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Abstract

We examine the extent to which 50,620 global institutional investors' specialization in publicly traded real estate securities is related to their investment performance. Consistent with the information advantage theory (Merton *Journal of Finance 42*, 483–510, 1987; Van Nieuwerburgh and Veldkamp *Journal of Finance, 64*, 1187–1215, 2009), we show a positive relation between the percentage of the institution's portfolio invested in real estate securities and the return generated on those securities. Moreover, we present evidence that the

institution's level of active share to real estate securities is positively related to performance. Additionally, we find that the benefits related to specialization are more pronounced for investors specializing in a narrow set of securities that requires a unique set of skills to analyze.

Introduction

The active money management industry is predicated on investors' belief that portfolio managers use their investment expertise to make superior investment decisions. In other words, investors believe that portfolio managers possess an informational advantage they can use to generate abnormal returns. However, despite the significant amount of capital investors allocate to actively managed investments—$11 trillion invested in actively managed equity mutual funds in the United States alone (ICI 2017 Fact Book)—and the substantial fees investors pay to portfolio managers, portfolio managers are unable, on average, to beat passive benchmarks. Moreover, studies focusing on real estate investments find that, on average, active managers underperform the market (e.g., Edward and Daniel 2000; Chiang et al. 2008; Bond and Mitchell 2010). Although these studies document that the *average* portfolio manager is unable to generate abnormal returns, this does not necessarily imply that all managers are unable to deliver superior performance.

In this paper, we examine the relation between institutional investors' specialization in publicly traded real estate assets and their performance. Our analysis tests the information advantage theory, which asserts that an investor who specializes becomes better informed about a narrow set of assets and may be able to generate superior returns by concentrating on them (Merton 1987; Van Nieuwerburgh and Veldkamp 2009). Using a sample of over 50,000 global institutional portfolios, we investigate whether specialization in real estate securities and real estate investment trusts (REITs) allows institutions to generate abnormal returns.[Footnote1] Our analysis relies on two measures of specialization: The portion of the institution's portfolio allocated to real estate and the portfolio's real estate active share, which is a measure of how much the portfolio's real estate holdings deviate from their underlying benchmark. Additionally, we compare the effects of specialization on the performance of real estate securities and REITs. Because REITs represent a narrower and fundamentally different set of securities that require a unique set of skills to understand and evaluate, we expect the benefits of specialization in REITs to be higher than those for real estate securities.[Footnote2]

We find that, although the average institution with real estate holdings is unable to beat its real estate benchmark, specialization is positively related to risk-adjusted returns. Specifically, we find that the portion of the institution's portfolio invested in real estate is positively related to the risk-adjusted returns earned on those investments. Additionally, the institution's level of real estate's active share is positively related to the risk-adjusted returns earned on these investments. Moreover, we find that the benefits associated with specialization are more pronounced for REITs than the broader set of real estate securities. These results are consistent with the information advantage theory.

The performance differences between specialized and diversified institutions are economically significant. For instance, institutions with the largest REIT allocations (over 75% of their portfolio) earn a positive quarterly alpha of 0.19% on their REIT investments; institutions with the lowest REIT allocations (less than 50%) generate a quarterly alpha of −0.57%. In addition, for institutions with the largest REIT allocations, a one standard deviation increase in an institution's REIT allocation is associated with a 0.80% increase in the quarterly risk-adjusted return the institution earns on its REIT investments. Our results hold when we limit the sample to only those institutions that invest in real estate securities and REITs based in the United States. Given that the benefits associated with specialization are persistent in the developed, transparent, and efficient U.S. market, suggests that the benefits of specialization are not limited to opaque markets.

Our study makes several important contributions to the literature. First, previous studies of institutional real estate investments have mainly focused on open-ended real estate mutual funds. In contrast, we examine the allocation decisions and performance of all mutual funds, as well as pension funds, hedge funds, and offshore institutions. Also, we employ a sample of institutional investors from around the world (institutions are from 79 countries with holdings in 82 different markets), rather than focusing solely on U.S. institutions, as in most previous studies. This more-inclusive examination of institutional real estate investments is important as institutions are playing an increasingly larger role in the global real estate market (Han et al. 1998; Devos et al. 2013).

Second, we do not limit our sample to portfolios that are fully invested in real estate. Our sample includes institutions with various levels of real estate investment. Third, we compute performance measures from reported holdings, which allows us to compute returns on the sections of each portfolio that are invested in real estate rather than simply observing the performance of the entire portfolio. The sample construction and method for return computation allow for a much larger number of institutions (48,081 institutions with some level of investment in real estate securities and 25,462 institutions that have some level of investment in REITs) compared to previous studies. Because institutions hold varying levels of exposure to real estate securities and REITs, our sample provides a unique way to test the information advantage theory and the benefits from specialization.

Fourth, we examine the relation between specialization and performance for real estate securities and REITs, separately. This comparison of two similar, but separate, asset classes provides a controlled environment to explore the potential benefits of specialization in the framework of the information advantage theory. Exploring specialization in the narrower REIT market segment, as opposed to the broader set of real estate securities, allows us to observe whether the benefits of specialization are related to the uniqueness of the securities. The findings from these tests of the information advantage theory can be generalized to other asset classes as well. Finally, the results add to the real estate institutional and mutual fund performance literature that provides conflicting evidence on whether actively managed portfolios are able to produce superior returns. We find evidence that while institutions, on average, are unable to beat a passive benchmark, specialization in real estate improves performance. Specifically, institutions with more of their portfolio allocated to real estate and institutions with higher levels of active shares outperform other institutions.

The rest of the paper is organized as follows. In Section 2, we review the related literature and state the testable hypotheses. In Section 3, we describe the data and methodology. The results are presented in Section 4. Concluding remarks are given in Section 5.

Literature Review and Hypotheses Development

This paper contributes to two streams of literature: The literature on the relation between institutional investors' portfolio allocation and performance in the real estate market, and the literature on information advantage. In this section, we review the research in these two streams of literature and present our hypotheses.

Institutional Investors and Real Estate Securities

Figure 1 presents our evidence that more institutions are investing in real estate, and that institutions are investing more of their portfolios in real estate. This pattern for our global sample of institutions is consistent with Han et al.'s (1998) and Devos et al.'s (2013) observations that institutions are playing an increasingly important role in the U.S. real estate markets.

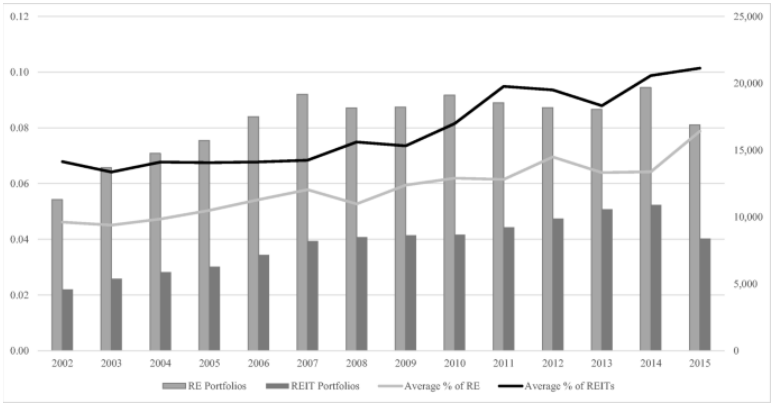

Fig. 1 Institutional investment in real estate over time. Figure 1 shows the total number of institutional portfolios (right axis) in each sample year with greater than 0% of holdings in either REITs or real estate securities. The figure also shows the average percentage of all institutional holdings in both REITs and real estate securities (left axis) of those institutions with at least some real estate exposure

Although institutions are playing an increasingly important role in the real estate sector, there are relatively few papers on their allocation decisions, trading behavior, or performance.[Footnote3] Moreover, the papers on these issues tend to focus exclusively on U.S.-based real estate mutual funds, rather than the real estate holdings of the broader set of institutional investors.

Studies of the performance of real estate mutual funds present mixed evidence. For instance, Kallberg et al. (2000), Cici et al. (2011), and Chou and Hardin III (2014) find that real estate mutual funds generate positive risk-adjusted returns. However, Edward and Daniel (2000) fail to find evidence of real estate mutual funds generating positive abnormal returns. Moreover, while Hartzell et al. (2010) fail to find evidence of REIT funds generate superior performance, they do show that REIT funds perform better than other real estate funds. Similarly, Edward and Daniel (2000) and Chiang et al. (2008) find that real estate funds of funds are not able to beat their benchmarks. Furthermore, Bond and Mitchell (2010) examine fund managers' direct real estate investments and find that managers are unable to consistently produce positive risk-adjusted returns. More recently, Ambrose et al. (2016) find no evidence of a relation between hedge funds' real estate exposure and performance.

The Information Advantage Theory and our Hypotheses

The empirical focus of our paper is on the relation between real estate specialization and performance. The traditional asset pricing literature suggests that investors achieve mean variance efficiency through a diversified portfolio (Sharpe 1964). However, according to the information advantage theory, investors who confront incomplete information are better off specializing (Merton 1987). Merton (1987) shows that when investors are endowed with limited information regarding a subset of assets, specialization produces superior mean variance efficiency compared to a diversified market portfolio. Exploring a joint model of investment and information acquisition, Van Nieuwerburgh and Veldkamp (2009) show that when information acquisition is subject to increasing returns to scale, an investor who possesses more precise information regarding a subset of assets should specialize in those assets, while the average investor with no informational advantage should hold a diversified portfolio.

Coval and Moskowitz (2001) provide evidence consistent with the information advantage theory. They find that geographically concentrated mutual funds earn positive alphas. Moreover, Choi et al. (2017) show that institutions that concentrate their portfolio within a few countries outperform institutions that are diversified across countries. Similarly, Kacperczyk et al. (2005) show that industry-concentrated mutual funds earn higher

alphas than diversified mutual funds. Ivković et al. (2008) find that households with more concentrated brokerage accounts outperform households with more diversified brokerage accounts. In a recent real estate-specific study, Ling et al. (2018) provide evidence that commercial real estate portfolio managers with geographically concentrated portfolios produce superior results, especially when the concentration occurs in markets with high levels of information asymmetry.

Based on the expectations of the information advantage theory and the findings presented in the literature, we hypothesize that institutions that specialize in real estate will earn higher risk-adjusted returns on their real estate investments compared with institutions with diversified portfolios. Formally, we test:

H1

Specialization in real estate increases an institution's risk-adjusted returns to those securities.

Throughout the analyses, we measure an institution's level of specialization in real estate in two different ways. First, we measure the portion of the institution's portfolio allocated to real estate, which allows us to examine the relation between the percentage of an institution's portfolio invested in an asset class and the risk-adjusted returns earned on those assets. However, some institutions may simply allocate their real estate holdings in an index-like fashion, gaining real estate exposure without engaging in active management. Therefore, in addition, we also compute each institution's active share to real estate. Borrowed from the finance literature, this measures the institution's level of active real estate management. Specifically, it is the deviation between the portfolio's real estate allocation and the corresponding weights of the underlying benchmark. The more the institution's allocation deviates from the benchmark, the higher the institution's active share. A high active share measure serves as an indicator that the institution is engaged in active real estate management (i.e., specialization).

As mentioned above, the information advantage theory also implies that the benefits of specialization are greater for assets that require a unique set of skills to analyze and evaluate. Because REITs are viewed as a fundamentally independent asset class that requires a unique set of skills to analyze, we expect that the benefits of specializing in REITs will be greater than the benefits associated with specializing in real estate securities. Formally, we hypothesize:

H2

The benefits of specialization are greater in REITs than in real estate securities.

To test H2, we calculate specialization measures for REITs and real estate securities, separately. We expect to find that the positive relation between specialization and performance is greater when institutions specialize in REITs compared with real estate securities.

Data and Methods

Data

We use the quarterly institutional holdings of publicly traded securities from Q1:1999 to Q1:2015, provided by FactSet (former LionShares), as our primary data source. FactSet compiles public filings of institutional investors from around the world. For example, FactSet collects 13-F, N-Q, and N-CSR filings for all institutions in the U.S. It uses similar public filings for institutions located in other countries. It provides institutional holdings data for over 80,000 institutions from around the world.[Footnote4] It also provides information on security characteristics, accounting information, and trading data. We obtain other systematic risk factors from Kenneth French's data library.

We limit the sample to institutions with exposure to publicly traded real estate securities. We identify real estate securities based on their NAICS name and their three- and four-digit Standard Industrial Classification (SIC) codes. Table 1 presents the distribution of the real estate securities across SIC codes. The institutions in our sample invest in 673 REITs and 2285 real estate securities across 38 different SIC codes. The largest number of securities is from Real Estate Agents and Managers (711; SIC code 6531), followed by Subdividers and Developers (345; SIC code 6552), and Hotels and Motels (262; SIC code 7011). There are considerable differences between some of these industries and the importance of the real estate market to these institutions varies. We utilize this broad definition of real estate securities to ensure that we include firms with exposure to different aspects of the real estate market.

Table 1 Real estate securities and REITs in the sample

SIC3	SIC 3 name	# of securities	SIC 4	SIC 4 name	# of securities
152	General Building Contractors, Residential	238	1521	Single-Family Home Construction	94
			1522	Residental Construction, NEC	144
153	Operative Builders	127	1531	Operative Builders	127
154	GNRL Building Contractors, Non-Residential	173	1541	Industrial Buildings and Warehouses	121
			1542	Nonresidential Construction, NEC	52
171	Plumbing, Heating, and Air-Conditioning	16	1711	Plumbing, Heating, Air-Conditioning	16
173	Electrical Work	32	1731	Electrical Work	32
174	Masonry, Stonework, Tile setting, Plastering	4	1742	Plastering, Drywall, and Insulation	1
			1743	Terrazzo, Tile, Marble, Mosaic Work	3
175	Carpentry and Floor Work	3	1751	Carpentry Work	3
176	Roofing, Siding, and Sheet Metal Work	3	1751	Roofing, Siding, and Sheetmetal Work	2
177	Concrete Work	3	1771	Concrete Work	3
178	Water Well Drilling	2	1781	Water Well Drilling	2
179	Miscellaneous Special Trade Contractors	50	1791	Structural Steel Erection	13
			1793	Glass and Glazing Work	1
			1794	Excavation Work	3
			1795	Wrecking and Demolition Work	2
			1796	Installing Building Equpment	10
			1799	Special Trade Contractors, NEC	21
245	Wood Buildings and Mobile Homes	13	2451	Mobile Homes	4
			2452	Prefabricated Wood Buildings	9
371	Motor Vehicles and Motor Vehicle Equipment	3	3716	Motor Homes	3
422	Public Warehousing and Storage	34	4221	Farm Product Warehousing and Storage	1
			4222	Refrigerated Warehousing and Storage	3
			4225	General Warehousing and Storage	20
			4226	Special Warehousing and Storage, NEC	10
616	Mortgage Bankers and Brokers	36	6162	Mortgage Bankers and Correspondents	36
651	Real Estate Operators and Lessors	215	6512	Nonresidential Building Operators	87
			6513	Apartment Building Operators	50
			6514	Dwelling Operators, Except Apartments	6
			6515	Mobile Home Site Operators	9
			6519	Real Property Lessors, NEC	63
653	Real Estate Agents and Managers	711	6531	Real Estate Agents and Managers	711
655	Land Subdividers and Developers	345	6552	Subdividers and Developers, NEC	345

701	Hotels and Motels	262	7011	Hotels and Motels	262
702	Rooming and Boarding Houses	1	7021	Rooming and Boarding Houses	1
732	Services to Dwellings and other Buildings	15	7349	Building Maintenance Services, NEC	15
	Total	2885	3798	Real Estate Investment Trusts	673

Table 1 Displays the three- and four-digit SIC codes used to identify real estate securities, as well as REITs used to compute institutions' real estate exposure and performance. The last column shows the number of securities in the sample period that belong to each SIC

Table 2 presents the geographic dispersion of the real estate securities and REITs in the sample. The securities are domiciled in 82 countries. The largest number of real estate securities is domiciled in Japan (305), China (179), and the United Kingdom (137), while the largest number of REITs is domiciled in the United States (319), the United Kingdom (64), and Canada (47).

Table 2 Real estate securities and REITs by domicile

Country	Number or real estate securities	Number of REITs		Country	Number of real estate securities	Number of REITs
ARE	14	0		KWT	13	2
ARG	5	0		LBN	3	0
AUS	76	36		LKA	8	0
AUT	15	0		LTU	1	0
BEL	15	9		LUX	10	1
BGD	3	0		LVA	1	0
BGR	2	1		MAR	6	0
BHR	1	0		MCO	1	0
BMU	28	1		MEX	22	6
BRA	38	0		MLT	2	0
BWA	2	0		MUS	7	0
CAN	41	47		MYS	56	14
CHE	30	0		NAM	0	1
CHL	9	0		NLD	19	6
CHN	179	1		NOR	22	0
CYM	58	2		NZL	6	7
CYP	4	1		PAK	4	0
DEU	92	5		PAN	1	0
DNK	15	1		PER	2	0
EGY	18	1		PHL	2	0
ESP	33	3		POL	43	0
EST	6	0		PRT	4	0

FIN	9	2		QAT	7	0
FRA	88	10		ROU	5	0
GBR	137	64		RUS	4	3
GGY	3	10		SAU	14	0
GRC	27	2		SGP	46	31
HKG	45	8		SRB	1	0
HRV	12	1		SVK	1	0
HUN	4	0		SVN	1	0
IDN	6	0		SWE	55	1
IMN	2	4		THA	67	1
IND	91	0		TUR	14	12
IRL	4	3		TWN	49	10
ISR	80	5		USA	136	319
ITA	17	0		VEN	1	0
JEY	3	2		VGB	6	3
JOR	6	1		VNM	53	3
JPN	305	21		ZAF	33	10
KEN	1	0		ZMB	1	0
KOR	33	2		ZWE	1	0
				Total	2285	673

Table 2 shows the number of real estate securities and REITs from Table 1 by their country of domicile. Each security must be “investable” to both domestic and foreign investors to be included in the sample

To construct our sample, we first remove observations with missing data, as well as institutions that do not hold at least one real estate security or REIT. Additionally, we remove banks, insurance companies, and index funds from the sample.[Footnote5] This results in a sample of 48,081 institutional investors with real estate exposure and 25,462 institutions that invest in REITs.

Methodology

To test our two hypotheses, we construct several measures of portfolio specialization and performance. We detail these measures in the following subsections.

Portfolio Specialization Measures

Our first measure of specialization is the percentage of the institution's total portfolio invested in publicly traded real estate securities. To compute this percentage, we aggregate the market value, in U.S. dollars (USD), of all securities that belong to any of the real estate SIC codes identified in Table 1, scaled by the total market value of the institution's portfolio. We separate REITs from other publicly traded real estate securities due to the unique skill sets required to effectively analyze REITs, and to allow us to examine our second hypothesis. More formally, the measure of portfolio weight of real estate securities is calculated as follows:

$$RE\ weight_{iS} = \frac{\sum_{j \in J_{iS}} p_j}{\sum_{j \in J_i} p_j}$$

(1a)

$$REIT\ weight_{iS} = \frac{\sum_{j \in J_{iS}} p_j}{\sum_{j \in J_i} p_j}$$

(1b)

where institutions are denoted by $i \in I$, securities by $j \in J$, and SIC real estate industries by $s \in S$. Key subsets include: J_s, which includes all securities that belong to a four-digit real estate SIC code s; J_S, which includes all real estate securities S; J_i, which includes all securities held by institution i; J_{iS}, which includes all real estate securities S held by institution i; and J_{is}, which includes all securities that belong to a four-digit real estate SIC code, s, held by institution i. Finally, p_j is the market value of security j.

RE weight$_{iS}$ (Eq. 1a) indicates the portion of institution *i*'s portfolio invested in real estate securities, while *REIT weight*$_{iS}$ (Eq. 1b) signifies the portion of institution *i*'s portfolio invested in REITs. These measures are computed for each quarter.

Our second specialization measure is the active share to real estate. This measure is the aggregated deviations between the institution's actual portfolio allocations and the allocations associated with a benchmark index. By definition, an institution that invests perfectly in line with benchmark weights will not generate abnormal returns. Active managers that pursue abnormal returns should have larger deviations from the benchmark, which results in higher active share values.

We construct active share measures for each institution's real estate holdings and for REITs against market value weighted real estate security and REIT benchmarks, respectively. Our real estate benchmarks are based on SIC codes, while the REIT benchmarks are based on property types. This methodology is similar to Cremers and Petajisto's (2009).[Footnote6]

First, we compute the difference between the actual and expected allocation for each firm in each three-digit real estate SIC code (*RE bias*$_{is}$) as follows:

$$RE\ bias_{is} = \frac{\sum_{j \in J_{is}} p_j}{\sum_{j \in J_{iS}} p_j} - \frac{\sum_{j \in J_s} p_j}{\sum_{j \in J_S} p_j}$$

(2)

where the first term on the right-hand side is the percentage of all real estate securities allocated by an institution in an SIC code, and the second term on the right-hand side is the percentage of the market value of all publicly traded real estate securities' in that SIC code.

We then aggregate the firm's *RE bias* measures from Eq. (2) to one portfolio-level real estate active share measure:

$$RE\ AS_i = \frac{\sum_{s \in S} |RE\ bias_{is}|}{2}$$

(3)

where the *RE AS* for institution *i* is the sum of the absolute values of the *RE bias* measures from Eq. (2), divided by 2. Active share values range between 0 and 1. An active share of 0 implies that an institution's allocations exactly mimic the benchmark weights, while an institution that engages in more active management will have active share values approaching 1. The interpretation of active share is "the percentage of the portfolio that should be reallocated to achieve perfect diversification in line with the benchmark weights."

We follow the same methodology to calculate REIT active shares. First, we compute differences between an institution's actual and market capitalization expected allocations to each REIT property type. Specifically, we calculate *REIT bias* as follows:

$$REIT\ bias_{is} = \frac{\sum_{j \in J_{is}} p_j}{\sum_{j \in J_i} p_j} - \frac{\sum_{j \in J_s} p_j}{\sum_{j \in J} p_j}$$

(4)

where the first term on the right-hand side is the actual allocation to a REIT property type by an institution as a share of their total REIT holdings. The second term on the right-hand side is the expected weight of that property type, computed as the market value of the REIT property type as a share of the total REIT market capitalization. Similar to Eq. (3), we aggregate the *REIT bias* measures from Eq. (4) to one portfolio-level REIT active share measure:

$$REIT\ AS_i = \frac{\sum_{s \in S} |REIT\ bias_{is}|}{2}$$

(5)

REIT AS is the percentage of the REIT holdings of an institution that should be reallocated across REIT property types to achieve perfect REIT diversification. The measure takes values between 0 and 1, so that a perfectly diversified portfolio that contains allocations in REIT property categories exactly in proportion with REIT

property-type market capitalization weights has an active share of 0. *REIT AS* approaches 1 for the most-concentrated REIT portfolios.

In addition to examining the relation between portfolio returns and institutional specialization, we also explore the relation between market-wide levels of institutional under and over weighting and subsequent securities returns. Specifically, we aggregate each institution's *RE bias* and *REIT bias* from equations (2) and (4), and calculate the average *RE bias* and *REIT bias* of each three-digit SIC code and property type. Formally, we generate a market-wide institutional bias for publicly traded real estate securities and REITs as follows:

$$SICRE\ bias_s = \frac{1}{I}\sum_{i \in J_s} RE\ bias_{is}$$

(6)

$$Property\ type\ REIT\ bias_s = \frac{1}{I}\sum_{i \in J_s} REIT\ bias_{is}.$$

(7)

Hence, SIC *RE bias*$_s$ and *Property type REIT bias*$_s$ are equally-weighted averages of all institutional investors' biases in the three-digit SIC codes and the REIT property types in a given quarter.

Performance Measures

We follow the methodology of Cici et al. (2011) and calculate institutions' returns on real estate securities and REITs based on their reported quarterly holdings. Specifically, an institution's quarterly returns to real estate, gross of fees, are the value-weighted returns of the individual securities belonging to each category in U.S. dollars. The returns are computed over a three-month window, which starts on the institution's reporting date of the reporting quarter to three months forward (0,3). The advantage of this methodology is that it allows us to compute the returns generated by different segments of a portfolio. However, the disadvantage is that we assume that the securities are held for the entire three months of the quarter, as we do not observe mid-reporting-period trades. To lessen the likelihood that mid-reporting-period trading is influencing our results, we also compute quarterly returns based on security returns from one month prior to reporting to two months after (−1,2), two months prior to one month after (−2,1), and from three months prior to the reporting quarter (−3,0). Although we do not tabulate the results of these alternative performance windows, they produce qualitatively similar results.

In the performance analyses, we control for the systematic risk exposure by including the value-weighted index of real estate returns. We also include a vector of explanatory variables in the baseline performance regression, which contains the institutions' specific specialization measures. The regression equations used to examine the excess returns to institutions' real estate securities (*RE Ret*$_{iqS}$) and REITs (*REIT Ret*$_{iqS}$) are defined as follows:

$$RE\ \mathrm{Ret}_{iqS} - Rf_q = \alpha_{iS} + \beta_{iS} \times (RE\ premium_q) + \phi \times Z_{iq} + \varepsilon_{iqS}$$

(8)

$$REIT\ \mathrm{Ret}_{iqS} - Rf_q = \alpha_{iS} + \beta_{iS} \times (REIT\ premium_q) + \phi \times Z_{iq} + \varepsilon_{iqS}$$

(9)

The systematic risk of the returns is captured on the right-hand side by the value-weighted return on all real estate securities in excess of the global risk-free rate (*RE premium*) in Eq. (8) and by the value-weighted return on all REITs in excess of the global risk-free rate (*REIT premium*) in Eq. (9). Figure 2 shows the returns on both

these benchmarks during our sample period. The benchmark index for both real estate securities and REITs is computed based on all publicly traded real estate securities and REITs that are considered to be "investable" by domestic and foreign institutional investors in the FactSet universe. We compute the benchmark by value-weighting the securities' returns by their "investable" or "float" market value, in USD, in a given period. However, this benchmarking methodology may not be appropriate for investors with a specific industry or country focus. Therefore, in the robustness tests, we attempt to mitigate this concern by rerunning all the tests by: 1) focusing only on those institutions that invest in the U.S. and use only U.S. real estate securities and REITs in the construction of the benchmark, and 2) rerunning the analysis for each industry that has a sufficient number of observations, and constructing the benchmark for each SIC industry from that industry's securities.

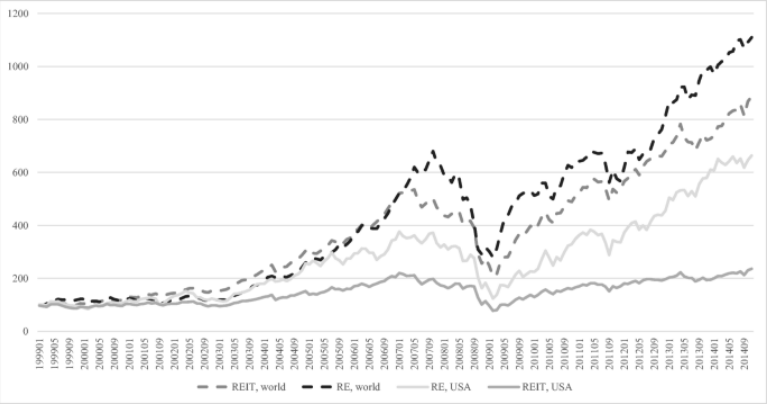

Fig. 2 Return to benchmarks. Figure 2 shows the performance of the two real estate benchmarks used in the study for the world and for the U.S., with monthly frequency. All benchmarks are computed based on value-weighted returns on the securities in the benchmark. All security returns are first converted to USD based on the exchange rate during each month. REIT securities are those that belong to SIC code 6798. Real estate securities industry SICs are reported in Table 1

In addition, we replicate the analyses with the Fama-French global risk factors in the baseline regression as additional controls for systematic risk (*SMB* is the global size factor that captures the performance differential between small and large capitalization securities; *HML* is the global value factor that captures the return differential between high and low book-to-market securities; and *UMD* is the global momentum factor that captures the return differential between winning and losing securities based on previous six months of returns).[Footnote7]

Finally, we include the investor's home country and investor type as fixed effects to control for variation in investor characteristics. For similar reasons, we also control for the total market value of the investor's portfolio in all specifications. All errors in the regressions are clustered by time and institution, excluding our market-wide analysis where errors are clustered by time alone.

Results

Summary Statistics

Table 3 presents the sample by institution type. Panel A presents the breakdown for the 48,081 institutions with real estate holdings and the mean and median percentage of their portfolios allocated to real estate. Mutual funds represent over half of the sample, followed by hedge funds and offshore funds, then pension funds. On average, real estate securities represent 6.2% of mutual fund portfolios, 6.5% of hedge fund portfolios, and 3.6% of pension fund portfolios. Panel B shows the breakdown of the 25,462 institutions with REIT exposure. Among institutions with REIT exposure, REITs represent, on average, 7.9% of mutual fund portfolios, 5.1% of hedge

funds and offshore funds' portfolios, and 5.7% of pension funds. For our analysis, we drop index funds from the sample because they, by definition, do not attempt to generate abnormal returns. Additionally, we drop banks and insurance companies from the sample due to their small sample sizes.[Footnote8]

Table 3 Sample description by investor type

Panel A: Institutions with investments in real estate securities			
Investor type	Total number	Average RE weight	Median RE weight
Banks & Insurance	220	0.1027	0.0400
Hedge funds & Offshore	8254	0.0649	0.0356
Index	2495	0.0597	0.0318
Mutual funds	37,371	0.0622	0.0337
Pension funds	2741	0.0361	0.0208
Total (Average)	48,018	(0.0651)	(0.0324)
Panel B: Institutions with investments in REITs			
Investor type	Total number	Average REIT weight	Median REIT weight
Banks & Insurance	107	0.0463	0.0103
Hedge funds & Offshore	4419	0.0509	0.0205
Index	1454	0.0808	0.0265
Mutual funds	17,109	0.0787	0.0256
Pension funds	2301	0.0570	0.0238
Total (Average)	25,462	(0.0627)	(0.0213)

Table 3 presents the breakdown of the sample by institution type. Panel A includes the 48,018 institutions with investments in real estate securities. Panel B includes the 25,462 institutions with REIT investments. Both panels also report the mean and median percentage of the portfolio invested in the relevant real estate sector

The Appendix presents the distribution of sample institutions across the 79 countries where they are domiciled. The Appendix shows both the number of institutions with either some real estate or REIT holdings, as well as the average percentage each holds. The largest number of institutions with real estate exposure is from the U.S. (11,476), the U.K. (5624), and Germany (4787). The largest number of institutions with REIT holdings is also from the U.S. (10,338), the U.K. (3952), and Germany (1454). For robustness, because many countries only include a handful of institutions, we replicate our analysis while eliminating institutions located in countries with less than ten institutions. Additionally, we replicate the analysis while eliminating institutions located in "tax havens."[Footnote9] The results of these analyses are untabulated and consistent with the results presented in the paper.

Portfolio Performance of Institutions' Real Estate Securities and REITs

We begin our analysis of the relation between specialization and performance by examining the average level of abnormal performance associated with different levels of real estate and REIT investment. Specifically, we partition our sample based on the percentage of an institution's portfolio invested in real estate securities or REITs, and examine the alpha that results from Eqs. (8) and (9), as well as when we control for the Fama-French factors. The purpose of this exercise is twofold. First, we want to compare the performance of real estate investors to passive benchmarks to observe how the performance of real estate investors around the world compares to the performance of institutions documented in previous studies. Second, partitioning the sample by real estate and REIT portfolio weight allows us to test our first hypothesis that specialization is positively related to the investor's risk-adjusted returns.

Panel A of Table 4 presents the results. In specifications (1)–(5), the dependent variable is the institution's returns from real estate securities in excess of the global risk-free rate. The independent variables are the *RE premium* and institution-type fixed effects. In specification (1), we analyze the performance of all institutions with real estate holdings; in specifications (2) and (3), we analyze the performance of institutions that hold less than and more than 50% of their portfolios in real estate securities, respectively. In specifications (4) and (5), we analyze the performance of institutions that hold less than and more than 75% of their portfolio in real estate securities, respectively.

Table 4 Portfolio performance by investors in real estate securities and REITs

Panel A: Market Model – Real Estate Securities							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
Alpha	-0.0117***	-0.0117***	-0.0082***	-0.0117***	-0.0119***	15.32***	0.04
	[-80.427]	[-80.127]	[-9.456]	[-80.240]	[-5.966]		
RE premium	0.5480***	0.5524***	0.2064***	0.5491***	0.3096***		
	[299.769]	[299.805]	[18.004]	[299.664]	[12.341]		
Observations	734,243	725,245	8998	731,017	3226		
Adjusted R^2	0.2036	0.2053	0.0768	0.2042	0.0893		
Panel B: Market Model – REITs							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
Alpha	-0.0054***	-0.0057***	0.0008***	-0.0057***	0.0019***	420.18***	313.43***
	[-32.224]	[-32.738]	[2.958]	[-32.847]	[4.842]		
REIT premium	0.4560***	0.4756***	0.0750***	0.4686***	0.0759***		
	[185.011]	[185.909]	[23.152]	[185.602]	[19.193]		
Observations	384,999	365,596	19,403	372,990	12,009		
Adjusted R^2	0.1997	0.2082	0.0361	0.2054	0.0289		
Panel C: Factor Model – Real Estate Securities							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
Alpha	-0.0113***	-0.0114***	-0.0091***	-0.0113***	-0.0146***	7.82***	0.11
	[-61.298]	[-61.001]	[-7.403]	[-61.098]	[-4.982]		
RE premium	0.5345***	0.5380***	0.0624*	0.0530***	0.1656**		
	[266.212]	[265.984]	[16.355]	[266.100]	[10.596]		
SMB	0.0536***	0.0523***	0.0624*	0.0530***	0.1656**		
	[10.190]	[9.868]	[1.802]	[10.047]	[2.062]		
HML	0.2161***	0.2173***	0.1021***	0.2163***	0.1708**		
	[47.823]	[47.713]	[3.414]	[47.776]	[2.355]		
UMD	-0.0196***	-0.0200***	-0.0024	-0.0200***	0.0438		
	[-5.830]	[-5.911]	[-0.107]	[-5.923]	[0.886]		
Observations	676,175	668,556	7619	673,471	2704		
Adjusted R^2	0.2117	0.2131	0.0896	0.2121	0.1081		
Panel D: Factor Model – REITs							

Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
Alpha	-0.0051***	-0.0054***	0.0003	-0.0053***	0.0011***	266.3***	207.03***
	[-24.278]	[-24.559]	[1.000]	[-24.481]	[2.588]		
REIT premium	0.4737***	0.4933***	0.0822***	0.4852***	0.0904***		
	[173.413]	[174.111]	[22.385]	[173.808]	[17.186]		
SBM	0.0526***	0.0528***	0.014	0.0552***	-0.0112		
	[9.186]	[8.867]	[1.189]	[9.422]	[-0.641]		
HML	-0.118***	-0.1227***	-0.0543***	-0.1195***	-0.0851***		
	[-22.183]	[-22.110]	[-5.982]	[-21.910]	[-6.020]		
UMD	-0.0234***	-0.0245***	0.007	-0.0253***	0.0165***		
	[-6.690]	[-6.722]	[1.324]	[-7.034]	[2.866]		
Observations	347,548	330,487	17,061	337,368	10,180		
Adjusted R^2	0.2073	0.2157	0.0392	0.2128	0.0330		

Table 4 shows results from cross-sectional regressions examining the determinants of investors' excess abnormal returns on real estate securities and REITs from the first quarter of 1999 to the second quarter of 2015. The dependent variable is the quarterly value-weighted return of the investor's real estate securities (Panel A) or REITs (Panel B) in its portfolio in excess of the global risk-free rate over the same quarter. The value-weighted quarterly return is computed based on the consecutive three-month security returns following the reporting period. The independent variables include the value-weighted return to real estate securities or REITs in excess of the global risk-free rate (*RE premium* in Panel A, *REIT premium* in Panel B). Panels C and D also includes the global Fama-French risk factors to capture other systematic risk in returns (*SMB*, *HML*, *UMD*). The top row displays the constant, which is the unexplained, or abnormal, return *Alpha* from regression Eqs. (8) and (9), which is the main variable of interest. Specifications 2 through 5 display results from regressions that include investors with varying levels of exposure to real estate securities (Panels A and C) and REITs (Panels B and D). Specification (1) includes investors with at least some exposure, specification (2) includes investors with less than 50%, specifications (3) includes investors with more than 50%, specification (4) includes investors with less than 75%, and specification (5) includes investors with 75% or more exposure in any given quarter. The last two columns of each panel show the χ^2statistics for the difference test of specification (2)–(3) and (4)–(5) *Alphas*. All specifications include investor type fixed effects. Errors are investor-quarter clustered. The robust *t*-statistics are in brackets (* significant at 10%, ** significant at 5%, *** significant at 1%)

The results presented in Panel A of Table 4 indicate that while, on average, institutions underperform compared to passive benchmarks, there is some evidence that specialization improves performance. Specifically, the −1.17% quarterly *Alpha* reported for all institutions. The results for specification (1) indicate that, on average, institutions are not able to generate superior returns. The results are similar in the other specification, even though the results of specification (3) suggest that institutions with over 50% of their portfolio invested in real estate produce better alphas. The differences in alphas between specifications (2)–(3) and (4)–(5) are also statistically significant, as indicated by the chi square statistics.

Panel B of Table 4 reports the results for REIT holdings. We again observe that, on average, institutions are not able to beat the passive benchmark, but we do observe stronger evidence that specialization is beneficial. While the quarterly *Alpha* for all institutions is −0.54% (specification (1)), the quarterly REIT *Alpha* for institutions with less than 50% of their holdings in REITs is −0.57% compared to 0.08% for institutions with more than 50% of their portfolio invested in REITs. Similarly, the quarterly REIT *Alpha* for institutions with less than 75% of their holdings in REITs is −0.57% versus 0.19% for institutions with over 75% allocated to REITs. These alpha differences are both statistically and economically significant. Comparing the performance of those institutions with the largest REIT allocation (>75%) to those with the lowest (<50%), the annual *Alpha* difference is over 3.0%.[Footnote10] These results support H1 that specialization is positively related to investors' performance. Panels C and D display the results when the global Fama-French risk factors, *SMB*, *HML*, and *UMD*, are included as additional controls for systematic risk. The results shown in Panels C and D are qualitatively similar to the results shown in Panels A and B. Our results in the remainder of the paper are robust to the inclusion of these additional risk factors, but in the interest of brevity, we only report the market model analysis. The additional Fama-French results are available upon request.

Overall, the results from Table 4 reveal several interesting facts. First, we provide evidence for overall underperformance by institutions holding publicly traded real estate. The underperformance is larger in real estate securities than REITs. However, we find a positive relation between portfolio weight and performance, which is consistent with the information advantage theory and benefits of specialization. Moreover, the benefits of REIT specialization appear to be more pronounced than real estate specialization, which is consistent with H2.

Specialization and Institutions' Excess Returns to Real Estate Securities and REITs

In this subsection, we continue our examination of the relation between specialization and performance. Specifically, we replicate the analysis above, but we add each institution's *RE weight* (Eq. 1a, Table 5 Panel A) and *REIT weight* (Eq. 1b, Table 5 Panel B), as well as the logarithm of the institution's market value and fixed effects for home country and type to the baseline regressions in Eqs. (8) and (9).

Table 5 Determinants of excess returns in real estate securities

Panel A: Real Estate Securities							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
RE weight	-0.0301***	-0.0538***	0.0054	-0.0387***	0.0288*	76.84***	17.74***
	[-26.691]	[-31.281]	[0.832]	[-32.006]	[1.800]		
MVE	-0.0007***	-0.0008***	0.0008	-0.0007***	0.0019	6.15***	4.56***
	[-10.479]	[-11.782]	[1.250]	[-10.930]	[1.538]		
RE premium	0.5479---	0.5520***	0.2068***	0.5486***	0.3115***		
	[298.955]	[298.935]	[18.017]	[298.823]	[12.371]		
Fixed effects							
Type	Yes	Yes	Yes	Yes	Yes		
Observations	733,072	724,108	8964	729,865	3207		
Adjusted R^2	0.2044	0.2061	0.0770	0.2050	0.0906		
Panel B: REITs							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
REIT weight	-0.0142***	-0.0447***	0.0137***	-0.0284***	0.0553***	677.06***	304.67***
	[-27.947]	[-29.688]	[8.213]	[-33.305]	[11.723]		
MVE	-0.0012***	.0.0012***	-0.0031***	-0.0011***	-0.0038***	75.91***	96.50***
	[-17.045]	[-16.241]	[-15.051]	[-15.695]	[-14.359]		
REIT premium	0.4556***	0.4752***	0.0720***	0.4682***	0.0704***		
	[184.480]	[185.371]	[21.597]	[185.023]	[16.995]		
Fixed effects							
Type	Yes	Yes	Yes	Yes	Yes		
Observations	384,511	365,109	19,402	372,503	12,008		
Adjusted R^2	0.2011	0.2097	0.0790	0.2069	0.0904		

Table 5 shows results from cross-sectional regressions examining the determinants of investors' excess abnormal returns on real estate securities (Panel A) and REITs (Panel B) from the first quarter of 1999 to the second quarter of 2015. The dependent variable is the quarterly value-weighted return on the investor's real estate securities or REITs in excess of the global risk-free rate over the same quarter. The value-weighted quarterly return is computed based on the consecutive three-month security returns following the reporting period. The main independent variable of interest is the share of real estate securities (*RE weight* in Panel A) or share of REITs (*REIT weight* in Panel B) the investor holds as a share of the total market value of its portfolio from Eqs. (1a) and (1b). We also control for the logarithm of total market value of the investor's portfolio (*MVE*). To control for systematic risk in the returns, we include the value-weighted return on real estate securities or REITs in excess of the global risk-free rate (*RE premium, REIT premium* in Panels A and B, respectively). The specifications in both panels include investors with >0% of real estate or REIT holdings in any given quarter in specification (1), <50% in specification (2), >50% in specification (3), <75% in specification (4) and > 75% in specification (5). The last two columns of each

panel show the χ^2statistics for the difference test of specification (2) - (3) and (4) - (5) coefficients. Regressions are run with investor type fixed effects. Errors are investor-quarter clustered. The robust t-statistics are reported in brackets (* significant at 10%, ** significant at 5%, *** significant at 1% level) below the coefficients

Table 5 presents the results. Panel A shows the results for real estate securities and Panel B shows the results for REITs. Contrary to H1, the negative coefficient of *RE weight* in specification (1) of Panel A indicates that the greater an institution's allocation to real estate securities, the worse is its performance. However, this negative relation seems to be driven by those institutions with a lower percentage of their portfolios allocated to real estate securities. The negative relation between *RE weight* and performance is only observed in the sub-sample of institutions that invest less than 50% (specification (2)) and less than 75% (specification (4)) of their portfolio in real estate securities. These results suggest that for institutions that do not specialize in real estate, the more they invest in real estate securities, the lower their risk-adjusted performance. For instance, if an institution increases its real estate position from 20% to 30%, it will see its annual risk-adjusted return drop by 2.2%.[Footnote11] Additionally, the size of the *RE weight* coefficient is noticeably smaller for the <75% sub-sample compared with the <50% subsample. Lastly, the chi square statistics indicate that the *RE weight* coefficient for those institutions with more of their portfolio invested in real estate securities is statistically higher than for the more diversified institutions.

Panel B presents the results of our REIT analysis. As in Panel A, the *REIT weight* coefficient is negative and statistically significant for the whole sample (specification (1)). Again, this relation seems to be driven by those institutions with less of their portfolios invested in REITs (specifications (2) and (4)). These results suggest that among institutions that invest a smaller portion of their portfolios in REITs, increasing their REIT allocation leads to lower returns. In comparison, for institutions that invest the majority of their portfolio in REITs (specification (3) and (5)), we observe a significant positive relation between *REIT weight* and performance. These results suggest that specialization is associated with better performance. This effect is especially pronounced among institutions that hold at least 75% of their portfolio in REITs. For these institutions, a one standard deviation increase in *REIT weight* is associated with a 0.79% increase in quarterly risk-adjusted returns.

Overall, the results in Table 5 provide further support for the information advantage theory and H1 that specialization is positively related to risk-adjusted returns. Additionally, the results in Table 5 suggest that the benefits of specialization accrue primarily to investors who specialize in a narrower set of securities that require a unique set of skills to analyze. These findings are also consistent with the information advantage theory and support H2.

Active Share Analysis

Active Share

In addition to *RE weight and REIT weight* as a measure of specialization, we also use the institution's level of active share. As mentioned above, active share is a proxy for the institution's level of active management as it measures the level of deviation between the portfolio's allocations and the value-weighted benchmark index's allocations. We examine the relation between active share and performance by including real estate active share (Eq. (3)) and REIT active share (Eq. (5)) in the regression Eqs. (8) and (9) as the main explanatory variables. As noted above, active share values range between 0 and 1, where higher values are associated with a higher level of active management.

The results are presented in Table 6; Panel A presents the real estate securities results and Panel B presents the REIT results. The results in Panel A suggest that institutions that more actively manage their securities can earn superior returns. Specifications (1) and (2) show an overall positive relation between an institution's level of active share and performance when the full sample is considered. However, the active share coefficient is not statistically significant in specifications (4) and (6), which consider portfolios with >50% and > 75% invested in real estate securities, respectively. This suggests that the relation between active share and performance is driven by those institutions with less of their portfolio allocated to real estate securities. This potentially reflects the difficulties associated with managing a larger portfolio. For example, Chen, Hong, Huang, and Kubik (2004)

document that larger mutual funds find it harder to generate superior performance, and that this effect is magnified among funds investing in smaller and less liquid assets.

Table 6 Active share in real estate securities and REITs

Panel A: Real Estate Securities								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(3)-(4)	(5)-(6)
Investors	All	All	<50%	>50%	<75%	>75%	χ^2	χ^2
RE AS	0.0135***	0.0128***	0.0144***	-0.0094	0.0127***	0.0127	9.16***	0.0000
	[7.322]	[6.932]	[7.492]	[-1.229]	[6.855]	[0.797]		
RE weight		-0.0050**	-0.0001	0.0057	-0.0031	0.0195	0.3200	1.0200
		[-2.308]	[-0.015]	[0.591]	[-1.534]	[0.872]		
MVE	0.000	0.000	-0.003	0.0019**	-0.0002	0.0034**	6.96***	5.45***
	[0.162]	[-0.059]	[-1.373]	[2.381]	[-1.081]	[2.217]		
RE premium	0.4024***	0.4023***	0.4185***	0.2435***	0.4034***	0.3708***		
	[88.476]	[88.450]	[88.712]	[15.227]	[88.418]	[11.157]		
Fixed effects								
Investor Type	Yes	Yes	Yes	Yes	Yes	Yes		
Observations	67,622	67,622	62,252	5370	65,715	1907		
Adjusted R^2	0.1874	0.1875	0.1981	0.0923	0.1914	0.1144		
Panel B: REITs								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(3)-(4)	(5)-(6)
Investors	All	All	<50%	>50%	<75%	>75%	χ^2	χ^2
REIT AS	0.0171***	0.0188***	0.0158***	0.0283***	0.0146***	0.0438***	34.93***	90.24***
	[27.907]	[26.870]	[22.739]	[14.150]	[22.394]	[14.607]		
REIT weight		0.0035***	-0.0036***	0.0061***	0.000	0.0260***	31.69***	64.58***
		[7.882]	[-2.861]	[5.160]	[-0.047]	[8.155]		
MVE	-0.0006***	-0.0005***	-0.0003***	-0.0010***	-0.0003***	-0.0011***	19.23***	21.55***
	[-7.388]	[-6.891]	[-3.372]	[-8.239]	[-3.228]	[-7.123]		
REIT premium	0.1291***	0.1292***	0.1589***	0.0681***	0.1455***	0.0710***		
	[51.649]	[51.687]	[46.568]	[26.068]	[47.999]	[22.380]		
Fixed effects								
Investor TYpe	Yes	Yes	Yes	Yes	Yes	Yes		
Observations	67,274	67,274	47,599	19,675	54,954	12,320		
Adjusted R^2	0.1409	0.1420	0.1711	0.1105	0.1603	0.1411		

We repeat the analysis for Table 5 and include the active share measure of investors' real estate securities or REITs as the main measure of investor specialization. The dependent variable is the quarterly value-weighted return on the investor's real estate securities (Panel A) or REITs (Panel B) in excess of the global risk-free rate over the same quarter. The value-weighted quarterly return is computed based on the consecutive three-month security returns following the reporting period. The main independent variables of interest are active share in real estate securities (*RE AS*) in Panel A and active share in REITs (*AS REIT*) in Panel B. These active share measures take a value between 0 and 1. A value of 0 signifies a perfectly diversified portfolio based

on weights of the securities available in a given quarter while a value of 1 signifies a portfolio that would have to be 100% reallocated in order to achieve perfect diversification. To be included in the sample, the investor is required to hold at least ten real estate securities or REITs. We also control for the logarithm of total market value of the investor's portfolio (*MVE*) and the value-weighted return to real estate securities or REITs (Panels A and B, respectively) in excess of the global risk-free rate. The last two columns of each panel show the χ^2statistics for the difference test of specification (3)–(4) and (5)–(6) coefficients. Regressions are run with investor type fixed effects. Errors are investor-quarter clustered. The robust t-statistics are reported in brackets below the coefficients (*significant at 10%, **significant at 5%, ***significant at 1% level)

The results in Panel B indicate that, overall, active share is positively related to performance. We observe a positive and statistically significant REIT active share coefficient in specifications (1) and (2). Unlike with the real estate securities, the REIT active share coefficient is positive across all REIT weight thresholds and has a larger magnitude for institutions that have a larger percentage of their portfolio allocated to REITs (specifications (4) and (6) compared to specifications (3) and (5)).

To further explore the relation between institutional investors' risk-adjusted returns and active share and its economic significance, we repeat the above analysis with indicator variables for the quartiles of active shares. We sort the institutions into quartiles based on their active share each quarter from the lowest to the highest active share. Table 7 presents the results for real estate and REITs in specifications (1) and (2), respectively. Consistent with our previous results, the coefficient of the second through fourth quartiles of active share are positive and statistically significant, relative to the omitted first quartile, for both real estate securities and REITs. The coefficient of the fourth quartile indicator variable is especially large in both specifications, which suggests that material outperformance, in terms of risk-adjusted return, is associated with institutional investors that deviate the most from their respective passively weighted index. Institutions in the fourth quartile, in terms of their active share in real estate securities and REITs, respectively, earn 1.67% and 1.76% more per quarter in terms of risk-adjusted returns compared to the first quartile.

Table 7 Excess returns to real estate securities and REITs by active share quartiles

Specification	**(1)**	**(2)**
Securities	**Real estate**	**REIT**
Active share quartiles		
Q2	0.0040***	0.0014***
	[8.253]	[7.564]
Q3	0.0081***	0.0038***
	[9.782]	[12.503]
Q4	0.0167***	0.0176***
	[13.797]	[25.355]
MVE	-0.0004	-0.0005***
	[-1.609]	[-5.095]
Fixed effects		
Home Country	Yes	Yes
Investor Type	Yes	Yes
Observations	62,172	57,263
Adjusted R^2	0.2010	0.1647

We repeat the analysis for Table 6 and include quartiles of real estate and REIT active share of investors' portfolios as independent variables. The dependent variable is the quarterly value-weighted return on the investor's real estate securities or REITs in excess of the global risk-free rate over the same quarter. The value-weighted quarterly return is computed based on the consecutive three-month security returns following the reporting period. The main independent variables of interest in specifications (1) and (2) are the real estate and REITs active share quartiles, respectively, so that *Q1* (*Q4*) includes investors with the lowest (highest) level of active share within their real estate or REIT portfolio (*Q1* is the omitted category). We also control for the logarithm of total market value of the investor's portfolio (*MVE*), and we include the value-weighted return to real estate securities or REITs as a benchmark (specifications (1) and (2), respectively) in excess of the global risk-free rate. Return benchmarks are omitted from the table in the interest of brevity. Regressions are run with investor home country and investor type fixed effects. Errors are investor-quarter clustered. The robust t-statistics are reported in brackets below the coefficients (* significant at 10%, ** significant at 5%, *** significant at 1% level)

Overall, the results presented in Tables 6 and 7 suggest that a high active share in a real estate security or REIT portfolio is associated with better risk-adjusted returns. The evidence that higher active share yields superior performance provides additional support to our previous findings and is in line with the information advantage theory.

Institutional under- and Overweighting and Subsequent Returns

The results presented in the previous section indicate that institutional investors' active share measure is positively related to risk-adjusted returns. This implies that institutions that deviate the most from a passively weighted index earn positive abnormal returns, on average. Outperforming the index can be due to the overweighting of winning stocks, the underweighting of losing stocks, or a combination of both. We cannot determine from institutions' active share whether under- or overweighting of securities (or a combination of both) drives the decision to deviate from the benchmark index, but we can investigate the relation of institutional weights and subsequent returns to securities in general. That is, we can test when institutions, on average, underweight (overweight) a certain set of securities, and whether those securities experience lower (higher) risk-adjusted returns in subsequent time periods.

We generate SIC industry-wide and REIT property type-wide institutional weighting variables from the average institutional holdings in each category of securities, as defined in Eqs. (6) and (7). The variable SIC *RE bias* (Eq. (6)) is the equally-weighted average portfolio *RE bias* (from Eq. (2)) of all institutions that invest in at least one real estate SIC industry. *Property type REIT bias* (Eq. (7)) is the equally-weighted average *REIT bias* (Eq. (4)) of all institutions that invest in at least one REIT property type. We then test whether securities that belong to a particular SIC industry or a REIT property type that is overweighed (SIC *RE bias* > 0 or *Property type REIT bias* > 0) by institutions outperform; and whether securities that belong to a particular SIC industry or a REIT property type that is underweighted (SIC *RE bias* < 0 or *Property type REIT bias* < 0) by institutions underperform passive benchmarks. Although this is not a direct test of institutional investors' portfolio returns, we investigate the consequences of institutions' decisions to under- and overweight a certain set of securities. In other words, we test whether institutions appear to be correct with their active management decisions on a large scale (i.e., have the foresight to correctly underweight the future losers and overweight the future winners).

Panel A of Table 8 reports the relation between SIC *RE bias* and risk-adjusted return to real estate securities that belong to a particular SIC industry. Specifications (1) and (2) of Panel A contain the SIC industries that have an average negative and positive SIC *RE bias* measure, respectively. According to the results in Panel A, the coefficients of SIC *RE bias* are not statistically significant in either specification. This suggests that institutional investors, on average, do not underweight (overweight) the future losing (winning) SIC industries.

Table 8 Institutional under- and overweighting and subsequent returns to securities

Panel A: Real estate securities		
Specification	(1)	(2)
Average institutional position	SIC RE bias <0	SIC Re bias >0
SIC RE bias	-0.0975	0.0476
	[-0.561]	[0.541]
RE premium	0.8084***	0.7503***
	[17.913]	[21.640]
Observations	902	464
Adjusted R^2	0.2615	0.5018
Panel B: REITs		
Specification	(1)	(2)
Average institutional position	Property type REIT bias <0	Property type REIT bias >0
Property type REIT bias	0.2956***	-0.0399

	[2.954]	[-0.888]
REIT premium	1.0492***	0.9478***
	[47.118]	[51.496]
Observations	1219	1024
Adjusted R^2	0.6464	0.7215

Table 8 presents the results of the market-wide institutional under- and overweight analysis. Specifically, we examine the relation between the subsequent return to real estate securities (panel A) and REITs (panel B) based on the market-wide weighting of institutional investors. The dependent variable in panel A is the quarterly value-weighted return in excess of the global risk-free rate to real estate securities that are underweighted by institutions on average (SIC *RE bias* < 0 from Eq. (6) in specification (1)) and overweighted by institutions on average (SIC *RE bias* > 0 from Eq. (6) in specification (2)). The dependent variable in panel B is the quarterly value-weighted return in excess of the global risk-free rate to REITs that are underweighted by institutions on average (*Property type REIT bias* < 0 from Eq. (7) in specification (1)) and overweighted by institutions on average (*Property type REIT bias* > 0 from Eq. (7) in specification (2)). The value-weighted quarterly returns are computed based on the consecutive three-month security returns following the reporting period in which SIC *RE bias* and *Property type REIT bias* are measured. The variable SIC *RE bias* (Eq. (6)) is the equally weighted average portfolio *RE bias* (from Eq. (2)) of all institutions that invest in at least one real estate security. *Property type REIT bias* (Eq. (7)) is the equally weighted average *REIT bias* (Eq. (4)) by all institutions that invest in at least one REIT. In all specifications, we also control for *RE premium* and *REIT premium, respectively*. The t-statistics are reported in brackets below the coefficients (* significant at 10%, ** significant at 5%, *** significant at 1% level)

On the contrary, the coefficient of *Property REIT bias* in specification (1) in Panel B is positive and statistically significant. This specification includes those REIT property types with negative *Property REIT bias* (i.e., the REIT property types that are underweighted by institutions). The positive *Property REIT bias* coefficient in this specification suggests that institutional investors, on average, predict the future losers and underweight them accordingly. The same relation does not hold in the REIT property types that are overweighted. Thus, the results presented in Panel B provide some preliminary evidence that institutional investors' positive returns from active management, at least on a large scale, may stem from their ability to avoid losing REITs rather than picking winners.

Robustness Checks

Analysis of the U.S. as a Subsample

In order to ensure that our results are not driven by informationally opaque or inefficient markets, in this subsection we limit our analysis to the U.S. market. By limiting the sample to only institutions that invest in the U.S., we ensure that our results are not driven by less-developed markets and also mitigate concerns about related exchange rate issues. Additionally, the U.S. focus allows for a narrower benchmark and lessens concerns about investment mandates of global institutions.

Tables 9, 10, and 11 replicate the main results in Tables 4, 5, and 6, respectively. The results in Tables 9 and 10 are generally consistent with the results presented above. The results in Table 9 suggest that institutional investors are underperforming their passive U.S. benchmarks. The results in Table 10 suggest that a higher level of specialization in real estate securities or REITs is associated with negative performance unless the institution is at least 50% or 75% (specifications (3) and (5) in Panels A and B) invested in these securities. The results in Table 11 are also broadly consistent with the results presented for the full global sample, but only show statistical significance when we consider REIT investments. This suggests that active share is associated with better abnormal performance in the U.S. for institutional investors that invest in REITs, but when real estate securities are considered, outperformance is not observed. These results are in line with H2 and imply

that specialization is more beneficial when it is applied to a narrower set of securities that require a unique set of skills to analyze.

Table 9 Portfolio performance by investors in U.S. real estate securities and REITs

Panel: Market Model – Real Estate Securities							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
Securities	RE	RE	RE	RE	Re		
Alpha	-0.0139***	-0.0138***	-0.0379***	-0.0138***	-0.0410***	26.53***	20.21***
	[-51.134]	[-50.643]	[-8.565]	[-50.789]	[-6.782]		
RE premium	0.5270***	0.5256***	0.8246***	0.5259***	0.8949***		
	[202.668]	[201.927]	[18.897]	[202.178]	[15.426]		
Observations	190,588	189,422	1166	189,874	714		
Adjusted R^2		0.2712	0.2713	0.2962	0.2713	0.3006	
Panel B: Market Model – REITs							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
securities	REIT	REIT	REIT	REIT	REIT		
Alpha	-0.0031***	-0.0031***	-0.0023***	-0.0031***	-0.0025***	4.38***	3.06***
	[-15.488]	[-14.599]	[-7.365]	[-14.735]	[-7.628]		
REIT premium	0.3719***	0.3941***	0.113***	0.3926***	0.1049***		
	[140.799]	[140.892]	[20.664]	[141.153]	[18.482]		
Observations	222,615	204,878	17,737	206,912	15,703		
Adjusted R^2	0.1927	0.2031	0.0798	0.2024	0.078		

Table 9 shows results from cross-sectional regressions examining the determinants of investors' excess abnormal returns on the U.S. real estate securities and REITs from the first quarter of 1999 to the second quarter of 2015. The table is identical to Table 4, except that only US-based holdings are included in the sample. The dependent variable is the quarterly value-weighted return of the investor's real estate securities (Panel A) or REITs (Panel B) in its portfolio in excess of the U.S. risk-free rate over the same quarter. The value-weighted quarterly return is computed based on the consecutive three-month security returns following the reporting period. The independent variables include the value-weighted return to real estate securities or REITs in excess of the U.S. risk-free rate (*RE premium* in Panel A*, REIT premium* in Panel B). The top row displays the constant, which is the unexplained, or abnormal, return *Alpha* from regression Eqs. (8) and (9) and the main variable of interest of this table. Specifications display results from regressions that include investors with varying levels of exposure to real estate securities and REITs. Specification (1) includes investors with at least some exposure, specifications (2) includes investors with less than 50%, specification (3) includes investors with more than 50%, specification (4) includes investors with less than 75%, and specification (5) includes investors with 75% or more exposure in any given quarter. The last two columns of each panel show the χ^2statistics for the difference test of specification (2)–(3) and (4)–(5) *Alphas*. Specifications also include investor type fixed effects. Errors are investor-quarter clustered. The robust t-statistics are reported in brackets (* significant at 10%, ** significant at 5%, *** significant at 1% level)

Table 10 Determinants of excess returns in real estate securities in the U.S. market

Panel A: Real Estate Securities							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
RE weight	-0.0246***	-0.0383***	-0.0097	-0.0326***	-0.085	1.96**	0.40
	[-6.135]	[-7.305]	[-0.491]	[-7.068]	[-1.026]		
MVE	-0.0008***	-0.0008***	-0.0008	-0.0008***	-0.0017	0.00	0.07
	[-6.015]	[-6.326]	[-0.400]	[-6.213]	[-0.494]		
RE premium	0.5265***	0.5252***	0.8237***	0.5254***	0.8944***		
	[202.543]	[201.812]	[18.663]	[202.058]	[15.124]		
Fixed effects							
Investor Type	Yes	Yes	Yes	Yes	Yes		
Observations	190,588	189,422	1166	189,874	714		
Adjusted R^2	0.2716	0.2718	0.2956	0.2718	0.2988		
Panel B: REITs							
Specification	(1)	(2)	(3)	(4)	(5)	(2)-(3)	(4)-(5)
Investors	All	<50%	>50%	<75%	>75%	χ^2	χ^2
REIT weight	-0.0152***	-0.0413***	0.0062*	-0.0313***	0.0377***	151.87***	274.21***
	[-32.694]	[-19.038]	[1.937]	[-20.014]	[9.762]		
MVE	-0.0011***	-0.0011***	-0.0028***	-0.0011***	-0.0028***	20.57***	17.54***
	[-12.599]	[-12.142]	[-7.711]	[-12.113]	[-7.006]		
REIT premium	0.3717***	0.3937***	0.1082***	0.3922***	0.1004***		
	[140.496]	[140.551]	[20.550]	[140.825]	[18.083]		
Fixed effects							
Investor Type	Yes	Yes	Yes	Yes	Yes		
Observations	222,615	204,878	17,737	206,912	15,703		
Adjusted R^2	0.1956	0.2051	0.1083	0.2044	0.1122		

Table 10 replicates the results from Table 5 for only those securities domiciled in U.S. markets. It shows results from cross-sectional regressions examining the determinants of investors' excess abnormal returns on real estate securities (Panel A) and REITs (Panel B) from the first quarter of 1999 to the second quarter of 2015. The dependent variable is the quarterly value-weighted return on the investor's real estate securities or REITs in excess of the U.S. risk-free rate over the same quarter. The value-weighted quarterly return is computed based on the consecutive 3-month security returns following the reporting period. The main independent variable of interest is the share of real estate securities (*RE weight* in Panel A) or share of REITs (*REIT weight* in Panel B) investor holds as a share of the total market value of its portfolio from Eqs. (1a) and (1b). We also control for the logarithm of total market value of the investor's portfolio (*MVE*). We also include the value-weighted return on real estate securities or REITs in excess of the U.S. risk-free rate (*RE premium, REIT premium* in Panels A and B, respectively). The specifications in both panels include investors with >0% of real estate or REIT holdings in any given quarter in specification (1), <50% in specification (2), >50% in specification (3), <75% in specification (4) and > 75% in

specification (5). The last two columns of each panel show the χ^2statistics for difference test of specification (2)–(3) and (4)–(5) coefficients. Regressions are run with investor type fixed effects. Errors are investor-quarter clustered. The robust *t*-statistics are reported in brackets (* significant at 10%, ** significant at 5%, *** significant at 1% level) below the coefficients

Table 11 Active share in U.S. real estate securities and REITs

Panel A: Real Estate Securities								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(3)-(4)	(5)-(6)
Investors	All	All	<50%	>50%	<75%	>75%	χ^2	χ^2
RE AS	0.0004	0.0015**	0.0017***	0.0800**	0.0015**	0.126	6.08***	2.00**
	[0.562]	[2.228]	[2.638]	[2.372]	[2.337]	[1.249]		
RE weight		-0.0172***	-0.0260***	-0.0546**	-0.0193***	-0.1002	1.65	0.64
		[-5.447]	[-6.938]	[-2.343]	[-6.006]	[-0.864]		
MVE	0.0001	0.0000	0.0000	0.0012	0.0000	0.0004	0.68	0.01
	[1.528]	[0.780]	[0.660]	[0.801]	[0.799]	[0.076]		
RE premium	0.1223***	0.1223***	0.1222***	0.1315***	0.1223***	0.0732		
	[145.332]	[145.299]	[145.144]	[5.549]	[145.310]	[1.693]		
Fixed effects								
Investor Type	Yes	Yes	Yes	Yes	Yes	Yes		
Observations	24,369	24,369	24,308	61	24,340	29		
Adjusted R^2	0.4982	0.4998	0.5015	0.2991	0.5009	-0.0094		
Panel B: REITs								
Specification	(1)	(2)	(3)	(4)	(5)	(6)	(3)-(4)	(5)-(6)
Investors	All	All	<50%	>50%	<75%	>75%	χ^2	χ^2
REIT AS	0.0301***	0.0306***	0.0298***	0.0299***	0.0298***	0.0346***	0.00	1.38
	[53.840]	[50.290]	[50.018]	[9.082]	[49.909]	[8.545]		
REIT weight		0.0010**	-0.0159***	0.0198***	-0.0105***	0.0406***	100.54***	188.26***
		[2.377]	[-9.384]	[6.317]	[-8.611]	[11.542]		
MVE		-0.0005***	-0.0005***	-0.0006***	-0.0015***	-0.0014***	7.31***	6.33***
	[-6.799]	[-6.698]	[-7.215]	[-4.472]	[-7.015]	[-4.120]		
REIT premium	0.3159***	0.3159***	0.3424***	0.0977***	0.3407***	0.0921***		
	[115.968]	[115.968]	[116.408]	[19.183]	[116.648]	[17.305]		
Fixed effects								
Investor Type	Yes	Yes	Yes	Yes	Yes	Yes		
Observations	165,905	165,905	149,007	16,898	150,730	15,175		
Adjusted R^2	0.2595	0.2595	0.2768	0.1390	0.2756	0.1453		

Table 11 replicates the analysis of Table 6, but only for those securities domiciled in the U.S. market. The dependent variable is the quarterly value-weighted return on the investor's real estate securities (Panel A) or REITs (Panel B) in excess of the U.S. risk-free rate over the same quarter. The value-weighted quarterly return is computed based on the consecutive three-month security returns following the reporting period. The main independent variables of interest are active share in real estate securities (*RE AS*) in Panel A and active share in REITs (*AS REIT*) in Panel B. To be included in the sample, the investor is required to hold at least ten real estate securities or REITs. We also control for the logarithm of total market value of the investor's portfolio (*MVE*), and we include the value-weighted return to U.S.-based real estate securities or REITs (Panel A and Panel B, respectively) in excess of the U.S. risk-free rate to capture systematic risk in the excess returns. The last two columns of each panel show the χ^2statistics for difference test of specification (3)–(4) and (5)–(6) coefficients. Regressions are run with investor type fixed effects. Errors are investor-quarter clustered. The robust *t*-statistics are reported in brackets below the coefficients (* significant at 10%, ** significant at 5%, *** significant at 1% level)

Other Untabulated Results

To ensure that our results are not driven by the unique market conditions that existed during the recent financial crisis, we exclude data from the crisis period and repeat the analyses above (2007:Q3–2008:Q4). The results of these analyses are qualitatively similar to the results we present in the paper, suggesting that our findings are not driven by the financial crisis.

As a final robustness test, we partition the broad real estate sample into a few subsamples based on their three-digit SIC code and replicate the main analyses. We do so to explore whether specialization in a narrower set of securities (other than REITs) would result in stronger abnormal performance compared with the broader real estate definition. This analysis produced mixed results, which, for brevity, we do not include. Some of the narrower definitions of real estate securities yield results that associate specialization with positive abnormal performance and other definitions do not. It is possible that some of the results are statistically insignificant due to a small sample size. These mixed results are also generally consistent with our previous results and provide additional evidence that specialization is associated with positive abnormal returns.

Conclusion

In this paper, we examine the performance of institutional investors in publicly traded real estate securities. Utilizing quarterly real estate security and REIT holdings of over 50,000 institutional investors from around the world, we examine the implications of the information advantage theory. Specifically, we explore whether specialization allows investors to generate superior returns. Additionally, we explore whether the benefits associated with specialization are greater in institutions' REIT holdings, which represent a separate asset class that requires a unique set of analytical skills.

We find that institutions that invest in publicly traded real estate are not able to generate abnormal returns, on average. However, higher real estate portfolio weight and active share—both measures of specialization—are associated with greater risk-adjusted returns. Additionally, we find that the benefits of specialization are greater for REITs, which require a unique set of analytical skills. Our findings are robust to the exclusion of the financial crisis of 2008–2009 and when we include only securities traded on the U.S. market—arguably one of the world's most efficient and transparent markets—in the analysis. Overall, our findings are consistent with the predictions of the information advantage theory. Namely, investors can benefit from concentrating their holdings in assets in which they possess more information than the average investor.

Notes

1. When we discuss real estate securities, we are referring to operating firms that are dependent on the real estate sectors. Table Error! Reference source not found. shows the Standard Industrial Classification (SCI) codes of the firms we classify as "real estate securities." REITs belong to SIC 6798.
2. The assertion that REITs require unique expertise is supported by Cici et al. (2011). The authors find that some mutual fund managers can better process REIT-specific information that leads to profitable investment decisions. The authors conclude that outperformance in REITs derives from "endemic abilities" of the managers to process information.
3. Papers that examine institutional investors in real estate include: Ciochetti, Craft, and Shilling (2002)'s study of institutional investors' liquidity concerns; Lantushenko and Nelling's (2016) and Freybote and Seagraves' (2017) studies on institutions' herding behavior in real estate; Devos, Ong, Speiler, and Tsang's (2013) and Das, Freybote, and Marcato's (2014) studies on institutional investor behavior, before, during, and after the financial crisis; An, Wu, and Wu's (2016) study on the relation between institutional ownership and REIT crash risk.

4. For institutions with multiple portfolios, FactSet provides holdings information for each portfolio. We treat each portfolio as an individual observation throughout the analyses.
5. We exclude banks and insurance investors from the sample due to their small sample size. We also exclude index funds because they, by definition, do not attempt to outperform the passive index.
6. We note that a firm must hold at least ten real estate or REIT securities to be included in our active share analysis.
7. We obtain the systematic risk factors from Kenneth French's data library. The data have been used previously in global performance studies (e.g., Fama and French 2012).
8. We observe qualitatively similar results if we include banks and insurance companies in our sample.
9. The list of tax-havens includes Hong Kong, Andorra, the Bahamas, Bermuda, the Cayman Islands, Cyprus, Gibraltar, Iceland, Monaco, and Malta.
10. This 3.04% annual Alpha is based on the Alphas reported in specification 2 and 5. Specifically, 0.0304 = 4 * (0.0019 – (−0.0057)).
11. The −2.2% annual return is calculated as follows: 4 x (0.1 x (−0.0538)) = −0.02152.

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Appendix

Sample description by investor's domicile

The Appendix shows the sample averages for portfolio weights of real estate securities and REITs by institutions' domiciles. The first column shows the number of investors from each domicile during the sample period and the last two columns show the average portfolio weights in real estate related securities and REITs. The table includes all investors with at least some portfolio weight in either real estate securities or REITs.

	Number of investors		**Portfolio weight**			**Number of investors**		**Portfolio weight**	
Domicile	**RE**	**REIT**	**RE**	**REIT**	**Domicile**	**RE**	**REIT**	**RE**	**REIT**
AND	2		0.0617		KEN	1		0.0615	
ARE	26	1	0.3157	0.0175	KOR	89	8	0.0386	0.0153
ARG	6	1	0.0823	0.0095	KWT	7		0.2104	
AUS	596	254	0.1848	0.1845	LBN	1		0.2150	
AUT	461	192	0.0990	0.0600	LIE	123	45	0.1015	0.0681
BEL	520	344	0.0561	0.0470	LKA	3		0.2525	
BGR	2	1	0.0472	0.1513	LTU	11	3	0.1248	0.0599
BHR	5		0.0834		LUX	644	303	0.0578	0.0485
BHS	25	10	0.0348	0.0118	LVA	6	1	0.0517	0.0107
BMU	17	6	0.0582	0.0188	MCO	1	1	0.0590	0.1751
BOL	1		0.0489		MEX	110	18	0.1174	0.1994
BRA	912	12	0.1397	0.0258	MLT	10	2	0.0590	0.5162
CAN	1959	1310	0.0489	0.0593	MUS	1		0.4795	
CHE	1675	807	0.0701	0.0511	MYS	259	166	0.0931	0.0603
CHL	172	25	0.0965	0.0570	NAM	5	5	0.0720	0.0349
CHN	585	12	0.0691	0.1557	NLD	533	355	0.1002	0.1125
CYM	4	3	0.0454	0.0378	NOR	261	96	0.0409	0.0189
CYP	1		0.0442		NZL	22	13	0.1038	0.0945
CZE	27	11	0.1157	0.0734	OMN	6		0.1574	
DEU	4787	1454	0.0370	0.0296	PAK	27		0.0243	
DNK	445	249	0.0435	0.0300	PHL	10	1	0.1624	0.0130
EGY	1		0.3377		POL	231	104	0.0821	0.0219
ESP	4669	1043	0.0657	0.1084	PRT	185	37	0.0408	0.0195
EST	26	18	0.1056	0.0416	QAT	1		0.0903	
FIN	277	82	0.0807	0.0879	ROU	9		0.1203	
FRA	3022	1172	0.0606	0.0455	RUS	10	5	0.0898	0.0909

GBR	5624	3952	0.0543	0.0561	SAU	21	2	0.1587	0.3813
GIB	2	2	0.0529	0.0140	SGP	521	286	0.1034	0.0622
GRC	88	30	0.0451	0.0246	SVK	17	5	0.3294	0.0828
HKG	755	359	0.1230	0.0408	SVN	81	40	0.0413	0.0416
HRV	27	9	0.1559	0.0955	SWE	733	277	0.0496	0.0188
HUN	35	15	0.0824	0.0367	THA	227	1	0.0347	0.0100
IDN	18		0.0618		TTO	1	1	0.0396	0.0484
IND	1061	6	0.0660	0.0253	TUR	25	24	0.0458	0.0467
IRL	292	169	0.0386	0.0255	TWN	404	124	0.0745	0.0743
ISL	4	1	0.0447	0.0314	USA	11,476	10,338	0.0443	0.0845
ISR	699	397	0.1425	0.0475	VNM	8	4	0.1422	0.1193
ITA	873	343	0.0406	0.0381	ZAF	575	472	0.0908	0.0975
JOR	1		0.1285		ZWE	2		0.1249	
JPN	1e722	435	0.0648	0.2192					
					Total (Avg)	48,081	25,462	(0.0990)	(0.0740)