Institutional Investors and Home-Biased REITs

by
Lucia Gibilaro
University of Bergamo
e-mail: lucia.gibilaro@unibg.it
Tel +39 / 0352052675
Fax +39 / 0352052549

and

Gianluca Mattarocci
(corresponding author)
University of Rome "Tor Vergata"
e-mail: gianluca.mattarocci@uniroma2.it
tel. +39 / 0672595903
fax. +39 / 062040219

Version January 2018

Institutional Investors and Home-Biased REITs

Abstract

Real estate investment trusts (REITs) are frequently considered an investment opportunity for institutional investors due to their above-average returns with respect to other financial instruments. Due to the unique characteristics of the real estate market, geographically specialised (home biased) REITs can normally benefit from higher-quality information for selecting investment opportunities and from a reduction of the cost of monitoring and servicing asset owners. Home-biased REITs can be particularly appealing for institutional investors because the addition of this type of asset to an already diversified investment portfolio can optimize the risk–return of their investment strategy and mitigate the concentration of real estate investments. This paper considers all the REITs in Standard & Poor's Global REIT Index and evaluates the percentage of investment released by (domestic and foreign) institutional investors and its change over time. Focusing on REITs' international real estate exposure, this paper shows that geographical diversification matters for investment decisions made by international investors and the results are robust with respect to the time horizon and the proxy for ownership concentration.

1. Introduction

Institutional investors actively invest in real estate investment trusts (REITs) worldwide and empirical evidence demonstrates that the percentage they own is increasing over time due to a reduction of the legal constraints on shareholder concentration (Feng, McKay, Price, and Sirmans, 2011). Institutional investors are frequently involved since the initial public offering (IPO) of the investment vehicle (Ling and Ryngaert, 1997) and, normally, real estate vehicles bought by institutional investors exhibit positive return immediately after listing (Ghosh, Nag, and Sirmans, 2000).

Real estate assets are normally opaque and characterized by a high level of information asymmetry. Specialized institutional investors therefore normally try to reduce the risk of misevaluating the assets by focusing on a single geographical area, for which they are assumed to have an informational advantage with respect to other market players (Zhou and Sah, 2009). International evidence shows an increasing role of international diversification strategies worldwide and the performance achieved by those REITs could be even better (in terms of return and risk) than home-biased REITs (Gibilaro and Mattarocci, 2016).

The paper aims to analyse institutional investors' demand for home-biased and internationally diversified REITs and to evaluate if the demand could also be affected by the nationality of the investor, distinguishing between national and international institutional investor demand. The results show that home-biased REITs are more attractive for domestic investors, while foreign investors are more attracted to internationally diversified ones. The performance analysis shows institutional investors are better in selecting the top investment opportunities among home-biased REITs and that foreign investors are normally better at picking stocks than domestic investors. Results obtained are consistent for almost all types of institutional investors excluding bank and trusts, endowment funds and few residual market players. Empirical evidence supports the hypothesis that portfolio composition criteria (home biased vs internationally diversified) affect the type of investors mostly interested to be REITs' shareholder and portfolios that are not focused geographically have to pay normally higher premiums for attracting a significant number of institutional investors

Section 2 presents a detailed literature review of the institutional investors' demand for indirect real estate investment opportunities by considering the literature of both REITs' features and performance that main explain an increase of interest by this type of investors. Section 3 presents the empirical analysis on a wide, representative sample of REITs worldwide by constructing a set of proxies of ownership concentration measures for both local of foreign investors and evaluating the role of REITs' portfolio diversification in explaining the percentage of institutional ownership and the risk-adjusted performance. The last section summarizes the results and discusses policy implications for the industry.

2. Literature review

Institutional investors normally try to select low-risk REITs and the standard criteria used to identify them are age, size, and the type of commitment and reputation of the underwriters (Wang, Chang, and Gau, 1992). Empirical evidence shows that the presence of institutional investors as REIT shareholders normally has a positive impact on future performance, even if the relation holds only when the real estate vehicle does not already have other institutional investors as reference shareholders (Striewe, Rottke, and Zietz, 2013). The positive effect of institutional investors' intervention is normally justified on the basis of their degree of control and monitoring of the investment strategy adopted by the REITs' managers, with effectiveness increasing when there are no strict legal constraints on maximum shareholder concentration (Downs, 1998) and the role of institutional investors can substitute alternative monitoring mechanisms (e.g. external management; Brockman, French, and Tamm, 2014). Unlike in the rest of the asset management industry, REIT investors do not invest prevalently in vehicles that are included in a reference benchmark for indexing purposes and inclusion or exclusion from such constituent lists has almost no effect on the demand for shares (Feng, Ghosh, and Sirmans, 2006).

Institutional investors normally prefer asset classes characterized by low risk and therefore prefer to invest in large REITs instead of small ones. Empirical evidence demonstrates that while the issue of size is relevant to all institutional investors, it is particularly relevant to investment companies, financial advisors, and banks (Below and Stansell, 2003). The main explanation is a liquidity issue, making investments in big (and listed) REITs safer for institutional investors that are liquidity constrained, owing to the opportunity to easily resell their shares when necessary (Ciochetti, Craft, and Shilling, 2002). The analysis of the risk assumed by REITs' institutional investors shows that they are worried about crash risk and normally they invest more in financial instruments characterized by a lower crash risk but there are some types of institutional investors that have shorter time horizon and invest also on REITs exposed to crash risk (An, Wu and Wu, 2016).

The financial characteristics of any type of investment opportunity can affect institutional investor demand, which is, as expected, a function of the expected risk and return of the investment (Eakins, Stansell, and Wertheim, 1998). Empirical evidence shows that REITs are normally included in financial portfolios to reduce overall risk and, so, low-risk profile REITs are requested more frequently by the market (Below, Stansell, and Coffin, 2000). Analyses on risk exposure related to REIT investment focus on the role of systematic and idiosyncratic risk in attracting institutional investors. The results show that different types of players (banks, insurance companies, advisors, etc.) have different risk preferences but are more concerned about REIT systematic risk exposure than about diversified risk exposure (Below, Stansell, and Coffin, 2000). Analysis of institutional investor demonstrates that risk attitudes differ for different types of investors on the basis of the average risk–return profile expected by their subscribers and the investment strategy time horizon (e.g. Chung, Fung, Shilling, and Simmons-Mosley, 2007). During the global financial crisis period, there was, on average, a flight to quality, with a reduction in risk exposure assumed by all types of institutional investors (Devos, Ong, Spieler, and Tsang, 2013).

Appraisals/evaluations of REIT portfolios are not continuously updated and insider information is disclosed several months after the fact to the market (Damodaran and Liu, 1993). This lack of disclosure can cause lowered interest from the market due to the higher risk perceived by investors. The availability of analyst evaluations of real estate vehicles generally significantly reduces the risk perceived by the market and has a positive impact on institutional investor demand (Wang, Erickson, Gau, and Su, 1995).
Institutional investors monitor the investment strategies adopted by REIT managers and empirical evidence demonstrates that they normally prefer to buy real estate vehicles with high growth potential (Hartzell, Sun, and Titman, 2006). The positive effect of their intervention on the performance of an investment vehicle is clearer for investment vehicles that have long-term leases characterized by a low degree of standardization like the contracts normally used in the retail, office, and healthcare sector (Chung, Fung, and Hung, 2012).

3. Empirical analysis

3.1 Sample

The sample considers all 396 constituents of the Standard & Poor's Global REIT Index at the end of the 2015 independent of country of domicile or inception date for the time horizon 2003–2015 (Table 1).

Table 1. Sample description

Year	N° REITs	Geographical Area	N° REITs
2003	225	Africa	10
2004	15	America	193
2005	19	Australia	34
2006	18	Asia	99
2007	11	Europe	60
2008	0	Top countries	N° REITs
2009	5	United States	148
2010	13	Japan	43
2011	11	Singapore	28
2012	19	Australia	27
2013	36	Canada	27
2014	17	United Kingdom	15
2015	11	South Africa	13

Source: Bloomberg data processed by the authors

More than a half of the REITs considered have been in the sample since 2003 (56.82%) and are prevalently are prevalently domicile in America (48.73%). The more represented countries are the United States, Japan, and Singapore and only seven countries have more than 10 REITs in the sample. For each REIT, the sample is supplemented with all the data of the portfolio geographical allocation on the basis of the annual report and the attention is focused on the percentage of exposure to foreign markets (Table 2).

Table 2. Geographical diversification of REITs' portfolio

Year	Mean number of countries in the REITs' portfolio	Percentage of REITs investing in multiple countries	Average number of countries in the portfolio of diversified REIT
2003	1.47	12.61%	4.71
2004	1.46	13.19%	4.48
2005	1.46	13.39%	4.44
2006	1.53	15.44%	4.45
2007	1.56	15.96%	4.51
2008	1.57	17.61%	4.24
2009	1.57	18.34%	4.11
2010	1.60	18.54%	4.21
2011	1.63	18.15%	4.47
2012	1.63	18.98%	4.32
2013	1.61	18.85%	4.23
2014	1.60	18.49%	4.23
2015	1.63	19.49%	4.21

Source: Annual Report data processed by the authors

On average, each REIT invests in 1.56 countries, but more than 80% of them are fully home biased for all the years considered. For those that are internationally diversified, the average number of countries is greater than four for all the years.

Using the Bloomberg data, the dataset is supplemented with information on REIT shareholder composition at the end of each fiscal year, considering the numbers and types of investors and focusing on the role of institutional investors (Table 3).

Table 3. Shareholders' characteristics of REITs

Variable	Year	Geographical area					
		Overall	Africa	America	Asia	Australia	Europe
Average number of investors	2003	135.01	14.00	176.58	27.09	32.79	98.86
	2004	143.13	18.00	196.25	31.00	25.63	108.18
	2005	146.43	24.67	218.33	28.94	33.48	110.48
	2006	155.30	29.33	255.04	30.64	35.92	124.59
	2007	184.75	43.00	295.85	58.85	51.83	157.35
	2008	201.51	44.00	320.88	69.28	60.86	166.98
	2009	207.80	45.00	329.08	72.39	62.66	170.48
	2010	199.45	46.67	314.47	71.42	61.77	161.42
	2011	201.85	41.00	313.60	74.23	63.20	163.32
	2012	208.82	61.50	324.06	81.01	72.39	170.86
	2013	221.89	92.83	331.32	103.34	85.58	173.13
	2014	234.64	174.00	338.53	121.28	88.51	182.66
	2015	254.74	184.00	367.27	137.55	96.06	195.23
Average percentage of institutional ownership	2003	76.00%	39.34%	82.44%	61.73%	57.31%	72.28%
	2004	74.99%	51.79%	82.59%	59.74%	64.44%	66.89%
	2005	76.55%	68.94%	82.81%	67.85%	69.59%	70.55%
	2006	76.11%	40.75%	83.43%	64.97%	76.83%	70.21%
	2007	77.42%	61.16%	85.57%	70.24%	74.53%	68.44%
	2008	77.35%	75.78%	85.37%	71.01%	71.15%	68.75%
	2009	75.44%	56.55%	82.64%	74.77%	60.12%	68.25%
	2010	76.80%	45.86%	85.09%	73.55%	62.36%	69.80%
	2011	77.18%	56.53%	84.88%	74.41%	66.47%	67.57%
	2012	76.24%	44.84%	83.77%	70.01%	69.96%	70.24%
	2013	71.32%	60.69%	77.50%	62.17%	71.02%	68.30%
	2014	72.06%	66.91%	78.88%	64.19%	65.84%	67.16%
	2015	47.60%	41.74%	54.77%	38.10%	33.91%	49.06%

Source: Bloomberg data processed by the authors

The average number of investors for the overall time horizon is around 191.95 and, as expected, has grown significantly, from 135 in 2003 to 254 in 2015. Institutional investors are the reference shareholders for REITs and own, on average, more than 73% of overall shares outstanding. There are differences across geographical areas in both the average number of investors and the percentage of institutional ownership: Europe and America are characterized by higher average numbers of investors and the larger role for institutional investors, while Australian REITs have lower numbers of investors and African ones are characterized by a lower share of institutional ownership.

Institutional investors have different preferences in selecting REITs and there are interesting differences between those selecting home-biased REITs and those selecting internationally diversified REITs (Table 4).

Table 4. The average role of institutional domestic vs foreign investors among REITs shareholders

	All REITs				REITs investing only in the home country				REITs with an international diversified portfolio			
	%D	%DI	%F	%FI	%D	%DI	%F	%FI	%D	%DI	%F	%FI
2003	70.40%	53.72%	29.60%	22.29%	74.40%**	57.87%**	18.48%**	15.57%**	61.90%**	47.32%**	28.81%*	30.39%**
2004	71.67%	52.61%	28.33%	22.37%	76.59%**	56.96%**	16.97%**	15.56%**	59.72%**	45.23%**	35.09%**	32.57%**
2005	64.76%	46.34%	35.24%	30.20%	68.16%**	49.08%**	27.33%**	24.74%**	56.76%**	41.58%**	36.57%**	35.34%**
2006	60.83%	42.42%	39.17%	33.69%	65.07%**	46.18%**	30.61%**	27.44%**	53.74%**	37.85%**	39.01%**	38.49%**
2007	59.21%	41.58%	40.79%	35.84%	64.76%**	45.04%**	31.17%**	29.24%**	46.39%**	35.06%**	48.08%**	42.04%**
2008	55.92%	38.95%	44.08%	38.40%	59.94%**	42.65%**	36.30%**	33.85%**	49.36%**	32.79%**	48.67%**	45.03%**
2009	55.56%	37.16%	44.44%	38.28%	61.27%**	41.39%**	35.87%**	33.35%**	45.07%**	29.82%**	54.08%**	48.91%**
2010	56.68%	38.88%	43.32%	37.92%	63.25%**	44.07%**	33.77%**	32.11%**	41.38%**	25.55%**	57.12%**	51.54%**
2011	56.01%	38.81%	43.99%	38.37%	61.77%**	43.81%**	35.29%**	32.99%**	42.72%**	24.96%**	54.99%**	51.22%**
2012	52.24%	34.32%	47.76%	41.92%	56.63%**	38.23%**	40.37%**	37.62%**	43.84%**	25.22%**	53.23%**	50.04%**
2013	48.99%	30.59%	51.01%	40.72%	52.44%**	33.30%**	41.08%**	37.24%**	41.91%**	23.66%**	55.63%**	47.43%**
2014	49.35%	30.51%	50.65%	41.54%	52.07%	32.95%**	39.45%**	37.59%**	39.45%**	21.82%**	57.88%**	51.31%**
2015	56.48%	19.97%	43.52%	27.63%	57.07%**	20.34%**	32.00%**	25.55%*	52.39%**	18.64%*	41.48%**	33.32%**
All	58.31%	38.91%	41.69%	34.55%	62.57%**	42.45%**	32.21%**	29.45%**	48.82%**	31.50%**	46.97%**	42.89%*

Notes: % Percentage of all domestic investors, %DI = Percentage of Domestic Institutional Investors, %F = Percentage of all foreign investors and %FI = Percentage of foreign Institutional Investors

** *= t- test on the average differences with respect to the overall sample statistical significant at 95% confidence level*

* *= t- test on the average differences with respect to the overall sample statistical significant at 99% confidence level*

Source: Bloomberg data processed by the authors

For the full sample of REITs, the role of international investors is increasing over time (from 29% in 2003 to 43% in 2015) and more institutional investors are domestic than foreign, even if their role is decreasing (from 53% in 2003 to 19% in 2015). Home-biased REITs seem to be more attractive to institutional investors, with stronger results for international investors with respect to domestic ones, even if the differences have been disappearing over the last few years.

3.2 Methodology

A preliminary analysis of institutional investors' preferences in selecting REITs is conducted following the methodology proposed by Chan, Leung and Wang (1998), adding the degree of international diversification of the REIT portfolio as an additional explanatory variable. The equations are as follows:

$$I\%_{it} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (1)$$

$$DI\%_{it} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (2)$$

$$FI\%_{it} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (3)$$

$$I\%_{it} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \omega HB_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (4)$$

$$DI\%_{it} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \omega HB_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (5)$$

$$FI\%_{it} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \omega HB_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (6)$$

where the percentages owned by all institutional investors ($I\%_{it}$), only domestic institutional investors ($DI\%_{it}$), and only foreign institutional investors ($FI\%_{it}$), respectively, are regressed with respect to a set of *n* dummy variables representing the REIT's industry focus ($Type_{it}$),[1] a dummy that assumes the value of one in the IPO year (IPO_{it}), the number of years since the listing date ($Vintage_{it}$), the market value ($Size_{it}$), the Herfindahl Index concentration ratio (CR_{it}), and the percentage of home-biased investments in the portfolio (HB_{it}).

Once the types of REITs that are more attractive to the two types (national and international) of institutional investors are identified, the analysis considers if there is any significant difference in the risk and performance achieved by REITs with higher percentages of institutional ownership. Following the approach proposed by Wang, Erikson, Gau, and Chan (1995), we construct four portfolios of REITs on the basis of the share of institutional ownership (overall and foreigners)[2] and compare their performance using a Chow test. The proxies constructed are the following:

[1] The REIT types considered are in healthcare, hospitality, industrial, logistic, office, residential, retail, and other.
[2] The four portfolios are constructed year by year, considering the percentage institutional ownership (all institutional and only foreigners) and classifying REITs on the basis of their quartile distribution.

$$R_{Gt}^{EW} = \frac{1}{n_{Gt}} \sum_{i=1}^{n_{Gt}} r_{it} \quad (5a) \qquad R_{Gt}^{VW} = \frac{1}{\sum_1^{n_{Gt}} MV_{it}} \sum_{i=1}^{n_{Gt}} MV_{it} r_{it} \quad (5b)$$

$$AR_{Gt}^{EW} = \frac{1}{n_{Gt}} \sum_{i=1}^{n_{Gt}} (r_{it} - E(r_{it})^k) \quad (6a) \qquad AR_{Gt}^{VW} = \frac{1}{\sum_1^{n_{Gt}} MV_{it}} \sum_{i=1}^{n_{Gt}} MV_{it} (r_{it} - E(r_{it})^k) \quad (6b)$$

where n_{Gt} and $\sum_1^{n_{Gt}} MV_{it}$ are, respectively, the number and sum of the market value of all REITs classified in quartile G for year t and r_{it} is the gross return for the REIT i at time t, computed considering the price change and the amount of dividends paid on the yearly time horizon. The expected return $E(r_{it})^k$ is computed considering the following alternatives:

$$E(r_{it})^I = r_{ft} + \beta_{it}^m (R_{m.t} - R_{ft}) \quad (7)$$

$$E(r_{it})^{II} = r_{ft} + \beta_{it}^m (R_{m.t} - R_{ft}) + \beta_{it}^{SMB} (SMB_t) + \beta_{it}^{HML} (HML_t) \quad (8)$$

$$E(r_{it})^{III} = r_{ft} + \beta_{it}^m (R_{m.t} - R_{ft}) + \beta_{it}^{SMB} (SMB_t) + \beta_{it}^{HML} (HML_t) + \beta_{it}^{MOM} (MOM_t) \quad (9)$$

$$E(r_{it})^{IV} = r_{ft} + \beta_{it}^m (R_{m.t} - R_{ft}) + \beta_{it}^{SMB} (SMB_t) + \beta_{it}^{HML} (HML_t) + \beta_{it}^{RMW} (RMW_t) + \beta_{it}^{CMA} (CMA_t) \quad (10)$$

where $E(r_{it})^I$, $E(r_{it})^{II}$, $E(r_{it})^{III}$, and $E(r_{it})^{IV}$ are, respectively, the expected returns on the basis of the single-factor model (Sharpe, 1964), the three- factor model (Fama and French, 1993), the four-factor model (Carhart, 1997), and the five-factor model (Fama and French, 2015).

The single-factor model (equation (7)) defines the expected return on the basis of the risk-free rate (the three-month Treasury bond rate) and the market return (the value-weighted market index of all the REITs in the sample).

The three-factor model (equation (8)) considers two additional explanatory factors related to the size perspective (SMB) and growth perspective (HML), where SMB is the difference in returns achieved by two value-weighted portfolios constructed considering, respectively, all the REITs with a market value below the median value (i.e. small) and those with a market value above the median value (i.e. big) and HML is the difference in returns achieved by two value-weighted portfolios constructed considering, respectively, all the REITs with a book-to-market value above the median value (i.e. high) and those with a book-to-market value below the median value (i.e. low).

The four-factor model (equation (9)) adds to the Fama–French factors a factor related to momentum (MOM), while the five-factor model (equation (10)) considers as additional factors to the three-factor model two proxies related to firm accounting profitability (RMW) and the investment strategy (CMA). Here, MOM is the difference in returns achieved by two value-weighted portfolios constructed considering, respectively, all the REITs that achieved a past performance above and below the median value and RMW is the difference in returns achieved by two value-weighted portfolios constructed considering, respectively, all the REITs that achieved an operating profit above the median value (i.e. robust) and below the median value (i.e. weak). Here, CMA is the difference in returns achieved by two value-weighted portfolios constructed considering, respectively, all the REITs that registered a growth of assets under management below the median value (i.e. conservative) and above the median value (i.e. aggressive).

All the betas are computed on the basis of a linear regression model constructed on weekly data for a two-year time horizon using a backward estimation procedure (data are collected from t - 2 to t).

To test if institutional investors are better able to evaluate home-biased or diversified REITs, the analysis is replicated considering the full sample and two samples constructed considering only fully home-biased REITs and only internationally diversified REITs.

3.3 Results

Analysis of the institutional percentage of ownership shows differences in the characteristics of REITs that are considered by domestic and foreign investors for selecting among REITs' investment opportunities (Table 5).

Table 5 – Institutional investors' ownership and REITs' features
The table presents results of a panel regression analysis of the degree of institutional ownership with respect to REITs' features for the time horizon 2003 – 2015. The model assumes REITs' type-specific effect

	(1)	(2)	(3)	(4)	(5)	(6)
IPO	0.0278	0.0061	0.0235	0.0272	0.0004	0.0280
Vintage	-0.0049**	-0.0094**	0.0033**	-0.0049**	-0.0087**	0.0028**
Size	-0.0010	-0.0050**	0.0038*	-0.0012	-0.0052**	0.0038*
CR	-0.4042**	-0.4435**	0.0374	-0.4049**	-0.4410**	0.0339
Home Bias	-	-	-	0.0155	0.2168**	-0.2045**
Constant	0.0017	0.0082	-0.0063	0.0020	0.0085	-0.0063
Type dummies	☑	☑	☑	☑	☑	☑
Observations	3094	3094	3094	3072	3072	3072
N° Reits	377	377	377	377	377	377
Overall R^2	7.13%	4.80%	3.41%	7.03%	8.20%	8.40%

Source: Bloomberg data processed by the authors

Institutional investors normally select REITs that are younger and which feature higher ownership concentration (i.e. a lower value of the Herfindahl Index). Considering all institutional investors, the degree of home bias does not affect institutional ownership interests in investing in a specific REIT. Considering the role of domestic and foreign investors separately, we can underline interesting differences in their REIT investment strategies. Domestic investors prefer younger, smaller, and more concentrated REITs, while foreign investors invest in older and bigger REITs. The impact of the degree of home bias is completely different for domestic and foreign investors: Domestic investors look for home-biased REITs, while foreign investors prefer to invest in more internationally diversified REITs.

Looking at the investment strategies adopted by institutional investors, it is possible to point out differences in the average returns for REITs with lower or higher percentages of shares owned by institutional investors, considering both an equally weighted and a value-weighted strategy (Tables 6 and 7, respectively).

Analysis of the equal-weighted portfolio shows that the average performance of home-biased REITs is higher than for internationally diversified REITs and the results are consistent, independently of the return proxy (gross returns or extra returns constructed on the basis of different theoretical models). Those REITs with a higher percentage of shares owned by institutional investors (fourth quartile) are those for which the returns of home-biased REITs are always higher than average and statistically significant. Considering separately domestic versus foreigners, results shows that foreign investors are better able to select top performers among home-biased REITs, even though, since the number of REITs selected is lower, the results are not always statistically different from the average market return.

The analysis of the value-weighted portfolios confirms previous results showing that greater institutional ownership is normally related to better performance achieved by the REITs and the results are stronger for greater foreign institutional ownership. A comparison of the results of the two strategies (value vs. equally weighted) demonstrates the results are stronger for the value-weighted strategy, supporting the hypothesis that institutional investors are more interested in bigger rather than smaller REITs.

Table 6. Performance analysis of equally weighted portfolio constructed on the basis institutional ownership

The table presents the average annual return of four equally weighted portfolios constructed considering percentage of ownership owned by institutional investors (1st Q portfolio considers REITs in the quartile with the lower percentage of ownership while 4thQ portfolio considers REITs in the quartile with the higher one). The analysis is performed considering the performance of all REITs (All) and the difference in average returns for the full sample and the sample of only home bias (ΔHB) or international diversified (ΔID) REITs.

	REIT Type	All institutional investors				Domestic institutional investors				Foreign institutional investors			
		1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q
Gross return	All	3.60%	5.34%	4.39%	4.64%	3.10%	4.86%	5.11%	4.65%	4.47%	2.87%	6.97%	3.66%
	ΔHB	1.12%	0.30%	0.51%	0.05%**	0.63%	0.32%	1.31%	-0.24%*	0.80%	0.94%*	0.55%**	0.93%
	ΔID	-3.12%	-1.92%	-1.53%	-0.85%	-2.16%	-0.43%	-4.58%	2.17%	-5.62%	0.37%	-0.01%	-2.91%
Single-factor model	All	3.43%	4.50%	3.46%	4.04%	2.96%	4.32%	4.20%	3.77%	4.12%	2.01%	6.07%	3.25%
	ΔHB	1.04%	0.09%**	0.59%	0.16%*	0.66%	0.05%**	1.26%	-0.27%	0.63%	0.87%	-0.51%**	0.67%
	ΔID	-2.62%	-0.73%	-2.06%	-0.21%*	-2.03%	0.59%	-4.21%	1.98%	-4.61%	0.49%	0.07%	-2.17%
Three-factor model	All	3.39%	4.29%	3.23%	3.90%	2.96%	4.27%	3.94%	3.49%	3.95%	1.74%	5.92%	3.23%
	ΔHB	1.04%	0.09%**	0.59%	0.16%**	0.67%	0.06%**	1.25%	-0.27%	0.63%	0.88%	-0.51%	0.68%
	ΔID	-2.62%	-0.75%	-1.99%	-0.20%*	-2.05%	0.56%	-4.19%	1.97%	-4.57%	0.49%	0.07%	-2.21%
Four-factor model	All	3.40%	4.31%	3.26%	3.92%	2.96%	4.28%	3.98%	3.52%	3.97%	1.77%	5.95%	3.23%
	ΔHB	1.04%	0.10%**	0.59%	0.16%*	0.67%	0.06%**	1.25%	-0.27%	0.64%	0.88%	-0.51%	0.68%
	ΔID	-2.63%	-0.75%	-1.99%	-0.21%*	-2.05%	0.56%	-4.20%	1.98%	-4.57%	0.48%	0.06%	-2.21%
Five-factor model	All	7.65%	13.99%	1.86%	3.76%	2.60%	7.70%	12.03%	4.01%	4.39%	3.12%	19.04%	0.32%
	ΔHB	1.68%	1.90%*	0.25%**	0.13%*	1.12%	0.59%**	3.10%	-0.34%	0.50%	0.38%	4.09%	-0.55%
	ΔID	-5.88%	-8.30%	-0.53%**	-0.48%	-1.80%	-2.11%	-11.37%	2.09%	-3.66%	1.49%	-13.56%	0.90%

Notes: * t-test on the difference with respect the overall sample statistically significant at 90% level ** t-test on the difference with respect the overall sample statistically significant at 90% level *** t-test on the difference with respect the overall sample statistically significant at 99% level.

Source: Bloomberg data processed by the authors

Table 7. Performance analysis of value weighted portfolio constructed on the basis institutional ownership

The table presents the average annual return of four value weighted portfolios constructed considering percentage of ownership owned by institutional investors (1st Q portfolio considers REITs in the quartile with the lower percentage of ownership while 4thQ portfolio considers REITs in the quartile with the higher one). The analysis is performed considering the performance of all REITs (All) and the difference in average returns for the full sample and the sample of only home bias (HB) or international diversified (ID) REITs.

	REIT Type	All institutional investors				Domestic Institutional investors				Foreign institutional investors			
		1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q	1st Q	2nd Q	3rd Q	4th Q
Gross return	All	3.60%	5.34%	4.39%	4.64%	3.10%	4.86%	5.11%	4.65%	3.60%	5.34%	4.39%	4.64%
	ΔHB	1.12%	0.30%	0.51%	0.05%**	0.63%	0.32%	1.31%	-0.24%*	1.12%	0.30%	0.51%	0.05%**
	ΔID	-3.12%	-1.92%	-1.53%	-0.85%	-2.16%	-0.43%	-4.58%	2.17%	-3.12%	-1.92%	-1.53%	-0.85%
Single factor model	All	2.32%	3.19%	2.09%	2.73%	1.78%	3.18%	2.83%	2.37%	2.32%	3.19%	2.09%	2.73%
	ΔHB	1.05%	0.12%	0.59%	-0.09%**	0.69%	0.08%**	1.30%	-0.23%	1.05%	0.12%*	0.59%	0.09%**
	ΔID	-2.71%	-0.95%	-2.10%	-0.42%	-2.17%	0.41%	-4.34%	1.70%	-2.71%	-0.95%	-2.10%	-0.42%
Three factor model	All	1.36%	1.31%	0.03%	1.08%	0.75%	1.96%	0.77%	0.23%*	1.36%	1.31%	0.03%	1.08%
	ΔHB	1.04%	0.05%	0.63%	-0.19%*	0.77%	-0.03%**	1.29%	-0.21%	1.04%	0.05%**	0.63%	0.19%*
	ΔID	-2.59%	-0.56%	-2.50%	-0.16%*	-2.31%	0.75%	-4.27%	1.23%	-2.59%	-0.56%	-2.50%	-0.16%*
Four factor model	All	1.47%	1.44%	0.14%	1.19%	0.85%	2.07%	0.89%	0.35%*	1.47%	1.44%	0.14%	1.19%
	ΔHB	1.02%	0.05%	0.63%	-0.19%*	0.76%	-0.04%**	1.29%	-0.21%	1.02%	0.05%**	0.63%	0.19%*
	ΔID	-2.53%	-0.56%	-2.49%	-0.15%*	-2.29%	0.79%	-4.27%	1.23%	-2.53%	-0.56%	-2.49%	-0.15%*
Five factor model	All	1.44%	1.20%	-0.17%	1.01%	0.81%	2.00%	0.61%	0.03%	1.44%	1.20%	-0.17%	1.01%
	ΔHB	1.03%	0.04%	0.63%	-0.26%	0.79%	-0.09%**	1.28%	-0.24%	1.03%	0.04%**	0.63%	0.26%
	ΔID	-2.55%	-0.49%	-2.58%	0.03%**	-2.33%	0.92%	-4.26%	1.15%	-2.55%	-0.49%	-2.58%	-0.03%**

Notes: * t-test on the difference with respect the overall sample statistically significant at 90% level ** t-test on the difference with respect the overall sample statistically significant at 90% level *** t-test on the difference with respect the overall sample statistically significant at 99% level.

Source: Bloomberg data processed by the authors

3.4. Robustness test

As a robustness test, we evaluate separately the role of home bias for different types of institutional investors, considering the following categories (Chung, Fung, Shilling, and Simmons-Mosley, 2007):

- Pension funds
- Hedge funds
- Investment advisors
- Hedge funds/investment advisors
- Banks and trusts
- Endowment funds
- Insurance companies
- Other

Summary statistics on the role of each type among institutional investors show that interest in some REIT categories is higher, as well as interesting differences between domestic and foreign investors (Table 8).

Table 8. The average role of institutional domestic vs foreign investors among REITs shareholders
The table presents the average value of shares owned by each type of institutional investor (Average) and the percentage of REITs with a value of shares owned by this type of investor is higher than zero (% Positive). The analysis considers the percentage owned by all institutional investors (All), only domestic (Domestic) or only foreigners (Foreign).

		All	Domestic	Foreign
Pension funds	Average	0.0515	0.0505	0.0216
	% Positive	73.08%	48.35%	61.41%
Hedge funds	Average	0.0531	0.0465	0.0220
	% Positive	44.75%	37.44%	28.92%
Investment advisor	Average	0.3772	0.2158	0.1996
	% Positive	98.40%	84.53%	94.54%
Hedge fund / Investment advisor	Average	0.2392	0.1392	0.1357
	% Positive	95.89%	76.32%	90.75%
Bank and trust	Average	0.0507	0.0475	0.0229
	% Positive	68.69%	48.64%	51.20%
Endowment funds	Average	0.0069	0.0062	0.0127
	% Positive	12.60%	11.17%	1.43%
Insurance companies	Average	0.0300	0.0270	0.0160
	% Positive	50.18%	41.83%	23.63%
Others	Average	0.0188	0.0128	0.0140
	% Positive	49.59%	24.08%	45.44%

Source: Bloomberg data processed by the authors

Among all types of institutional investors, investment advisors and hedge funds/investment advisors have higher average REIT exposures (0.37 and 0.23, respectively) and they are at least one of the shareholders in almost all real estate investment vehicles (98.40% and 95.89%, respectively). On average, the role of domestic investors is higher with respect to foreigners for almost all types of

institutional investors (excluding endowment funds and others) and the main investors are always investment advisors and hedge funds/investment advisors.
For each type of institutional investor, we consider the role of REIT characteristics in explaining the percentage owned by institutional investors of type j, with the following equations:

$$I\%_{it}^{j} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \omega HB_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (4a)$$

$$DI\%_{it}^{j} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \omega HB_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (5a)$$

$$FI\%_{it}^{j} = \alpha + \theta IPO_{it} + \gamma Vintage_{it} + \tau Size_{it} + \varphi CR_{it} + \omega HB_{it} + \sum_{k=1}^{n} \beta_k Type_{kt} + \varepsilon_{it} \quad (6a)$$

where all the independent variables are defined consistently with equations (4) to (6) and the role of investor type j with respect to overall investors is the dependent variable. The results of the analysis are summarized by institutional investor type in Table 9.
Institutional ownership predictability among pension funds, hedge funds, investment advisors, and hedge funds/investment advisors is comparable to that in the full-sample analysis. The impact of home bias is, as for the full sample, on average, positive, but if we consider domestic and foreign investors separately, the impact is negative and statistically significant for the former and positive and statistically significant for the latter. The results are different only for foreign banks and trusts, which do not seem to be influenced by home bias, and for endowment funds and the residual category "other", for which home-bias characteristics are not relevant to either domestic or foreign investors.
The usefulness of the data on the investment strategies adopted by different types of institutional investors is analysed considering the differences in the returns achieved by REITs with higher exposure (fourth quartile) and lower exposure (first quartile). The results are tested considering both equally and value-weighted returns (Tables 10 and 11 respectively).
The results show that the strategy of investing in REITs characterized by higher institutional ownership fits the best if the analysis focuses on the strategy adopted by foreign banks and trusts or hedge funds and the results are better for the value-weighted portfolios

Table 9 – Institutional investors' ownership and REITs' features classified by type of Institutional investor

The table presents results of a panel regression analysis of the degree of institutional ownership with respect to REITs' features for the time horizon 2003 – 2015. The model assumes a REITs' type-specific effect

Investor type	Equation	IPO	Vintage	Size	CR	Home Bias	Constant	Type dummies	Observations	N° Reits	Overall R^2
Pension fund	(4a)	-0.0145	0.0006**	0.0008**	-0.0550**	0.0134*	0.0356**	☑	3072	377	6.57%
	(5a)	-0.0048	0.0006**	0.0003	-0.0409**	0.0238**	0.0117	☑	3072	377	7,09%
	(6a)	-0.0096	-0.0004	0.0008**	-0.0143**	-0.0107**	0.0240**	☑	3072	377	2.21%
Hedge fund	(4a)	0.0034	-0.0001	-0.0001**	-0.0489**	0.0178*	0.0180	☑	3072	377	5.34%
	(5a)	-0.0016	0.0002*	-0.0006**	-0.0433**	0.0217**	0.0018	☑	3072	377	8.24%
	(6a)	0.0001	-0.0003**	0.0005	-0.0078	-0.0005	0.0118	☑	3072	377	0.51%
Hedge fund / Investment advisor	(4a)	-0.0007	-0.0003	-0.0008	-0.1463**	0.0120	0.02262**	☑	3072	377	4.81%
	(5a)	-0.0135	-0.0019**	-0.0002**	-0.2078**	0.0585**	0.1388**	☑	3072	377	9.34%
	(6a)	0.0140	0.0017**	0.0001	0.0689**	-0.0410*	0.0806*	☑	3072	377	1.94%
Investment advisor	(4a)	0.0687*	-0.0016**	0.0001	-0.1885**	-0.0813**	0.5411**	☑	3072	377	2.56%
	(5a)	0.0446*	-0.0016**	-0.0001*	-0.1723**	0.1097**	0.1679**	☑	3072	377	6,54%
	(6a)	0.0254	-0.0004	0.0002*	-0.0207	-0.1834**	0.3753**	☑	3072	377	7.39%
Bank and trust	(4a)	-0.0152	-0.0003	-0.0002	0.0091	0.0257**	0.1448	☑	3072	377	0.70%
	(5a)	-0.0191	-0.0004*	0.0001	0.0264**	0.324**	-0.0015	☑	3072	377	1,90%
	(6a)	0.0025	0.0005**	0.0001	-0.0026	0.0036	-0.0058	☑	3072	377	0.82%
Endowment funds	(4a)	-0.0008	-0.0001	0.0001*	-0.0016*	0.0012*	-0.0009	☑	3072	377	1.10%
	(5a)	-0.0072	-0.0001	0.0001	-0.0014*	0.0010	-0.0006	☑	3072	377	0.84%
	(6a)	-0.0001	0.0001	0.0001**	-0.0002	0.0002	-0.0003	☑	3072	377	1.03%
Insurance companies	(4a)	-0.0221*	-0.0002	0.0002	0.0281**	0.0103*	0.0057	☑	3072	377	1.93%
	(5a)	-0.0177*	-0.0003*	0.0003	0.0222**	0.0091*	0.0065	☑	3072	377	1.99%
	(6a)	-0.0032	0.0001	-0.0001	0.0066	-0.0014*	-0.0004	☑	3072	377	0.87%
Others	(4a)	-0.0031	0.0003*	-0.0001	0.0129	-0.0035	0.0014	☑	3072	377	0.40%
	(5a)	0.0009	0.0001	-0.0001	0.0179*	0.0018	-0.0078	☑	3072	377	0.82%
	(6a)	-0.0006	0.0001	-0.0001	-0.0049*	-0.0025	0.0085*	☑	3072	377	0.65%

Source: Bloomberg data processed by the author

Table 10. Performance analysis of equally weighted portfolio for different types of Institutional investors

The table presents the difference of the average annual return of four equally weighted portfolios constructed considering percentage of ownership owned by institutional investors (1st Q portfolio considers REITs in the quartile with the lower percentage of ownership while 4thQ portfolio considers REITs in the quartile with the higher one). The analysis is performed considering the performance of all REITs (All) and the difference in average returns for the full sample and the sample of only home bias (ΔHB) or international diversified (ΔID) REITs.

Investor type	REIT Type	Gross return			Single factor model			Three factor model			Four factor model			Five factor model		
		All	HB	ID	All	HB	ID	All	HB	ID	All	HB	ID	All	HB	ID
Pension funds	IO	1,45%	1,20%	2,62%	0,38%	-0,03%	2,01%	-1,00%	-1,54%	1,07%	-0,98%	-1,53%	1,09%	-1,20%	-1,81%	0,96%
	DIO	0,68%	0,64%	0,64%	-0,35%	-0,49%	-0,03%	-1,81%	-2,06%	-1,10%	-1,77%	-2,02%	-1,07%	-2,04%	-2,32%	-1,25%
	FIO	1,54%	1,17%	2,99%	0,82%	0,34%	2,68%	0,04%	-0,49%	2,14%	0,04%	-0,49%	2,16%	-0,04%	-0,61%	2,15%
Hedge fund	IO	-0,16%	-0,73%	0,57%	-1,13%	-1,72%	-0,45%	-2,40%	-3,03%	-1,67%	-2,38%	-3,01%	-1,67%	-2,66%	-3,29%	-1,99%
	DIO	0,32%	-0,16%	1,66%	-0,75%	-1,24%	0,68%	-2,17%	-2,68%	-0,67%	-2,16%	-2,66%	-0,65%	-2,46%	-2,97%	-0,98%
	FIO	1,58%	1,92%	-0,24%	0,75%	1,18%	-1,30%	-0,31%	0,16%	-2,45%	-0,29%	0,19%	-2,47%	-0,53%	-0,03%	-2,75%
Hedge fund Investment advisor	IO	1,09%	0,15%	3,47%	0,24%	-0,77%	2,91%	-0,68%	-1,75%	2,17%	-0,66%	-1,73%	2,19%	-0,90%	-1,99%	2,03%
	DIO	0,50%	0,04%	0,92%	-0,14%	-0,61%	0,49%	-1,04%	-1,57%	-0,20%	-1,02%	-1,55%	-0,16%	-1,18%	-1,69%	-0,31%
	FIO	0,37%	-0,74%	1,95%	-0,08%	-1,12%	1,32%	-0,67%	-1,67%	0,61%	-0,66%	-1,66%	0,62%	-0,73%	-1,70%	0,48%
Investment advisor	IO	-1,13%	-1,81%	-0,53%	-1,75%	-2,47%	-0,92%	-2,36%	-3,09%	-1,33%	-2,35%	-3,09%	-1,32%	-2,49%	-3,25%	-1,39%
	DIO	-1,37%	-0,97%	-0,90%	-2,31%	-2,02%	-1,72%	-3,48%	-3,30%	-2,66%	-3,45%	-3,27%	-2,65%	-3,68%	-3,54%	-2,92%
	FIO	1,00%	0,58%	5,98%	0,97%	0,54%	5,13%	1,12%	0,73%	4,66%	1,10%	0,70%	4,61%	1,12%	0,71%	4,66%
Bank and trust	IO	1,53%	0,79%	4,04%	1,11%	0,32%	3,87%	0,43%	-0,40%	3,43%	0,44%	-0,39%	3,44%	0,42%	-0,44%	3,43%
	DIO	-0,21%	-0,22%	1,73%	-0,88%	-0,88%	1,34%	-1,78%	-1,74%	0,45%	-1,77%	-1,72%	0,48%	-1,89%	-1,84%	0,38%
	FIO	5,06%	4,22%	6,60%	5,19%	4,27%	7,06%	5,17%	4,21%	7,25%	5,18%	4,21%	7,26%	5,22%	4,21%	7,38%
Endowment funds	IO	2,81%	3,28%	8,64%	1,88%	2,40%	7,95%	0,62%	1,18%	6,84%	0,65%	1,20%	6,88%	0,39%	0,96%	6,63%
	DIO	1,97%	3,04%	4,43%	0,94%	2,08%	3,61%	-0,44%	0,76%	2,34%	-0,41%	0,79%	2,38%	-0,72%	0,51%	2,14%
	FIO	3,44%	3,09%	9,93%	3,57%	3,16%	9,79%	3,77%	3,29%	9,24%	3,79%	3,31%	9,02%	3,93%	3,46%	8,58%
Insurance companies	IO	1,72%	0,18%	5,52%	1,20%	-0,28%	4,94%	0,46%	-0,97%	4,12%	0,48%	-0,94%	4,13%	0,34%	-1,05%	3,92%
	DIO	2,63%	1,10%	6,67%	2,01%	0,50%	6,02%	1,13%	-0,34%	5,01%	1,15%	-0,32%	5,03%	0,98%	-0,46%	4,76%
	FIO	0,90%	0,10%	3,62%	0,22%	-0,60%	3,12%	-0,57%	-1,41%	2,46%	-0,57%	-1,41%	2,47%	-0,71%	-1,56%	2,35%
Others	IO	0,62%	0,01%	2,75%	0,18%	-0,46%	2,31%	-0,44%	-1,08%	1,66%	-0,43%	-1,08%	1,67%	-0,50%	-1,19%	1,63%
	DIO	2,21%	2,47%	3,12%	1,51%	1,92%	2,15%	0,54%	1,02%	1,06%	0,56%	1,05%	1,05%	0,37%	0,89%	0,78%
	FIO	1,13%	0,05%	2,48%	0,71%	-0,45%	2,13%	0,14%	-1,04%	1,56%	0,15%	-1,04%	1,59%	0,09%	-1,16%	1,56%

Source: Bloomberg data, processed by the authors.

Table 11. Performance analysis of value weighted portfolio for different types of Institutional investors

The table presents the difference of the average annual return of four equally weighted portfolios constructed considering percentage of ownership owned by institutional investors (1st Q portfolio considers REITs in the quartile with the lower percentage of ownership while 4thQ portfolio considers REITs in the quartile with the higher one). The analysis is performed considering the performance of all REITs (All) and the difference in average returns for the full sample and the sample of only home bias (ΔHB) or international diversified (ΔID) REITs.

Investor type	REIT Type	Gross return			Single factor model			Three factor model			Four factor model			Five factor model		
		All	HB	ID	All	HB	ID	All	HB	ID	All	HB	ID	All	HB	ID
Pension funds	IO	1,97%	0,10%	5,07%	1,15%	-1,24%	4,77%	-0,12%	-2,96%	4,04%	-0,09%	-2,95%	4,08%	-0,33%	-3,31%	3,97%
	DIO	0,46%	0,77%	0,86%	-0,50%	-0,12%	-0,01%	-1,96%	-1,67%	-1,24%	-1,93%	-1,61%	-1,22%	-2,26%	-1,90%	-1,53%
	FIO	1,76%	0,31%	4,83%	1,31%	-0,49%	4,82%	0,64%	-1,43%	4,52%	0,66%	-1,43%	4,56%	0,60%	-1,58%	4,58%
Hedge fund	IO	2,25%	1,16%	3,95%	1,15%	0,20%	2,82%	-0,36%	-1,29%	1,38%	-0,34%	-1,26%	1,39%	-0,71%	-1,59%	1,01%
	DIO	2,17%	1,93%	2,03%	1,11%	0,96%	0,96%	-0,40%	-0,55%	-0,49%	-0,39%	-0,53%	-0,47%	-0,75%	-0,85%	-0,85%
	FIO	2,60%	2,50%	2,30%	1,77%	1,75%	1,46%	0,64%	0,60%	0,45%	0,66%	0,63%	0,44%	0,35%	0,36%	0,13%
Hedge fund Investment advisor	IO	2,17%	0,50%	3,81%	1,45%	-0,44%	3,49%	0,50%	-1,63%	2,97%	0,53%	-1,60%	3,02%	0,28%	-1,91%	2,89%
	DIO	-0,92%	-0,89%	0,54%	-1,72%	-1,71%	-0,03%	-2,62%	-2,59%	-0,86%	-2,59%	-2,57%	-0,83%	-2,81%	-2,78%	-1,01%
	FIO	1,80%	0,41%	3,25%	1,43%	-0,11%	3,13%	0,90%	-0,74%	2,80%	0,92%	-0,73%	2,82%	0,81%	-0,88%	2,79%
Investment advisor	IO	0,06%	-0,94%	-1,70%	-0,72%	-1,71%	-2,35%	-1,41%	-2,34%	-2,96%	-1,40%	-2,35%	-2,95%	-1,60%	-2,54%	-3,09%
	DIO	1,76%	1,07%	3,26%	0,43%	-0,36%	1,78%	-1,13%	-2,12%	0,22%	-1,11%	-2,09%	0,25%	-1,49%	-2,46%	-0,17%
	FIO	-0,77%	-1,14%	4,99%	-0,67%	-1,06%	4,14%	-0,26%	-0,64%	3,90%	-0,29%	-0,68%	3,87%	-0,19%	-0,61%	4,07%
Bank and trust	IO	2,69%	0,88%	3,51%	2,20%	0,32%	3,27%	1,41%	-0,62%	2,80%	1,43%	-0,61%	2,84%	1,29%	-0,73%	2,71%
	DIO	1,45%	1,06%	2,74%	0,54%	0,28%	1,86%	-0,75%	-0,93%	0,56%	-0,73%	-0,89%	0,58%	-1,00%	-1,09%	0,28%
	FIO	4,81%	3,22%	5,66%	4,84%	2,98%	6,25%	4,64%	2,58%	6,51%	4,64%	2,56%	6,55%	4,60%	2,45%	6,64%
Endowment funds	IO	3,18%	2,66%	4,52%	2,58%	1,93%	4,18%	1,61%	0,83%	3,41%	1,62%	0,83%	3,46%	1,41%	0,60%	3,28%
	DIO	2,10%	1,25%	3,06%	1,34%	0,36%	2,52%	0,19%	-0,91%	1,57%	0,21%	-0,90%	1,63%	-0,03%	-1,15%	1,44%
	FIO	2,18%	1,63%	6,26%	2,66%	2,18%	6,29%	3,38%	2,92%	7,10%	3,39%	2,94%	6,91%	3,58%	3,19%	6,73%
Insurance companies	IO	3,03%	0,76%	6,13%	2,44%	0,12%	5,76%	1,51%	-0,92%	5,12%	1,53%	-0,89%	5,14%	1,34%	-1,09%	4,99%
	DIO	3,92%	2,32%	6,68%	3,40%	1,75%	6,24%	2,43%	0,70%	5,38%	2,45%	0,74%	5,40%	2,26%	0,57%	5,16%
	FIO	2,07%	0,82%	4,20%	1,45%	0,03%	3,90%	0,69%	-0,88%	3,40%	0,69%	-0,89%	3,42%	0,50%	-1,12%	3,31%
Others	IO	1,39%	1,42%	2,04%	0,96%	1,00%	1,84%	0,25%	0,26%	1,33%	0,25%	0,27%	1,35%	0,11%	0,11%	1,29%
	DIO	1,92%	2,75%	2,10%	1,41%	2,43%	1,41%	0,56%	1,68%	0,42%	0,57%	1,71%	0,41%	0,32%	1,52%	0,11%
	FIO	1,88%	0,99%	2,53%	1,38%	0,28%	2,40%	0,65%	-0,65%	1,99%	0,65%	-0,66%	2,02%	0,49%	-0,89%	1,98%

Source: Bloomberg data processed by the author

4. Conclusion

Institutional investors are the main investors in REITs worldwide and their role is more important in more developed markets (America and Europe) whereas, in less developed markets, (Africa) their role can be even less important than that of individual investors. Among institutional investors, the role of domestic players is greater than that of international players, even if foreign interest in home-biased REITs has been increasing over time. Home-biased REITs are more interesting for domestic institutional investors, while institutional foreigners prefer to invest in internationally diversified REITs. Considering the return of the investment strategy, all institutional investors are capable of picking stocks among home-biased REITs, but foreigners outperform them all.

The results are relevant to all REIT investors looking for the best investment opportunities in the market and who want to adopt a herding strategy with respect other institutional investors in order to take advantage of their informational advantage (e.g. Lantushenko and Nelling, 2017). The investment strategy based on institutional portfolio holdings normally suggest to overweight assets owned by this type of investors and reduce the exposure on assets that are not bought by investors that are assumed to have an information advantage. Herding strategies are expected to perform at their best by focusing on the foreigners' investment choices, which, on the basis of the results, seems to be more effective ex post with respect to the results realized by all domestic players.

The greater capability of foreign institutional investors to invest only in the best home-biased REITs is inconsistent with the standard assumption proposed in the literature, that home bias familiarity drives the choice of real estate investment vehicle (e.g. Imazeki and Gallimore, 2009). Stock picking selection could be affected by the type of foreign institutional investors investing abroad, but a more detailed analysis of investor characteristics is necessary to generalize the results to all types of investors, independent of their risk profiles, investment horizons and amount of money invested in the REIT.

References

An H., Wu Q. and Wu Z. (2016), "REIT Crash Risk and Institutional Investors", *Journal of Real Estate Finance and Economics*, vol. 53, n. 4, pp 527–558

Below S. and Stansell S. (2000), "The Determinants of REIT Institutional Ownership: Tests of the CAPM", *Journal of Real Estate Finance and Economics*, vol. 21, n. 3, pp. 263-279.

Below S. and Stansell S. (2003), "Do the individual moments of REIT return distributions affect institutional ownership patterns?", *Journal of Asset Management*, vol. 4, n. 2, pp. 77-95.

Below S.D., Stansell S.R. and Coffin M. (2000), "Institutional investment in REIT Common Stocks: An examination of the prudent man investment hypothesis", *Journal of Real Estate Portfolio Management*, vol. 6, n. 2, pp. 113-130.

Brockman P., French D.W. and Tamm C. (2014), "REIT Organizational Structure. Institutional Ownership. and Stock Performance", *Journal of Real Estate Portfolio Management*, vol. 20, n. 1, pp. 21-36.

Chan S.H., Leung W.K. and Wang K. (1998), "Institutional Investment in REITs: Evidence and Implications", *Journal of Real Estate Research*, vol. 16, n. 3, pp. 357-374.

Ciochetti B.A., Craft T.M. and Shilling J.D. (2002), "Institutional Investors' Preferences for REIT Stocks", *Real Estate Economics*, vol. 30, n. 4, pp. 567–593.

Chung R., Fung S., and Hung S.Y.K. (2012), "Institutional Investors and Firm Efficiency of Real Estate Investment Trusts", *Journal of Real Estate Finance and Economics*. vol. 45, n. 1, pp. 171-211.

Chung R., Fung S., Shilling J.D., and Simmons-Mosley T.X. (2007), "Are Hedge Fund Managers Better Able to Forecast Real Estate Security Returns than Others?", *Journal of Portfolio Management*, vol. 33, n. 5, pp. 165-174.

Carhart M.M. (1997), "On Persistence in Mutual Fund Performance", *Journal of Finance*, vol. 52, n.1, pp. 57-82.
Damodaran A. and Liu C.H. (1993), "Insider Trading as a Signal of Private Information", *Review of Financial Studies*, vol. 6, n. 1, pp. 79-119.
Devos E., Ong S.E., Spieler A.C. and Tsang D. (2013), "REIT Institutional Ownership Dynamics and the Financial Crisis", *Journal of Real Estate Finance and Economics*, vol. 47, n. 2, pp. 266-288.
Downs D.H. (1998), "The Value in Targeting Institutional Investors: Evidence from the Five-or-Fewer Rule Change", *Real Estate Economics*, vol. 26, n. 4, pp. 613–649.
Eakins S.G., Stansell S.R. and Wertheim P.E. (1998), "Institutional portfolio composition: an examination of the prudent investment hypothesis", *Quarterly Review of Economics and Finance*, vol. 37, n. 2, pp. 33-47.
Fama E. and French K. (1993), "Common Risk Factors in the Returns on Stocks and Bonds", *Journal of Financial Economics*, vol. 33, n. 1, pp. 3-56.
Fama E. and French K. (2015), "A five-factor asset pricing model", *Journal of Financial Economics*, vol. 116, n. 1, pp. 1-22.
Feng Z., Ghosh C. and C. Sirmans (2006), "Changes in REIT Stock Prices. Trading Volume and Institutional Ownership Resulting from S&P REIT Index Changes", *Journal of Real Estate Portfolio Management*, vol. 12, n. 1, pp. 59-71.
Feng. Z., McKay Price S. and Sirmans C.F. (2011), "An overview of Equity Real Estate Investment Trusts (REITs): 1993-2009", *Journal of Real Estate Literature*, vol. 19, n. 2, pp. 307-343.
Ghosh C., Nag R. and Sirmans C.F. (2000), "The Pricing of Seasoned Equity Offerings: Evidence from REITs", *Real Estate Economics*, vol. 28, n. 3, pp. 363–384.
Gibilaro L., and Mattarocci G. (2016), "Are Home-biased REITs Worthwhile?", *Journal of Real Estate Portfolio Management*, vol. 22, n. 1, pp. 19-30.
Hartzell S., and Titman S. (2006), "The Effect of Corporate Governance on Investment: Evidence from Real Estate Investment Trusts", *Real Estate Economics*, vol. 34, n. 3, pp. 343–376.
Imazeki T. and Gallimore P. (2009), "Domestic and Foreign Bias in Real Estate Mutual Funds", Journal of Property Research, vol. 26, n.4, pp. 367–89.
Lantushenko V. and Nelling E. (2017), "Institutional Property-Type Herding in Real Estate Investment Trusts", *Journal of Real Estate Finance and Economics*, vol. 54, n. 4, pp. 459-481
Ling D.C. and Ryngaert M. (1997), "Valuation uncertainty. institutional involvement. and the underpricing of IPOs: The case of REITs", *Journal of Financial Economics*, vol. 43, n. 3, pp. 433–456.
Sharpe W.F. (1964), "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk", *Journal of Finance*, vol. 19, n. 3, pp. 425-442.
Striewe N., Rottke N. and Zietz J. (2013), "The Impact of Institutional Ownership on REIT Performance", *Journal of Real Estate Portfolio Management*, vol. 19, n. 1, pp. 17-30.
Wang K., Chan S.H. and Gau G.W. (1992), "Initial public offerings of equity securities: Anomalous evidence using REITs", *Journal of Financial Economics*, vol. 31, n. 3, pp. 381-410.
Wang K., Erickson J., Gau G. and Chan S.H. (1995), "Market microstructure and real estate returns", *Journal of Real Estate Economics*, vol. 23, n. 1, pp. 85-100.
Zhou. X. and Sah V. (2009), "Does Home Expertise Exist in Equity REITs?", *Journal of Real Estate Portfolio Management*, vol. 15, n. 3, pp. 281–88.