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Intermediated investment management in private markets: Evidence from pension fund investments in real estate ☆

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ABSTRACT

We evaluate the economics of financial intermediation in alternative assets by investigating the allocation and performance of pension fund investments in real estate, the most significant alternative asset class for institutional investors. We document substantial heterogeneity in real estate investment cost and performance, determined by two main factors: mandate size and investment approach. Larger pension funds are more likely to invest in real estate internally, have lower costs, and higher net returns. Smaller pension funds invest primarily in direct real estate through external managers and fund-of-funds, and disregard listed property companies. Overall, we find that delegating real estate investment management to financial intermediaries increases costs and disproportionally reduces returns.

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1. Introduction

Over the last decade, institutional investors have significantly increased their exposure to alternative assets. For instance, pension funds increased their exposure to real estate, private equity, hedge funds, infrastructure, and commodities from 9% in 1990 to 16% in 2010 (Andonov, Bauer, and Cremers, 2012), while university endowment funds increased the allocation to alternative assets from 7% in 1989 to 19% in 2005 (Brown, Garlappi, and Tiu, 2010). The markets for these private assets are generally less transparent than public markets, and institutional investors face significant fixed costs related to learning, understanding, and monitoring the investments.

To achieve superior returns in private markets, gathering information about specific assets and capitalizing on the acquired informational advantage requires a high level of specialization. This induces the majority of institutional investors to select external investment managers who are specialized in a single asset class, and to delegate portfolio decisions to these specialists (Blake, Rossi, Timmermann, Tonks, and Wermers, 2013). However, delegated investment management can cause misalignment of objectives between institutional investors and their external managers, including loss of diversification, unobservable managerial appetite for risk, and different investment horizons (Sharpe, 1981; Binsbergen, Brandt, and Koijen, 2008).

Institutional investors can prevent these agency conflicts by employing well-qualified specialized asset managers to work in their internal investment divisions, but they face high costs to attract human capital and to collect market information. Indeed, over time pension funds have increased their allocation to external managers and fund-of-funds at the expense of in-house asset managers. Investor movement towards delegated portfolio managers in the private market is rational, if financial intermediaries are able to deliver higher returns than internal managers. However, hiring external investment managers does not necessarily ensure better performance (Brown, Goetzmann, and Liang, 2004; Chen, Hong, Jiang, and Kubik, 2013), which may be due to coordination problems and, importantly, higher fees. Indeed, it has been argued that the increased prevalence of delegated asset management is simply due to pension funds shifting responsibility for potentially poor performance to external managers and fund-of-funds (Lakonishok, Shleifer, and Vishny, 1992).

This paper contributes to the literature on financial intermediation and investment performance, as well as to the literature on alternative assets. We focus on the allocation and performance of pension funds in real estate investments, which is the most significant alternative asset class for institutional investors.[1] Real estate offers unique possibilities to explore the role of intermediated investment management.

First, real estate is the alternative asset class with most heterogeneity in the implemented investment approach. On the one hand, internal management (i.e., direct selection of properties or REITs, without intermediaries) accounts for a significant part of pension fund assets. On the other hand, in addition to delegating investments to external managers, pension funds increasingly use fund-of-funds, which yields an additional layer of intermediation. Internal management is also possible in private equity, but this approach is significantly less common,[2] whereas for investments in hedge funds, internal management is almost impossible and the choice of investment approach is limited to external managers or fund-of-funds. The heterogeneity in investment approach allows us to assess its importance for performance outcomes, which has hardly been addressed in the private equity literature. Fang, Ivashina, and Lerner (2013) study the internal investments made by seven large pension funds, but otherwise, the private equity literature is focused solely on delegated investment management. For real estate, many pension funds have deep and broad experience in internal management, so we can make a viable comparison between investment approaches for a significant number of pension funds.

[1] For example, all properties in the most widely used U.S. private real estate index, the NCREIF Property Index (representing more than $315 billion in 2012), have been acquired, at least in part, on behalf of tax-exempt institutional investors – the great majority of which are pension funds. Outside of the U.S., pension funds constitute more than 60% of the investors in the IPD U.K. property database (Bond and Mitchell, 2010), the main U.K. private real estate index.

[2] According to the CEM database, on average, only 11% of the private equity investments are managed internally, while in real estate the internal investment approach accounts for 19% of the assets (http://www.cembenchmarking.com/Default.aspx).

Second, addressing real estate allows us to study a much larger sample than what is common in the general private equity and intermediation literature,[3] and a sample with much more heterogeneity in asset size (the average real estate holding is $716 million, with a standard deviation of $1,728 million). Moreover, we investigate performance in the longer run, as the sample period of 22 years is considerably longer than the typical life of a real estate private equity fund. The performance figures thus mostly reflect realized cash flows from deals and funds that have completed the fund life cycle.

Third, the literature on private equity performance almost exclusively addresses the United States, while we take a distinctively global perspective, investigating the performance of pension funds in the U.S., Canada, Europe, and Australia/New Zealand. This is important, as the results for the U.S. differ significantly from the results for the other regions, which implies that broader generalizations based on studies of the U.S. alone are inaccurate.

Last, we take the perspective of the institutional investor, demonstrating the actual bottom-line performance, instead of examining the private equity, hedge fund, or real estate industry in isolation. The performance of institutional investors is affected by costs, entry and exit barriers, the timing of in- and outflows, and other issues that usually do not show up in single asset class studies, but that are relevant for the investors in these funds.

We use the CEM dataset, the broadest global database on pension fund investments. This unique database contains data for almost 1,000 defined benefit pension funds across the world over the 1990–2011 period. The assets under management of these funds exceeded $6.4 trillion in 2011.[4] The CEM database provides extensive coverage of both direct real estate investments and REIT holdings. For instance, the aggregate pension fund holdings of private commercial real estate in the database add up to more than $360 billion in 2011, which represents 32% of the aggregate market value of the IPD Global Property Index (and equals the total market value of the U.S. NCREIF Property Index). REIT holdings of pension funds covered by CEM in 2011 equal some $60 billion, which corresponds to 10% of the FTSE EPRA/NAREIT Global Index in that year.

Our results show that about 74% of the pension funds in the CEM database invest in real estate, allocating on average 5.5% of pension fund assets (average allocations to private equity and hedge funds are 3.7% and 3.1%, respectively). Once pension funds decide to invest in real estate, they have to make two choices. First, they have to decide on the real estate investment approach. Funds typically employ three investment approaches: internal management, external management, and investing through fund-of-funds. We document that just 18% of real estate investments are managed internally by pension funds. Larger pension funds are more likely to invest internally, whereas smaller funds are more likely to rely on intermediaries, investing externally or through fund-of-funds. However, even among the largest quintile of pension funds, with on average $40 billion in assets under management, only 42% of the funds manage direct real estate or REIT portfolios internally. Importantly, pension funds with greater allocation to other alternative asset classes, like private equity and hedge funds, are more likely to invest in real estate through financial intermediaries, suggesting that internal management can be viewed as a more specializing approach.

Second, funds select the investment subcategory: direct real estate investments or investments in REITs. Although listed REITs provide liquid and scalable property exposure, which should make these vehicles attractive to smaller investors, we document that larger funds are in fact more likely to invest in REITs. Allocations to REITs are mostly implemented as complementary investments to the direct real estate holdings of larger pension funds.

The choice of investment subcategory and approach has significant effects on the costs and performance of pension fund investments in real estate. On average, pension funds pay fees of 79 bps

[3] For example, Lerner, Schoar, and Wongsunwai (2007) study the private equity investments of 352 limited partners, 132 of them are pension funds, during the 1991–1998 period, while Harris, Jenkinson, and Kaplan (2014) examine the private equity performance of over 200 institutional investors from 1984 to 2008. Studying the relation between intermediaries and performance in hedge funds, Agarwal, Nanda, and Ray (2013) examine a sample of 336 institutions. We analyze the real estate investments of 755 pension funds from 1990 to 2011.

[4] CEM collects data from pension funds investing in multiple asset classes and the data have been used previously by French (2008) to study the cost of active investing, and by Andonov, Bauer, and Cremers (2012) to examine the asset allocation, market timing, and security selection skills of pension funds.

for investments in real estate, which are higher for direct real estate (86 bps) and lower for REITs (43 bps). Even though our cost figures do not include the performance fees (which are subtracted directly from returns in the CEM database), real estate investment fees are substantially lower than fees for investments in private equity and hedge funds. Phalippou (2009) and Metrick and Yasuda (2010) estimate that the average private equity buyout fund charges fees of more than 7% per year (the annual management fee alone is 2% of capital commitments). For hedge funds, French (2008) documents that the average annual fee is 4.26% of assets (the management fee alone is 1.16%) over the 1996–2007 period, and for funds-of-hedge-funds, the average fees are even higher.

We find strong economies of scale in the costs of real estate investments: doubling the size of a real estate mandate reduces the annual costs by 10 bps. Importantly, we document that larger pension funds are not only able to organize internal mandates more efficiently, but also negotiate lower fees with external investment managers. Financial intermediation through external management and fund-of-funds considerably increases the overall investment costs. A fund that invests internally has 29 bps lower investment costs than a fund that invests through external managers. Investing through fund-of-funds increases the costs by 144 bps.

On a net benchmark-adjusted basis, we find that pension funds generally meet the thresholds of their benchmarks. However, there is substantial heterogeneity in the investment returns of pension fund allocations to real estate. We document that larger funds obtain higher net benchmark-adjusted returns: doubling the size of real estate holdings increases returns by 33 to 50 bps. We observe these economies of scale both among REIT investments and direct real estate investments. In addition, larger funds have a better performance in their internal as well as external mandates. These results show that larger pension funds not only invest more efficiently internally, but can also select and retain better external managers.

The investment approach has an even stronger effect on performance. When controlling for size and costs, pension funds investing through internal asset management divisions obtain 138 bps higher net benchmark-adjusted returns than funds that delegate the asset management to external managers. Moreover, investing through fund-of-funds results in a 201 bps lower return. Overall, financial intermediation through externally delegated asset management in real estate investments results in significant underperformance.

Our results on the effect of investment approach on performance in alternative assets are in line with the theoretical model of financial intermediation by Stoughton, Wu, and Zechner (2011), where high net-worth institutions do not invest through fund-of-funds and achieve superior returns, because underperforming assets are only sold indirectly, through fund-of-funds. Our findings also complement the empirical evidence on the agency conflicts and inferior investment performance resulting from intermediation among equity mutual funds (e.g., Bergstresser, Chalmers, and Tufano, 2009; Chen, Hong, Jiang, and Kubik, 2013).

The economies of scale in pension fund performance in real estate contrast the diseconomies of scale that have been documented for equity mutual funds (Chen, Hong, Huang, and Kubik, 2004), but are in line with the evidence on private equity funds and hedge funds. Kaplan and Schoar (2005) document a concave relation between fund size and performance of private equity funds, whereas Agarwal, Nanda, and Ray (2013) find that larger institutions invest more directly instead of using funds of hedge funds, and outperform the smaller institutions.

Our findings have some general implications for the investment management industry. In line with Lakonishok, Shleifer, and Vishny (1992) and Goyal and Wahal (2008), we conclude that pension funds should avoid extended intermediation chains, like fund-of-funds, and could benefit from considering the full range of investment approaches. Especially larger investors should evaluate the possibility of investing internally. The findings also show that portfolio size provides economies of scale and negotiating power with respect to cost and access to better investment opportunities. Smaller pension funds should therefore reconsider their approach to real estate investments, substituting direct holdings with REITs and specializing in one alternative asset class, instead of simultaneously investing in multiple alternative assets.

The remainder of this paper is organized as follows. In the next section, we describe the institutional marketplace for investments in alternative assets. We introduce the dataset used in this paper in Section 3. In Section 4, we investigate the choices pension funds make in their real estate

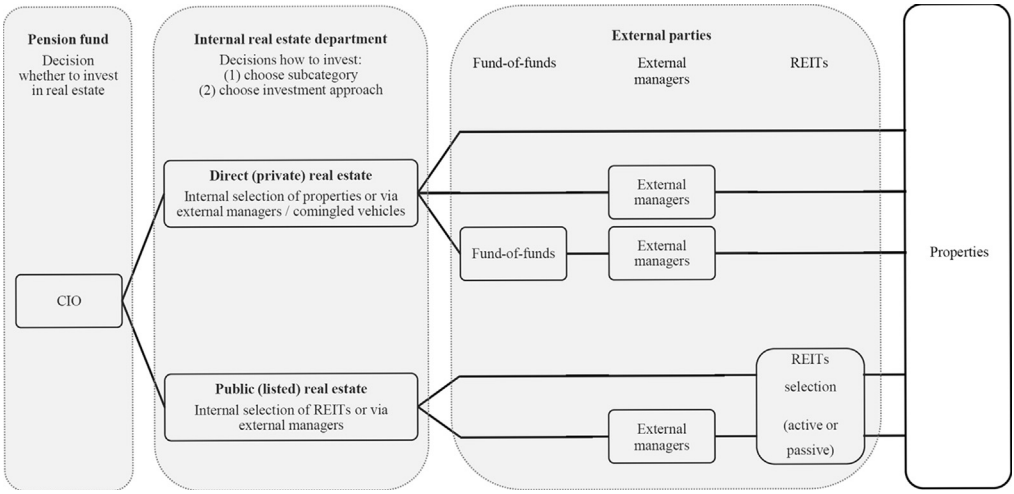

Fig. 1. How pension funds invest in real estate: the institutional marketplace and the investment process.

investments, and address the use of internal versus external investments, the use of fund-of-funds and REITs, and the pension fund characteristics related to these choices. In Section 5, we examine the investment costs that pension funds face when choosing different investment approaches in real estate. In Section 6, we focus on the performance of the real estate holdings, investigating the relation between the benchmark-adjusted returns of pension funds and their investment choices and size, and determining performance persistence. The paper ends with a conclusion and discussion.

2. How institutional investors invest in real estate

Thus far, academic research has focused predominantly on the risk-return characteristics of real estate in a mixed-asset portfolio. Compared to typical portfolio models, predicting about 10–20% of allocations to real estate (e.g., Friedman, 1971; Kallberg, Liu, and Greig, 1996), institutional investors generally have more modest allocations to private and public real estate investments. In this section, we explain the institutional marketplace and the investment process for institutional investors considering an allocation to real estate. Fig. 1 provides a stylized chart of the decision process and financial intermediation layers that investors face when investing in real estate.

The first decision is whether an institutional investor includes real estate in the strategic asset allocation. Institutional investors seeking exposure to real estate can invest in debt-type assets and equity-type assets. Debt-type assets include private commercial real estate debt (whole loans or mortgages) and commercial mortgage-backed securities. The debt real estate assets are usually part of a broader fixed income portfolio and are not the focus of this paper. Our analysis covers real estate equity investments, which are generally organized as separate mandates in a pension fund portfolio. There are two subcategories of real estate equity assets: direct (private) commercial real estate and listed (public) real estate equity, in many countries structured as real estate investment trusts (REITs), or an equivalent legal structure.

After deciding to invest in real estate directly, through REITs, or using a combination, a pension fund selects an investment approach. Investing in direct (private) real estate can be executed internally or can be outsourced to third-party fund managers. If a fund decides to invest in direct real estate internally, it typically establishes a separate or "at-arms-length" division.[5] When outsourcing

[5] Internal investing means that the buy–sell decisions for individual properties are made within the organization (including wholly-owned subsidiaries).

the investment decision, institutional investors can directly select the external managers (funds) or invest via fund-of-funds.[6] In the latter case, the fund-of-funds manager selects the external managers (funds), who then acquire the assets.

Investing in public real estate securities requires selection of REITs, which can be outsourced to external investment managers, or can be executed internally by the pension fund. REIT investments can also be classified as passive if they replicate a broad capital market benchmark (e.g., the FTSE/NAREIT Index) or are dedicated to matching a specific set of liabilities (i.e., if REIT investments are part of a strategic asset allocation designed to match fund-specific liabilities).

Overall, an institutional investor directly trades properties only if that institution internally invests in direct real estate. External investing in direct real estate and REITs creates additional intermediation layers between the pension fund and the assets. Fig. 1 illustrates these additional layers. The involvement of third-party intermediaries potentially creates principal-agent conflicts and increases the investment costs, as each intermediation layer leads to additional fees. However, not all approaches that delegate investments create similar agency problems. REITs, for example, are listed on the stock market, which not only increases transparency and liquidity, but also lowers investment costs. In addition, the institutional design of REITs may reduce agency conflicts, for example by mandatory dividend distributions (Bauer, Eichholtz, and Kok, 2010b). External investing in direct real estate demands strong monitoring capacities from the investor, especially in the absence of a stock market to mitigate potential agency conflicts. In addition, the costs for external investments in private real estate are typically higher, because they incorporate management fees as well as performance fees. Investing through fund-of-funds adds another layer of both management and performance fees. Hence, when delegating investments in private real estate assets, pension funds need more skills as compared to investments in public equities and fixed income, in order to select and monitor the external parties. See Lakonishok, Shleifer, and Vishny (1992), Goyal and Wahal (2008), and Stoughton, Wu, and Zechner (2011) for an elaborate discussion of agency problems in the investment management industry.

3. Data

3.1. The CEM database

We use the defined benefit pension fund data collected by CEM Benchmarking Inc. Pension funds included in the CEM database had more than $6.35 trillion of assets under management in 2011 and covered around 40% of global defined benefit pension fund assets (which is also more than 20% of total global pension fund assets).[7] Over the 1990–2011 period, the U.S. pension funds included in the dataset controlled more than 40% of the total assets under management by the U.S. defined benefit pension fund sector. Canadian pension funds included in the CEM database held approximately 80–90% of the total assets under management by Canadian pension funds. The CEM database also covers a smaller percentage of, mostly larger, European, Australian, and New Zealand pension funds. Table 1 presents the number of pension funds in the CEM database, the number of funds investing in real estate, and the average size of these funds. To our knowledge, this is the broadest global database on pension fund asset allocation and performance available for academic research.

The CEM database contains detailed information on each fund's annual asset allocation decisions, self-declared benchmarks for each asset class, and precise cost structure and performance data for all separate asset classes and their benchmarks. While CEM collects data from pension funds investing in multiple asset classes, we solely focus on real estate allocations in this paper. In the data, real estate

[6] External investing also incorporates real estate limited partnerships. The limited partnerships are investments in real estate funds that focus on the active management of properties, ranging from moderate reposition or releasing of properties to development or extensive redevelopment. These funds typically have a fixed life span during which properties are acquired, actively managed, and then sold. This category includes value added and opportunistic partnerships.

[7] The comparison is based on the Towers Watson Global Pension Assets Study 2012 (http://www.towerswatson.com/en/Insights/IC-Types/Survey-Research-Results/2012/01/Global-Pensions-Asset-Study-2012).

includes assets invested in direct real estate holdings, segregated real estate holdings, real estate limited partnerships, and REITs.[8]

The CEM database provides a broad and complete perspective on the choices and outcomes of pension fund real estate allocations. Using data at the pension fund level rather than real estate only datasets (like those offered by NCREIF, IPD, or NAREIT) provides some unique insights into the allocation decisions, costs, and returns of real estate investments. First, pension fund returns reflect the costs of real-life constraints involved in real estate investments, such as commitment periods and delays on the withdrawal of capital that external parties impose. Second, pension fund returns reflect the costs of managing a portfolio of underlying real estate investments in private, public or both real estate subcategories, as the returns are reported net of an additional layer of fees. Third, the CEM data incorporates returns in both public and private real estate investments, taking into account the time trend in weights assigned to both subcategories. Focusing on either NCREIF or NAREIT data does not reflect the overall real estate portfolio of an institutional investor, and does not provide insight into the allocation choices that institutional investors face within their real estate allocation.

As reporting to CEM is voluntary, the data are potentially vulnerable to self-reporting bias. Andonov, Bauer, and Cremers (2012) address the self-reporting issue by constructing a Cox proportional hazard model. They test whether the decision of a particular fund to exit the database is related to its returns (from all asset classes), costs or size. The results show that the database does not suffer from self-reporting bias with respect to costs and returns, though larger funds are more likely to survive in the CEM database.[9]

Table 1 shows that, on average, 73.6% of the pension funds in the CEM database invest in real estate. In Europe and Australia/New Zealand this percentage is higher, which may be due to the database covering fewer, mostly large funds. In Canada, the percentage of funds investing in real estate decreases over time, from 75.5% in 1990 to 61.4% in 2011.

During the 1990–2011 period, pension fund real estate holdings increased substantially and their total value amounted to more than $434 billion in 2011. In line with Pagliari, Scherer, and Monopoli (2005), we find that pension funds favor private real estate investments over REITs. In 2011, pension fund holdings in direct real estate were more than $360 billion and the holdings in REITs were around $60 billion.[10]

3.2. Real estate allocation and investment approach

Including all pension funds in the database, real estate represents on average 4.0% of pension fund assets. This compares to a 2.0% allocation to private equity and a 1.1% allocation to hedge funds. When we focus just on pension funds investing in real estate, these funds allocate, on average, 5.5% of their assets to real estate. Fig. 2 shows that real estate assets as a percentage of total pension fund total assets were higher at the beginning of the sample period and picked up again after 2000. Real estate investments represented 6.5% of the total assets by 2011.

Panel A of Table 2 shows that there is substantial variation in the allocation to real estate assets across regions. Fund size and geography are important determinants of this heterogeneity. European and Australian/New Zealand funds are substantially larger and their real estate holdings, in dollar terms, are more significant than the holdings of U.S. and Canadian funds. In Panel B of Table 2, we observe the size of the real estate investments by subcategory. The size of REIT mandates is comparable to the size of direct real estate mandates, but the number of pension funds that invest in

[8] REIT investments are reported separately in the CEM database – CEM explicitly asks pension funds to split REIT investments from the small cap equity mandate. Some pension funds may not be able to filter out REITs from passive index investments, and our results may thus slightly understate actual allocations to REITs.

[9] Bauer, Cremers, and Frehen (2010a) also address the self-reporting bias by matching the CEM data with the Compustat SFAS data. They test whether the decision to stop reporting is related to the overall fund performance, but the results indicate that there is no evidence of a self-reporting bias related to performance in the exiting and entering years.

[10] A minor part of pension fund real estate holdings is classified as “other real assets,” which captures investments that could not be classified as direct real estate or REITs. For instance, a building owned by the pension fund and used as office space by the fund, but also partially leased to other tenants for a rent, will be classified as such. Other real assets also capture investments in raw land.

Table 1
The CEM database.

This table presents the number of pension funds in the CEM database by year (#Funds in data) and the number of pension funds in the CEM database investing in real estate (#Funds in RE). The Avg. Size column shows the average total assets under management (in billion US$) of the pension funds in the database. The last raw (Total) reports the total number of funds in the CEM database and the total number of pension funds investing in real estate.

Year	All funds			U.S.			Canada			Europe			Aus/Nzd		
	#Funds in data	#Funds in RE	Avg. Size	#Funds in data	#Funds in RE	Avg. Size	#Funds in data	#Funds in RE	Avg. Size	#Funds in data	#Funds in RE	Avg. Size	#Funds in data	#Funds in RE	Avg. Size
1990	88	70	4.93	35	30	9.46	53	40	1.94						
1991	124	101	4.55	63	52	7.28	61	49	1.72						
1992	164	130	4.59	83	68	7.45	81	62	1.66						
1993	220	161	4.27	134	100	5.92	86	61	1.71						
1994	269	202	3.78	168	128	4.85	98	71	1.58	3	3	15.41			
1995	298	224	4.42	192	152	5.64	102	68	1.75	4	4	13.96			
1996	296	211	4.85	185	139	6.22	105	66	2.03	6	6	11.90			
1997	273	202	5.96	168	131	7.73	97	63	2.58	8	8	9.77			
1998	286	202	6.78	174	133	9.11	104	62	2.51	8	7	11.60			
1999	306	208	8.15	182	137	10.41	110	59	2.54	14	12	22.80			
2000	285	202	9.06	164	125	12.02	104	62	2.86	15	13	20.59	2	2	2.05
2001	294	200	8.56	176	125	10.56	99	58	3.00	17	15	20.98	2	2	2.13
2002	274	184	8.37	156	112	10.80	98	55	2.64	16	14	21.29	4	3	2.19
2003	279	190	9.23	158	118	11.02	96	53	3.10	20	15	25.46	5	4	5.22
2004	287	209	10.66	167	132	12.18	95	56	3.79	18	15	34.52	7	6	6.23
2005	297	216	11.63	156	126	13.09	106	61	4.90	25	20	32.53	10	9	7.88
2006	291	217	14.43	147	121	15.79	102	59	6.70	29	25	37.09	13	12	9.19
2007	356	261	14.05	218	168	12.76	99	58	7.84	28	25	47.79	11	10	9.59
2008	370	282	13.39	213	161	12.62	90	61	8.46	58	52	24.41	9	8	9.87
2009	353	262	13.32	204	154	12.52	93	56	7.01	50	47	27.90	6	5	16.98
2010	357	266	15.23	204	160	14.25	93	50	9.30	55	52	28.86	5	4	15.63
2011	362	287	17.54	198	161	16.77	83	51	10.95	75	69	26.42	6	6	22.84
Total	978	755		573	444		250	168		136	125		19	18	

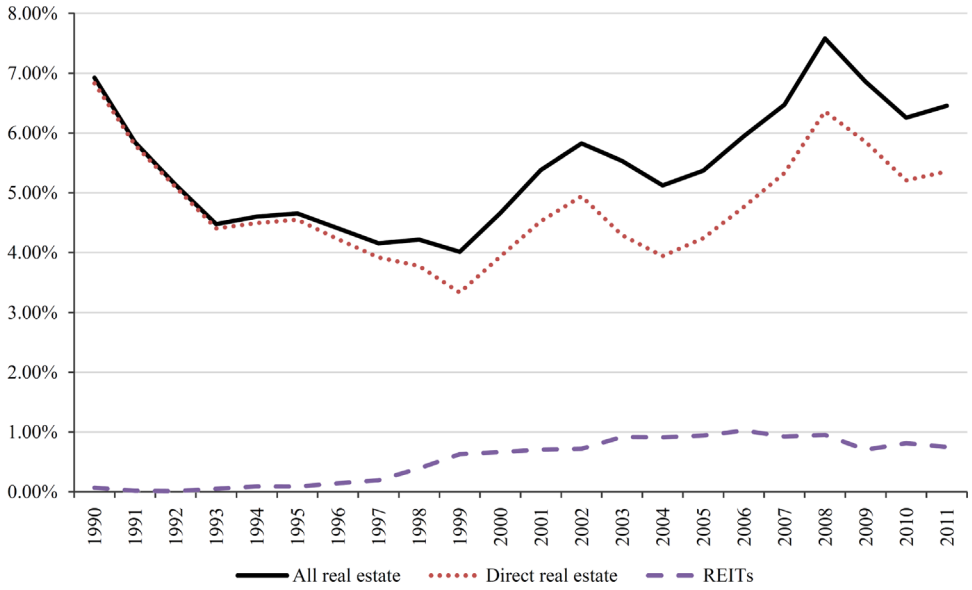

Fig. 2. Real estate as a percentage of total pension fund assets.

Table 2
Descriptive statistics: real estate holdings.

This table provides descriptive statistics of pension fund investments in real estate. We present the time series averages of cross-sectional statistics for the 1990–2011 time period, showing the following statistics: median, mean, and standard deviation (StDev). Columns # Funds and # Obs present the number of funds investing in real estate or in one of the subcategories and the number of observations. Panels A, B, and C display the summary statistics of real estate holdings in million US$. In Panel A, the real estate assets descriptive statistics are presented separately for U.S., Canadian, European, and Australian/New Zealand funds. In Panel B, we split the real estate investments into two subcategories: real estate investment trusts (REITs) and direct real estate. Panel C presents the real estate holdings summary statistics by investment approach. For internal and external statistics, we use the entire period 1990–2011. Fund-of-funds exist in the data since 1995 and we present the time series averages of cross-sectional statistics for the 1995–2011 period.

	Median	Mean	StDev	# Funds	# Obs
Panel A: Real estate holdings in million US$					
All funds	129	716	1,728	755	4,487
U.S.	156	694	1,512	444	2,733
Canada	59	492	1,302	168	1,281
Europe	1,005	2,265	3,696	125	402
Aus/Nzd	718	887	775	18	71
Panel B: Real estate holdings by subcategory in million US$					
REITs	96	341	1,235	246	1,109
Direct real estate	123	644	1,413	716	4,192
Panel C: Real estate holdings by investment approach in million US$					
Internal	230	985	1,875	187	1,024
External	105	566	1,366	695	3,853
Fund-of-funds	79	95	59	61	148

direct real estate is substantially higher than the number of funds that invest in REITs. Panel A of Fig. 3 shows that REITs gained popularity after 1997 and make up about 15% of the overall real estate holdings, on average.

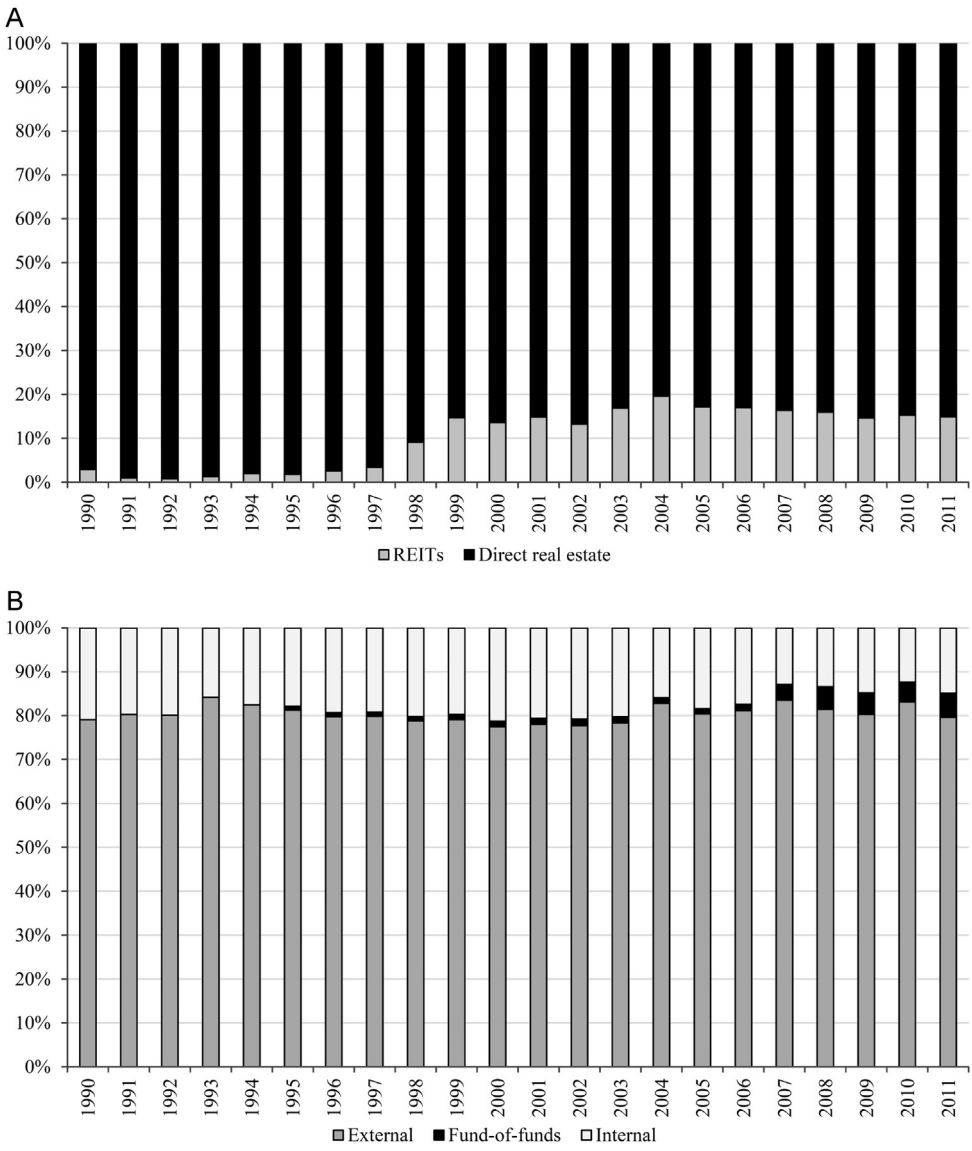

Fig. 3. Allocations to real estate subcategories and investment approaches over time. Panel (A): Average pension fund investments in real estate subcategories and Panel (B): Average percentage of assets allocated to an investment approach.

Pension funds implement three main investment approaches within their real estate allocation: internal management, external management, and investing via fund-of-funds. In Panel B of Fig. 3, we observe that pension funds have some 80% of their assets managed externally, with little variation over time. Interestingly, the allocation to internal mandates has decreased from 20.9% in 1990 to 14.9% in 2011, due to an increased allocation to fund-of-funds. The percentage allocation to fund-of-funds has increased from zero in 1990 to 5.6% in 2011, mainly at the expense of internal, not external mandates. Even though the vast majority of funds use external management, Panel C of Table 2 shows that the dollar value of internal mandates is substantially larger than the value of external mandates.

Table 3 shows more descriptive statistics regarding pension fund investment approaches in real estate. In Panel A, we document that the percentage of internal management is lowest among U.S.

Table 3
Descriptive statistics: investment approach.

This table shows pension fund investment approaches in real estate. For every variable we present the time series averages of cross-sectional means. Columns %*Ext* and %*Int* present the percentage of assets managed externally and internally in the period 1990–2011. %*FoF* shows the percentage of assets invested in fund-of-funds during the 22 years period. Panel A shows the investment approach separately for U.S., Canadian, European, and Australian/New Zealand funds. Panel B presents the percentage allocations to different real estate investment approaches for REITs and direct real estate. For REITs, our data allow for two distinct decompositions. In addition to %*Ext* and %*Int*, we also decompose REIT investments into percentage of assets managed actively (%*Act*) and passively (%*Pas*). For direct real estate assets, we observe one decomposition in four different investment approaches. In addition to %*Ext*, %*Int*, and %*FoF*, we also add the percentage of assets invested in limited partnerships (%*LP*). In Panel A, %*LP* is combined with %*Ext*.

Panel A: Real estate investment approach in percent

	%Ext	%Int	%FoF
All funds	80.37	17.89	1.74
U.S.	91.30	6.57	2.14
Canada	65.05	34.66	0.29
Europe	49.20	48.45	2.35
Aus/Nzd	85.71	13.15	1.14

Panel B: Real estate investment approach by subcategory in percent

	%Ext	%Int	%FoF	%LP	%Act	%Pas
REITs	59.48	40.52	–	–	93.12	6.88
Direct real estate	75.12	15.86	2.11	5.69	–	–

funds (6.6%). Canadian funds, even though they are significantly smaller than U.S. funds, allocate 34.7% of their real estate investments through internal mandates. European and Australian/New Zealand funds have higher allocations through internal mandates as well. Investments in fund-of-funds are mainly implemented by U.S. and European pension funds.

Panel B of Table 3 shows that pension funds are more likely to invest internally in REITs rather than in direct real estate: the average allocation to internal mandates is 40.5% among REITs, compared to 15.9% among direct real estate investments.

Passive management in real estate is not really possible, except investments held through REITs. Investments are classified as passive in the CEM data if they replicate a broad capital market benchmark (like the FTSE/NAREIT Index) or match a specific set of liabilities (i.e., if they are part of a strategic asset allocation based on the pension fund liabilities). On the basis of that definition, the vast majority of the REIT investments are managed actively (93%) and there are very few pension funds that passively invest in REITs.

3.3. Real estate investment costs

In this subsection, we provide descriptive statistics regarding the level of overall real estate investment costs, the differences in costs between REITs and direct real estate, and the role of investment approach and size as determinants of cost differences. The CEM database contains detailed information on the investment costs of pension funds. Internal investment costs include compensation and benefits of employees managing internal portfolios and support staff, related research expenses, and allocated overhead costs. In the CEM database, external investment costs capture the management fees paid to investment consultants and external money managers. The performance fees, carried interest, and rebates[11] are directly subtracted from the returns and are not incorporated into the cost figures. External investment costs also include costs for internal staff whose

[11] Carried interest is a fee that is a portion of returns exceeding a hurdle rate. Rebates are the limited partner share of certain fee income realized by the general partner in connection with the fund, such as fees for break-up, monitoring, and funding.

Table 4
Descriptive statistics: real estate investment costs.

This table provides the descriptive statistics on investment costs of pension funds investing in real estate (in bps). The values presented are time series averages of cross-sectional statistics for the 1990–2011 period (for fund-of-funds 1995–2011). The statistics presented are median, mean, and standard deviation (StDev). In Panel A, the cost statistics are presented for all funds, as well as separately for U.S., Canadian, European, and Australian/New Zealand funds. In Panel B, we split the real estate investment costs into REITs and direct real estate. We split REIT investment costs into two investment approaches: internal and external. For direct real estate, we distinguish four approaches: internal, external, limited partnerships, and fund-of-funds. Costs for all internal mandates are a weighted average of internal investment costs across all subcategories. Costs for all external mandates are calculated as a weighted average of costs for external mandates in REITs, external mandates in direct real estate, limited partnerships in direct real estate, and external mandates in other real assets. Investments in direct real estate via fund-of-funds are the only category from Panel B not incorporated into Panel C, because we analyze the fund-of-funds as a separate investment approach.

	Median	Mean	StDev	# Funds	# Obs
Panel A: Costs in bps by region					
All funds	68.63	79.47	92.53	744	4,358
U.S.	84.70	95.47	102.08	439	2,665
Canada	46.95	57.53	52.67	164	1,238
Europe	33.02	41.78	33.98	123	386
Aus/Nzd	46.03	47.53	18.01	18	69
Panel B: Costs in bps by subcategory and investment approach					
REITs:	35.08	42.64	54.51	237	1,065
– Internal	7.99	12.09	13.83	50	279
– External	52.58	61.64	63.44	209	865
Direct real estate:	73.63	85.91	106.95	713	4,159
– Internal	23.14	31.62	31.30	145	750
– External	78.65	87.89	79.54	611	3,253
– Limited partnership	94.80	119.97	150.18	117	366
– Fund-of-funds	172.79	196.72	94.79	60	147
Panel C: Costs in bps by investment approach					
Internal	19.72	26.81	27.42	170	939
External	77.15	87.90	88.31	689	3,759

sole responsibility is overseeing the external investments in real estate assets. Similarly, for fund-of-funds, cost figures capture the base management fee paid to both the fund-of-funds manager and the underlying managers, but they do not include performance fees and carried interest on either layer.

Table 4 provides the summary statistics of real estate investment costs per region. Pension funds pay fees of about 79 bps for real estate investments. We find that U.S. pension funds have higher real estate investment costs than funds from other regions: the average costs of U.S. pension funds amount to 95 bps, which is about twice the percentage that their foreign peers are paying. Canadian funds pay 58 bps, European funds pay 42 bps and Australian/New Zealand funds pay 48 bps for their real estate investments. Fig. 4 shows that these cost differences are consistent during the 1990–2011 period. Moreover, U.S. pension funds have higher costs for investing in both REITs (Panel B) and direct real estate (Panel C). Fig. 4 shows that there are no particular time patterns in REIT investment costs, but direct real estate investment costs have increased since 2002. The increasing costs in direct real estate are mostly due to the increasing allocations to fund-of-funds, which is the most expensive investment approach in real estate.

Cost summary statistics for subcategories are presented in Panel B of Table 4. The average costs for investing in direct real estate are 86 bps and are about double the costs for investing in REITs (43 bps). Internal investing in REITs and internal direct selection of properties are associated with substantially lower costs than the external investment approaches. Furthermore, within direct real estate investments, limited partnerships and fund-of-funds yield substantially higher costs than other ways of gaining real estate exposure: 120 bps and 197 bps, respectively. Panel C of Table 4 shows that costs

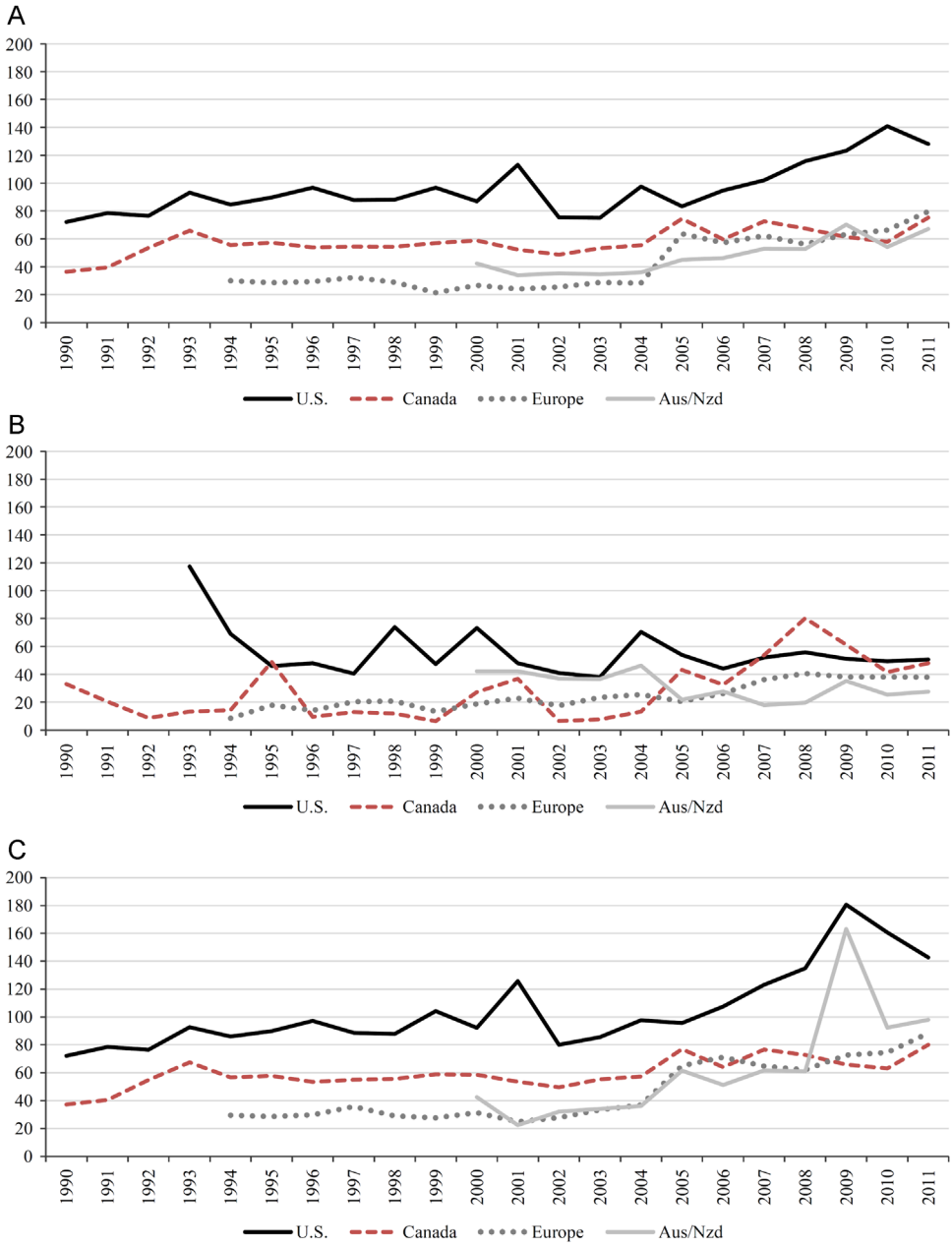

Fig. 4. Real estate investment costs by region and subcategory. Panel (A): Overall real estate investment costs by region (in bps), Panel (B): REIT investment costs by region (in bps) and Panel (C): Direct real estate investment costs by region (in bps).

for all external mandates are 88 bps, on average, as compared to just 27 bps for all internal mandates, on average.[12]

[12] Costs for all external mandates are calculated as a weighted average of costs for external mandates in REITs, external mandates in direct real estate, limited partnerships in direct real estate, and external mandates in other real assets. Costs for all internal mandates are also a weighted average of internal investment costs across all subcategories. Investments in direct real

Overall, the descriptives indicate that the selected subcategories and investment approach strongly influence the overall level of real estate investment costs. But of course, these non-parametric comparisons are not conclusive: for example, U.S. pension funds have a low allocation to internal mandates (just 6.6%) as compared to funds from other regions, which may explain their higher costs.

4. Pension fund characteristics and real estate investments

In this section, we examine the two main investment decisions presented in Fig. 1 for the institutional investors with an existing real estate allocation. First, we investigate which pension fund characteristics influence the choice of real estate subcategories. Second, we examine which investment approach pension funds implement in their allocation to real estate. We estimate the following logit model:

$$\Pr(y_{i,t}=1|X)=F(\beta_1 Size_{i,t}+\beta_2 \%Alter_{i,t}+\beta_3 Public_i+\beta_4 Region_i+\beta_5 YD_t+\upsilon_{i,t}), \quad (1)$$

where F is a logit function taking on values strictly between zero and one, and $y_{i,t}$ is a binary dependent variable. We model the probabilities as a function of pension fund characteristics (X), focusing on total fund size (*Size*) and the allocation to other alternative asset classes (*%Alter*) of fund i in year t.[13] *Size* is the natural logarithm of the dollar value of the pension fund assets under management. The *%Alter* variable captures the asset allocation to private equity, hedge funds, infrastructure, commodities, and natural resources. We control for plan type using a dummy variable (*Public*) that captures whether the pension plan is public or corporate. We also control for regional effects (*Region*), include year dummies (*YD*), and cluster the standard errors by pension funds, allowing for intragroup correlation.

Table 5 presents the results. In Panel A, we analyze which characteristics determine whether a pension fund invests only in direct real estate, only in REITs, or simultaneously in both direct real estate and REITs. The dependent binary variable is 1 if a fund has direct real estate holdings only and 0 otherwise.[14] We find that smaller pension funds are more likely to invest in direct real estate only. A one unit increase in the logarithm of assets under management (i.e., doubling the fund size) decreases the probability that a pension fund invests only in direct real estate by 2.6% to 4.0%. Smaller pension funds are also slightly more likely to invest only in REITs, but the economic significance is small. As Panel A of Fig. 5 shows, the percentage of funds investing only in REITs and not in direct real estate is very low. REITs are typically incorporated in a portfolio of larger pension funds as complementary to existing direct real estate exposure. Indeed, a one unit increase in the logarithm of assets under management increases the probability that a pension fund invests simultaneously in both REITs and direct real estate by 4.5% to 5.5%.

Although REITs provide easy and low-scale property exposure, which should make them especially attractive to smaller investors, larger pension funds invest more in REITs. Our results are in line with Ciochetti, Craft, and Shilling (2002), who document that the largest pension plans invest more in REITs. This finding is surprising, since we document below that investing in private real estate is more expensive. Moreover, direct real estate investments are less liquid and require more monitoring skills, because of the increased potential for agency conflicts following from asymmetric information problems.[15]

(*footnote continued*)
estate via fund-of-funds are the only category from Panel B not incorporated into Panel C, because we analyze the fund-of-funds as a separate investment approach.

[13] Fund size and allocation to other alternative assets are measured as an average during year t. Our results are robust to the inclusion of lagged $Size_{t-1}$ and $\%Alter_{t-1}$ variables instead of contemporaneous variables.

[14] We also estimate the relation between pension fund characteristics and real estate investments using Tobit regressions rather than logit models. In these regressions, instead of dummy variables, the dependent variables are the percentage allocated to one real estate subcategory or investment approach, left-censored at 0 and right-censored at 1. The Tobit regressions deliver the same results as the logit regressions.

[15] Of course, allocation decisions might also be influenced by (perceptions of) correlations between REITs, direct real estate, and other asset classes.

Table 5
Regression results: real estate investments and pension fund characteristics.

In Panel A, the dependent variable is constructed based on the decision to invest in REITs or direct real estate, only taking into account pension funds investing in real estate. Panel B provides the results of logit regressions explaining whether a pension fund invests in real estate internally, externally or through fund-of-funds. As independent variables we include *Size* – log of total pension fund assets, *%Alter* – strategic percentage allocation to other alternative asset classes, *%REITs* – allocation to real estate investment trusts (REITs) as a percentage of all real estate assets, *Public* – dummy variable capturing public pension funds (the base result refers to corporate funds), *Canada*, *Europe*, and *Aus/Nzd* – regional dummy variables (the base result refers to U.S. funds). We present the marginal effects (elasticities) at the means of the independent variables. The marginal effects for the dummy variables are estimated for discrete changes from 0 to 1. We also include year dummies (*YD*) and cluster the standard errors by pension fund, allowing for intragroup correlation. We report standard errors in brackets and significance levels with *, **, and ***, which correspond to 0.10, 0.05, and 0.01, respectively.

	Size	%Alter	%REITs	Public	Canada	Europe	Aus/ Nzd	YD	# Obs	Pseudo R^2
Panel A: Logit regressions – pension fund allocations to REITs and direct real estate										
Direct RE only	−0.040***	0.232						Yes	4,487	0.144
	[0.011]	[0.160]								
Direct RE only	−0.026***	0.366**		−0.020	0.149***	−0.066	−0.105	Yes	4,487	0.176
	[0.010]	[0.161]		[0.035]	[0.029]	[0.056]	[0.105]			
REITs only	−0.006*	−0.295***						Yes	4,487	0.082
	[0.003]	[0.091]								
REITs only	−0.009***	−0.290***		0.008	−0.035***	0.010	0.006	Yes	4,487	0.138
	[0.003]	[0.095]		[0.009]	[0.008]	[0.014]	[0.017]			
REITs and Direct RE	0.055***	0.037						Yes	4,487	0.161
	[0.010]	[0.131]								
REITs and Direct RE	0.045***	−0.057		−0.006	−0.112***	0.045	0.096	Yes	4,487	0.191
	[0.010]	[0.127]		[0.026]	[0.027]	[0.043]	[0.086]			
Panel B: Logit regressions – pension fund allocations to investment approaches										
Internal	0.076***	−1.018***	0.054					Yes	4,487	0.086
	[0.012]	[0.261]	[0.059]							
Internal	0.095***	−0.285	0.159***	0.005	0.468***	0.435***	0.182	Yes	4,487	0.244
	[0.014]	[0.229]	[0.049]	[0.036]	[0.059]	[0.084]	[0.114]			
External	−0.011	0.900***	0.014					Yes	4,487	0.033
	[0.009]	[0.233]	[0.054]							
External	−0.017**	0.335*	−0.047	−0.036	−0.274***	−0.285***	0.012	Yes	4,487	0.153
	[0.009]	[0.195]	[0.042]	[0.030]	[0.054]	[0.078]	[0.065]			
FoF	−0.006*	0.038	−0.018					Yes	4,487	0.116
	[0.003]	[0.027]	[0.015]							
FoF	−0.007**	0.016	−0.024*	0.016	−0.023**	0.023*	0.067	Yes	4,487	0.193
	[0.003]	[0.020]	[0.013]	[0.014]	[0.010]	[0.014]	[0.056]			

In Panel A of Table 5, we also find that pension funds with higher allocations to other alternative assets have a higher probability to invest exclusively in real estate directly. For example, the probability to invest in direct real estate only for pension funds that have no allocation to other alternative assets is 79.2%. This probability increases to 82.8% for funds that have at least 10% of assets allocated to other alternative asset classes. Based on the regional dummies, Canadian funds are more likely to invest in direct real estate only.

Panel B of Table 5 presents the analysis of the characteristics that determine whether a pension fund invests internally, externally or through fund-of-funds. The dependent binary variable is 0 if a fund does not invest in real estate internally and 1 otherwise. In the other specifications, the dependent variable reflects external management and fund-of-funds investments, respectively.

In line with expectations, larger pension funds are more likely to invest internally. A one unit increase in the logarithm of assets (i.e., doubling the fund size) increases the probability that a pension fund invests internally by 9.5%. Smaller funds are more likely to delegate investment management by investing externally and through fund-of-funds. A one unit increase in the log size decreases the probability that a pension fund invests externally by 1.7%. Furthermore, the allocation to other alternative assets is

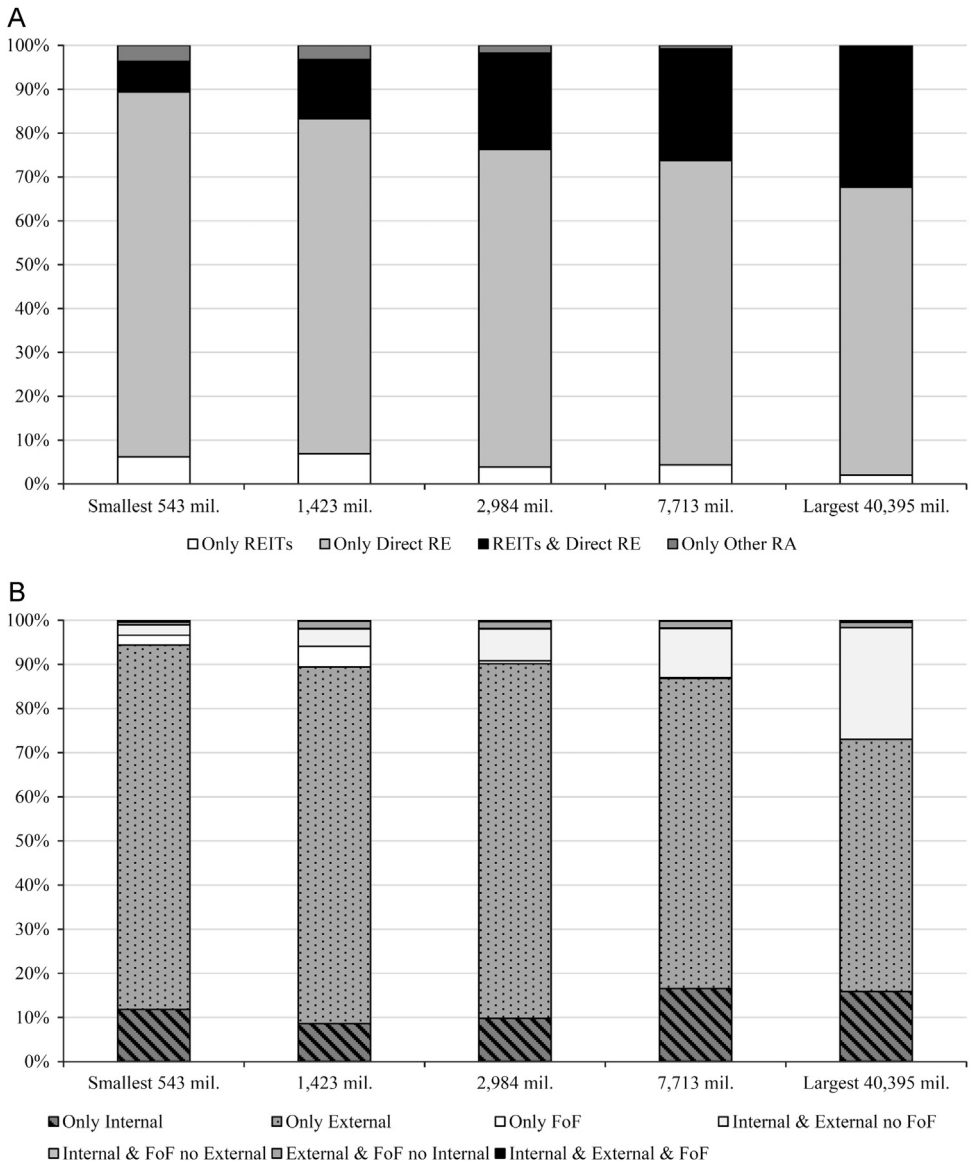

Fig. 5. Pension fund investments in real estate by size quintiles. Panel (A): Pension fund allocations to real estate subcategories by size quintiles and Panel (B): Pension fund investment approach in real estate by size quintiles.

significantly and positively related to the probability to externally invest in real estate. The marginal effect of allocations to alternatives estimated at means indicates that a 10% increase in the allocation to alternatives increases the probability of external investing in real estate by 3.4%. Importantly, even after controlling for size, investments in other alternative asset classes and allocation to REITs, Canadian and European pension funds are significantly more likely to invest internally than U.S. pension funds.

Since pension funds can simultaneously invest via multiple investment approaches, in Panel B of Fig. 5 we further analyze the relation between pension fund size and investment approach. We split

the funds into quintiles based on their size and calculate the percentage of funds selecting a particular combination of investment approaches. The majority of funds across all size quintiles invest only externally in real estate. Among the smaller quintiles, this holds for more than 80% of the funds. Additionally, only pension funds in the smaller quintiles invest exclusively through fund-of-funds. As we move from the smallest to the largest quintile, the percentage of pension funds investing internally (only internally or simultaneously internally and externally) is increasing. However, even among the largest quintile, some 58.4% of the funds do not manage properties or REITs internally.

Our results indicate that larger funds are more likely to invest internally in real estate, but a minority of the smallest funds also take that approach. In the smallest quintile, about 14.5% of funds decide to invest internally. Internal management requires devoting sufficient resources to establish an internal real estate department or an "at-arms-length" operating division. Establishing such an internal department for direct selection of properties or REITs is costly and can be regarded as a more long-term commitment. In line with this statement, we observe that funds with a larger allocation to other alternative asset classes are more likely to invest externally. This positive relation suggests that especially external real estate mandates are part of a broader portfolio of alternatives. On the other hand, when a pension fund decides to invest in real estate internally, it is likely to devote significant organizational resources and to specialize in real estate for a longer period, rather than to invest in a broader portfolio of alternatives.

5. The costs of pension fund real estate investments

In this section, we analyze the relation between real estate investment costs, investment approach, and mandate size. To disentangle the effects of real estate portfolio size, allocation to subcategories, and investment approach, we estimate pooled panel regressions, as well as Fama and MacBeth (1973) regressions. In the panel regressions, we include year and region fixed effects, and double cluster the standard errors independently at the fund and year level to control for potentially correlated performance shocks within pension funds and across years:

$$C_{i,t} = \gamma_0 + \gamma_1 Mandate_{i,t} + \gamma_2 Approach_{i,t} + \gamma_3 YD_t + \gamma_4 Region_i + u_{i,t}, \tag{2}$$

where $C_{i,t}$ refers to the investment costs, $Region_i$ captures region fixed effects, YD_t refers to year dummies, and $u_{i,t}$ are idiosyncratic errors. *Mandate* is the log of the dollar value of the real estate investment portfolio, and *Approach* refers to the percentage allocation to external managers, fund of funds, etc.[16]

As the pooled panel regression results might be influenced by years with a higher number of observations, we estimate Fama and MacBeth (1973) regressions to overcome this potential bias, putting equal weight on each year. In the first stage of the Fama and MacBeth (1973) model, we regress the fund-specific investment costs on a set of pension fund characteristics for each year:

$$C_{i,t} = \alpha_t + \delta_{1,t} Mandate_{i,t} + \delta_{2,t} Approach_{i,t} + \delta_{3,t} Region_i + \varepsilon_{i,t}, \quad i = 1, 2, \ldots, N \text{ for each } t. \tag{3}$$

The error term $\varepsilon_{i,t}$ is assumed to be normally distributed with a mean of zero. We correct for autocorrelation and heteroscedasticity using Newey-West standard errors. In the second stage we estimate the coefficients as the average of the cross-sectional regression estimates:

$$\hat{\alpha} = \frac{1}{T}\sum_{t=1}^{T}\hat{\alpha}_t, \quad \hat{\delta}_1 = \frac{1}{T}\sum_{t=1}^{T}\hat{\delta}_{1,t}, \quad \hat{\delta}_2 = \frac{1}{T}\sum_{t=1}^{T}\hat{\delta}_{2,t}, \quad \hat{\delta}_3 = \frac{1}{T}\sum_{t=1}^{T}\hat{\delta}_{3,t} \tag{4}$$

Table 6 presents the results of the analysis. Regressions for the pooled sample of all assets indicate that pension funds allocating more assets to real estate realize strong scale advantages in their investment costs. Based on Panel A, a one unit increase in the log of the real estate mandate (i.e., doubling the mandate size) reduces the costs by 10 bps, when controlling for investment approach,

[16] Mandate and investment approach variables are measured as an average during year *t*, whereas costs and returns are measured at the end of year *t*. Even though mandate and approach variables are not measured at the same time as performance, the contemporaneous regressions could still generate a mechanical relation. We replicate all specifications in Tables 6, 8 and 9 using one-year lagged values of all mandate and investment approach variables and our results are robust to the inclusion of lagged instead of contemporaneous variables.

Table 6
Regression results: real estate investment costs.

The dependent variables are the investment costs in bps. In the regressions by subcategories, the dependent variables are the investment costs for REITs or direct real estate. In the regional regressions, the dependent variables are the investment costs for all real estate assets. In the regressions by investment approach, the dependent variables are the investment costs for all real estate assets managed internally, externally or via fund-of-funds. Panel A reports the results of pooled panel regressions with region and time fixed effects (YD). In the pooled panel regressions, we independently double cluster the standard errors by fund and by year. In Panel B, we estimate Fama-MacBeth regressions and correct for autocorrelation and heteroscedasticity using Newey-West with three lags. We include the following characteristics: *Mandate* – log of total holdings in real estate, log of holdings in one subcategory or log of holdings in one investment approach, *%Ext* – percentage of investments in external mandates, *%Act* – percentage in active mandates, *%FoF* – percentage in fund-of-funds, and *%LP* – percentage in limited partnerships. *Canada*, *Europe*, and *Aus/Nzd* are regional dummy variables (the base result refers to U.S. pension funds). We report standard errors in brackets and significance levels with *, **, and ***, which correspond to 0.10, 0.05, and 0.01, respectively. In the panel regressions, the R^2 column presents the *R*-square, while in the Fama-MacBeth regressions it presents the average *R*-square from the cross-sectional regressions.

	Mandate	%Ext	%Act	%FoF	%LP	Canada	Europe	Aus/Nzd	YD	# Obs	R^2
Panel A: Panel regressions with double clustered standard errors											
All assets	−10.27***	28.60***		144.10***		−38.97***	−36.45***	−42.57***	Yes	4,358	0.11
	[2.18]	[6.09]		[49.28]		[7.01]	[9.47]	[5.22]			
Direct RE	−13.12***	22.07***		126.26***	115.34***	−43.37***	−40.46***	−30.64***	Yes	4,159	0.12
	[2.79]	[7.02]		[42.44]	[33.08]	[7.78]	[8.41]	[9.21]			
REITs	−10.08**	32.42***	31.00***			−19.50	−15.54***	−19.98***	Yes	1,065	0.14
	[4.00]	[5.56]	[6.59]			[13.51]	[4.40]	[5.54]			
U.S.	−13.98***	51.82***		182.83***					Yes	2,665	0.09
	[3.48]	[9.67]		[70.54]							
Canada	−4.68***	29.12***		89.36***					Yes	1,238	0.12
	[1.73]	[6.11]		[24.36]							
Europe	−1.47	27.47***		113.21***					Yes	386	0.30
	[2.66]	[10.25]		[21.77]							
Internal	−3.12***					8.93*	2.10	−1.69	Yes	939	0.09
	[0.98]					[4.82]	[3.86]	[9.89]			
External	−9.91***					−39.77***	−28.62***	−42.79***	Yes	3,759	0.05
	[2.56]					[7.59]	[9.58]	[10.35]			
FoF	−88.45					−138.77	−110.01	17.02	Yes	147	0.16
	[58.29]					[104.37]	[103.10]	[51.09]			
Panel B: Fama-MacBeth regressions with Newey-West standard errors											
All assets	−9.56***	29.57***		94.54***		−38.40***	−21.70***	−23.87***		4,358	0.20
	[1.34]	[4.13]		[23.88]		[4.92]	[7.54]	[9.17]			
Direct RE	−11.98***	22.64***		80.80***	45.87*	−41.64***	−26.23***	−17.75**		4,159	0.22
	[2.54]	[7.11]		[17.97]	[26.60]	[6.28]	[8.06]	[8.40]			
REITs	−12.68**	26.38***	36.96***			−35.35**	−11.76**	−18.33***		1,028	0.39
	[4.26]	[7.15]	[8.86]			[14.35]	[4.70]	[4.42]			
U.S.	−12.57***	51.64***		128.34***						2,665	0.18
	[1.69]	[4.33]		[40.78]							
Canada	−4.61***	27.41***		39.78						1,238	0.18
	[1.52]	[4.89]		[29.67]							
Europe	−0.57	19.50**		83.78						386	0.39
	[3.97]	[7.92]		[55.43]							
Internal	−3.82***					7.61*	2.22	0.42		923	0.16
	[0.97]					[4.15]	[2.22]	[4.65]			
External	−9.58***					−40.54***	−20.66***	−24.68**		3,759	0.09
	[1.97]					[5.20]	[5.70]	[10.11]			
FoF	−71.19*					−89.00**	−67.21	59.35		113	0.20
	[35.86]					[28.24]	[40.19]	[27.91]			

year, and region fixed effects. Our results also indicate that allocations to external investment managers and fund-of-funds significantly increase the investment costs. A pension fund that delegates the asset management to external managers has 29 bps higher investment costs than a fund that invests internally in real estate. Investing through fund-of-funds would increase the costs by 144 bps as compared to internal management.

We also investigate the importance of size and investment approach in explaining the costs of investments in REITs and direct real estate. In the regressions for both subcategories, the size coefficient is significantly negatively related to investment costs. Controlling for investment approach also explains part of the heterogeneity in investment costs. The percentage of assets managed externally is positively related to the costs associated with REIT investments. Similarly, the percentage of assets invested in external mandates, fund-of-funds, and limited partnerships result in substantially higher costs for direct real estate investments.

When we split the sample into regions, we still document strong economies of scale among U.S. and Canadian funds. For Europe, the log of real estate assets under management is insignificant, which may be due to the smaller sample size and the fact that funds are generally very large. (The size of the minimum allocation to real estate in Europe is equal to the median real estate investment mandate of U.S. and Canadian funds.)[17] The observed scale advantages are strongest among U.S. funds, where a one unit increase in the log of real estate holdings reduces the investment cost by 14 bps. Greater allocation to external mandates and fund-of-funds remain positively related to costs in the regional regression results.

In the regressions by investment approach, we document that larger pension funds have lower costs in all three investment approaches: internal, external, and fund-of-funds investments. The magnitude of the economies of scale is much stronger for external mandates, where a one unit increase in the log of assets managed externally reduces the costs by 10 bps. For internal costs, a one unit increase in the log of internally managed assets reduces the internal costs by 4 bps.[18] These findings show that larger funds not only organize internal mandates more efficiently, but also negotiate lower fees for their external investments in real estate. The lower investment costs of larger pension funds can be due to competitive pricing of the external managers, as well as bargaining power of the large investors. Assuming marginal costs to the external manager drop with the size of the investment, the findings point at competitive pricing, with external asset managers incorporating the economies of scale.[19]

Even after controlling for size and investment approach, we find that U.S. pension funds have costs that are 36 bps to 43 bps higher compared to pension funds from other regions. Our results indicate that the higher costs of U.S. pension funds can be attributed chiefly to their external mandates, whereas their costs for internal investing are similar to those of pension funds from other regions. In addition, the results by real estate subcategory show that U.S. funds overpay relatively more for their mandates in direct real estate than for their REIT investments. Even though external managers in the U.S. incorporate economies of scale in pricing, pointing at a competitive market, there seem to be regional differences in either the costs of investment management, or alternatively, the profit margins of external fund managers.

The results for the Fama and MacBeth (1973) regressions in Panel B of Table 6 are consistent with the panel regressions. We continue to observe that pension funds allocating more assets to real estate realize strong scale advantages in their internal and external investment costs. The investment approach also remains a major determinant of real estate investment costs, since greater external

[17] We do not report the separate results for Australia and New Zealand as the number of observations is low. In this region we have 69 cost observations.

[18] Larger funds also pay lower fees for investing in fund-of-funds, but the *Mandate* variable is marginally significant only in the Fama and MacBeth (1973) regressions in Panel B.

[19] In order to distinguish between the bargaining power and competitive pricing explanations, we would need information on the number of external managers through which pension funds invest and the allocated mandates to each of these managers. The bargaining power hypothesis would be valid if large and small pension funds allocated the same amount to one external manager, but the larger pension funds managed to negotiate lower investment fees. The competitive pricing hypothesis would hold if the external managers offered quantity discounts to the pension funds as they increased the size of their investments.

management and allocation to fund-of-funds considerably increase the overall costs. Moreover, U.S. pension funds have considerably higher costs for investing in real estate, even after controlling for mandate size and investment approach.

6. Pension fund performance in real estate investments

In the previous sections, we documented that pension funds often opt for investing in direct real estate over REITs, and prefer delegated investment management over internal management, despite the higher costs associated with these approaches. It may be possible that the investment preferences are driven by performance differences in investment approaches. In this section, we examine whether pension fund real estate returns justify the preference for more expensive investment approaches. We first address the performance of allocations to REITs and direct real estate, before and after deducting the investment costs, and returns on self-reported benchmarks. We then relate the benchmark-adjusted returns to fund characteristics, such as the size of the real estate mandate and the implemented investment approach. We also investigate the persistence in pension fund real estate investment performance.

6.1. Benchmark-adjusted returns

Table 7 reports the returns of pension fund real estate investments by subcategory and investment approach. Panel A shows that the average gross return of pension funds in real estate is about 7% during the 1990–2011 period. REITs delivered a higher gross return (10.90%) than direct real estate investments (7.12%).[20] The gross returns on internally managed assets (8.49%) are higher than the returns on external mandates (7.23%).

To put these returns into perspective, we compare them with the returns on self-reported benchmarks. In the CEM database, pension funds declare their benchmarks, which are usually market indexes (e.g., the NCREIF Index or the FTSE/NAREIT Index for U.S. real estate investments), against which performance is measured. Benchmark returns can also be a combination of multiple indices, weighted by the asset allocation. The realized returns and the benchmark returns are provided in the local currency.[21] The advantage of using self-declared benchmarks is that these benchmarks more precisely reflect the allocation and risk exposure of the real estate allocations. For example, if a fund is exposed to office buildings in the U.S., benchmarking its returns against the NCREIF Office Index is more appropriate than using the broader NCREIF Property Index. Similarly, if a pension fund invests internationally and engages in any currency management, the benchmark returns are a weighted average of indices in multiple countries and account for the implemented hedging policy. The disadvantage of using self-declared benchmarks is that pension funds can strategically select benchmarks that are easier to outperform, which implies that one should be careful when drawing conclusions if outperformance relative to these benchmarks would be documented.

The results in Panel B of Table 7 show that pension funds mostly match, but do not outperform, their self-declared benchmarks on a gross return basis. In this panel, we run a random coefficient regression, with a constant only, for returns on all real estate assets, returns by subcategory, and returns by investment approach. An important advantage of the random coefficient model is that it allows for heteroscedasticity-adjusted and fund-specific alphas, while being more robust to outliers than the standard Fama and MacBeth (1973) approach. Following Swamy (1970), the random coefficient model is similar to a generalized least squares approach that puts less weight on the return series of funds that are more volatile. In the regressions, we include every pension fund that has at least three return observations.[22]

[20] Returns on public real estate (REITs) are based on market returns, while direct (private) real estate returns include both returns from net asset valuations and returns from realized transactions. In the analysis, we analyze the REIT and direct real estate returns together as well as separately to control for potential differences in the return estimations.

[21] If currency risk hedging is done at the asset class level, pension funds provide hedged returns and benchmarks.

[22] Our results are robust to the inclusion of all funds in the sample, regardless of the number of observations, or limiting the sample only to pension funds with at least five observations.

Table 7
Pension fund returns in real estate investments.

This table presents the pension fund returns in real estate investments. Panel A shows the time series averages of cross-sectional mean gross returns for the 1990–2011 period (for fund-of-funds 1995–2011). Standard deviations of the gross returns are in brackets. In Panel B, we deduct self-declared benchmark returns from pension fund returns, resulting in gross benchmark-adjusted returns. In Panel C, we also deduct the investment costs, resulting in net benchmark-adjusted returns. In Panels B and C, we run a random coefficient model with a constant only, for every fund that has at least three observations. The All RE Assets column presents the constants for the performance in all real estate assets together for all funds and per region. The consecutive two columns present the constants for performance in subcategories: REITs and direct real estate. The last three columns report the performance of different investment approaches: internal, external, and fund-of-funds (FoF). In Panels B and C, we report the constant and standard error in brackets, and denote significance levels with *, **, and ***, which correspond to 0.10, 0.05, and 0.01, respectively. In Panel D, we report the number of funds and observations (in parentheses) included in these regressions.

	All RE Assets	**Subcategory**		**Approach**		
		REITs	Direct RE	Internal	External	FoF
Panel A: Gross returns in percent						
All funds	7.34	10.90	7.12	8.49	7.23	6.65
	[9.26]	[9.60]	[8.41]	[11.49]	[9.23]	[7.93]
Panel B: Gross benchmark-adjusted returns in percent						
All funds	−0.14	0.88**	−0.20	0.90	−0.25	−3.13
	[0.24]	[0.43]	[0.27]	[0.57]	[0.26]	[1.96]
U.S.	−0.34	0.93*	−0.45	0.37	−0.35	−3.04*
	[0.29]	[0.51]	[0.33]	[0.99]	[0.31]	[1.61]
Canada	0.35	−0.21	0.35	0.98	0.31	
	[0.49]	[2.29]	[0.49]	[0.77]	[0.56]	
Europe	−0.12	1.35	−0.38	1.74	−1.21	−0.42
	[0.98]	[0.93]	[1.05]	[1.43]	[1.11]	[3.62]
Aus/Nzd	0.02	0.07	0.29		0.04	
	[1.44]	[0.29]	[1.35]		[1.62]	
Panel C: Net benchmark-adjusted returns in percent						
All funds	−0.93***	0.43	−1.05***	0.62	−1.12***	−5.11***
	[0.25]	[0.43]	[0.28]	[0.57]	[0.27]	[2.01]
U.S.	−1.26***	0.42	−1.44***	0.12	−1.29***	−4.78***
	[0.30]	[0.51]	[0.35]	[0.99]	[0.32]	[1.59]
Canada	−0.23	−0.66	−0.25	0.67	−0.42	
	[0.50]	[2.33]	[0.50]	[0.76]	[0.57]	
Europe	−0.68	1.06	−1.01	1.52	−2.08*	−2.50
	[1.02]	[0.94]	[1.09]	[1.43]	[1.12]	[3.38]
Aus/Nzd	−0.44	−0.19	−0.30		−0.42	
	[1.46]	[0.29]	[1.37]		[1.65]	
Panel D: Number of funds and observations included in the regressions						
All funds	421	114	405	90	374	15
	(3,569)	(819)	(3,473)	(761)	(3,024)	(90)
U.S.	261	82	248	27	249	9
	(2,221)	(595)	(2,135)	(215)	(2,091)	(65)
Canada	111	9	108	41	87	
	(1,035)	(63)	(1,024)	(400)	(696)	
Europe	40	18	39	21	30	4
	(265)	(133)	(262)	(143)	(192)	(16)
Aus/Nzd	9	5	10		8	
	(48)	(28)	(52)		(45)	

The overall gross benchmark-adjusted returns of all pension funds are not significantly different from zero.[23] We observe outperformance only in REIT investments, where pension funds obtain positive abnormal annual returns of 88 bps. Of course, we cannot conclude that pension funds obtain alpha on a risk-adjusted basis, because our annual data does not allow us to control for multiple benchmarks, which may explain a significant portion of REIT returns.[24]

U.S. pension funds that delegate investment management through investing in fund-of-funds underperform their self-declared benchmarks by 304 bps per year, even before deducting investment costs. Part of this significant underperformance may be due to the higher performance fees of fund-of-fund managers, because the CEM database captures just the management fees paid to both the fund-of-funds manager and the underlying managers. (Our cost data do not include the performance fees and carried interest paid on either layer, as these costs are deducted directly from the gross returns.)

In Panel C of Table 7 we deduct the investment costs and focus on the net benchmark-adjusted performance of pension fund investments in real estate. Overall, we document an annual underperformance of 93 bps. This seems to be driven mostly by the underperformance of U.S. pension funds, which significantly underperform their self-declared benchmarks, by 126 bps per year. The returns on pension fund real estate investments in other regions are not significantly different from zero. Interestingly, U.S. pension funds do not underperform in their internal real estate mandates, but rather in their selection of external asset managers (-129 bps) and fund-of-funds (-478 bps). This large and significant underperformance cannot be explained solely by investment costs, because these are much lower than the size of the estimated alphas.

6.2. Explaining performance by fund characteristics

In this section, we explain the gross and net benchmark-adjusted returns by a selection of pension fund characteristics, employing panel regressions with double clustered standard errors, region and time fixed effects, as well as Fama and MacBeth (1973) regressions. We again use Eqs. (3) and (4), with gross and net benchmark-adjusted returns as the dependent variables. Table 8 presents the results for the relation between performance and pension fund characteristics for all real estate assets.

The results in Table 8 show that real estate mandate size is positively related to both gross and net benchmark-adjusted performance. Based on Panel B, a one unit increase in the log of real estate holdings (*Mandate*) increases the net benchmark-adjusted returns by 30 bps to 51 bps. The documented economies of scale remain even after controlling for costs and investment approach. Furthermore, higher costs disproportionally reduce performance. An increase in costs by 100 bps results in 148 bps lower net returns. The results also indicate that external management and fund-of-funds have a lower performance. A pension fund that delegates the asset management responsibilities to external managers experiences a decrease in net benchmark-adjusted returns of 108 bps to 218 bps, as compared to a pension fund that invests internally in real estate. Adding even more intermediaries to the asset management process by investing through fund-of-funds reduces returns by at least 127 bps. The Fama and MacBeth (1973) regressions in Panels C and D of Table 8 deliver consistent results with the panel regressions.

In Table 9, we examine the relation between performance in real estate subcategories and pension fund characteristics. In these regressions, the mandate size and investment approach variables refer to direct real estate investments and REITs, respectively. We find significantly positive economies of scale for direct real estate investments. A one unit increase in the log of direct real estate assets improves the performance by 43 bps to 47 bps. Higher allocations to external managers and fund-of-funds result in lower returns from direct real estate. Investing in direct real estate via external managers

[23] In a related paper, using data on publicly traded REIT portfolios as well as portfolios of private entities, Hochberg and Mühlhofer (2011) find that both public and private real estate portfolio managers do not exhibit market timing or security selection skills.

[24] Hartzell, Mühlhofer, and Titman (2010) investigate REIT mutual fund performance using three sets of REIT-based benchmarks, plus an index of returns derived from non-REIT real estate firms, including homebuilders and real estate operating companies. The REIT-based factors consist of a set of characteristic factors, a set of property-type factors, and a set of statistical factors. Using annual return data, we cannot control for this extensive list of factors.

Table 8
Regression results: performance and characteristics.

In Panels A and C, the dependent variable is the gross benchmark-adjusted return on all real estate assets of all pension funds. The dependent variable in Panels B and D is the net benchmark-adjusted return on all real estate assets. The net benchmark-adjusted returns are constructed after deducting the costs and self-declared benchmark returns from pension fund real estate returns. Panels A and B report the results of pooled panel regressions with region and time fixed effects (YD). In the pooled panel regressions, we independently double cluster the standard errors by pension fund and by year. In Panels C and D, we estimate Fama-MacBeth regressions on the net benchmark-adjusted returns and correct for autocorrelation and heteroscedasticity using Newey-West with three lags. We regress the returns on the following characteristics: *Mandate* – log of total holdings in real estate, *%Ext* – percentage of investments in external mandates, *%FoF* – percentage in fund-of-funds, and *Costs* – total costs for investing in real estate. *Canada*, *Europe*, and *Aus/Nzd* are regional dummy variables (the base result refers to U.S. pension funds). We report standard errors in brackets and significance levels with *, **, and ***, which correspond to 0.10, 0.05, and 0.01, respectively. In the panel regressions, the R^2 column presents the *R*-square, while in the Fama-MacBeth regressions it presents the average *R*-square from the cross-sectional regressions.

	Mandate	%Ext	%FoF	Costs	Canada	Europe	Aus/Nzd	YD	# Obs	R^2
Panel A: Panel regressions on gross benchmark-adjusted returns										
GR	0.36**				1.03**	1.09	−0.47	Yes	4,028	0.08
	[0.14]				[0.51]	[0.97]	[0.81]			
GR		−1.49**	−2.54***		0.18	0.97	−0.37	Yes	4,028	0.08
		[0.59]	[0.80]		[0.57]	[0.96]	[0.78]			
GR	0.30**	−1.03	−1.68**		0.66	0.83	−0.53	Yes	4,028	0.08
	[0.15]	[0.63]	[0.85]		[0.55]	[0.95]	[0.82]			
GR	0.30*	−1.08*	−1.27	−0.48**	0.35	0.51	−0.67	Yes	3,945	0.08
	[0.16]	[0.60]	[0.87]	[0.24]	[0.51]	[0.91]	[0.80]			
Panel B: Panel regressions on net benchmark-adjusted returns										
NR	0.51***				1.45***	1.39	0.01	Yes	3,945	0.09
	[0.14]				[0.51]	[1.01]	[0.87]			
NR		−2.18***	−4.27***		0.24	1.24	0.15	Yes	3,945	0.08
		[0.60]	[0.81]		[0.53]	[0.98]	[0.86]			
NR	0.42***	−1.51**	−3.04***		0.89*	1.02	−0.08	Yes	3,945	0.09
	[0.16]	[0.64]	[0.86]		[0.51]	[0.97]	[0.89]			
NR	0.30*	−1.08*	−1.27	−1.48***	0.35	0.51	−0.67	Yes	3,945	0.11
	[0.16]	[0.60]	[0.87]	[0.24]	[0.51]	[0.91]	[0.80]			
Panel C: Fama MacBeth regressions on gross benchmark-adjusted returns										
GR	0.37***				1.36*	1.38**	0.03		4,028	0.06
	[0.14]				[0.76]	[0.65]	[0.68]			
GR		−1.53***	−2.24***		0.43	1.58**	0.05		4,028	0.05
		[0.49]	[0.61]		[0.74]	[0.73]	[0.64]			
GR	0.30*	−1.14*	−1.87***		1.02	1.13	0.07		4,028	0.07
	[0.16]	[0.66]	[0.63]		[0.70]	[0.70]	[0.74]			
GR	0.33*	−1.38*	−2.01***	0.08	0.97*	0.80	−0.08		3,945	0.08
	[0.19]	[0.70]	[0.76]	[0.42]	[0.57]	[0.75]	[0.68]			
Panel D: Fama MacBeth regressions on net benchmark-adjusted returns										
NR	0.50***				1.83**	1.52**	0.28		3,945	0.06
	[0.15]				[0.73]	[0.70]	[0.69]			
NR		−2.20***	−3.49***		0.57	1.81**	0.31		3,945	0.05
		[0.61]	[0.88]		[0.69]	[0.78]	[0.64]			
NR	0.41**	−1.68**	−2.97***		1.33**	1.13	0.32		3,945	0.08
	[0.18]	[0.79]	[0.93]		[0.64]	[0.73]	[0.75]			
NR	0.33*	−1.38*	−2.01***	−0.92**	0.97*	0.80	−0.08		3,945	0.11
	[0.19]	[0.70]	[0.76]	[0.42]	[0.57]	[0.75]	[0.68]			

Table 9
Regression results: performance and characteristics.

The net benchmark-adjusted returns are constructed by deducting the costs and self-declared benchmark returns from pension fund real estate returns. In the regressions by subcategories, the dependent variable is the net benchmark-adjusted return on REITs or direct real estate. In the regional regressions, the dependent variable is the net benchmark-adjusted return on all real estate assets. In the regressions by investment approach, the dependent variable is the net benchmark-adjusted return on all assets managed internally, externally or via fund-of-funds. Panel A reports the results of pooled panel regressions with region and time fixed effects (YD). In the panel regressions, we independently double cluster the standard errors by pension fund and by year. In Panel B, we estimate Fama-MacBeth regressions on the net benchmark-adjusted returns and correct for autocorrelation and heteroscedasticity using Newey-West with three lags. We include the following characteristics: *Mandate* – log of total holdings in real estate, log of holdings in one subcategory or log of holdings in one investment approach, *%Ext* – percentage of investments in external mandates, *%Act* – percentage in active mandates, *%FoF* – percentage in fund-of-funds, and *%LP* – percentage in limited partnerships. *Canada*, *Europe*, and *Aus/Nzd* are regional dummy variables (the base result refers to U.S. pension funds). We report standard errors in brackets and significance levels with *, **, and ***, which correspond to 0.10, 0.05, and 0.01, respectively. In the panel regressions, the R^2 column presents the *R*-square, while in the Fama-MacBeth regressions it presents the average *R*-square from the cross-sectional regressions.

	Mandate	%Ext	%Act	%FoF	%LP	Canada	Europe	Aus/Nzd	YD	# Obs	R^2
Panel A: Panel regressions with double clustered standard errors											
Direct RE	0.47***	−1.60***		−3.53***	−3.07*	0.82	0.65	−0.64	Yes	3,835	0.11
	[0.13]	[0.56]		[0.96]	[1.59]	[0.60]	[1.06]	[0.82]			
REITs	0.43***	1.28	0.75			−2.15	0.49	−0.13	Yes	966	0.06
	[0.17]	[0.96]	[2.24]			[1.66]	[1.33]	[1.13]			
U.S.	0.40**	−1.54**		−2.28**					Yes	2,426	0.09
	[0.20]	[0.73]		[1.07]							
Canada	0.67***	−0.82		−6.86					Yes	1,096	0.12
	[0.21]	[0.67]		[5.69]							
Europe	−0.29	−3.82***		−8.40***					Yes	363	0.20
	[0.36]	[1.30]		[2.26]							
Internal	0.52**					1.08	1.83	−3.82**	Yes	850	0.06
	[0.24]					[1.38]	[1.50]	[1.81]			
External	0.41**					1.05*	0.76	0.19	Yes	3,389	0.10
	[0.18]					[0.59]	[0.94]	[1.18]			
FoF	1.42					5.82	−0.76	−6.40	Yes	131	0.12
	[1.72]					[4.25]	[4.39]	[7.57]			
Panel B: Fama-MacBeth regressions with Newey-West standard errors											
Direct RE	0.43***	−2.07***		−3.61***	−2.55	1.17	1.01	0.20		3,835	0.10
	[0.14]	[0.73]		[0.90]	[2.38]	[0.74]	[0.88]	[0.75]			
REITs	0.46***	1.28	0.92			−2.20	1.31	−0.46		934	0.14
	[0.15]	[1.12]	[1.40]			[1.45]	[1.45]	[0.47]			
U.S.	0.40*	−2.06*		−2.60***						2,426	0.04
	[0.21]	[1.18]		[0.91]							
Canada	0.55**	−1.07**		2.15						1,096	0.08
	[0.24]	[0.47]		[3.54]							
Europe	−0.47	−1.20		−2.65						363	0.32
	[1.00]	[2.72]		[1.99]							
Internal	0.62***					1.19	2.29**	−1.13*		850	0.13
	[0.23]					[1.66]	[1.10]	[0.61]			
External	0.38**					1.40*	1.20	0.29		3,389	0.06
	[0.18]					[0.81]	[0.93]	[0.92]			
FoF	−0.84					8.08	−3.75	−15.13		99	0.38
	[3.03]					[10.13]	[5.04]	[10.15]			

instead of internal selection of properties results in a 160 bps to 207 bps annual decrease in the net benchmark-adjusted returns. Investing through fund-of-funds reduces the returns by 353 bps to 361 bps. Our results for REITs indicate that the size of REIT holdings is also positively related to performance. There is no significant relation between investment approach and net benchmark-adjusted returns in REITs.[25]

Next, we split the real estate assets by region and analyze the relation between size, investment approach, and performance separately for U.S., Canadian, and European pension funds. In Table 9, we document significant economies of scale in the performance of U.S. and Canadian investors. Investing through intermediaries, like external managers and fund-of-funds, reduces performance in all three regions. For instance, among U.S. pension funds, external managers deliver 154 bps to 206 bps lower net benchmark-adjusted returns than internal mangers, while fund-of-funds deliver 228 bps to 260 bps lower returns.

In Table 9, we also analyze the relation between performance and characteristics per investment approach.[26] The results show that larger pension funds have better returns within both internal and external real estate mandates. For externally managed portfolios, a one unit increase in the log of assets improves the annual net benchmark-adjusted returns by 38 bps to 41 bps. The scale effect is even stronger for internal management, where a one unit increase in the log of assets increases the returns by 52 bps to 62 bps.

As a robustness check, we examine whether the exclusion from the sample of the 2008–2011 period of economic downturn influences the relation between real estate investment performance and pension fund characteristics. In unreported results, we confirm that size remains positively related to performance, while external management and investing in fund-of-funds still have a disproportionally negative effect on returns.

We acknowledge that precise measures of risk for the real estate investments are not available and therefore that differences in returns may in theory be attributed to differences in risk profiles of investments managed internally, externally or by fund-of-funds. The self-reported benchmarks may not capture entirely the differences in risk-taking across pension funds. However, there is little reason to believe that riskier projects will be managed internally and not by financial intermediaries that have potentially higher expertise and are focused only on real estate.[27]

Summarizing, we document that pension funds investing internally in real estate outperform those funds that delegate the investment management. Moreover, investing in real estate through fund-of-funds results in substantial underperformance (around 300 bps per year), as compared to other investment approaches, which may be due to multiple layers of fees, lack of skill, and possibly greater agency conflicts. Larger funds seem to have better skills, which enable them to select better properties when investing internally, and to select better investment managers when investing externally. When investing through external managers, larger funds are likely to get preferential treatment, have greater monitoring capacity, and may have access to better investment opportunities at lower cost. The positive relation between fund size and performance is in line with evidence on private equity funds, for which a concave relation between fund size and performance has been documented (Kaplan and Schoar, 2005). In contrast, increased fund flows generally lead to underperformance for mutual funds (Chen, Hong, Huang, and Kubik, 2004).

[25] In the Fama and MacBeth (1973) regressions for REITs, we use a shorter time period (1998–2011), as the number of observations during the first years is low (see Panel A of Fig. 3) and Fama and MacBeth (1973) regressions assign equal weight to every year in the second stage. In the panel regressions for REITs, reported in Panel A of Table 9, we use all the available return observations.

[26] For fund-of-funds in the Fama and MacBeth (1973) regressions, we focus on a shorter time period (2007–2011) because the number of observations in the earlier years is very low (see Panel B of Fig. 3).

[27] Alternatively, we could assign benchmarks to measure risk-adjusted performance instead of using the self-reported benchmarks. However, the correlation of the pension fund returns with the assigned benchmarks is typically lower than with the self-reported benchmarks. For instance, among U.S. pension funds the correlation between their gross returns in direct real estate and self-reported benchmarks is 0.75, whereas the correlation between their gross returns and the NCREIF Property Index is 0.70. Based on these simple correlations, it seems that the self-reported benchmarks better capture differences across funds in investment style (core vs. value-add or opportunistic), property type, and geographic location.

6.3. Persistence

We document that pension funds generally meet, but do not exceed the performance of their benchmarks, and that performance is positively related to the size of real estate holdings, and to the implementation of internal management. We examine whether there is persistence in the performance of pension fund real estate investments, splitting pension funds into five quintiles based on their net benchmark-adjusted returns. Table 10 presents the transition matrixes (i.e., the probabilities that a fund ranked in one of the five quintiles in year t ends up in any of the quintiles in year $t+1$). We also investigate the difference in returns in year $t+1$ between funds ranked in the lowest and highest quintile in year t. Under the null hypothesis of no persistence, the value of the difference in returns in year $t+1$ should be centered on zero, which would mean that past performance is no prediction of future performance. Carpenter and Lynch (1999) show that the t-test for the difference between top and bottom portfolios ranked by past performance is best specified under the null hypothesis of no persistence, as it is the most powerful against the alternatives considered.[28]

In Panel A of Table 10, we document strong persistence in the performance of pension fund real estate investments. Funds are more likely to end up in a high-ranked quintile next year if they perform well in this year, and funds are more likely to rank low next year if they performed relatively poorly this year. Funds have, on average, a 30% chance to remain in the same quintile, and if they do not, they are most likely to move to an adjacent quintile.

The results in Panel B of Table 10 show that there is no persistence in REIT performance. Pension funds ranked in the highest quintile are in fact most likely to end up in the bottom quintile next year. The difference in REIT returns between the top and bottom ranked funds in the following year is small and insignificant. The overall persistence in real estate performance is entirely due to the persistence in direct real estate performance, as shown in Panel C. The last columns of the table provide the year $t+1$ average net benchmark-adjusted return for the pension funds that are in the lowest and highest ranked quintiles in year t, and the t-statistic for the performance difference between the two groups. The net benchmark-adjusted return for the bottom quintile is -3.20%, while the return is 1.44% for the top quintile. The difference is statistically significant, with a t-statistic of 6.38.

The persistence in performance can potentially be explained by the fact that direct real estate returns are susceptible to appraisal smoothing of property valuations.[29] However, Geltner and Goetzmann (2000) argue that the NCREIF Property Index, which captures direct real estate investments, is more like an annual index, partially updated each quarter. Hence, the use of annual returns in this paper should help minimize the problems associated with “stale” appraisals of direct real estate returns. Nevertheless, we also address the persistence in pension fund performance in direct real estate by using a two-year horizon, when the appraisal smoothing effect should have lapsed. Panel D of Table 10 shows that 27.23% of the funds in the best performing quintile in year t will end up in the same quintile two years later. Funds are also more likely to end up in the worst performing quintile in year $t+2$, if they were ranked in that quintile in year t. The difference in returns in year $t+2$ between the best and worst performing pension funds ranked in year t is 1.14 percentage points (t-statistic of 1.67).

In Appendix Table A1, we examine whether the persistence results are robust to controlling for the effect of size, investment costs, and approach on performance. We run an ordered logit model, where the dependent variable is the quintile ranking based on the performance in year $t+1$ and the main independent variable is the quintile ranking in year t, while controlling for real estate mandate size, costs, and investment approach. The results indicate that pension fund performance ranking in year t has a significant positive effect on the performance ranking in year $t+1$. For example, looking at all

[28] Similar methodology has been used by Tonks (2005) to examine the persistence in pension fund returns and Carhart (1997) to examine the performance persistence among mutual funds.

[29] For instance, the NCREIF database has various statistical problems, including smoothing and lagging due to the partial adjustment in the index caused by the stale valuations, and artificial seasonality in the index returns due to the clustering of the reappraisals in the fourth calendar quarter.

Table 10
Persistence in the performance of pension fund real estate investments.

Pension funds are placed into quintiles based on their total net benchmark-adjusted returns (Panel A), direct real estate returns (Panels B and C), and REIT returns (Panel D). *High* row or column represents the quintile with the highest return. In the transition matrices, percentages represent the probability that a fund which was ranked in one of the five quintiles in year t ends up in any of the quintiles in year $t+1$. Return in $t+1$ columns present the total, direct real estate, and REIT net benchmark-adjusted returns in year $t+1$ of the top and bottom quintiles, which are formed in year t. The Test Diff column is a t-statistic of the difference in net benchmark-adjusted returns between the low and high quintile. In Panel C, we investigate the persistence in the performance of pension fund direct real estate investments over a two-year horizon to control for possible short-term smoothing of the returns. In Panel D, the analysis of persistence in performance of pension fund REIT investments is based on the 1998–2011 period, whereas in the other panels we employ the entire sample period.

Panel A: All real estate

		Year $t+1$ ranking					Return in $t+1$		Test
		Low	2	3	4	High	Low	High	Diff
	Low	**34.67%**	21.90%	16.42%	11.13%	15.88%	−2.96	1.38	−6.46***
	2	22.11%	**26.42%**	21.42%	15.20%	14.85%			
Year t ranking	3	15.22%	21.11%	**27.68%**	21.45%	14.53%			
	4	11.69%	15.25%	18.47%	**33.05%**	21.53%			
	High	15.96%	12.81%	12.81%	20.53%	**37.89%**			

Panel B: REITs (1998–2011 period)

		Year $t+1$ ranking					Return in $t+1$		Test
		Low	2	3	4	High	Low	High	Diff
	Low	**32.52%**	14.63%	13.01%	17.89%	21.95%	−0.90	−0.42	−0.32
	2	17.69%	**30.77%**	23.85%	16.92%	10.77%			
Year t ranking	3	10.29%	**31.62%**	22.06%	21.32%	14.71%			
	4	14.71%	12.50%	22.06%	**32.35%**	18.38%			
	High	**27.27%**	11.57%	20.66%	18.18%	22.31%			

Panel C: Direct real estate (one-year persistence)

		Year $t+1$ ranking					Return in $t+1$		Test
		Low	2	3	4	High	Low	High	Diff
	Low	**33.75%**	23.04%	15.71%	13.04%	14.46%	−3.20	1.44	−6.38***
	2	20.46%	**26.10%**	23.10%	15.17%	15.17%			
Year t ranking	3	15.63%	19.62%	**27.95%**	21.01%	15.80%			
	4	12.21%	15.22%	19.29%	**31.15%**	22.12%			
	High	15.36%	14.31%	12.22%	21.82%	**36.30%**			

Panel D: Direct real estate (two-years persistence)

		Year $t+2$ ranking					Return in $t+2$		Test
		Low	2	3	4	High	Low	High	Diff
	Low	**24.42%**	19.77%	15.35%	18.14%	22.33%	−0.93	0.21	−1.67*
	2	19.42%	**24.55%**	23.21%	18.08%	14.73%			
Year t ranking	3	13.62%	19.15%	**27.66%**	22.34%	17.23%			
	4	16.92%	19.09%	19.09%	**23.64%**	21.26%			
	High	21.13%	15.25%	15.90%	20.48%	**27.23%**			

real estate assets (Panel A), an increase in the quintile ranking from 3 to 4 increases the probability of ranking among the best performers in year $t+1$ by 4.8%. Again, we document persistence only for pension fund performance in direct real estate.

These results show that certain pension funds are persistently more likely to outperform (or underperform) their direct real estate benchmarks, while that is not the case for REIT investors. This finding may be explained by the fact that direct real estate markets are illiquid and not very transparent, which may give insiders an edge. On the other hand, the stock listing of REITs makes the REIT market more transparent and efficient, and outperformance more difficult. Additionally, higher transaction costs and market illiquidity limit the possibility to exploit persistence in direct real estate returns.[30]

Similar to our findings on persistence in direct real estate performance, persistence has been documented among private equity funds and hedge funds as well. Kaplan and Schoar (2005) find substantial persistence in leverage buyout (LBO) and venture capital (VC) fund performance. General partners (GPs) whose private equity funds outperform the industry in one fund are likely to outperform the industry in the next and vice versa. Fung, Hsieh, Naik, and Ramadorai (2008) document that better performing hedge funds, generating positive alpha, are less likely to be liquidated, and have a higher propensity to deliver alpha persistently.

7. Conclusion

Comparable to investments in private equity and hedge funds, pension funds face a palette of choices to deploy capital in the illiquid property market, the most significant alternative asset class. The allocations to real estate can be managed internally, externally, and through fund-of-funds, and can be invested both in REITs and directly in fixed assets. This offers the opportunity to investigate the impact of delegated investment management on costs and performance of investments in private markets. Binsbergen, Brandt, and Koijen (2008) argue that investing through multiple external asset managers is costly, as it causes agency conflicts between the institutional investor and external managers. According to the Stoughton, Wu, and Zechner (2011) financial intermediation model, if it is costly to identify higher quality fund managers, the choice between direct and intermediated asset management will depend upon investor size, since search costs are more easily offset by better performance on a larger investment.

Exploiting access to a unique sample of pension funds, we evaluate the economics of financial intermediation in alternative assets, documenting that the costs and performance of pension fund real estate investments are indeed mainly determined by two main variables: mandate size and the choice to invest internally or externally. We find strong scale advantages in pension fund real estate investments: large pension funds not only have lower investment costs, but also achieve higher net benchmark-adjusted returns. This is partly due to the fact that larger funds are more likely to opt for internal management, rather than selecting financial intermediaries. Internal management is associated with substantially lower costs and better benchmark-adjusted performance as compared to external managers. Moreover, even when large pension funds select an external investment approach, they seem to have better skills than the smaller pension funds in our sample. When investing through financial intermediaries in real estate, larger funds presumably benefit from competitive pricing (and may assert more negotiating power), which then leads to access to more favorable investment opportunities at lower costs.

Surprisingly, larger funds are also more likely to invest in REITs (mostly in combination with direct real estate investments), whereas smaller funds allocate more capital to fund-of-funds in direct real estate. Investing through fund-of-funds results in substantial underperformance as compared to other investment approaches. This is at least partly due to multiple layers of fees, but fund-of-fund

[30] Prior research on performance persistence in real estate has arrived at similar conclusions. Among mutual funds that invest only in the REIT sector, Kallberg, Liu, and Trzcinka (2000) find little evidence of persistence. On the other hand, among fund managers investing in the direct real estate market, Bond and Mitchell (2010) document performance persistence over a short-term horizon, but there is little evidence of persistence in fund returns over a medium- and long-term horizon.

managers also seem to lack skills in selecting investment managers, since both their gross and net benchmark-adjusted returns are significantly negative. Especially smaller pension funds do not seem to recognize that REITs represent an investment approach in real estate that is comparable to selecting external managers investing in direct real estate (and much better than fund-of-funds managers), but with substantially lower investment costs.

Overall, the behavior of small and large pension funds indicates that there may be differences between the two groups, with relatively less sophisticated agents among smaller funds, and more sophisticated agents, with an ability to detect profitable real estate investments, among larger funds. Lerner, Schoar, and Wongsunwai (2007) document that agency conflicts and information gaps associated with assessing private equity fund portfolios lead to dramatic disparities in the performance of venture capital investments across different classes of institutional investors. We document that such information gaps and agency problems can also lead to performance differences within one class of institutional investors – pension funds. Our results on the effect of delegated investment management on performance are in line with Agarwal, Nanda, and Ray (2013), who find that the performance of institutions investing in funds of hedge funds is worse than the performance of those institutions investing directly in hedge funds.

Fund-of-funds in direct real estate perform worse than REIT mutual funds and funds investing in hedge funds. The literature on the performance of REIT mutual funds shows that this industry generates an average alpha that is either zero or significantly positive.[31] Funds investing in hedge funds deliver small alphas, albeit sporadically (Fung, Hsieh, Naik, and Ramadorai, 2008), but there is no significant underperformance among hedge fund-of-funds either. Compared to these benchmarks, fund-of-funds in direct real estate perform poorly, so it seems surprising that small pension funds increasingly use their services. However, this behavior is consistent with the Lakonishok, Shleifer, and Vishny (1992) model of pension fund portfolio management: despite higher costs and lower returns, pension funds will maintain a preference for external management and fund-of-funds, as a way to shift responsibility for potentially poor performance to the external manager, and even to shift the responsibility for poor selection of managers to the fund-of-funds manager. Goyal and Wahal (2008) show that pension funds continuously engage in hiring and firing external money managers, even though these decisions have, on average, no effect on their performance, while creating substantial transition costs.

This paper has some general implications for institutional investors investing in real estate. Pension funds should consider the full range of possible approaches to real estate investments and avoid extended chains of financial intermediaries. Particularly smaller funds should re-evaluate their extensive use of fund-of-funds to gain exposure to direct real estate and consider substituting part of this allocation with REITs. Smaller pension funds can also implement more passive strategies in REIT investments in order to remain cost-competitive with larger funds.

Appendix A

See Table A1.

[31] For instance, Cici, Corgel, and Gibson (2011) find that REIT mutual funds obtained significant abnormal net returns, while Hartzell, Mühlhofer, and Titman (2010) document that REIT mutual funds deliver alpha close to zero and fail to outperform any alternative benchmark net of fees.

Table A1
Regression results: performance persistence.

The net benchmark-adjusted returns are constructed after deducting the costs and self-declared benchmark returns from pension fund real estate returns. Pension funds are placed into quintiles based on their total net benchmark-adjusted returns (Panel A), direct real estate returns (Panels B and C), and REIT returns (Panel D). In Panel C, we investigate the persistence in the performance of pension fund direct real estate investments over a two-year horizon to control for possible short-term smoothing of the returns. In Panel D, the analysis of persistence in performance of pension fund REIT investments is based on the 1998–2009 period, whereas in the other panels we employ the entire sample period. The coefficients in the table present the marginal effects after an ordered logit model. The dependent variable is the quintile ranking based on returns in year *t*. We show the marginal effects for the probability to be ranked in the quintile with lowest and in the quintile with the highest returns. The $Rank_{t-1}$ variable is the quintile ranking in the previous year. The $Rank_{t-2}$ variable is the quintile ranking two years ago. We also include the following variables: *Mandate* – log of total holdings in real estate (Panel A), log of direct real estate holdings (Panels B and C) or log of REIT holdings (Panel D), *Costs* – total costs for investing in real estate (Panel A), costs for investing in direct real estate (Panels B and C) or costs for investing in REITs (Panel D), *%Act* – percentage in active mandates, *%FoF* – percentage in fund-of-funds, and *%LP* – percentage in limited partnerships. The marginal effects are estimated at the median values. In the ordered logit model, we also add time fixed effects (YD), region fixed effects, and cluster the standard errors by funds. We report standard errors in brackets and significance levels with *, **, and ***, which correspond to 0.10, 0.05, and 0.01, respectively.

	$Rank_{t-1}$	$Rank_{t-2}$	Mandate	Costs	%Ext	%Act	%FoF	%LP	Region	YD
Panel A: All real estate assets										
Low ranking	−0.048***		−0.013***	0.047***	0.040**		0.019		Yes	Yes
	[0.006]		[0.004]	[0.016]	[0.017]		[0.049]			
High ranking	0.048***		0.013***	−0.046***	−0.039**		−0.019		Yes	Yes
	[0.006]		[0.003]	[0.017]	[0.017]		[0.048]			
Panel B: Direct real estate (one-year persistence)										
Low ranking	−0.042***		−0.010***	0.041***	0.045***		0.014	0.058**	Yes	Yes
	[0.005]		[0.003]	[0.013]	[0.016]		[0.038]	[0.028]		
High ranking	0.049***		0.012***	−0.048***	−0.053***		−0.016	−0.069**	Yes	Yes
	[0.006]		[0.003]	[0.017]	[0.019]		[0.045]	[0.035]		
Panel C: Direct real estate (two-year persistence)										
Low ranking		−0.006*	−0.012***	0.057***	0.063***		0.064	0.073**	Yes	Yes
		[0.004]	[0.004]	[0.016]	[0.020]		[0.042]	[0.037]		
High ranking		0.007*	0.016***	−0.076***	−0.084***		−0.085	−0.097*	Yes	Yes
		[0.004]	[0.004]	[0.024]	[0.027]		[0.055]	[0.050]		
Panel D: REITs (1998–2011)										
Low ranking	−0.017*		−0.009	0.017	−0.016	−0.057*			Yes	Yes
	[0.010]		[0.011]	[0.059]	[0.039]	[0.032]				
High ranking	0.016*		0.009	−0.015	0.014	0.052*			Yes	Yes
	[0.009]		[0.010]	[0.055]	[0.036]	[0.032]				

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