and financial stocks are likely to decrease as they have been relabeled as two different sectors.

Consistent with predictions from the style-investing view, we find positive investor reactions to the creation of the new real estate sector and decreased comovement between real estate and financial stocks after the reclassification. In particular, the S&P 1500 Pure Real Estate Index[4] displays a cumulative abnormal return (CAR) of 1.46% during the three trading days around the announcement date of March 13, 2015. In addition, the real estate firms attract an average of 0.65 more analyst coverage after the announcement. This finding shows that the sector relabeling attracts more investor attention to real estate stocks. We also find evidence that the institutional holding of real estate stocks increases after the announcement and execution relative to before the announcement. Overall, these empirical findings show that investors respond positively to the creation of the new real estate sector.

In addition, we find that the correlation between the S&P 1500 Pure Real Estate Index and S&P 1500 Pure Financial Index drops sharply after the reclassification event. The correlation is 0.80 before

[2]Equity REITs own income-producing real estate properties for the long-term and are required to pay out at least 90% of its taxable income through dividends to shareholders. Mortgage REITs originate real estate loans or invest in mortgage-backed securities. Equity REITs, along with real estate management & development companies, are the core of the new GICS real estate sector, while mortgage REITs remain in the financial sector. According to the NAREIT REIT indices, the total market capitalization of all REITs reached $1.05 Trillion in December 2018, accounting for 3.90% of the U.S. total equity market capitalization. Equity REITs represent 93.57% of the total market capitalization of all REITs, while mortgage REITs account for the remaining 6.43%.

[3]In the context of the style-investing framework of Barberis and Shleifer (2003), "styles" refer to category labels from various groupings of stocks. Styles include but are not limited to market sectors, value versus growth, large versus small capitalization, high versus low price, S&P 500 versus Non-S&P 500, and so on.

[4]See the Data section and Appendix A for detailed definitions of key terms and variables (e.g., the Pure Real Estate Index and the Pure Financial Index) that are used in this paper.

the announcement of the separation of the two sectors. It decreases to 0.58 after the announcement, and further decreases to 0.27 after the execution of sector separation on September 1, 2016. This striking fall in correlation cannot be fully explained by the fundamental-based view. On the other hand, this decreased comovement is consistent with the style-investing view of Barberis and Shleifer (2003). It is possible that the fall in correlation might be driven by the changes of fundamentals. To examine this potential explanation, we adjust for changes in macroeconomic fundamentals and still find a significant decrease in the correlation. Consistent with the index correlation results, the average univariate beta of real estate stocks with the S&P 1500 Pure Financial Index decreases from 0.60 before the announcement to 0.29 after the execution, while the univariate beta of real estate stocks with the S&P 1500 Pure Real Estate Index increases from 0.71 before the announcement to 0.86 after the execution. These findings can be interpreted under the style-investing view that sector labeling is an important driver of stock return comovement.

This study substantially contributes to two major strands of REITs literature: one on REITs event studies and another on the comovements of REITs with other asset classes. On the one hand, previous event studies have examined REITs' market reactions to new security offerings (Howe & Shilling, 1988), tax reforms (Sanger, Sirmans, & Turnbull, 1990), and reappraisals (Damodaran & Liu, 1993). This paper enriches this line of research by examining equity REITs' market reactions to the announcement of the new real estate GICS sector creation. We find positive abnormal returns at the announcement of the new sector creation, and greater investor attention after the announcement. The increased visibility of the real estate stocks, as evidenced by the enhanced analyst coverage and greater institutional ownership after the new sector creation, could contribute to better information production and more pricing efficiency for real estate stocks. On the other hand, the relationships among equity REITs, the general equity market, and the private real estate market have been well documented in the literature. Among others, Liu and Mei (1992), Okunev and Wilson (1997), Waggle and Agrrawal (2006), and Case et al. (2012) study the time-varying relationship between equity REITs and the general stock market; Clayton and MacKinnon (2001), Oikarinen, Hoesli, and Serrano (2011), and Yunus, Hansz, and Kennedy (2012) explore the dynamic linkages between the equity REITs (securitized) and the unsecuritized real estate market; Pavlov et al. (2018) show that S&P index membership of REITs enhances the return comovement between REITs and indexed stocks while strengthening their link with the underlying real estate market. Our study extends this strand of REITs literature to uncover the relationship between REITs and financial stocks, and documents a significant decrease in comovement after the reclassification of real estate from the financial sector to a new standalone real estate sector. Given that real estate stocks have less comovement with financial stocks after the sector reclassification, investors can more effectively use equity REITs to achieve real estate sector exposure and execute strategic asset allocation.

In addition, our empirical findings confirm the importance of industry classification and investor attention. Bhojraj, Lee, and Oler (2003) show that GICS is the most advantageous industry classification system for capital market research, while Vardharaj and Fabozzi (2007) highlight the importance of GICS sectors in equity asset allocation. Our findings from the GICS sector relabeling of real estate stocks confirm the importance of sector classification on investor attention and stock return comovement. Previously, Chen, Noronha, and Singal (2004), Elliott, Van Ness, Walker, and Warr (2006), and Chan, Kot, and Tang (2013) show that the price effect of S&P 500 addition is due to the increase in institutional ownership and analyst coverage. However, Denis, McConnell, Ovtchinnikov, and Yu (2003) find such study is subject to selection bias since firms added to the S&P 500 Index experience improvement in realized earnings. Hence, one could argue that the increase in analyst coverage and institutional ownership is due to the anticipated better firm performance instead of addition to the S&P

500 Index.[5] Our setting provides a better and cleaner natural setting because it is unlikely that the creation of new real estate sector is due to the anticipated better performance of individual real estate firms. Furthermore, we control for the time trend and firm fixed effects in our regression analysis. As a result, the positive changes of analyst coverage and institutional ownership for the real estate firms are more likely driven by the creation of new real estate sector.

This study provides new evidence that supports the style-investing view of Barberis and Shleifer (2003). Previous studies use additions and deletions to the S&P 500 (Barberis, Shleifer, & Wurgler, 2005), stock splits (Green & Hwang, 2009; Kumar, Page, & Spalt, 2013), and changes in the S&P value and growth indices (Boyer, 2011). One challenge with these tests using individual stocks is that their samples may be self-selected, which undermines the validity of the tests. For example, Chen, Singal, and Whitelaw (2016) document that the S&P 500 additions and stocks that experience splits are momentum winners, which exhibit increases in betas and generate excess comovement. Complementary to their approach, this paper provides empirical evidence from the real estate sector creation at both the sector index level and the individual stock level that is consistent with the style-investing view.[6]

Finally, our study has important practical implications for investors, portfolio managers, and policy makers. The increased visibility of the real estate stocks, as evidenced by the enhanced analyst coverage and greater institutional ownership after the new sector creation, could contribute to better information production and more pricing efficiency for real estate stocks. With decreased comovement between real estate and financial stocks after the sector reclassification, investors can more effectively use real estate stocks to build mean-variance efficient portfolios. The style-investing behaviors shown in this study also suggest that policy makers and regulators should be mindful of the market impact of sector labeling and reclassification when formulating policies intended to ease the potential systemic risk of asset class shifting.

The rest of the article is organized as follows. Section 2 develops the main hypotheses based on the classical fundamental-based versus the alterative style-investing views. Section 3 describes the data collection and management process. Section 4 presents the methodology and empirical results. Section 5 draws the conclusions.

2 | DEVELOPMENT OF HYPOTHESES

2.1 | Hypothesis on investors' positive reactions to the creation of the new real estate sector

The creation of the GICS sector on real estate is a decision from MSCI and S&P to recognize the growing importance of real estate in the global economy and the unique nature of real estate firms. Under the classical fundamental-based view, the reclassification of real estate stocks from the financial sector into a standalone real estate sector does not change their underlying cash flows or risk level. Therefore, the creation of the new real estate sector should not change investor behaviors or affect stock returns.

[5]Institutional ownership is also used as a proxy for firm transparency of REITs as in Feng, Pattanapanchai, Price, and Sirmans (2019).

[6]While the creation of the new real estate GICS sector may reflect the increasing importance of real estate stocks and a general sense that they are less tied to financial stocks, our findings of increased analyst coverage and institutional ownership for real estate stocks, and decreased comovement between real estate and financial stocks, remain strong even after we use the difference in differences approach, matched time periods, as well as adjustments for fundamentals.

Under the style-investing view, the reclassification event will likely increase the visibility and investors' awareness of real estate firms. Before the creation of this new GICS sector, real estate stocks were mixed as a niche industry with financial stocks in the financial sector, and hence investors tended to focus more on financial stocks and ignore real estate stocks. Contrary to the fundamental-based view, the style-investing view suggests that the new real estate sector creation should serve as a validation of the greater importance and increased visibility of real estate stocks, and therefore be viewed by the investors as positive news.

Such an unprecedented new sector creation in the GICS system could also provide a setting to test whether investor attention and awareness on real estate stocks increase following the sector reclassification. With real estate stocks being separated from financial stocks to form a new real estate sector, there should be some immediate effects on the investor base of real estate stocks and the information environment.

First of all, given that the GICS sets the basis of S&P Dow Jones Indices and MSCI indices, funds using these stock indices for sector allocation will have to rebalance their portfolios and give more weights to real estate stocks since they form a new GICS sector. Despite their high dividend yield and stable return, real estate stocks have traditionally been underweighted in institutional portfolios (Chun, Sa-Aadu, & Shilling, 2004). Appendix B shows that, in terms of the number of listed companies, the new real estate sector is ranked the sixth largest among the 11 S&P Super Composite 1500 sector indices and the seventh largest in the 11 S&P Large-Cap 500 sector indices. In terms of the total market capitalization as of December 31, 2018, this new sector is ranked ninth largest among the 11 S&P Super Composite 1500 sector indices and the 10th largest in the 11 S&P Large-Cap 500 sector indices. Given that the total market capitalization of the new real estate sector is larger than that of the materials and utility sectors in the S&P Super Composite 1500, even active fund managers who ignored real estate stocks in the past will more likely give them considerations as a distinct equity sector and include them in the investment policies and portfolios. In addition, with the creation of the new real estate equity sector, more capital will likely be allocated to index funds tracking the new sector. Greater demand and increased attention from passive and active funds will lead to higher institutional ownership in real estate stocks.

Second, real estate firms should attract more analyst research coverage after the new sector creation. Real estate stocks, especially REITs, were not well understood by general investors in the past. With more investor attention and awareness in the new sector, analysts should be motivated to provide more coverage to satisfy the increasing investor demand for information and research on real estate stocks. Analysts who conduct research along the line of GICS sectors will spend more time and efforts to study the real estate sector to identify sector trends. The above discussion gives rise to the first hypothesis under the alternative style-investing view:

Hypothesis #1: Investors react positively to the announcement of the creation of the new real estate sector.

We test this hypothesis using stock returns, analyst coverage, and institutional holdings. Since the stock market typically responds to news immediately, we first predict that the *real estate stocks experience positive abnormal returns upon the announcement of the new real estate sector*. It takes time for analysts to initiate new coverage, and hence we further predict that the *analyst coverage of real estate stocks increases after the announcement*. On the other hand, institutional investors need time to make changes to their portfolio allocation, and index funds do not adjust their portfolio weights until the actual creation of the new sector. Therefore, we predict that *institutional ownership of real estate stocks increases after the announcement, and especially after the execution of the new real estate sector creation*.

2.2 | Hypothesis on the decreased comovement between real estate stocks and financial stocks after the creation of the new real estate sector

The fundamental-based view and the alternative style-investing view also differ in their predictions on the return comovement between real estate stocks and financial stocks. Under the fundamental-based view, the returns of two stocks are correlated if there are correlated changes in the fundamental values of the two stocks. The relabeling of real estate stocks as a new sector should not change the correlation between the changes in the fundamental values of real estate stocks and financial stocks. Therefore, the fundamental-based view predicts that the comovement between real estate stocks and financial stocks does not change after the reclassification.

In contrast, the style-investing view has different predictions on the return comovement. In particular, the style-related comovement model of Barberis and Shleifer (2003) suggests that investing based on "style classification," rather than individual securities, coupled with shifting market sentiments, induce *over* comovement among same style assets and *under* comovement among different style assets. Studies have documented strong empirical evidence supporting Barberis and Shleifer's (2003) framework of style investing-related comovement. Using additions to the S&P 500 index, Barberis et al. (2005) find excess comovement of these stocks with the S&P 500 after joining the index. Green and Hwang (2009) find that following stock splits, stocks have increased comovement with low-priced stocks and decreased comovement with high-priced stocks. Boyer (2011) studies the reclassification of stocks between S&P value indices and growth indices and finds that a stock experiences more comovement with the index it joins and less with the index it leaves. While the events of additions to the S&P 500 index, reclassification of stocks between value and growth, and splitting of stocks are often associated with changes in the firms' fundamentals, these studies have demonstrated that the excess comovement still exists after adjusting for fundamentals.

The reclassification of real estate stocks from an industry under the *financial sector* to a standalone new *real estate sector* creates a natural setting to test the style-related comovement framework of Barberis and Shleifer (2003). Real estate was previously under the umbrella of the financial sector, but became a separate GICS sector starting September 1, 2016. Such reclassification is merely a change in the sector label, which is not due to any changes in fundamental cash flows or riskiness of individual real estate firms. We conjecture that real estate and financial stocks have stronger comovement when they were in the same financial sector before the reclassification, but have less comovement after real estate stocks were spun off and promoted to a separate real estate sector outside of the financial sector. Excess comovement within a sector is also consistent with the limited attention and categorical learning behavior model of Peng and Xiong (2006), which demonstrates that investors' tendency to process more market- and sector-level information leads to within-sector return correlations that are higher than their fundamental correlations. Moreover, Basak and Pavlova (2013) develop a framework that explicitly captures institutional investors' tilt toward stocks that compose their performance benchmark index, inducing excess correlations among stocks within the same index and generating an asset-class effect. Based on Barberis and Shleifer (2003), Peng and Xiong (2006), and Basak and Pavlova (2013), we formulate the second hypothesis:

Hypothesis #2: The comovement between real estate and financial stocks decreases after the reclassification of real estate stocks from an industry under the financial sector to a standalone new real estate sector.

At the index level, this hypothesis predicts that the *return correlation between the pure real estate index and the pure financial index decreases after the sector reclassification*. At the firm level, this

hypothesis predicts that *the real estate stocks' betas with the pure real estate index increase, while their betas with the pure financial index decrease after the reclassification*.

3 | DATA

Before the creation of the new real estate market sector in September 2016, the S&P financial sector index includes both financial and real estate firms. To avoid the confusion of the original financial sector index before the reclassification and the pure financial sector after the reclassification, we refer to the S&P financial sector index before September 2016 as the "S&P Combined Financial & Real Estate Index" in this study. After September 2016, the newly launched S&P real estate sector index, which we refer to as the "S&P Pure Real Estate Index," includes equity REITs and real estate management & development companies. After September 2016, the S&P financial sector index excludes those in the "S&P Pure Real Estate Index," and is thus referred to as the "S&P Pure Financial Index" in this study.

Based on daily total return and market capitalization data directly provided by the S&P Dow Jones Indices on (a) the S&P financial sector index (full sample period), (b) the S&P real estate industry index (before reclassification), (c) the S&P real estate sector index (after reclassification), and (d) the S&P mortgage REITs index (before reclassification), we construct the S&P Combined Financial & Real Estate Index (including both financial and real estate stocks), the S&P Pure Real Estate Index (including only equity REITs and real estate management & development companies, excluding mortgage REITs), and the S&P Pure Financial Index (including financial companies and mortgage REITs, excluding equity REITs and real estate management & development companies), from October 10, 2001 (earliest date with available return data on S&P real estate indices) to December 31, 2018 (end of the sample period).

Before the reclassification, the S&P real estate industry index includes equity REITs and real estate management & development companies, as well as mortgage REITs. Since the total capitalization of "S&P Pure Real Estate Index" is equal to the S&P real estate industry index minus the S&P mortgage REITs index, the return on the "S&P Pure Real Estate Index" before reclassification can be inferred from the following:

$$R_{SP\ real\ estate\ Industry} = \left(\frac{CAP_{SP\ pure\ real\ estate}}{CAP_{SP\ real\ estate\ industry}}\right) R_{SP\ pure\ real\ estate} + \left(\frac{CAP_{SP\ mortgage\ REITs}}{CAP_{SP\ real\ estate\ industry}}\right) R_{SP\ mortgage\ REITs} \quad (1)$$

Since the total capitalization of the "S&P Pure Financial Index" should be equal to the "S&P Combined Financial & Real Estate Index" minus the "S&P Pure Real Estate Index," the return on the "S&P Pure Financial Index" before reclassification can be inferred from the following:

$$R_{SP\ combined\ financial\ \&\ real\ estate} = \left(\frac{CAP_{SP\ pure\ real\ estate}}{CAP_{SP\ combined\ financial\ \&\ real\ estate}}\right) R_{SP\ pure\ real\ estate} + \left(\frac{CAP_{SP\ pure\ financial}}{CAP_{SP\ combined\ financial\ \&\ real\ estate}}\right) R_{SP\ pure\ financial} \quad (2)$$

Table 1 presents the number of listed stocks and their total market capitalization for the S&P combined and pure financial and real estate indices on three dates: March 13, 2015 (the announcement date of the creation of the new real estate sector); September 1, 2016 (the execution date of the creation of

TABLE 1 Market value and number of stocks for the S&P Combined and Pure Real Estate and Financial Indices

	Total market value in billion USD				No. of listed stocks			
	Announcement date	Execution date	Last date of the sample period		Announcement date	Execution date	Last date of the sample period	
				12/31/2018				12/31/2018
Index name	3/13/2015	9/1/2016	12/31/2018	(in %)[a]	3/13/2015	9/1/2016	12/31/2018	(in %)[b]
S&P Super Composite 1500 Index	21,252	21,801	24,096		1,502	1,506	1,506	
S&P 1500 Combined Financials & Real Estate Index	3,598	3,662	4,018	16.7	297	307	334	22.2
S&P 1500 Pure Financial Index	2,879	2,822	3,195	13.3	204	210	228	15.1
S&P 1500 Pure Real Estate Index	719	840	823	3.4	93	97	106	7.0
S&P Large-Cap 500 Index	18,787	19,476	21,838		502	505	505	
S&P 500 Combined Financials & Real Estate Index	3,013	3,067	3,436	15.7	85	92	99	19.6
S&P 500 Pure Financial Index	2,540	2,462	2,804	12.8	63	64	67	13.3
S&P 500 Pure Real Estate Index	472	604	631	2.9	22	28	32	6.3
S&P Mid-Cap 400 Index	1,716	1,601	1,551		400	400	400	
S&P 400 Combined Financials & Real Estate Index	409	431	400	25.8	88	97	97	24.3
S&P 400 Pure Financial Index	225	244	255	16.4	53	58	61	15.3
S&P 400 Pure Real Estate Index	184	186	145	9.4	35	39	36	9.0
S&P Small-Cap 600 Index	748	705	707		600	601	601	
S&P 600 Combined Financials & Real Estate Index	177	165	182	25.8	124	118	125	20.8
S&P 600 Pure Financial Index	114	116	136	19.2	88	88	87	14.5
S&P 600 Pure Real Estate Index	63	49	47	6.6	36	30	38	6.3

Note: This table presents the number of listed stocks and their total market capitalization for the S&P combined, pure financial, and pure real estate indices on three dates: March 13, 2015 (the announcement date of the creation of the new real estate sector); September 1, 2016 (the execution date of the creation of the new real estate sector); and December 31, 2018 (the last date of the sample period). In particular, before the creation of the new real estate sector, the S&P Financial Sector Index includes both financial and real estate stocks, and therefore is referred to as the "S&P Combined Financial & Real Estate Index" in this study. After the reclassification in September 2016, the newly launched S&P Real Estate Sector Index, which is referred to as the "S&P Pure Real Estate Index," includes equity REITs and real estate management & development companies, but excludes mortgage REITs. After reclassification, the S&P Financial Sector Index excludes those in the "S&P Pure Real Estate Index," and thus is referred to as the "S&P Pure Financial Index." Before the reclassification in September 2016, we infer daily returns on the "S&P Pure Real Estate Index" based on the daily total return and market value data on the S&P Real Estate Industry Index and S&P Mortgage REITs Index, and then infer daily returns on the "S&P Pure Financial Index" using daily total return and market cap data on the S&P Financial Sector Index and the "S&P Pure Real Estate Index." After the reclassification in September 2016, we infer daily returns on the "S&P Combined Financial and Real Estate Index" using data on the S&P Financial Sector Index and the S&P Real Estate Sector Index.

[a]Total market value as a % in the corresponding S&P 1500, 500, 400, and 600 Indices, respectively.

[b]Total number of listed stocks as a % in the corresponding S&P 1500, 500, 400, and 600 Indices, respectively.

Source: Bloomberg.

the new real estate sector); and December 31, 2018 (the last date of the sample period). As of December 31, 2018, 106 stocks (with a total market capitalization of $823 billions) in the new real estate sector account for 7.0% of the total number and 3.4% of the total market capitalization of the S&P 1500 Super Composite Index, and 31.7% of the total number and 20.5% of the combined market capitalization of the financial and real estate firms in the composite index. For the three market capitalization components of S&P 1500 Super Composite Index, the new real estate sector accounts for 6.3% (2.9%), 9.0% (9.4%), and 6.3% (6.6%) of the total number (total market capitalization) of the S&P Large-Cap 500, Mid-Cap 400, and Small-Cap 600 Indices, respectively.

Since equity REITs and real estate management & development companies (referred to as real estate firms) are elevated to the new real estate sector, while financial companies and mortgage REITs (referred to as financial firms) remain in the financial sector, we use financial firms as the control group to test whether the market has different reactions between the real estate stocks and their control group.

To obtain firm-level data on real estate and financial stocks, we first download the CRSP Compustat merged data by the data date of December 31, 2015.[7] We then use the new classification information from the excel file "GICS Structure With historical changes" downloaded from MSCI website, which tracks the historical changes up to August 31, 2016. The sample of mortgage REITs includes the firms with subindustry code 40402030 before August 31, 2016 and new subindustry code 40204010. The sample of real estate firms includes the firms with industry-group code 4040 and new sector code 60, and excludes the mortgage REITs. The sample of financial firms includes firms with industry-group code 4010, 4020, and 4030 and the mortgage REITs. We then use the identifiers in each sample to download the daily stock return data from CRSP, the monthly analyst forecast data from the Institutional Brokers Estimation System (I/B/E/S), and the weekly institutional ownership data from Bloomberg.

We use the Fama and French (1997) three-factor model to estimate abnormal returns. Data on the three factors, including the equity market excess return, the size factor, and the book to market value factor, are downloaded from Kenneth R. French's online data library.[8] We also download macroeconomic variables from Bloomberg and use them to obtain conditional return correlations between real estate and financial indices. The macroeconomic data include daily observations on the yields of 3-month and 10-year Treasuries, yields of Moody's AAA and BAA corporate bonds, and the Chicago Board Options Exchange's (CBOE) VIX index; monthly observations on the S&P Case-Shiller U.S. National Home Price Index, the U.S. inflation rate, the U.S. Unemployment Rate, and the Conference Board's Consumer Confidence Index; quarterly observations on the U.S. GDP growth rate.

4 | METHODOLOGY AND EMPIRICAL RESULTS

4.1 | Event study on abnormal returns

We first employ the event study approach to measure and test the abnormal returns on the official announcement of the creation of a new real estate equity market sector.[9] The event study method has been used extensively in finance to study investors' reaction to the arrival of news in the markets. In particular, researchers have used the method extensively to test the efficient market hypothesis and

[7]We downloaded these data on October 7, 2016.

[8]See http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

[9]The initial proposal to create a new real estate sector was on November 10, 2014, and the official announcement for the final decision with the execution date was on March 13, 2015. We focus on the announcement date of March 13, 2015. We also test the market reaction to the initial proposal and find no significant impact, possibly due to the lack of attention and the uncertainty of the proposal. Due to space constraints, we do not report the proposal date results in the paper.

measure the abnormal stock returns when a stock is announced to be added to or removed from the S&P 500 index (Beneish & Whaley, 1996; Chen et al., 2004; Dhillon & Johnson, 1991; Harris & Gurel, 1986; Shleifer, 1986), when Standard and Poor's changed the way of announcing changes in the composition of S&P 500 index (Beneish & Whaley, 1996; Lynch & Mendenhall, 1997), when the Toronto Stock Exchange 300 Index changed the definition of public float and hence the weights of some stocks in its index (Kaul, Mehrotra, & Morck, 2000). In our setting, it is possible that creating a new real estate sector in the GICS is positive news to the market since it reflects the growing popularity and certifies the importance of real estate stocks in the equity market and will likely increase the investor attention on real estate stocks. We test the market reactions at both the index level and the firm level.

To test whether there is any abnormal return around the announcement period at an index level, we follow Campbell, Lo, and MacKinlay (1997, pp. 158–160) to compute the abnormal returns and their conditional covariance matrix for each index. We first run the ordinary least square regression to estimate the coefficient vector based on the estimation window.

$$R_i = X_i\theta_i + \epsilon_i \tag{3}$$

where X has four columns with a vector of ones in the first column and the vectors of the Fama–French three factors in the next three columns, and R is the vector of excess returns for index i. We then use the estimated parameter vector $\hat{\theta}_i$ to calculate the abnormal returns during the event window.

$$\hat{\epsilon}^*_i = R^*_i - X^*_i\hat{\theta}_i \tag{4}$$

Next, we construct the covariance matrix for the abnormal returns:

$$V_i = \mathrm{I}\sigma^2_{\epsilon_i} + X^*_i\left(X'_iX_i\right)^{-1}X^{*\prime}_i\sigma^2_{\epsilon_i} \tag{5}$$

Finally, we aggregate the daily abnormal return of the 3-day event window to get the CAR and the corresponding variance. Under the null hypothesis, the CAR should follow the normal distribution and the sample CAR should follow the Student's t distribution.

Table 2 presents the event study results on the S&P financial and real estate indices. The event date is the new real estate GICS sector announcement day of March 13, 2015. We first run the Fama and French three-factor model to estimate the coefficients during the 250-day estimation window of (–270, –21), and then use the coefficients to obtain the CAR during the 3-day event window of (–1, 1). The t-statistics are calculated based on the formula derived in Campbell et al. (1997). We test whether the CARs are statistically significant and report the corresponding p-values in the last column. The S&P 1500 Pure Real Estate Index has a CAR of 1.462%, which is sizable and significant at the 10% level. As described in the data section, before September 1, 2016, the S&P 1500 financial sector index includes both financial and real estate stocks; therefore, we call it the S&P 1500 Combined Financial & Real Estate Index. We create the S&P 1500 Pure Financial Index by excluding the S&P Pure Real Estate index from the S&P Combined Financial & Real Estate Index based on the market capitalization and returns. The S&P 1500 Pure Financial Index has a CAR of 0.45%, which is only about one-third of the CAR of the S&P 1500 Pure Real Estate Index and is not statistically significant. The S&P 1500 Combined Financial & Real Estate Index has a CAR of 0.64%, which is higher than that of the S&P 1500 Pure Financial Index and is significant at 10% level. The analysis shows that the real estate stocks reacted more positively to the news and drove up the S&P 1500 Combined Financial & Real Estate Index. We also examine the CARs for the three market capitalization components of S&P 1500 Index. We find that the real estate stocks in the S&P Large-Cap 500 Index and Mid-Cap 400 Index have more positive reactions than those in the S&P Small-Cap 600 Index.

TABLE 2 Event study on the S&P Real Estate and Financial Indices

Index name	CAR	*t* statistic	*p*-value
S&P Super Composite 1500 Index	0.078	1.214	.113
S&P 1500 Combined Financials & Real Estate Index	0.640	1.432	.077
S&P 1500 Pure Financial Index	0.450	0.806	.210
S&P 1500 Pure Real Estate Index	1.462	1.410	.080
S&P Large-Cap 500 Index	0.093	1.324	.093
S&P 500 Combined Financials & Real Estate Index	0.617	1.279	.101
S&P 500 Pure Financial Index	0.475	0.817	.207
S&P 500 Pure Real Estate Index	1.451	1.426	.078
S&P Mid-Cap 400 Index	–0.061	–0.207	.582
S&P 400 Combined Financials & Real Estate Index	0.742	1.303	.097
S&P 400 Pure Financial Index	0.087	0.147	.441
S&P 400 Pure Real Estate Index	1.545	1.352	.089
S&P Small-Cap 600	0.024	0.109	.456
S&P 600 Combined Financials & Real Estate Index	0.864	1.483	.070
S&P 600 Pure Financial Index	0.620	0.871	.192
S&P 600 Pure Real Estate Index	1.296	1.145	.127

Note: This table reports the results of event study on real estate and financial indices. The event date is the announcement day of the creation of the new real estate sector on March 13, 2015. We first run the Fama–French three-factor model to estimate the coefficients during the 250-day estimation window of (–270, –21), and then use the coefficients to obtain the abnormal return (AR) and the cumulative abnormal return (CAR denoted in %) during the 3-day event window of (–1, 1). The *t*-statistics are calculated based on the formula derived in Campbell et al. (1997, pp. 158–160). We test whether the CARs are statistically significant and report the corresponding *p*-values in the last column.

We then apply the event study methodology to test the reaction of individual real estate and financial stocks to the news. Unlike most event studies in corporate finance where the event dates are not clustered, an econometric issue arises in this case because the abnormal returns during the event window are cross-sectionally dependent due to the clustering on the same event date. Greenwood (2005) discusses a similar clustering situation and the resulted inference bias when examining the market reaction of 255 securities to a unique event in April 2000 that changes the member weightings of the Nikkei 225 Index. Kolari and Pynnonen (2010) use the stocks' correlations before the event date to adjust the cross-sectional dependence and potential event-induced volatilities, and show that their test statistics perform better than those in the previous literature. We follow Kolari and Pynnonen (2010) to compute the Kolari test statistics. Our results are reported in panel A of Table 3. As described in the Data section, the individual firm sample includes all real estate stocks and financial stocks in the Compustat and CRSP datasets. The mean CAR of the real estate stocks is 1.26% in comparison with 0.86% for the financial stocks. The simple *t*-test shows that both CARs are at the 1% significance level. With the correction of cross-sectional dependence, the Kolari statistics for both CARs are still significant. To check the robustness, we also conduct nonparametric test using the Cowan (1992) generalized rank statistics. The results in the last two rows of panel A confirm that the abnormal returns are highly significant.

In panel B of Table 3, we further test the difference in abnormal returns between the real estate stocks and financial stocks. We first run an OLS regression of the CARs of both real estate and financial stocks on the dummy variable *RealEstate* that equals 1 for real estate stocks and 0 for financial stocks. The *RealEstate* dummy variable's coefficient is 0.404% in column 1 with a *p*-value of .046. We also run the quantile regression in column 2 to test the median difference. The coefficient is 0.684 and significant

TABLE 3 Event study on individual real estate and financial firms

Panel A: Univariate analysis of announcement CARs		
	Real estate	**Financial**
Average CAR	1.261	0.857
Number of firms	209	797
t statistics	5.389	7.955
p-value	.000	.000
Kolari statistics	1.713	2.118
p-value	.088	.035
Generalized sign statistics	9.700	11.873
p-value	.000	.000
Panel B: Test the difference of CARs between real estate stocks and financial stocks		
	(1)	**(2)**
	OLS	**Quantile Regression**
Variables	**Dependent variable = CAR**	
RealEstate	0.404**	0.684***
	(0.199)	(0.134)
Constant	0.857***	0.767***
	(0.092)	(0.064)
Observations	1,006	1,006

Note: This table reports the event study results on all individual real estate and financial firms in the Compustat and CRSP datasets. The event date is the announcement date of the creation of the new real estate sector on March 13, 2015. We first run the Fama–French three-factor model to estimate the coefficients during the 250-day estimation window of (–270, –21), and then use the coefficients to obtain the abnormal returns (ARs) and the cumulative abnormal returns (CARs denoted in %) during the 3-day event window of (–1, 1). *RealEstate* is a dummy variable that equals 1 for real estate firms and 0 for financial firms. Kolari statistics are computed based on Kolari and Pynnonen (2010), while the generalized sign statistics are computed based on Cowan (1992). Robust standard errors are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

at the 1% level. Hence, both the mean and median of the CARs of the real estate stocks are statistically higher than those of the financial stocks.

Overall, our announcement abnormal return results at the index and firm levels both show that investors reacted positively to the creation of a new real estate sector and real estate stocks experience more positive abnormal return than financial stocks. It is challenging to explain these findings under the fundamental-based view, as the reclassification of real estate stocks into a new equity market sector is less likely to change their underlying cash flows or risk level.[10] Therefore, the creation of the new real estate sector should not change investor behaviors or affect stock returns.

The positive abnormal announcement returns are easier to be explained under style-investing view. In particular, markets have frictions and investors have limited attention. The reclassification of real estate firms into a standalone real estate sector will likely increase the visibility and investors' awareness of real estate firms. Before the creation of this new GICS sector, real estate stocks were mixed as a niche

[10] As pointed out by the reviewer, a possible alternative explanation is that the reclassification could be due to real estate insiders' information on the industry's positive future prospects and their efforts to lobby for the sector reclassification. According to this explanation, small firms and nonindexed firms would be expected to show greater positive CARs because they are subject to a higher degree of information asymmetry. To the contrary, we find that large firms and indexed firms have greater CARs, suggesting that the creation of the new real estate sector in GICS is unlikely driven by inside information about the future performance of real estate industry. All test results are available upon request.

industry with financial stocks in the financial sector, and hence investors tended to focus more on the financial stocks and ignore real estate stocks. Contrary to the fundamental-based view, the style-investing view suggests that the new real estate sector creation should serve as a validation of the greater importance and increased visibility of real estate stocks, and therefore be viewed by the investors as positive news.

4.2 | Investor attention and awareness: analyst coverage and institutional holdings

To examine whether analyst coverage on real estate firms increases following the announcement, we obtain the number of analysts from I/B/E/S. We first run a univariate analysis of the changes in the raw number of analysts who are covering the firms and report the results in panel A of Table 4. On average, financial firms have attracted 3.76 more analysts than real estate firms before the announcement. More importantly, the real estate firms attracted an average 0.65 more analysts after the announcement, while the financial firms lost an average 0.60 analysts. Both changes are significant at the 1% level. These findings indicate that the investor awareness increases for real estate firms and decreases for financial firms after the announcement.

To further study the change of analyst coverage, we carry out a number of regressions with a set of control variables. We create two dummy variables: *RealEstate* and *Post. RealEstate* is a dummy variable that equals 1 for real estate stocks and 0 for financial stocks. *Post* is a dummy variable that equals 1 if the month of analyst forecast is after the month of the announcement of the new real estate sector, and 0 if it is before the announcement. Bhushan (1989) finds that large firms tend to attract more analyst coverage and firms with more return variability make private information discovery more valuable. Hence, we also control for the *market value of the firm* and *standard deviation of the stock returns*. Since there is skewness in the number of analysts, we follow He and Tian (2013) to use the *natural log of one plus the raw number of analysts* in the regression analysis.

In columns 1 and 2 of panel B in Table 4, we run the regressions based on the subsamples of real estate stocks and financial stocks, respectively. The coefficients of the *Post* variable show that the number of analysts covering real estate stocks increases after the announcement, while the number of analysts covering financial stocks decreases after the announcement. In column 3, we include both real estate and financial stocks, and add an interactive term *RealEstate*Post*. The coefficient of the interactive term is positive and significant at 1% level. These difference in differences results suggest that the real estate firms attract more new analysts relative to financial firms after the announcement. To control for any time trend effect, we further add the variable *MonthsElapsed* in column 4 that measures the difference between the month of analyst forecast and the month of announcement. The coefficient of the interactive term is still positive and significant after controlling for the time trend. We include the firm fixed effects to control for any unobservable time-invariant firm characteristics and cluster the standard errors at the firm and month level (Petersen, 2009) for all regressions in panel B.

Our empirical results from analyst coverage show that real estate stocks receive more coverage, while financial stocks receive less coverage after the announcement of the creation of the new real estate sector. These findings are consistent with the interpretation that investors have limited attention as documented in Peng and Xiong (2006), and they shift some of their attention away from financial stocks to real estate stocks after the creation of the new real estate sector.

To examine the change of institutional ownership after the announcement, we use the weekly institutional holding data from Bloomberg to test the prediction that the announcement of the creation of new real estate sector increases the professional investors' awareness of real estate stocks in Table 5. The dependent variable is the percentage of share outstanding being held by institutional investors.

TABLE 4 Tests on the analyst coverage of real estate and financial firms

Panel A: Univariate analysis of the average number of analysts				
Sector	**Before**	**After**	**Difference**	***p*-value**
Real estate	3.387	4.032	0.645***	.000
Financial	7.144	6.548	–0.596***	.000
Panel B: Regression analysis of Ln(1 + number of analysts)				
	(1)	**(2)**	**(3)**	**(4)**
	Real Estate	**Financial**	**Both**	**Both**
Variables	**Dependent Variable = Ln(1 + number of analysts)**			
Post	0.094***	–0.051***	–0.053***	0.002
	(0.025)	(0.014)	(0.014)	(0.016)
RealEstate * Post			0.152***	0.152***
			(0.027)	(0.026)
MarketValue	0.167***	0.148***	0.152***	0.175***
	(0.030)	(0.016)	(0.014)	(0.016)
Standard Deviation of Returns	1.515*	1.289***	1.329***	1.113***
	(0.829)	(0.414)	(0.385)	(0.389)
MonthsElapsed				–0.002***
				(0.000)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	13,060	45,901	58,961	58,961
R^2	0.722	0.897	0.880	0.880
Adjusted R^2	0.718	0.896	0.878	0.879

Note: This table reports the results of tests on the prediction that analyst coverage of real estate stocks increases after the announcement of the creation of new real estate sector. Panel A lists the average number of analysts that cover real estate and financial firms before and after the announcement, respectively. In panel B, the dependent variables are the natural log of (1 + number of analysts). *RealEstate* is a dummy variable that equals 1 for real estate firms and 0 for financial firms. *Post* is a dummy variable that equals 1 if the month of analyst forecast is after the month of the announcement of the new real estate sector, and 0 if it is before the month of the announcement. *MarketValue* is the average of the natural log of the daily market value within each month. *Standard Deviation of Returns* is the standard deviation of daily returns within each month. *MonthsElapsed* is the difference between the month of analyst forecast and the month of announcement. Columns (1) and (2) are based on the subsamples of real estate firms and financial firms, respectively. Columns (3) and (4) include both real estate and financial firms. Column (4) also controls for time fixed effects by adding the *MonthsElapsed* variable. The observations are monthly. The estimation is based on the postannouncement period (between the announcement date of March 13, 2015 and December 31, 2018), and the matched period before the announcement with an equal number of months. Robust standard errors clustered at the firm and month level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

Since changes in the index funds likely occur after the official execution of the real estate sector creation, we expect that most of the increase in institutional holding will concentrate in the postexecution period, although it is likely that some institutional investors may start to invest more in real estate stocks immediately following the announcement. Therefore, we create two post announcement dummy variables: *Post1* and *Post2*. *Post1* is a dummy variable that equals 1 if the week of the observation is after the week of the announcement of the new real estate sector and before the week of the execution of new real estate sector, and 0 otherwise. *Post2* is a dummy variable that equals 1 if the week of the observation is after the week of the execution of new real estate sector, and 0 otherwise. *WeeksElapsed* is the number of weeks between the week of observation and the week of announcement.

TABLE 5 Tests on the institutional ownership of real estate and financial firms

	Percentage of shares held by institutional investors			
	(1)	(2)	(3)	(4)
Dependent variable	**Real estate**	**Financial**	**Both**	**Both**
Post1	3.629***	1.613***	1.618***	0.190
	(0.660)	(0.390)	(0.388)	(0.443)
RealEstate * Post1			1.980***	2.005***
			(0.757)	(0.760)
Post2	5.688***	2.407***	2.415***	0.135
	(0.835)	(0.528)	(0.512)	(0.660)
RealEstate * Post2			3.247***	3.256***
			(0.970)	(0.975)
Market Value	5.911***	6.008***	5.982***	5.594***
	(1.321)	(0.944)	(0.784)	(0.811)
Standard Deviation of Return	–0.289	11.208***	9.426**	8.986**
	(12.726)	(4.182)	(4.171)	(4.125)
WeeksElapsed				0.015***
				(0.004)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	45,549	160,822	206,371	206,371
R^2	0.902	0.931	0.929	0.929
Adjusted R^2	0.902	0.930	0.929	0.929

Note: This table reports the results of tests on the prediction that institutional ownership of real estate stocks increases after the announcement and the execution of the creation of the new real estate sector. The dependent variable is the percentage of shares outstanding being held by institutional investors. *RealEstate* is a dummy variable that equals 1 for real estate firms and 0 for financial firms. *Post1* is a dummy variable that equals 1 if the institutional ownership observation is in a week after the announcement and before the execution of new real estate sector, and 0 if it is in a week before the announcement or after the execution. *Post2* is a dummy variable that equals 1 if the institutional ownership observation is for a week after the execution of new real estate sector and 0 if it is before the week of execution. MarketValue is the average of the natural log of the daily market value within each week. Standard Deviation of Returns is the standard deviation of daily returns within each week. *WeeksElapsed* is the difference between the week of observation and the week of announcement. Columns (1) and (2) are based on the subsamples of real estate firms and financial firms, respectively. Columns (3) and (4) include both real estate and financial firms. Column (4) also controls for time fix effects by adding the *WeeksElapsed* variable. The observations are weekly. The estimation is based on the postannouncement period (between the announcement date of March 13, 2015 and June 30, 2017), and the matched period before the announcement with an equal number of weeks. Robust standard errors clustered at the firm and week level are reported in parentheses. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

In Table 5, we use firm fixed effects to control for any unobservable time-invariant firm characteristics and cluster the standard errors for both the firm and week level (Petersen, 2009) for all regressions. Columns 1 and 2 present regression results based on the subsamples of the real estate stocks and financial stocks, respectively. The coefficients of the *Post1* and *Post2* variables show that the percentage of institutional ownership of the real estate stocks increases after the announcement and the execution, while that of the financial stocks also increases but with a smaller magnitude. The coefficient of *Post1* is 3.629%, while the coefficient of *Post2* is 5.688% for the real estate sample, indicating that there are more index funds increasing holding after the execution. In column 3, we include both real estate and financial stocks, and add two interactive terms (*RealEstate*Post1* and *RealEstate*Post2*) into the regression. The coefficients of the interactive terms *RealEstate*Post1* and *RealEstate*Post2* are 1.98% and 3.427%, and significant at 10% and 5%, respectively. These results show that the percentage of

TABLE 6 Correlation between returns of the S&P 1500 Pure Real Estate Index and Pure Financial Index

Panel A: Correlation during various periods				
Sample period	**Before announcement**	**After announcement and before execution**	**After execution**	**Entire sample period**
Correlation	0.804***	0.576***	0.265***	0.777***
p-value	.000	.000	.000	.000
Number of observations	3,378	372	586	4,336
Panel B: Correlation during the same-length period before and after execution				
	586 days before execution		**586 days after execution**	
Correlation	0.530***		0.265***	
p-value	.000		.000	
Number of observations	586		586	

Note: This table presents the pairwise correlation between daily returns of the S&P 1500 Pure Real Estate Index and the S&P 1500 Pure Financial Index during different periods. The entire sample period is from October 10, 2001 (earliest date with available return data on S&P real estate indices) to December 31, 2018 (end of the sample period). The announcement date of the creation of new real estate sector is March 13, 2015, and the execution date is September 1, 2016. ***, **, and * denote significance of correlations at the 1%, 5%, and 10% levels, respectively.

institutional holding increases more in real estate stocks relative to financial stocks after the announcement and execution. The increasing institutional holding could be due to the increasing popularity of passive indexing investment, such as ETFs and indexed mutual funds.[11] To control for any possible time trend effect, we further add the variable *WeeksElapsed* in column 4 to capture the number of weeks from the week of announcement to the week of observation. The coefficients of the interactive terms are still positive and significant after including the time trend effect. Overall, empirical results from Table 5 clearly show that the percentage institutional holding of real estate stocks increases after the announcement and execution of the creation of real estate sector, and this increase is more significant for real estate stocks than for financial stocks. These findings show that real estate stocks attract more professional investor attention after the creation of a new real estate sector.

4.3 | Changes in comovement between returns of real estate and financial indices

To examine whether the comovement between the real estate and financial stocks decreases after the reclassification, we first compute the correlation of the S&P pure real estate and pure financial indices for the three subperiods: from the inception of the sample period (October 10, 2001) to the announcement date (March 13, 2015); after the announcement date and before the execution date (September 1, 2016); and after the execution date to the end of the sample period (December 31, 2018). Table 6 presents the correlation statistics for the S&P Super Composite 1500 Indices. As shown in panel A of Table 6, the return correlation of the S&P Pure Real Estate and Pure Financial Indices changes from 0.80 before the announcement to 0.58 after the announcement and before the execution, and declines sharply to an insignificant correlation of 0.27 after the execution. One might be concerned that this sharp decline in correlation could be due to the long period (3,378 days) before the announcement, and short period after the execution (586 days). To control for the length of the period, we match the 586 days after execution with the same-length period before execution. Panel B of Table 6 shows that

[11]The increased popularity of Real Estate Leveraged ETFs (Tang & Xu, 2013a) and the mandatory rebalancing near the end of each trading day (Tang & Xu, 2013b) may contribute to the comovement within the real estate sector.

the 586-day correlation declines from a highly significant 0.53 before the execution to 0.27 after the execution. Overall, Table 6 clearly shows that the comovement between returns of the real estate index and those of the financial index decreases dramatically after the creation of the new real estate sector.

Under the fundamental-based view, the returns of two stocks are correlated if there are correlated changes in the fundamental values of the two stocks. It is hard to believe that the relabeling of real estate stocks as a new sector would change the correlation between the changes in the fundamental values of real estate stocks and financial stocks so dramatically.

This dramatic decrease in correlations is in line with the style-investing view. In particular, the style-related comovement model of Barberis and Shleifer (2003) suggests that investing based on "style classification," rather than individual securities, coupled with shifting market sentiments, induces *over* comovement among same style assets and *under* comovement among different style assets.[12]

Real estate was previously under the umbrella of the financial sector, but became a separate GICS sector starting September 1, 2016. Such reclassification is less likely due to the changes in fundamental cash flows or riskiness of individual real estate firms. The style-investing view helps explain that real estate and financial stocks have stronger comovement when they were in the same financial sector before the reclassification, but have less comovement after real estate stocks were spun off and promoted to a separate real estate sector outside of the financial sector. Excess comovement within a sector is also consistent with the limited attention and categorical learning behavior model of Peng and Xiong (2006), which demonstrates that investors' tendency to process more market- and sector-level information leads to within-sector return correlations that are higher than their fundamental correlations. Moreover, Basak and Pavlova (2013) develop a framework that explicitly captures institutional investors' tilt toward stocks that compose their performance benchmark index, inducing excess correlations among stocks within the same index and generating an asset-class effect.

Overall, the dramatic decrease in the correlation is consistent with the style-investing view, but cannot be easily explained by the fundamental-based view that changes in the fundamental values of real estate stocks and financial stocks are highly correlated before the separation of the two sectors and less correlated afterward. Nevertheless, to further address the unlikely fundamental value explanation, we carry out two additional tests: the correlation change across different firm sizes and the correlation of returns that control for a set of factors that might drive fundamental values.

According to the fundamental-based view, if changes in the fundamental values of real estate stocks and financial stocks are less correlated after the creation of the new real estate sector, then the decrease in comovement should have similar magnitude for firms in different market capitalization groups. Consequently, the fundamental-based view predicts that the decrease in comovement is not related to firm size. On the other hand, the style-investing view predicts that the change in comovement can be different across different firm sizes. In particular, investors have limited attention. They are more likely to pay more attention to large firms than small firms, which is evidenced by more analyst coverage over the large firms. Therefore, the change in investor attention is likely to be larger for large firms than for small firms. To test this conjecture, we present additional correlation analysis by firm size for the Large-Cap (S&P 500), Mid-Cap (S&P 400), and Small-Cap (S&P 600) Indices in Table 7.

[12]Studies have documented strong empirical evidence supporting Barberis and Shleifer's (2003) framework of style investing-related comovement. Using additions to the S&P 500 index, Barberis, Shleifer, and Wurgler (2005) find excess comovement of these stocks with the S&P 500 after joining the index. Green and Hwang (2009) find that following stock splits, stocks have increased comovement with low-priced stocks and decreased comovement with high-priced stocks. Boyer (2011) studies the reclassification of stocks between S&P value indices and growth indices and finds that a stock experiences more comovement with the index it joins and less with the index it leaves.

TABLE 7 Correlation between returns of real estate index and financial index across different capitalization groups

Panel A: Correlation between pure real estate and financial indices				
Sample period	**Before announcement**	**After announcement and before execution**	**After execution**	**Entire sample period**
Large-Cap: S&P 500 Pure Real Estate Index and S&P 500 Pure Financial Index				
Correlation	0.795***	0.572***	0.235***	0.769***
p-value	.000	.000	.000	.000
Number of observations	3,378	372	586	4,336
Mid-Cap: S&P 400 Pure Real Estate Index and S&P 400 Pure Financial Index				
Correlation	0.800***	0.566***	0.368***	0.768***
p-value	.000	.000	.000	.000
Number of observations	3,378	372	586	4,336
Small-Cap: S&P 600 Pure Real Estate Index and S&P 600 Pure Financial Index				
Correlation	0.827***	0.565***	0.467***	0.795***
p-value	.000	.000	.000	.000
Number of observations	3,378	372	586	4,336

Panel B: Correlation during the same-length period before and after execution		
	586 days before execution	**586 days after execution**
Large-Cap: S&P 500 Pure Real Estate Index and S&P 500 Pure Financial Index		
Correlation	0.527***	0.235***
p-value	.000	.000
Mid-Cap: S&P 400 Pure Real Estate Index and S&P 400 Pure Financial Index		
Correlation	0.519***	0.368***
p-value	.000	.000
Small-Cap: S&P 600 Pure Real Estate Index and S&P 600 Pure Financial Index		
Correlation	0.533***	0.467***
p-value	.000	.000

Notes: This table presents the pairwise correlation between daily returns of the Pure Real Estate Index and the Pure Financial Index for S&P Large-Cap 500, Mid-Cap 400, and Small-Cap 600 firms during different periods. The entire sample period is from October 10, 2001 (earliest date with available return data on S&P real estate indices) to December 31, 2018 (end of the sample period). The announcement date of the creation of new real estate sector is March 13, 2015, while the execution date is September 1, 2016. ***, **, and * denote significance of correlations at the 1%, 5%, and 10% levels, respectively.

Consistent with the results from Table 6, Table 7 shows that the correlation declines after the execution of the creation of real estate sector in panel A (using the full sample period) and panel B (using the matched same-length period). The decline of the return correlation between real estate and financial indices is most sizable for the large-cap group, registering a 0.53 correlation in the 586 days before the execution and a 0.24 correlation in the 586 days after the execution. The decline in correlation is from 0.52 to 0.37 for the mid-cap group and from 0.53 to 0.47 in the small-cap group. These results indeed show that the change in investor attention is larger for large firms than for small firms, consistent with the prediction from the style-investing view.

Overall, results from Tables 6 and 7 show that the correlation between the returns on the S&P Pure Real Estate Index and the S&P Pure Financial Index is significantly lower after the reclassification of real estate sector, with the large-cap firms showing the most dramatic reduction in correlation.

One might question whether the drastic reduction in the unconditional correlation between real estate and financial index returns after the reclassification (as shown in Table 7) is due to changes in systematic factors, changes in economic conditions, or fundamentals, instead of the reclassification event itself. A large number of financial studies (Campbell, 1987; Campbell & Amber, 1993; Chen, Roll, & Ross, 1986; Fama & French, 1989; Stambaugh, Yu, & Yuan, 2012) have shown that macroindicators of business and financial conditions and investor sentiment are potential drivers of stock returns. Chan, Hendershott, and Sanders (1990), Lin, Rahman, and Yung (2009), and Huerta, Egly, and Escobari (2016) examine the impact of these macroeconomic variables on returns of real estate stocks, while Kadilli (2015) examines their predictability on returns of financial stocks. To control for macroeconomic variables that could drive the real estate and financial index returns, we obtain the abnormal excess returns from the residuals by regressing the return of the real estate index and return of the financial index on the change in short-term interest rate, change in term structure spread, change in credit spread, stock market implied volatility, home price growth rate, change in investor sentiment, inflation, change in unemployment rate, and GDP growth rate.[13] We then compute the correlation between abnormal excess returns of the real estate and financial indices. Panel A of Appendix C shows that the conditional correlation of returns on the real estate and financial indices (after controlling for macroeconomic variables) decreases from 0.80 before the announcement, to 0.56 after the announcement and before the execution, and dramatically to only 0.25 after the execution. Panel B shows that the conditional correlation decreases from 0.51 before the execution to 0.25 after the execution. These findings show that changes in economic fundamentals cannot fully explain the decrease in comovement between financial and real estate stocks after the sector reclassification.

Fama and French (1992) find that stock returns are driven by three systematic factors: the stock market excess return, the size factor, and the book to market value factor. In Table 8, we present the conditional correlation of the real estate and financial index returns after controlling for the above macroeconomic variables as well as the Fama and French three factors. Panel A of Table 8 shows that the conditional correlation of the real estate and financial indices decreases slightly from 0.26 before the announcement, to 0.20 after the announcement and before the execution, and dramatically to –0.039 after the execution. With the same-length period of 586 days, panel B shows that the correlation of abnormal excess returns for real estate and financial indices decreases from a 0.17 before the execution to –0.039 after the execution.

In summary, the robust empirical results using unconditional and conditional correlations, with and without controlling for the same-length period, show that the correlation between the S&P Pure Real Estate Index and the S&P Pure Financial Index is significantly lower after the reclassification of the real estate sector.

4.4 | Changes in betas of individual real estate stocks with the pure real estate index and pure financial index

Barberis et al. (2005) show that a stock's beta with the S&P 500 rises after inclusion in the S&P 500 and falls after deletion from the S&P 500. At the sector level, the real estate stocks, which were previously members of the financial sector, were reclassified as the new real estate sector after the reclassification. Using daily returns on all 212 individual real estate stocks, we test whether their betas with the S&P 1500 Pure Real Estate Index (the new style category) increase after reclassification and their betas with the S&P 1500 Pure Financial Index (the old style category) decrease after reclassification.

[13] See Appendix A for detailed definitions on the variables.

TABLE 8 Correlation between abnormal excess returns of real estate index and financial index after controlling for Fama–French three factors and macroeconomic variables

Panel A: Correlation during various periods				
Sample period	**Before announcement**	**After announcement and before execution**	**After index execution**	**Entire sample period**
Correlation	0.264***	0.200***	–0.039	0.235***
p-value	.000	.000	.351	.000
Number of observations	3,378	372	586	4,336
Panel B: Correlation during the same-length period before and after the execution				
	586 days before execution		**586 days after execution**	
Correlation	0.165***		–0.039	
p-value	.000		.351	
Number of observations	586		586	

Note: This table presents the pairwise correlation between the daily abnormal excess returns of the S&P 1500 Pure Real Estate Index and S&P 1500 Pure Financial Index during different sample periods. To obtain the abnormal returns, we have controlled for the Fama–French three factors (the stock market excess return, the size factor, and the book to market value factor) as well as the following macroeconomic variables: change in short-term interest rate, change in term structure spread, change in credit spread, stock market implied volatility, home price growth rate, change in investor sentiment, inflation, change in unemployment rate, and GDP growth rate. See Appendix A for variable definitions. The entire sample period is between October 10, 2001 (the earliest date with available return data on S&P real estate indices) and December 31, 2018 (the last date of the sample period). For the creation of the new real estate GICS sector, the announcement date is March 13, 2015, and the execution date is September 1, 2016. ***, **, and * denote significance of correlations at the 1%, 5%, and 10% levels, respectively.

In Table 9, we present the cross-sectional distribution of the real estate stocks' univariate beta estimates during the entire sample period from October 10, 2001 to December 31, 2018, as well as three subperiods: before the announcement date of March 13, 2015; after the announcement date and before the execution date of September 1, 2016; and after the execution date.

$$R_{firm\ i,t} = \alpha_i + \beta_i R_{index,t} + \epsilon_{i,t} \tag{6}$$

where $\epsilon_{i,t}$ is a zero mean noise term.

Panel A of Table 9 clearly shows that the mean beta of real estate stocks with the S&P 1500 Pure Financial Index declines from 0.60 before the announcement, to 0.48 after announcement and before execution, and further to 0.29 after the execution. The real estate stocks' average financial beta falls by 0.115 from before to after the announcement and further declines by 0.195 from before to after the execution. Both decreases are significant at the 1% level. On the other hand, panel B shows that the average beta of real estate stocks with the S&P 1500 Pure Real Estate Index increases from 0.71 before the announcement, to 0.85 after announcement and before execution, and 0.86 after the execution. Since only 104 of the 212 real estate stocks are included in the S&P 1500 Pure Real Estate Index, the real estate stocks' beta with the S&P 1500 Pure Real Estate Index is likely different from 1. The increase in the average real estate beta is also consistent with Ambrose et al. (2007), who document an increase in return correlation between REITs that remain outside the index and the index counterparts after some REITs were added into general stock market indices. The results from panel B show the real estate stocks' average real estate beta increases by 0.138 from before to after the announcement, which is significant at 1% level, and further increases by 0.006 from before to after the execution.

Table 10 conducts additional tests on changes in the financial beta, that is, the univariate beta of real estate stocks on the S&P 1500 Pure Financial Index, to explore further implications of the "style-investing view." Because investors have limited attention, they are more likely to pay greater attention

TABLE 9 Univariate beta of real estate stocks on the Pure Financial Index and Pure Real Estate Index

Panel A: Univariate beta of real estate stocks on the S&P 1500 Pure Financial index								
Sample period	Entire sample (1)	Before announcement (2)	After announcement and before execution (3)	After execution (4)		After announcement – before announcement (3) – (2)	After execution – before announcement (4) – (3)	After execution – before announcement (4) – (2)
Mean	0.583	0.600	0.484	0.290	Mean	–0.115***	–0.195***	–0.310***
Std. Dev.	0.281	0.309	0.239	0.183	Std. Err.	0.020	0.013	0.022
Median	0.620	0.653	0.443	0.271	*t*-statistic	–5.824	–15.078	–14.181
N	201	201	201	201	Pr(|T| > |t|)	0.000	0.000	0.000
Panel B: Univariate beta of real estate stocks on the S&P 1500 Pure Real Estate index								
	(1)	(2)	(3)	(4)		(3) – (2)	(4) – (3)	(4) – (2)
Mean	0.764	0.711	0.848	0.855	Mean	0.138***	0.006	0.144***
Std. Dev.	0.318	0.340	0.307	0.323	Std. Err.	0.018	0.017	0.022
Median	0.801	0.762	0.937	0.930	*t*-statistic	7.671	0.374	6.490
N	201	201	201	201	Pr(|T| > |t|)	0.000	0.709	0.000

Note: This table provides summary statistics of the univariate beta of real estate stocks with the S&P 1500 Pure Financial Index (in panel A) and the S&P 1500 Pure Real Estate Index (in panel B), respectively. See Appendix A for variable definitions. The entire sample period is between October 10, 2001 (the earliest date with available return data on S&P real estate indices) and December 31, 2018 (the last date of the sample period). For the creation of the new real estate GICS sector, the announcement date is March 13, 2015, and the execution date is September 1, 2016. The standard errors for the differences are from paired *t*-tests. ***, **, and * denote significance of differences at the 1%, 5%, and 10% levels, respectively.

TABLE 10 Additional tests on changes in the univariate beta of real estate stocks on the S&P 1500 Pure Financial Index

	Sample period	Mean	SD	*N*
Panel A: Beta of individual real estate stocks on the S&P 1500 Pure Financial index across firm size groups				
Large firms	Before announcement	0.73	0.25	67
	After execution	0.26	0.18	67
	Change	–0.47***		
Medium firms	Before announcement	0.65	0.27	67
	After execution	0.32	0.19	67
	Change	–0.34***		
Small firms	Before announcement	0.42	0.32	67
	After execution	0.29	0.18	67
	Change	–0.13***		
Large firms – small firms	Before announcement	0.31***		
	After execution	–0.02		
	Change	–0.34***		
Panel B: Univariate beta of real estate stocks on the S&P 1500 Pure Financial index: S&P 1500 versus non-S&P				
	Sample period	**Mean**	**SD**	***N***
S&P 1500 firms	Before announcement	0.75	0.20	88
	After execution	0.28	0.18	88
	Change	–0.47***		
Non-S&P 1500 firms	Before announcement	0.48	0.33	113
	After execution	0.30	0.18	113
	Change	–0.19***		
S&P 1500 – Non S&P 1500	Before announcement	0.26***		
	After execution	–0.02		
	Change	–0.28***		
Panel C: Univariate beta of real estate stocks on the S&P 1500 Pure Financial index: excluding largest firms				
	Sample period	**Mean**	**SD**	***N***
Excluding top 5% of firms	Before announcement	0.59	0.31	191
	After execution	0.30	0.18	191
	Change	–0.29***		
Excluding top 10% of firms	Before announcement	0.57	0.31	181
	After execution	0.29	0.18	181
	Change	–0.28***		
Excluding top 20% of firms	Before announcement	0.56	0.31	161
	After execution	0.30	0.18	161
	Change	–0.26***		

Note: This table provides additional tests of the change in univariate beta of real estate stocks on the S&P 1500 Pure Financial Index, for different firm size groups (panel A), indexed versus nonindexed firms (panel B), and samples excluding 5%, 10%, and 20% of largest firms (panel C). See Appendix A for variable definitions. The entire sample period is between October 10, 2001 (the earliest date with available return data on S&P real estate indices) and December 31, 2018 (the last date of the sample period). For the creation of the new real estate GICS sector, the announcement date is March 13, 2015, and the execution date is September 1, 2016. For the changes and differences, ***, **, and * denote significance of differences at the 1%, 5%, and 10% levels, respectively.

to large firms than to small firms, and to firms in the S&P 1500 indices than to nonindexed firms. Consequently, among different size groups of real estate firms, we expect larger capitalization stocks, which attract more investor attention, to have a greater decline in the financial beta. Similarly, stocks in the S&P indices receive more attention than those outside of the indices, and hence we expect the indexed real estate firms to experience a greater decline in financial beta than the nonindexed firms.

In panel A of Table 10, we compare the change in the financial beta of real estate firms among the large, medium, and small firms according to market capitalization, respectively. The three groups of real estate firms all experience statistically significant decrease in the financial beta, while the large firms have an average decline of 0.47 in financial beta, significantly larger than the 0.13 decline in financial beta for small firms. The greater reduction in financial beta for large real estate firms is consistent with further implication of the "style-investing view."[14] In panel B of Table 10, we compare the change in the financial beta of real estate firms in the S&P 1500 index versus those not in the index. The magnitude of average decline in financial beta for the real estate firms in the S&P 1500 index is 0.28 larger than that for the nonindexed firms. The larger decrease of beta for indexed firms relative to nonindexed firms provides further support to the "style-investing view." Finally, since larger firms experienced more dramatic decline in financial beta, there is the concern that the decline in financial beta may be driven by a few large firms. To address this concern, we discard the top 5%, 10%, and 20% of largest real estate firms and re-estimate the change in their financial beta in panel C of Table 10. Results from panel C show that the decline in financial beta for real estate firms after the reclassification is strong, robust, and prevalent for the entire real estate industry.

To examine the real estate firms' beta on the financial index and the real estate index together, as a robustness check, we use a bivariate beta approach following Barberis et al. (2005) to regress the daily returns of real estate stocks on the daily returns of the S&P 1500 Pure Financial Index as well as the S&P 1500 Pure Real Estate Index.

$$R_{firm\ i,t} = \alpha_i + \beta_{financial,i} R_{financial\ index,t} + \beta_{real\ estate,i} R_{real\ estate\ index,t} + \epsilon_{i,t} \tag{7}$$

Table 11 presents the results from the bivariate beta estimation for the real estate stocks. These results confirm the main findings from the univariate beta estimation, consistently showing decreased beta on the financial index and increased beta on the real estate index. However, as mentioned in the previous literature, one major caveat with this approach is the concern of multicollinearity. In particular, as shown in Chen et al. (2016), the multicollinearity between two indices in a bivariate beta regression could lead to parameter estimates that are unstable and have little economic significance. As previously reported, the correlation between the returns of real estate and financial indices is indeed very high, especially before the reclassification of the new real estate sector.

To partially address the problem of multicollinearity, we first regress daily returns of the Pure Financial Index on those of the Pure Real Estate Index to obtain the residuals as the Orthogonalized Pure Financial Index, and then we regress the real estate stock returns on the Orthogonalized Pure Financial Index as well as the Pure Real Estate Index.

[14]We also examine the change in financial beta of real estate stocks among different subindustry groups, such as Industrial, Office, Health Care, Residential, Retail, Diversified, Hotel & Resort, Specialized REITs, as well as Other Real Estate companies. As shown in Appendix D, the decreases in all subindustries are statistically significant with industrial REITs experiencing the largest decrease in beta of 0.50. Although it is beyond the scope of this paper to further examine the behaviors of different REIT groups, since subindustry concentration could play an important role in predicting REITs return (see Zhang & Hansz, 2019), we control for the subindustry fixed effects to carry out a cross-sectional regression of the change in beta over firm size. As shown in Appendix E, the negative coefficients of firm size suggest that, after adjusting for different property types, larger real estate firms experienced more decrease in beta than smaller firms, lending additional support to the "style-investing view."

TABLE 11 Bivariate betas of real estate stocks with the Pure Financial Index and Pure Real Estate Index

	Beta on the S&P 1500 Pure Financial Index				Beta on the S&P 1500 Pure Real Estate Index			
Sample period	**Entire sample** (1)	**Before announcement** (2)	**After announcement and before execution** (3)	**After execution** (4)	**Entire sample** (5)	**Before announcement** (6)	**After announcement and before execution** (7)	**After execution** (8)
Mean	0.130	0.157	0.130	0.109	0.670	0.596	0.755	0.823
Std. Dev.	0.186	0.194	0.291	0.214	0.354	0.369	0.373	0.353
Median	0.083	0.117	0.066	0.061	0.709	0.624	0.873	0.931
N	201	201	201	201	201	201	201	201
		After announcement – before announcement (3) – (2)	**After execution – before execution** (4) – (3)	**After execution - before announcement** (4) – (2)		**After announcement – before announcement** (7) – (6)	**After execution – before execution** (8) – (7)	**After execution – before announcement** (8) – (6)
Mean		–0.028*	–0.021	–0.048***		0.159***	0.068***	0.227***
Std. Err.		0.015	0.013	0.013		0.020	0.014	0.022
t-statistic		–1.876	1.591	3.581		7.835	4.721	10.201
Pr(|T| > |t|)		0.062	0.113	0.000		0.000	0.000	0.000

Note: This table provides summary statistics of the bivariate betas of real estate stocks with the S&P 1500 Pure Financial Index and Pure Real Estate Index. See Appendix A for variable definitions. The entire sample period is between October 10, 2001 (the earliest date with available return data on S&P real estate indices) and December 31, 2018 (the last date of the sample period). For the creation of the new real estate GICS sector, the announcement date is March 13, 2015, while the execution date is September 1, 2016. The standard errors for the differences are from paired *t*-tests. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

First stage:

$$R_{financial\ index,t} = a + bR_{real\ estate\ index,t} + \epsilon_t \tag{8}$$

where ϵ_t is the residual from the first-stage regression and is defined as the Orthogonalized Pure Financial Index Return of period t, $R_{orthogonalized\ financial\ index,t}$.

Second stage:

$$R_{firm\ i,t} = \alpha_i + \beta_{real\ estate,i}R_{real\ estate\ index,t} + \beta_{orthogonalized\ financial,i}R_{orthogonalized\ financial\ index,t} + \epsilon_{i,t} \tag{9}$$

Appendix F shows that the real estate stocks' average beta on the orthogonalized pure financial index decreases after the announcement, and even further after the execution. In contrast, the real estate stocks' average beta on the pure real estate index increases after the announcement, and even further after the execution. In sum, the results from both univariate and bivariate beta analysis show that betas of individual real estate stocks with the Pure Financial Index decrease after the reclassification, while betas of individual real estate stocks with the Pure Real Estate Index rise after the reclassification.

Overall, strong and robust empirical results from the index-level correlation analysis and firm-level beta analysis support the hypothesis that the comovement between real estate and financial stocks decreases after the reclassification of real estate stocks from an industry under the financial sector to a standalone new real estate sector. The changes in return comovement for real estate stocks could be due to the changes in institutional ownership and analyst coverage as documented in Section 4.2. As a potential interpretation, our findings of increased comovement within real estate stocks and decreased comovement between real estate and financial stocks could be due to the increased institutional ownership and analyst coverage on real estate stocks after the creation of the new real estate GICS sector. These findings cannot be fully explained by the fundamental-based view and are more consistent with the style-investing interpretation.

5 | CONCLUSIONS

This study examines the market responses and return comovement between real estate and financial stocks around the reclassification of real estate firms from the financial sector into a standalone new real estate sector. We find that the S&P 1500 Pure Real Estate Index experiences a CAR of 1.46% during the 3-day event window around the announcement of the new sector creation. In addition, using a difference in differences approach, we document increased analyst attention and higher institutional ownership on real estate stocks after the announcement and execution of the new sector creation. These empirical findings confirm the importance of industry classification and sector labeling in financial market research and practice.

More importantly, we find that the return comovement between real estate and financial stocks decreases dramatically after the new sector creation. The correlation between the S&P 1500 Pure Real Estate Index and Pure Financial Index decreases from 0.80 before the announcement of the new sector creation to 0.27 after the execution of the new sector creation. We also control for changes in the fundamentals using a set of macroeconomic variables and the Fama–French three factors. The results of decreased correlation between the real estate and financial stocks remain highly robust using index or individual firms, and with or without controlling for macroeconomic fundamentals. Overall, our

empirical findings cannot be fully explained by the fundamental-based view and are more consistent with the style-investing interpretation.

Our study has important implications for real estate investors, portfolio managers, and policy makers. The increased investor attention from analyst coverage and institutional ownership after the new sector creation could contribute to better price discovery for real estate stocks. For portfolio managers, our findings provide new insight on the importance of sector diversification, as equities tend to have more excess correlation within sectors than across sectors. Given that real estate stocks have less comovement with financial stocks after the sector reclassification, investors can more effectively use real estate stocks to achieve portfolio diversification. For policy makers and regulatory bodies, our findings suggest that sector labeling forms an important basis for style-investing behavior, and thus they should be circumspect of it when formulating policies intended to ease the potential systemic risk of asset class shifting.[15]

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[15] A potential extension to our study is to examine changes in derivatives trading behavior after the reclassification. For example, Cashman, Harrison, and Sheng (2018) find that option volume increases are followed by decreases in REIT returns.

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APPENDIX

APPENDIX A Definitions of Terms and Variables

Name	Definition
Analyst Coverage	A variable that is defined as the Natural Log of (1+the number of analyst forecasts during the month). Analysts forecast data are from the Institutional Brokers Estimation System (I/B/E/S).
Announcement date	Announcement of the creation of the new real estate GICS equity market sector on March 13, 2015
Bivariate betas of real estate stocks	The coefficients on the two indices when regressing the daily return of real estate stocks on the S&P Pure Financial Index return and the Pure Real Estate Index return with an intercept term.
CAR	The cumulative abnormal return of a stock during the three-day event window of (−1, 1). The CARs are calculated by the Fama-French three-factor model during the 250-day estimation window of (−270, −21).
Change in credit spread	Daily change in the yield spread between Moody's BAA and AAA Corporate Bonds
Change in investor sentiment	Monthly % Change in the Conference Board's Consumer Confidence Index
Change in short-term interest rate	Daily change in the 3-month Treasury yield
Change in term structure spread	Daily change in the yield spread between 10-year and 3-month Treasuries
Change in unemployment rate	Monthly % Change in the U.S. Unemployment Rate
Combined Financial & Real Estate Index	Includes both financial and real estate firms in the S&P indices
Equity REITs	Equity REITs own income-producing real estate properties for the long-term and are required to pay out at least 90% of its taxable income through dividends to shareholders. As of June 2017, equity REITs account for 95% of the total market capitalization of the new real estate equity market sector, while real estate management & development companies account for the remaining 5%.
Execution date	Execution of the creation of the new real estate GICS equity market sector on September 1, 2016
Fama-French three Factors	The three factors from Fama and French's three-factor model (1992): the equity market excess return, the size factor, and the book to market value factor. Data of the three factors are downloaded from Kenneth R. French's online data library at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.
Financial beta of real estate stocks	A real estate stock's beta with the S&P Pure Financial Index
Financial firms	Refer to publicly-traded financial companies and mortgage REITs that remain in the GICS financial sector

(Continues)

APPENDIX A (Continued)

Name	Definition
Financial stocks	Refer to stocks of publicly-traded financial companies and mortgage REITs that remain in the GICS financial sector.
Fundamental value-based view	Also referred to as the fundamental-based view in the paper. The fundamental value-based view is from the traditional theory of stock price and return comovement based on a frictionless market with rational investors. Under this view, the return of a stock should reflect the change in its fundamental value and the return correlation of stocks should be driven by the correlated changes in their respective fundamental values.
GDP growth rate	Quarterly Year-over-Year (YOY) growth in the U.S. GDP
GICS	Established by MSCI and S&P in 1999, the Global Industry Classification Standard (GICS) assigned companies into industries and grouped the industries into ten broad equity market sectors. The creation of a new real estate sector in September 2016 represents the 11th sector and the first new sector since the inception of GICS in 1999. GICS has been widely used as a primary classification system for the development of indices, mutual funds, and ETFs, as well as the benchmarks for asset allocation and portfolio diversification.
Home price growth rate	Monthly % change in the S&P Case-Shiller U.S. National Home Price Index
Index return	The total return of an index is based on the percentage change in the index price, adjusted for the dividend yield
Inflation rate	Monthly YOY % change in the U.S. Consumer Price Index
Institutional Ownership	Percentage of shares outstanding that are being held by institutional investors. The weekly data are from Bloomberg.
MarketValue	The monthly average of the natural log of the daily market value of a firm. The daily market value is obtained by multiplying the closing price with the shares outstanding recorded in thousands.
MonthsElapsed	The difference between the month of analyst forecast and the month of announcement of the creation of the new real estate sector.
Mortgage REITs	Mortgage REITs originate real estate loans or invest in mortgage-backed securities. After the creation of the new real estate sector, mortgage REITs remain in the financial sector.
Orthogonalized Pure Financial Index	Regress the daily returns of the S&P 1500 Pure Financial Index on those of the S&P 1500 Pure Real Estate index, and take the residuals as the Orthogonalized Pure Financial Index.
Post	Dummy variable that equals 1 if the month of the analyst forecast is after the month of the announcement of new real estate sector, and 0 if it is before the month of announcement
Post1	Dummy variable that equals 1 if the institutional ownership observation is in the week after the week of the announcement of the new real estate sector and before the week of the execution of new real estate sector, and 0 if it is in the week before the week of announcement or after the week of execution.
Post2	Dummy variable that equals 1 if the institutional ownership observation is in the week after the week of the execution of the new real estate sector, and 0 if it is before the week of the execution

(Continues)

APPENDIX A (Continued)

Name	Definition
Pure Financial Index	Includes financial companies and mortgage REITs in the S&P indices, excluding equity REITs and real estate management & development firms
Pure Real Estate Index	Includes equity REITs and real estate management & development companies in the S&P indices, excluding mortgage REITs
Real estate beta of real estate stocks	A real estate stock's beta with the S&P Pure Real Estate Index
Real estate firms	Refer to publicly-traded equity REITs and real estate management & development companies that are included in the new GICS real estate sector
Real estate stocks	Refer to stocks of equity REITs and real estate management & development companies that are included in the new GICS real estate sector
RealEstate	Dummy variable that equals 1 for real estate firms, and 0 for financial firms
REIT	According to NAREIT, a real estate investment trust (REIT) is a company that that owns, operates or finances income-producing real estate. REITs include equity REITs and mortgage REITs. As of December 2018, equity REITs represent 94% of the total market capitalization of all REITs, while mortgage REITs account for the remaining 6%.
Standard Deviation of Returns	The standard deviation of daily stock returns within each month
Stock market implied volatility	Chicago Board Options Exchange's (CBOE) VIX index, which is the near-term volatility implied by S&P 500 index option prices
Stock return	The total return of a stock is based on the percentage change of stock price, adjusted for dividend yield
Styles	In the context of the style-investing framework of Barberis and Shleifer (2003), "*styles*" refer to category labels from various groupings of stocks. Styles include but are not limited to market sectors, value vs. growth, large vs. small capitalization, high vs. low price, S&P 500 vs. Non-S&P 500, etc.
Style-investing view	The style-investing view is developed by Barberis and Shleifer (2003) and based on a market with frictions and irrational investors. According to this view, investors group stocks into different styles in the financial markets. As a result, stocks in the same style comove too much and those in different styles comove too little.
Univariate beta of real estate stocks	The coefficient on the index when regressing the daily return of real estate stocks on the daily return of an index with an intercept term
WeeksElapsed	The difference between the week of institutional ownership observation and the week of announcement of the creation of the new real estate sector.

APPENDIX B S&P 1500 and Large-Cap 500 Sector Indices: Market Value and Number of Listed Stocks as of December 2018

NAME OF THE INDEX	No. of Listed Stocks			Market Value (MV)			Average MV	Dividend
	Number	%	Rank	in Bil. USD	% of Total	Rank	in Bil. USD	Yield
S&P 1500 FINANCIALS INDEX	228	15.14%	1	3,194.6	1/0/1900	3	14.01	2.28%
S&P 1500 INDUSTRIALS INDEX	228	15.14%	2	2,390.7	9.92%	5	10.49	2.13%
S&P 1500 CONSUMER DISCRETIONARY INDEX	218	14.48%	3	2,546.0	10.57%	4	11.68	1.48%
S&P 1500 INFORMATION TECHNOLOGY INDEX	211	14.01%	4	4,688.1	19.46%	1	22.22	1.71%
S&P 1500 HEALTH CARE INDEX	164	10.89%	5	3,581.0	14.86%	2	21.84	1.66%
S&P 1500 REAL ESTATE INDEX	**106**	**7.04%**	**6**	**823.5**	**3.42%**	**9**	**7.77**	**4.02%**
S&P 1500 ENERGY INDEX	93	6.18%	7	1,213.5	5.04%	8	13.05	3.58%
S&P 1500 MATERIALS INDEX	85	5.64%	8	722.1	3.00%	11	8.50	2.28%
S&P 1500 CONSUMER STAPLES INDEX	68	4.52%	9	1,866.5	7.75%	7	27.45	3.15%
S&P 1500 TELECOMUNICATION SERVICES INDEX	53	3.52%	10	2,265.1	9.40%	6	42.74	1.65%
S&P 1500 UTILITIES INDEX	52	3.45%	11	805.2	3.34%	10	15.48	3.39%
S&P 1500 SUPER COMPOSITE INDEX (TOTAL)	1,506	100.00%		24,096.3	100.00%		16.00	2.13%
S&P 500 INDUSTRIALS INDEX	69	13.66%	1	2,021.8	9.26%	6	29.30	2.30%
S&P 500 INFORMATION TECHNOLOGY INDEX	68	13.47%	2	4,353.4	19.93%	1	64.02	1.80%
S&P 500 FINANCIALS INDEX	67	13.27%	3	2,804.1	12.84%	3	41.85	2.24%
S&P 500 CONSUMER DISCRETIONARY INDEX	65	12.87%	4	2,259.8	10.35%	4	34.77	1.46%
S&P 500 HEALTH CARE INDEX	61	12.08%	5	3,342.7	15.31%	2	54.80	1.75%
S&P 500 CONSUMER STAPLES INDEX	33	6.53%	6	1,792.4	8.21%	7	54.32	3.23%
S&P 500 REAL ESTATE INDEX	**32**	**6.34%**	**7**	**631.4**	**2.89%**	**10**	**19.73**	**3.65%**
S&P 500 ENERGY INDEX	30	5.94%	8	1,129.7	5.17%	8	37.66	3.66%
S&P 500 UTILITIES INDEX	29	5.74%	9	703.8	3.22%	9	24.27	3.48%
S&P 500 TELECOMUNICATION SERVICES INDEX	26	5.15%	10	2,207.1	10.11%	5	84.89	1.64%
S&P 500 MATERIALS INDEX	25	4.95%	11	591.9	2.71%	11	23.68	2.35%
S&P 500 LARGE-CAP INDEX (TOTAL)	505	100.00%		21,838.0	100.00%		43.24	2.18%

Source: Bloomberg.

APPENDIX C Correlation between Abnormal Excess Returns of Real Estate Index and Financial Index after Controlling for Macroeconomic Variables

Panel A: Correlation during various periods				
Sample Period	Before Annoucement	After Announcement Before Execution	After Execution	Entire Sample Period
Correlation	0.80***	0.56***	0.25***	0.77***
P-value	0.00	0.00	0.00	0.00
Number of Observations	3378	372	586	4336

Panel B: Correlation during the same-length period before and after the execution		
	586 Days before Execution	586 Days After Index Execution
Correlation	0.51***	0.25***
P-value	0.00	0.00
Number of Observations	586	586

Note: This table presents the pairwise correlation between the daily abnormal excess returns of the S&P 1500 Pure Real Estate Index and S&P 1500 Pure Financial Index during different sample periods. To get the abnormal excess returns, we have controlled for the following macroeconomic variables: change in short-term interest rate, change in term structure spread, change in credit spread, stock market implied volatility, home price growth rate, change in investor sentiment, inflation, change in unemployment rate, and GDP growth rate. See Appendix A for variable definitions. The entire sample period is from October 10, 2001 (earliest date with available return data on S&P real estate indices) to December 31, 2018 (end of the sample period). For the creation of the new real estate GICS sector, the announcement date is March 13, 2015, and the execution date is September 1, 2016. ***, **, and * denote significance of correlations at the 1%, 5%, and 10% levels, respectively.

APPENDIX D Beta of Real Estate Stocks on the Pure Financial Index by Sub-industry Groups

		Mean	Std Dev	Median	No. of stocks
Industrial REITs	Before Announcement	0.76	0.29	0.64	9
	After Execution	0.26	0.05	0.26	9
	Change	−0.50***			
Office REITs	Before Announcement	0.68	0.29	0.81	19
	After Execution	0.30	0.08	0.30	19
	Change	−0.38***			
Health Care REITs	Before Announcement	0.57	0.20	0.59	15
	After Execution	0.16	0.10	0.17	15
	Change	−0.41***			
Residential REITs	Before Announcement	0.53	0.29	0.65	20
	After Execution	0.13	0.11	0.15	20
	Change	−0.40***			
Retail REITs	Before Announcement	0.66	0.32	0.68	32
	After Execution	0.27	0.14	0.27	32
	Change	−0.39***			
Diversified REITs	Before Announcement	0.58	0.36	0.58	23
	After Execution	0.26	0.10	0.27	23
	Change	−0.33***			
Hotel & Resort REITs	Before Announcement	0.76	0.33	0.75	18
	After Execution	0.51	0.20	0.57	18
	Change	−0.25***			
Specialized REITs	Before Announcement	0.56	0.20	0.58	26
	After Execution	0.24	0.18	0.19	26
	Change	−0.31***			
Other Real Estate companies	Before Announcement	0.48	0.33	0.44	39
	After Execution	0.39	0.22	0.41	39
	Change	−0.09*			

Note: This table provides summary statistics of the univariate beta of real estate stocks on the S&P 1500 Pure Financial Index in each subindustry group. See Appendix A for variable definitions. The entire sample period is between October 10, 2001 (the earliest date with available return data on S&P real estate indices) and December 31, 2018 (the last date of the sample period). For the creation of the new real estate GICS sector, the announcement date is March 13, 2015, and the execution date is September 1, 2016. The standard errors for the differences are from paired t-tests. ***, **, and * denote significance of differences at the 1%, 5%, and 10% levels, respectively.

APPENDIX E Regression Analysis of Beta of Real Estate Stocks on the Pure Financial Index over Firm Size

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Var.	**Change in Beta over Financial index**					**Winsorized Change in Beta**	
Ln(Market Cap)	−0.0503***		−0.0464***	−0.0409***	−0.0414**		
	(0.0123)		(0.0133)	(0.0142)	(0.0159)		
Rank of Market Cap		−0.00164***					−0.00161***
		(0.000353					(0.000327)
Winsorized Ln(Market Cap)						−0.0553***	
						(0.0120)	
Sub-industry Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	201	201	191	181	161	201	201
R-squared	0.307	0.318	0.310	0.287	0.297	0.332	0.339

Note: This table reports the regression results of change in the univariate beta of individual Real Estates stocks on the S&P 1500 Pure Financial Index over firm size. The sub industries as shown in Appendix D are included as fixed effect. Columns (1), (2), (6), and (7) use the full sample of 201 firms. Column (3) has discarded the top 5% largest firms as measured by market caplitalization. Column (4) has discarded the top 10% firms and column (5) has discarded the top 20% of firms. The change in beta is the univariate beta of real estate stocks on the S&P 1500 Pure Financial Index after the execution less the same beta before the announcement date. The Winsorized Ln(Market Cap) and Winsorized Change in Beta are bottom and top coded at 5% on both tails. The Rank of Market Cap is 1 for smallest firm and 201 for the largest firm. Robust standard errors in parentheses. ***p<0.01, ** p<0.05, * p<0.1

APPENDIX F Bivariate Betas of Real Estate Stocks on the Orthogonalized Pure Financial Index and Pure Real Estate Index

	Beta on the Orthogonalized S&P Pure Financial Index				Beta on the S&P 1500 Pure Real Estate Index			
Sample Period	**Entire Sample**	**Before Announcement**	**After Announcement and Before Execution**	**After Execution**	**Entire Sample**	**Before Announcement**	**After Announcement and Before Execution**	**After Execution**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**
Mean	0.13	0.16	0.13	0.11	0.77	0.72	0.85	0.91
Std. Dev.	0.19	0.19	0.29	0.21	0.32	0.34	0.31	0.30
Median	0.08	0.12	0.07	0.06	0.81	0.76	0.93	0.98
N	201	201	201	201	201	201	201	201
Skewness	1.00	1.23	1.13	0.70	−0.65	−0.39	−1.36	−1.21
Kurtosis	4.16	5.51	4.46	3.02	3.07	2.57	4.73	4.77
	After Announcement - Before Announcement	**After Execution - Before Execution**	**After Execution - Before Announcement**		**After Announcement - Before Announcement**	**After Execution - Before Execution**	**After Execution - Before Announcement**	
	(3) – (2)	**(4) – (3)**	**(4) – (2)**		**(7) – (6)**	**(8) – (7)**	**(8) – (6)**	
Mean	−0.028*	−0.021	−0.048***		0.138**	0.052***	0.190***	
Std. Err.	0.015	0.013	0.013		0.018	0.016	0.021	
t-statistic	−1.876	−1.591	−3.581		7.704	3.310	9.227	
Pr(|T| > |t|)	0.062	0.113	0.000		0.000	0.001	0.000	

Note: This table provides summary statistics of the bivariate betas of real estate stocks with the orthogonalized Pure Financial Index and the Pure Real Estate Index. In the first stage, we regress daily returns of the S&P 1500 Pure Financial Index on those of the S&P 1500 Pure Real Estate Index to obtain the residuals as the Orthogonalized Pure Financial Index, and then we regress the individual real estate stock returns on the Orthogonalized Pure Financial Index as well as the Pure Real Estate Index. See Appendix A for variable definitions. The entire sample period is from October 10, 2001 (the earliest date with available return data on S&P real estate indices) to December 31, 2018 (the last date of the sample period). For the creation of the new real estate equity market sector, the announcement date is March 13, 2015, and the execution date is September 1, 2016. The standard errors for the differences are from paired t-tests. ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively.

APPENDIX G Correlation between Returns of the S&P 1500 Pure Real Estate Index and S&P 500 Index

Panel A: Correlation during various periods				
Sample Period	**Before Announcement**	**After Announcement and Before Execution**	**After Execution**	**Entire Sample Period**
Correlation	0.748***	0.735***	0.520***	0.733***
P-value	0.000	0.000	0.000	0.000
Number of Observations	3378	372	586	4336

Panel B: Correlation during the same-length period before and after execution		
	586 Days Before Execution	586 Days After Execution
Correlation	0.687***	0.520***
P-value	0.000	0.000
Number of Observations	586	586

Note: This table presents the pairwise correlation between daily returns of the S&P 1500 Pure Real Estate Index and the S&P 500 Index during different periods. The entire sample period is from October 10, 2001 (earliest date with available return data on S&P real estate indices) to December 31, 2018 (end of the sample period). The announcement date of the creation of new real estate sector is March 13, 2015, and the execution date is September 1, 2016. ***, **, and * denote significance of correlations at the 1%, 5%, and 10% levels, respectively