Capital-Market Competitiveness and Managerial Investment Decisions: Evidence from Commercial Real Estate*

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Abstract

We investigate the association between capital-market competitiveness and the quality of investment decisions that delegated money managers make. We use commercial property as a natural laboratory, in that this industry contains funds that are traded in segmented capital markets of different competitiveness, but whose managers all choose from the same investment opportunity set. We find that the submarkets most bought by REIT managers outperform the least-bought (or most sold) submarkets, while for our groups of private managers this effect decreases in line with the competitiveness of their capital markets. We also distinguish between movement into submarkets in genuine anticipation of high returns, versus *stock chasing*, or movement into submarkets that offer availability and therefore easy entry. We find that REITs tend to move into submarkets in anticipation of high returns, while private institutions have more tendency to *stock-chase*, with such behavior again becoming more prevalent the less competitive the capital market.

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1 Introduction

Free-market competition ensures that resources in an economy are allocated to their most efficient use, and in product markets this mechanism is thought to generate the best possible products. The same basic principle should, in theory, apply to delegated portfolio management: a competitive capital market should ensure that capital is allocated to the most efficient projects, and, therefore, to portfolio managers who will put it to best use. As is the case in the product market setting, in a competitive capital market, delegated portfolio managers should be appropriately incentivized by the market to make sound investment decisions. The mechanism through which this happens is often termed the 'Wall Street Walk', or investors' 'voting with their feet.' [1] For portfolio managers, the threat of losing capital, combined with the prospect of attracting new capital, should incentivize good decision making.

In practice, the effectiveness of this mechanism has been difficult to determine empirically. In part, this is due to the difficulty of measuring the threat of losing capital or the prospect of attracting capital. Even when measuring *realizations* of capital flows, the focus has been on capital outflows, as these are easier to identify. Economic intuition, however, suggests that both the upside and the downside should act together as incentives. Further, also by necessity, investigations of this mechanism have so far focused on large-shareholder actions– as once again, these are easier to measure. Intuitively, however, concerted action by small shareholders should be just as important.

In this paper, we attempt to empirically assess the association between capital-market competitiveness and the quality of investment decisions made by money managers.[2] Our setting is the US Commercial Real Estate market, which acts as a natural laboratory for

[1]See e.g. Parrino, Sias and Starks (2003).

[2]A working definition of capital-market competitiveness could be the ease with which a capital market allows investors to *vote with their feet*, that is to withdraw money from underperforming managers and re-allocate it to outperforming managers.

exploring this issue. Claims on the cash flows of managed Commercial Property Portfolios are traded in parallel, in segmented capital markets of varying competitiveness. However, the managers of all US Commercial-Property investment vehicles draw from the same investment opportunity set, in that their investment decisions consist of picking a set of sub-markets (metropolitan-area by property-type) in which to invest.[3] In this setting, we can directly observe the ex-post performance of the underlying investments, and, therefore, assess the ex-post quality of managerial decision making by managers of investment vehicles, traded in capital markets with different levels of competitiveness.

To investigate the association between capital-market competitiveness and the quality of managerial investment decisions, we investigate the performance of individual sub-groups of managers in aggregate. We do this by examining first holdings and then active trading behavior of each sub-group of managers, following a similar methodology to that of Chen, Jegadeesh and Wermers (2000). We rank submarkets by institutional presence or trading, i.e. what fraction of square footage in that market is held, or bought, by each group of institutional investors we examine. If submarkets with high fractional holdings or a high level of positive trading (i.e. buying) by a group of institutions generate higher returns than submarkets with low fractional holding or a high level of negative trading (i.e. selling) by that group of institutions, then that institutional class as a whole has made good capital allocation decisions and therefore created value.

Beyond its appropriateness as a laboratory for our particular study, the Real Estate

[3]As Hochberg and Mühlhofer (2014) explain, evidence for this statement can be found, for example, in the annual reports and 10-K filings of REITs. As an example, consider Simon Property Group (currently the largest REIT) and its 10-K for the year 2010. Simon, in its portfolio description (p.13), characterizes its investment choices primarily by subtype and location. In its property table (pp.14–32), once again the primary attributes for the firm's investment properties are size and location (CBSA). The discussion of the company's development pipeline (starting p. 81) also characterizes investment choices exclusively by city. Similarly, Camden, a large apartment REIT, lists on page 6 of its 2010 annual report, some highlights of its portfolio. In this listing, investment choices are only defined by city and state (i.e. CBSA). Property type is superfluous, as Camden only invests in apartment complexes. Starting page 10 of its 10-K filing for the same year, in the "Property Table", all investment choices are characterized primarily by size and location.

Market represents a significant sum of capital, in particular actively managed capital held in portfolios by investment managers. Portfolio managers of Commingled Real Estate Funds that report to the National Council of Real Estate Investment Fiduciaries (NCREIF) currently manage a property portfolio valued in excess of $247 billion, and the total market capitalization of Real Estate Investment Trusts (REITs) is over $389 billion. Several billion dollars per year are expended by these portfolio managers in pursuit of underpriced properties. Presumably, these managers are expected to yield returns in excess of what would be earned through a passive portfolio strategy.

That said, there is significant variation in the level of competitiveness of the markets in which real estate fund managers operate. The Commercial-Property investment vehicles that are traded in the most competitive capital market are REITs. REITs are traded in US stock markets and trading them is as quick and cheap as trading any other US equity. Very importantly, REIT shares can also be short-sold. In contrast, managers of private commercial real estate funds operate in the less competitive setting of a private capital market. Of these private funds, the subgroup whose capital market is relatively most competitive consists of Open-Ended funds. These operate in a similar fashion as mutual funds, with the exception of some restrictions on redemptions. These restrictions are driven by concerns that a large amount of redemptions for a fund would mean that a large number of properties must be sold, which may be difficult due to the lack of liquidity in the commercial real estate market. Within this set of open-ended funds, we can further distinguish between Core funds (which follow a broader market-wide strategy) and Non-Core funds which follow a more focused and opportunistic strategy. While it is relatively easy to invest in and withdraw investments from both of these fund types, this is more difficult than it is in the REIT setting.

A less competitive segment of the private fund market is the Separate Accounts category. Separate Accounts are vehicles run by large pension funds as a separate investment portfolio for their exclusive use. These vehicles are housed with a broker, who also acts as investment advisor. While the pension-fund managers have complete power in directing the broker's actions and can change brokers if they are not satisfied, ultimately, the pension-fund managers are not the actual investors. Given that most of these vehicles are run by pension funds with a mandatory contribution (often defined-benefit programs) the ultimate investors, that is, the employees that contribute, have little to no power to re-allocate money. Furthermore, given that many of these pension funds are set up for public employees, the boards of these funds (who direct their institutional broker's actions) are often political appointees. This arguably creates a much less competitive capital market than that for Open-Ended funds, not to mention that for REITs.[4]

The final, and least competitive, segment of the private fund market is Closed-Ended funds. These are set up as limited partnerships or limited-liability companies (LLCs), often with a limited lifetime. After an initial fund-raising effort, in which investors deposit money in this vehicle (and obtain partnership- or LLC shares), the ability to withdraw capital is virtually non-existent, as there are no secondary markets for these shares. Furthermore, these vehicles generally have a time horizon (often between one and four years) by which the money must be invested into property; if this has not happened, the funds need to be returned to investors, often with a penalty. Due to the absolute shut-out on withdrawals during the lifetime of these vehicles, we regard these as having the least competitive capital market.[5]

Given this institutional landscape of funds traded in capital markets of varying competitiveness, but whose managers pick from the same investment opportunity set, we regard this market as a suitable natural laboratory to investigate the association between capital-market

[4]For many of these structures, diligent efforts are made to set up contracts for their board members that incentivize performance of the underlying portfolio. By implication, our study also tests the effectiveness of such contracting, in comparison with the simple incentive mechanism of capital-market competitiveness.

[5]While the ranking of capital-market competitiveness between Separate Accounts and Closed-Ended funds can be somewhat uncertain (as issuers of Closed-Ended funds will have to return to capital markets for their next fund), it should be clear that both of these vehicles offer far less possibility for investors to *vote with their feet* than REITs or even Open-Ended funds.

competitiveness and the quality of managerial decision making.

Although investors largely appear to trust the ability of portfolio managers to invest their capital, the academic literature has repeatedly questioned the ability of active managers to systematically pick underpriced investments. Beginning with Jensen (1968), a large literature has explored the ability of mutual fund managers to systematically pick stocks and time their investments so as to generate abnormal performance and justify the fees and expenses of active money management. Despite the volume of articles in this vein, evidence on the systematic ability of mutual fund portfolio managers to generate abnormal profits has yielded results that are mixed at best, and generally has concluded that managers exhibit little to negative ability to generate abnormal returns. These findings are often ascribed to the fact that the stock market is overall generally considered to be highly informationally efficient.

In contrast to the mutual fund setting, where markets are believed to be highly efficient, real estate investment portfolios provide us with a laboratory for exploring active management utilizing an alternative asset class that is traded in a less efficient market than that for common equities,[6] and in which abnormal profits by informed investors are therefore considered to be more common. While many alternative asset classes are traded in private markets, many of these markets suffer from a lack of data availability, particularly as regards trading and returns data. The real estate market is an exception in this respect, and therefore provides an ideal laboratory for constructing a systematic view of whether and how informed institutional-level investors can generate abnormal profits through active trading.

As our goal is to compare the aggregate quality of decision-making of various groups of managers, we take an aggregate approach in our methodology. Examining the aggregate performance of property held and traded by groups of real estate portfolio managers focuses

[6] In the real estate literature, many studies have documented the predictability of property markets (mainly to make a statement about their efficiency), for example Liu and Mei (1992, 1994), Barkham and Geltner (1995), Case and Shiller (1990), Case and Quigley (1991),and especially Geltner and Mei (1995) and Mühlhofer (2012) who use technical trading strategies to illustrate that market timing profits can be made in the property market.

on the issue of whether the consensus opinion of the entire group of the real estate portfolio management community about a particular property class (location and type) represents superior information about the value of that property class. We expect active property trades to represent a stronger portfolio manager opinion about the value of that property class than the passive decision of holding an existing position, since the latter may be driven by non-performance related reasons such as concerns over transaction costs, capital gains taxes, or long-term strategic asset allocation. We would therefore expect any evidence of property selection ability to be more discernible by examining trades rather than holdings.

We find that the most widely held submarkets *underperform* the submarkets least held by institutions. This result is strongest for private entities and only exists to a very small extent for REITs. This suggests that markets which are widely held by institutions may exhibit some degree of overcrowding, with excessive demand for space raising prices and eliminating future returns. When we examine trading, on the other hand, we find that, for REITs, which act in the most competitive capital market, the most-bought submarkets outperform the least-bought (or most sold) submarkets. This result is strongest when measuring trading as well as subsequent performance over long horizons. This suggests that REITs do in fact create value through active trading and supports a hypothesis that these firms further are *early movers* into markets that will exhibit superior performance.

In line with our hypothesis, the trading effects observed for REITs are small to non-existent for private entities as a whole. When we subdivide the sample of private funds by the competitiveness of their capital market, however, we find some evidence that for Open-Ended funds, the most bought decile outperforms the most sold. This effect is much weaker than for REITs, however. For Separate Accounts, we find no statistical difference between the performance of the most-bought and most-sold deciles of submarkets, and for Closed-Ended funds, we find weak evidence that the *most sold* market decile outperforms the *most bought* decile. This continuum of performance lines up with the continuum of capital-market competitiveness in the commercial real estate setting, and so we find our main hypothesis supported by this test.

We further attempt to distinguish between trades that are made for genuine value creation through reallocation decisions that are due to positive selection ability, versus trades that consist of buying into a market, simply because of availability. Institutional trading may be motivated more by stock (i.e. space) availability in certain markets, rather than by an effort or an ability to find market segments that truly outperform. Such behavior may be motivated by the necessity to invest newly-raised funds into commercial property by a certain deadline, in order to avoid withdrawal by end investors. A situation such as this could lead managers to simply choose markets which offer an easy entrance due to large amounts of stock availability rather than because they believe those markets will outperform in the future. We term this behavior (akin to empire building in Corporate Finance) *stock chasing*.

When we horserace stock growth and forward returns, we find that private managers buy into markets that are characterized by recent growth in underlying stock, whereas REIT managers buy into markets that are characterized by high future returns, suggesting that REIT managers are able to generate outperformance through selection ability. Subdividing the set of private managers by capital-market competitiveness once again yields the result that trading by Open-Ended funds shows a positive association with future returns and no association with stock growth, while trading by Separate Accounts shows no association with future returns and a positive association with stock growth (*stock-chasing* behavior). For Closed-Ended funds we find both a positive association with stock growth and a *negative* association with future returns. Once again, these results on the quality of managerial investment decisions line up with the degree of capital-market competitiveness for each respective group of managers. Thus, we find the hypothesis of a relationship between performance and capital market competitiveness supported.

Our analysis is related to a number of finance and economics research literatures. Abnormal profits (or the lack thereof) for mutual funds in the stock market have been studied extensively in the literature (see e.g. Jensen (1968, 1969), Brown and Goetzmann (1995), Gruber (1996), Carhart (1997), and for mutual funds of REITs (Kallberg, Liu and Trzcinka (2000), Hartzell, Mühlhofer and Titman (2010). Daniel, Grinblatt, Titman and Wermers (1997), distinguish between *timing* and *selectivity*[7]). The common theme that emerges from these studies is that true risk-adjusted abnormal profits are rare in stock portfolios held by mutual funds and when found, such profits lack persistence.

Other studies have attempted to generate a systematic view of how potential trading profits are made in alternative asset markets such as private equity or venture capital. Of note here are studies such as Cochrane (2005), Kaplan and Schoar (2005), Ljungqvist and Richardson (2003), as well as Gompers, Kovner, Lerner and Scharfstein (2008). Such studies, while generating some useful inferences about these markets, suffer from problems with data availability (for example by being able to observe only venture-capital financed firms that went public, having to rely on voluntarily reported investment returns, or by being forced to use other indirect public-market related measures to infer information about the more inefficient private market). In our study, on the other hand, we make use of a complete dataset of property trades by institutional-grade REITs and private property managers covered by NCREIF, thus providing both complete trading information and eliminating selection bias. The use of real estate transaction data thus affords us a laboratory for testing whether informed institutional investors are able to exploit market inefficiencies to generate abnormal trading profits and how the degree of value-added in this dimension differs among managers that act in different capital markets.

The remainder of the paper is organized as follows. Section 2 discusses the data used

[7] Hochberg and Mühlhofer (2014) explore such a decomposition of returns for real estate portfolio managers.

in our analysis. Section 3 presents and discusses our empirical methodology and results. Section 4 discusses and concludes.

2 Data

Property transaction data for REIT portfolio managers are obtained from SNL Financial, which aggregates data from 10-K and 10-Q reports of a large sample of institutional-grade publicly traded REITs. The SNL Financial DataSource dataset provides comprehensive coverage of corporate, market, and financial data on publicly traded REITs and selected privately held REITs and REOCs (Real Estate Operating Companies). One part of the data contains accounting variables for each firm, and the other contains a listing of properties held in each firm's portfolio, which we use for this study. For each property, the dataset lists a variety of property characteristics, as well as which REIT bought and sold the property and the dates for these transactions. By aggregating across these properties on a firm-by-firm basis in any particular time period, we can compute a REIT's fractional exposure to particular sets of characteristics such as property type and geographic segment.

Property transactions data for private real estate portfolio managers are obtained from the National Council of Real Estate Investment Fiduciaries (NCREIF), which collects transaction-level data for private entities (primarily pension funds). Having one's properties be part of NCREIF's portfolio is generally considered highly desirable for a private pension fund, in that this gives the fund prestige. Because NCREIF's policy is to only report data on high-grade institutional-quality commercial real estate (which it uses for its flagship industry index, the NPI) being part of NCREIF's database confirms a level of quality on the part of the investor. It is not possible for an investor to report performance only in certain quarters and not in others, as some times happens with private equity; NCREIF membership constitutes a long-term commitment. Further, data reported by NCREIF members is treated by the organization under a strict non-disclosure agreement.[8] Thus, manipulating performance numbers would be ineffective because this could not help the investor signal quality. Because NCREIF members are both willing and able to fully and confidentially report this data to NCREIF, this arrangement gives us the opportunity to examine trades in a large private asset market, in a more complete and unbiased way than the data used in past studies on other alternative asset classes. This data source thus helps us overcome issues such as selection- and survivorship bias, which plague much of the private-equity, hedge-fund, and venture-capital literature.

Aggregate square footage data is obtained from CBRE Econometric Advisors (formerly Torto-Wheaton Research). This firm conducts estimates of available commercial stock, by submarket. The estimates produced by this firm are highly regarded in institutional circles for observing trends throughout urban markets across the United States.

Table 1 presents summary statistics for our data. We have 198 submarkets, which we track over a 1980 to 2011 time window, at a quarterly frequency.[9] These summary statistics are computed across the entire panel of submarkets and quarters. As can be seen in Panel A of the table, the average submarket contains 227 million square feet of space, with the median at 162 million and the third quartile at 275 million. The difference between the mean and the median (and the mean's proximity to the third quartile) indicates that there are a few markets at the top of the distribution that are extremely large, with then a large number of small markets making up the rest of the distribution. This is a well-known phenomenon in the Urban Economics literature, which models city sizes as following approximately an exponential decay by rank within a large region (e.g. Zipf's Law).

The average private institution in our sample holds 6.6 million square feet per submarket, while the average REIT holds about two thirds of this (4.6 million). Interestingly enough,

[8]As academic researchers, we are given access to NCREIF's raw data under the same non-disclosure agreement.

[9]As limited by our stock data, many submarkets start later. All REIT data starts in 1995.

despite this difference in actual square footage held, the two types of institutions hold, on average, very similar fractions of available space in a given submarket (4.0% and 4.4% respectively), which would indicate that, on average, REITs are present in smaller markets at least to a larger extent than private investors. On average, private institutions turn over (i.e. buy or sell) 469,000 square feet per quarter, while REITs turn over 363,000 square feet per quarter. For both types of institutions, this constitutes approximately seven to eight percent of their holdings in the average market.

Panel B presents statistics for the sub-groups of private managers in our sample. Of note here is that, in any particular sub-market, Separate Accounts hold, on average, the most square footage, followed by Core Open-Ended funds, then Non-Core Open-Ended funds, and lastly Closed-Ended funds. The same ranking applies to turnover, which implies that these sub-groups tend to trade similar proportions of their portfolios.

For all distributions reported here, the means are well above the medians. For trading activity, in particular, these means are close to the third quartile. This indicates that for all these measures there exists a high degree of positive skewness, with a few very large markets at the top which have a much higher degree of institutional presence as well as institutional trading activity. As with total stock available, this is consistent with evidence of the existence of *Urban Giants* in the Urban Economics literature, as well as with industry concepts such as *Gateway Cities*–cities which dominate other markets (e.g. New York City or Los Angeles)–and anecdotal evidence.

3 Empirical Analysis

3.1 Holdings and Trades

To investigate the association between capital-market competitiveness and the quality of managerial investment decisions, we investigate the performance of individual sub-groups of managers in aggregate. We do this by examining first holdings and then active trading behavior of each sub-group of managers. Once again, our groups consist of REITs, Open-Ended Funds, Separate Accounts, and Closed-Ended Funds. These managers choose among the same set of potential investments, but are funded through capital markets of varying competitiveness.

To this end, in this part of the study, we adapt the methodology of Chen, Jegadeesh and Wermers (2000) (henceforth CJW). Specifically, we assess whether the choice to allocate capital to specific submarkets and away from others by each subgroup of the institutional class generates positive value-added.

In line with CJW, we begin by classifying submarkets according to their level of fractional institutional ownership by a group of managers, as well as according to the extent to which the asset is traded by a group of institutions. We then rank submarkets based on these measures and sort into portfolios on these two dimensions. Finally, returns over various time horizons for each of these portfolios are computed and reported. If submarkets with high fractional holdings or a high level of positive trading (i.e. buying) by a group of institutions generate higher returns than submarkets with low fractional holding or a high level of negative trading (i.e. selling) by that group of institutions, then that institutional class as a whole has made good capital allocation decisions and therefore created value.

The classification according to fractional holdings is achieved through the following measure:

$$FracHolding_{i,g,t} = \frac{Sqf\ Held_{i,g,t}}{Total\ Stock_{i,t}} \tag{1}$$

In this expression, $Sqf\ Held_{i,t}$ is the number of square feet of space held in submarket i in all institutional portfolios belonging to manager group g in the data at time t, while $Total\ Stock_{i,t}$ is the total square footage of stock that exists in submarket i at that time. For example, consider the sub-market of Chicago office properties. In this case, the $FracHolding_{i,t}$ measure indicates the proportion of Chicago office space that is held by all institutional investors in our sample combined, as a fraction of total Chicago office space available. Intuitively, if markets with high (low) *FracHolding* at time t, subsequently generate high (low) returns, institutional portfolio managers in aggregate have created value, by being heavily invested in rising markets and out of falling markets. The (presumably) less sophisticated set of non-institutional investors would, by implication, be pursuing the opposite strategies and thereby not generate value through active trading.

As a stronger measure of institutional interest, we follow CJW in developing a measure that shows how much a submarket is traded by institutions, defined as follows:

$$Trade_{i,g,t} = FracHolding_{i,g,t} - FracHolding_{i,g,t-1} \quad (2)$$

The measure is thus defined as a first difference between fractional holdings at two subsequent time periods. Intuitively, a positive measure here suggests an increase in the fraction of total available square footage which is held by a group of institutional investors in our sample (i.e. institutional investors *buying into the market* in net terms), while a negative measure suggests a decrease in this fraction (i.e. institutional investors *selling out of the market* in net terms). If a sub-market with a strongly positive (negative) *Trades* measure at time t, subsequently generates high (low) returns, then a certain group of institutional investors in aggregate will have generated value. As stated above, active trading behavior should indicate more strongly held opinions by the industry about a particular market, and so we may very well find different results by examining active trading behavior, rather than passive holdings snapshots.

Our datasets contain a list of properties traded by REITs as well as commingled Real Estate funds (NCREIF members). For each property, the datasets list a variety of property characteristics (such as size, type, and location), as well as which entity bought and sold the property and the dates for these transactions. We aggregate across trades, to determine overall exposure to a particular sub-market by a group of institutional investors in our dataset. The returns to a particular sub-market are taken from NCREIF's flagship National Property Index (NPI), which exists at various levels of aggregation by geography and property type. We conduct this procedure for REITs and NCREIF members separately, as well as, within the NCREIF universe, for each of the three types of funds, and we use index return data aggregated at the level of Core-Based Statistical Area (CBSA) interacted with property type. The example of Chicago Office property, given above, is in line with this. Given that we have separate data for holdings by portfolio managers of each type of entity, active in respectively different capital markets, we thus examine whether all these groups of managers differ in their value-added capacity, and how this is associated with capital-market competitiveness.

To avoid drawing inferences that might be driven by the commercial property's slow transaction speed or (relatively) low volatility, we consider multiple time horizons, both for the computation of our measures, as well as for the measurement of subsequent returns. In a first run, we compute $FracHolding$ for each submarket (i) and group (g) over just one quarter (t). Based on these measures, we sort markets into deciles by $FracHolding_{i,g,t}$ and then compute returns for the subsequent year (i.e. we aggregate the returns for quarters $t+1$ through $t+4$) for each market, and report distributional statistics for the returns to all markets that in any quarter t end up in either the bottom or top decile of $FracHolding$. We then also report hypothesis tests, testing whether these distributions of returns differ from each other. Having done this, we then keep the same sort, and instead report distributions and hypothesis tests for two-year forward returns (i.e. an aggregation of the returns for quarters $t+1$ through $t+8$), three-year forward returns (i.e. an aggregation of the returns for quarters $t+1$ through $t+12$) and four-year forward returns (i.e. an aggregation of the returns for quarters $t+1$ through $t+16$). Following this, we proceed analogously, by sorting on $Trade$ over the previous quarter, instead of $FracHolding$.

Lastly, we conduct this set of tests by sorting on annualized versions of $FracHolding$ and $Trade$. For the former, we use the four-quarter moving average (i.e. average $FracHolding$ over quarters $t-3$ through t), and for $Trade$ we use the four-quarter trailing sum (i.e. the sum of $Trade$ over quarters $t-3$ through t). We conduct the same decile sort and report the same forward returns for the bottom and top decile of submarkets.

Table 2 presents the first set of results from our main test. First, the table shows distributional statistics for the bottom decile and top decile markets sorted by one-quarter $FracHolding$ or $Trade$, in this case for private managers. We further show t-tests of the hypothesis that the two means are equal to each other, against the two-sided alternative. We structure the tests, such that the difference tested is $Top - Bottom$, i.e. a positive t-statistic indicates that the top decile would be outperforming the bottom, while a negative t-statistic indicates the opposite.

We further show results from a Kolmogorov-Smirnov (KS) test, testing the null hypothesis that the two distributions of returns are the same. This test has the advantage over a t-test of means, that it considers differences in the entire distribution, even away from the center (i.e. the mean). Given that we are facing such skewed data, the results from this test constitute an important source for making statistical inferences about the relationships we observe. When conducting a KS-test against the two-sided alternative which rejects, the D statistic does not allow an inference for which direction the two distributions are likely to differ in reality (unlike, for example in a t-test, where the sign of the statistic itself indicates this). Therefore, we conduct KS tests against the one-sided alternative that is suggested by the outcome of the t-test. It should be noted that the alternative hypotheses on a KS test concern the positions of the cumulative distribution functions (CDF) in relation to each other. Therefore, the *positive* alternative, on the KS tests in this case, states that the CDF of the top-decile returns lies *above* that of the bottom-decile returns, which indicates that the top-decile returns have a statistical tendency to be *lower* than the bottom. The negative alternative states the opposite.

As is well known, the NCREIF NPI returns data is based on appraisals when transactions are too scarce to construct the index returns. There are generally well-known problems with appraisals, in that returns based on appraisals become smoothed, understating second moments. However, the consensus in the literature is that first moments remain accurate.[10] For this reason, in our primary set of results, we offer comparisons among raw returns to the top and bottom deciles. However, in order to attempt to rule out a hypothesis that returns differences between deciles are only due to their differing risk, we also examine differences in the distributions of Sharpe Ratios (λ) between the top and bottom decile. If we assume that the smoothing parameters related to appraisals are invariant through the cross-section of sub-markets, a cross-sectional comparison of distributions of Sharpe Ratios should lead to valid inferences about risk-adjusted returns. Given that Sharpe Ratios follow a complex statistical distribution (see e.g. Lo (2002)), making parametric statistical tests to compare these two distributions difficult, here too we resort to the KS test, which is distributionally independent. Furthermore, the skewness discussed above, further warrants the use of this test also for this purpose. The KS test of Sharpe Ratios is presented in the Table as KS_λ, and, as above, we use the one-sided alternative suggested by the t-test of means.

The first panel of Table 2, which presents results for all Private institutions, from a sort based on fractional holdings and distributions of one-year returns suggests that, on average, the least held decile actually has a return of 8% per year, a *higher* return than the most held decile, which only shows a return of 6% per year. Similar relationships can be observed for all quartiles reported, as well, with the most-held decile of markets always underperforming the least-held. The gap seems to narrow, when approaching the upper part of the distribution,

[10] See e.g. Geltner (1991), Clayton, Geltner and Hamilton (2001).

with the first quartiles differing by about four percentage points, while the third quartiles differ by only about ten basis points. Both the t-test and the KS test strongly reject a hypothesis of these two sets of returns being the same, in favor of the alternative that the least-held decile outperforms the most-held. The same is true for the KS_λ statistic, which strongly rejects the null that the distributions of Sharpe Ratios are the same, in favor of the alternative that the least-held decile outperforms the most-held, even on a risk-adjusted basis. The next section of the panel, which presents two-year returns for the same sort, tells a similar story: the most widely held markets significantly underperform the least widely held for this type of investor. This effect becomes stronger, in magnitude and significance, when we repeat the exercise with three-year and four-year forward returns in the bottom part of the panel.

These results directly contradict a hypothesis that private institutions create value by having especially strong concentrations in markets that will generate especially high performance. Instead, we may be observing an alternative effect here, which might be one of over-crowding. Markets that are widely held by institutions may tend to be somewhat overbought, causing excessive demand that in turn drives up prices and thus reduces returns. If institutions were holding a portfolio that is approximately value-weighted (as dictated by finance theory), this could lead to such a result, with large markets showing these signs of overbuying.

The second panel of the table presents distributions of decile-portfolio returns when sorted by trades. Over a one-year horizon, we find that the two sets of return distributions are statistically indistinguishable from each other. This indicates that these investors do not have a strong tendency to either buy into markets that will perform very strongly, nor out of markets that will perform poorly. When examining a two-year return horizon, we find that the KS test weakly rejects the hypothesis of the two distributions being the same (at the 10% level), in favor of the negative alternative, i.e. that the most bought decile does, in fact, outperform the least-bought (or most sold). The KS_λ statistic tells the same story.

We interpret this finding as weak evidence that over a longer return horizon, these investors generate some value added through their trades. The lack of rejection of the t test, however, would indicate that this is happening away from the center of the distribution, meaning that it would be somewhat infrequent. In the center of the distribution, trading behavior appears to look more like pure liquidity trading that would be associated with making trades for only portfolio rebalancing, without generating profits. The same pattern persists for three-year and four-year forward returns, and is similar in magnitude though losing its statistical significance.

Table 3 presents similar results to those described for private managers for REITs, except that these are somewhat weakened. In the top two portions of the table, we still find some evidence that the most widely held markets by REITs underperform the least held markets. However, this difference is smaller (only around one percentage point per quarter, or about half that observed for private entities). This effect is small enough, and seems to be irregular enough in the central portions of the distributions, that t-tests fail to reject a hypothesis of the means of the two distributions being the same. However, the KS tests do reject at a five-percent level, in favor of the positive alternative (which states the the top decile *underperforms* the bottom, in that the former's CDF lies above that of the latter). For the distributions of Sharpe Ratios, the results are weaker. For sorts based on trades, we find no difference in the returns distributions among the top and bottom deciles, which would indicate a pattern of liquidity trades only, when looking at REITs over this return horizon. The patterns become stronger in significance for three-year and four-year ahead returns.

To allow for the slow trades and low volatility of the commercial property market, we repeat the same set of tests, using annualized versions of the $FracHolding$ and $Trade$ measures to conduct the submarket sort. The results for private entities for this test are reported in Table 4. This table paints a similar picture to Table 2, in that the least-held markets strongly and significantly outperform the most-held markets, again supporting an over-crowding hypothesis. Similarly, on trading, we find weak evidence of the most-bought markets outperforming the least-bought (this time on a one-year return horizon), with a 10%-level rejection by the KS test for the one-and two-year forward returns.

Conducting the same test for REITs, in Table 5, we find a slightly different picture from Table 3. The negative holding effects are somewhat weakened, with gaps shrinking to about a half percentage points and KS tests rejecting only at the 10%-level for one- and two-year forward returns, at the 5%-level for three-year forward returns and at the 1%-level for four-year forward returns. However, on trades, here we find very strong results, especially with two-year return horizons. In this case, the most bought submarket decile generates an average return of 20.21% over these two years, while the most sold decile generates only 16.57%; this is a difference of almost four percentage points. When examining the quartile statistics, one can see that this outperformance is consistently visible throughout the distribution and this gap actually grows as one moves toward the top. Both the t-test and the KS test strongly reject (at the 5% level and 1% level respectively) the hypothesis of identical performance, in favor of positive outperformance of the most-bought decile. These results are similar in magnitude and stronger in statistical significance for the three- and four-year forward returns. The KS test of Sharpe Ratios also rejects at one-year return horizons, weakly rejects at three-year return horizons, and strongly rejects at four-year return horizons, indicating that risk-adjusted returns show a similar pattern as the one described for raw returns above.

The picture that forms, thus, is that when measuring trades and performance over longer horizons, REITs seem to generate significant value through their trading activity. A hypothesis of REITs' being early movers into markets that will generate especially good performance could explain why these results are the most prominent at the longest time horizons, as in that case it would take some time for this outperformance to be visible. Private managers seem to add much less value along this dimension.

The analysis presented so far suggests, first, that, consistent with previous literature, trades (as stronger proxies for opinions) show stronger results about managerial value added than holdings. Second, we begin to observe a pattern of managerial value added that lines up with capital-market competitiveness. Private managers (who have a less competitive capital market) add about zero value through their trading behavior, and REIT managers (who have a more competitive capital market) add decided positive value.

To further investigate this, we subdivide private managers by fund type, according to capital-market competitiveness and examine systematic differences in value-added. Among private fund types, open-ended funds should have the most competitive capital market, followed by separate accounts, and lastly closed-end funds. In the interest of brevity, we only report results for deciles sorted on one-year *trade*. Table 6 presents these results.

In Panel A of Table 6 we present top- and bottom-decile returns for open-ended funds which, among private portfolios, should have the most competitive capital market. Throughout the distributions and at all time horizons, in this panel, the point estimates of returns to the top-decile (i.e. most-bought) markets at least slightly exceed those to the bottom-decile (i.e. most-sold) markets. While none of the t-tests reject the hypothesis that the means of the distributions are identical, some of the KS tests do reject this hypothesis in favor of the negative alternative, implying that returns to the most bought decile statistically do tend to exceed those to the most sold. While this does not happen for both types of test at all return horizons, there is still widespread (at least weak) evidence that value is being created by these types of funds. Of course, the evidence here is much weaker than that observed for REITs in Table 5, which is consistent with our hypothesis, as the capital market for private open-ended funds should be less competitive than that for REITs.

Panel B presents the results from this test for separate accounts. In this panel we find that, while some positive differences exist in point estimates between top- and bottom-decile markets, these are not visible everywhere, and none of the statistical tests reject hypotheses of either equality of means or equality of distributions at the five percent level, with even only one test (the KS test for raw returns at the one-year horizon) rejecting this at the ten percent level. The overall picture that emerges here is thus one of zero value created by managers of separate accounts. With the capital market for separate accounts being less competitive than that for open-ended funds, this finding is once again consistent with our hypothesis.

Finally, Panel C presents results for closed-ended funds. For this group, we find that in most cases the bottom-decile return actually exceeds the top-decile return, implying that these funds have a tendency to buy into under-performing markets and sell out of outperforming markets. Since the value of all t-statistics is negative, for all KS tests in this table we test the null against the *positive* alternative, i.e. that bottom decile returns have a tendency to exceed top-decile returns. While none of the t-tests statistically reject the hypothesis that the means are identical, the KS test for raw returns does consistently reject the null, implying that the most-bought deciles underperform in a statistically significant way. This panel thus presents some evidence that managers of closed-ended funds, which have the least competitive capital market, are creating the least value and may actually be destroying value. Overall, managerial performance lines up exactly in the order of capital-market competitiveness, with REIT managers performing best, followed by managers of closed-ended funds, then managers of separate accounts, and lastly managers of closed-ended funds.

In Table 7, we repeat the analysis for the private manager (NCREIF) sample, but restrict the sample period to the time period after 1995. This matches the time period for which the REIT data is available, so as to rule out differences in the documented patterns being caused solely by differences in the sample periods for the two sets of managers. When we restrict the NCREIF sample to this period, we observe similar negative holdings-return relationships across the different lengths of forward-return periods, and no significant trade-return relationships, as observed for private managers across the entire sample.

3.2 Stock Chasing

We next test the hypothesis that institutional trading may be motivated more by stock availability in certain markets, rather than by an effort or an ability to find market segments that truly outperform. We term such behavior *stock chasing*. Investing in markets with large stocks of investible property may be motivated by the necessity to invest newly-raised funds into commercial property by a certain deadline (often the end of a tax year, or, in the case of closed-end funds a commitment period for capital deployment of typically 18 months to four years), in order to avoid having the money withdrawn again by end investors.[11] A situation such as this one could lead managers to simply choose markets which offer easy entrance due to large amounts of stock availability. This behavior would be akin to *empire building* in corporate finance, in that the manager is investing money in order to grow funds under management, rather than because positive-NPV investment opportunities exist.

To test this hypothesis, and differentiate it from the alternative of genuine value creation by institutional managers who are able to identify outperforming markets ex-ante, we run the following regression:

$$trade_{t,t+1,i,g} = \alpha + \beta_1 2.yr.return_{t+1,t+3,i} + \beta_2 stock.growth_{t-1,t,i} + \epsilon_{t,i,g} \tag{3}$$

In the above notation, t is in years. This regression associates current trade by group g, in sub-market i, during the year following time t, with stock growth the year before (i.e. the change in square footage available between $t-1$ and t in sub-market i), and two-year returns following the trade action. Under the hypothesis of value creation, we should find a positive relationship between trade and return, implying that managers will buy into markets that will generate high returns and sell out of markets that will generate low returns. On the other

[11] Anecdotal evidence for such situations exists.

hand, if trades are driven by stock growth, we should find a positive relationship between stock growth and subsequent trades. In this scenario, developers make an optimal decision to develop stock ahead of an anticipated market upturn and fund managers then invest in this stock, with both types of entities creating value in this way. A setup in which fund vehicles develop in-house when it is optimal to do so for investment purposes would also be compatible with this approach. We estimate Equation 3 through OLS, with heteroskedasticity- and autocorrelation-adjusted standard errors. For each group of managers we estimate a model without and one with property-type fixed effects, with Apartments serving as the base case and dummies for all other property types. For REITs we do not have enough data on Hotel firms to include these.

Table 8 presents the results of this analysis. The table, once again, shows the important difference in the patterns among managers, and performance that lines up exactly as implied by our classification of capital-market competitiveness. In Panel A, we present the estimates of the regressions for private institutions, and in Panel B, the estimates from regressions using the REIT manager sample. For the private manager (NCREIF sample), we observe no significant relationship between future high returns and trading activity. However, we observe a positive and significant relationship between stock growth and trading activity, suggesting that private managers buy into markets that are growing in stock, rather than predicting future appreciation in the market. In other words, the evidence suggests that, overall, private managers engage in *stock chasing*, rather than generating superior returns for investors.

In the REIT sample, however, we observe the opposite: there is no statistically significant relationship between trades and stock availability, but there is a strong positive association between trades into a market and future returns in that market. This suggest that for REIT managers, the choice to buy into a market may be motivated by a prediction of future appreciation in that market, rather than due to growth in stock in that market. The lack of dependence between stock growth and trades even implies that REIT managers will manage to find properties to buy in markets that will appreciate, even when this is hard to do. The regression models for the REIT manager sample have much greater explanatory power than the models for private managers, with a R^2 of 7.8% versus 0.1% for the private manager models. For neither group of managers, the addition of property-type fixed effects changes any of the inferences regarding relationships between stock growth, trades, and future returns. The contrast between these two panels, once again, supports our hypothesis, in that the managers that have the most competitive capital market make investment decisions that are better ex-post.

In Panel C, once again, we subdivide the sample of private managers according to the relative competitiveness of their capital markets. We begin with Open-Ended funds, which have the most competitive capital market. For completeness' sake we also show the subdivision between Core and Non-Core funds; while the capital markets for these two types of funds are similar (in that both types are open-ended), core funds tend to follow more of a strategy that yields broad market exposure, while non-core funds tend to act more opportunistically, and so one could believe ex-ante that we may see different stock-trade-return relationships. The results, however, do not show that this distinction is important. All three sub-sections for open-ended funds (Core, Non-core, and All) show that these funds actually have a strong positive relationship between trades and future returns and no statistical relationship between stock growth and trade. This makes these vehicles (which operate in the most liquid of the private capital markets) similar to REITs. Once again this lines up with our hypothesis, as the capital market in which these funds operate is relatively the most competitive for private funds, this market is still far less competitive than the REIT market. The fact that there is little difference between Core- and Non-Core funds which have the same type of capital market further highlights the strength of this association.

The fourth section of Panel C presents results for Separate Accounts. For this group of managers, we find an insignificant coefficient with a negative point estimate for forward returns. On the other hand, we find a significantly positive coefficient for previous stock growth. This illustrates *stock chasing* by this group of managers, with no association between trades and future returns. The fifth section, for Closed-Ended funds shows an even bleaker picture for this group of managers. For these managers we also find a significant positive association between past stock growth and trades, with a significantly *negative* association between trades and future returns. These results would be consistent with a tendency for these managers to buy into markets at the end of a boom, when stock is plentiful, but future returns are low, as a downturn is on hand.

Overall these results show a continuum of quality of managerial investment decisions that lines up with the continuum of capital-market competitiveness. REIT managers, with the most competitive capital market, are best at buying into high-yielding markets, irrespective of whether stock is plentiful or not. This group is followed by managers of open-ended funds who have a somewhat less competitive capital market, and show a slightly smaller effect in this respect. Then, managers of separate accounts show significant *stock chasing* and zero association between trades and subsequent returns. Lastly, managers of closed-ended funds show significant *stock chasing* and a tendency to buy into underperforming markets and sell out of outperforming markets. This evidence yields support to our hypothesis of an association between capital-market competitiveness and the quality of managerial investment decisions.

4 Conclusion

In the same way in which a competitive product market is thought to lead to superior products, a competitive capital market should incentivize portfolio managers to make better investment decisions. In this paper we examine the association between capital-market competitiveness and the quality of investment decisions made by managers. We use Commercial Property Portfolio Management as a natural laboratory for this: in this setting we have a set of managers who act in somewhat segmented capital markets of varying degrees of competitiveness, who pick investments from a common investment opportunity set.

We find that REITs, whose capital market is most competitive, show a statistical tendency to buy into outperforming submarkets and sell out of underperforming submarkets. Open-Ended private funds also show such a tendency but to a lesser extent. Separate Accounts show trading that is statistically unrelated to outperformance, while Closed-Ended funds show a tendency to buy into *underperforming* markets. This performance continuum lines up with our continuum of capital-market competitiveness. When we investigate a hypothesis of *stock chasing* (i.e. buying into markets that have easy availability, rather than markets that will outperform) we find that here too the evidence lines up with our continuum of capital-market competitiveness. REIT trades are not associated with past stock growth and positively associated with future performance; the same is true for Open-Ended funds. The trades by Separate Accounts are positively associated with stock growth and not associated with future performance. Trades by Closed-Ended funds are positively associated with stock growth and negatively associated with future performance.

To our knowledge we are first to examine the association between capital-market competitiveness and managerial performance in this setting.

References

Barkham, R. and Geltner, D.: 1995, Price discovery in american and british property markets, *Real Estate Economics* **23**(1), 21–44.

Brown, S. J. and Goetzmann, W. N.: 1995, Performance persistence, *Journal of Finance* **50**, 679–698.

Carhart, M. M.: 1997, On persistence in mutual fund performance, *Journal of Finance* **52**, 57–82.

Case, B. and Quigley, J.: 1991, Dynamics of real-estate prices, *Review of Economics and Statistics* **73**(1), 50–58.

Case, K. and Shiller, R.: 1990, Forecasting prices and excess returns in the housing market, *AREUEA Journal* **18**(3), 253–273.

Chen, H., Jegadeesh, N. and Wermers, R.: 2000, The value of active mutual fund management: An examination of the stockholdings and trades of fund managers, *Journal of Financial and Quantitative Analysis* **35**(03), 343–368.

Clayton, J., Geltner, D. and Hamilton, S.: 2001, Smoothing in commercial property valuations: Evidence from individual appraisals, *Real Estate Economics* **29**(3).

Cochrane, J. H.: 2005, The risk and return of venture capital, *Journal of Financial Economics* **75**, 3–52.

Daniel, K., Grinblatt, M., Titman, S. and Wermers, R.: 1997, Measuring mutual fund performance with characteristic-based benchmarks, *Journal of Finance* **52**(3), 1035–1058.

Geltner, D.: 1991, Smoothing in appraisal-based returns, *Journal of Real Estate Finance and Economics* **4**(3), 327–345.

Geltner, D. and Mei, J.: 1995, The present value model with time-varying discount rates: Implications for commercial property valuation and investment decisions, *Journal of Real Estate Finance and Economics* **11**(2), 119–135.

Gompers, P., Kovner, A., Lerner, J. and Scharfstein, D.: 2008, Venture capital investment cycles: The impact of public markets, *Journal of Financial Economics* **87**.

Gruber, M. J.: 1996, Another puzzle: The growth in actively managed mutual funds, *Journal of Finance* **51**, 783–810.

Hartzell, J., Mühlhofer, T. and Titman, S.: 2010, Alternative benchmarks for evaluating mutual fund performance, *Real Estate Economics* **38**(1), 121–154.

Hochberg, Y. V. and Mühlhofer, T.: 2014, Market timing and investment selection: Evidence from real estate investors. Working paper, available at: http://tobias.muhlhofer.com.

Jensen, M.: 1968, The performance of mutual funds in the period 1945-1964, *Journal of Finance* **23**, 389–416.

Jensen, M.: 1969, Risk, the pricing of capital assets, and the evaluation of investment portfolios, *Journal of Business* **42**, 167–247.

Kallberg, J. G., Liu, C. L. and Trzcinka, C.: 2000, The value added from investment managers: An examination of funds of reits, *Journal of Financial and Quantitative Analysis* **35**, 387–408.

Kaplan, S. N. and Schoar, A.: 2005, Private equity performance: Returns persistence and capital, *Journal of Finance* **60**, 1791–1823.

Liu, C. H. and Mei, J.: 1992, The predictability of returns on equity reits and their comovement with other assets, *Journal of Real Estate Finance and Economics* **5**(4), 401–418.

Liu, C. H. and Mei, J.: 1994, An analysis of real estate risk using the present value model, *Journal of Real Estate Finance and Economics* **8**, 5–20.

Ljungqvist, A. and Richardson, M. P.: 2003, The cash flow, return and risk characteristics of private equity. Unpublished Working Paper, New York University.

Lo, A. W.: 2002, The statistics of sharpe ratios, *Financial Analysts Journal* pp. 36–52.

Mühlhofer, T.: 2012, They would if they could: Assessing the bindingness of the property holding constraint for reits., *Real Estate Economics* **Forthcoming**.

Parrino, R., Sias, R. W. and Starks, L. T.: 2003, Voting with their feet: Institutional ownership changes around forced ceo turnover, *Journal of financial economics* **68**(1), 3–46.

R Development Core Team: 2008, *R: A Language and Environment for Statistical Computing*, R Foundation for Statistical Computing, Vienna, Austria. ISBN 3-900051-07-0.
URL: *http://www.R-project.org*

Table 1: Summary Statistics

This table presents summary statistics for total stock, as well as square-footage held and turned over by both private institutions (NCREIF Members) and REITs. The distributional statistics presented are for the entire panel of submarkets (interaction of CBSA and property type) and calendar quarters. *Net Square-Footage Turned Over* is defined as the absolute value of purchases minus sales.

Panel A

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
Stock (1000s of sqf)	227,649	251,733	84,862	162,921	275,452
Square-Footage Held by Private Institutions (1000s of sqf)	6,609	7,683	2,127	4,009	7,919
Square-Footage Held by REITs (1000s of sqf)	4,600	6,299	945	2,425	5,155
Fraction of Space Held by Private Institutions	0.0402	0.0431	0.0132	0.0274	0.0529
Fraction of Space Held by REITs	0.0442	0.06	0.0072	0.0197	0.056
Net Square-Footage Turned Over by Private Institutions, in each Submarket-Quarter (1000s of sqf)	469.11	1,387.51	19.66	164.71	478.44
Net Square-Footage Turned Over by REITs, in each Submarket-Quarter (1000s of sqf)	363.38	878.56	8.54	76.26	334.99
Total Number of Submarkets: 198					

Panel B

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
Core, Open-End					
Square Footage Held (1000s of sqf)	1,911	2,840	431	1,007	2,188
Fraction of Space Held by These Institutions	0.0112	0.0158	0.0023	0.0063	0.0134
Net Square-Footage Turned Over by These Institutions, in each Submarket-Quarter (1000s of sqf)	154.92	630.07	1.27	6.58	94.27
Non-Core, Open-End					
Square Footage Held (1000s of sqf)	1,312	2,312	251	595	1,444
Fraction of Space Held by These Institutions	0.0073	0.0113	0.0013	0.0038	0.009
Net Square-Footage Turned Over by These Institutions, in each Submarket-Quarter (1000s of sqf)	131.18	444.91	0.68	3.77	43.2
Separate Accounts					
Square Footage Held (1000s of sqf)	2,884	3,765	812	1,642	3,378
Fraction of Space Held by These Institutions	0.0178	0.024	0.0041	0.0112	0.0234
Net Square-Footage Turned Over by These Institutions, in each Submarket-Quarter (1000s of sqf)	238.79	1,133.71	2.82	17.72	224.23
Closed-End					
Square Footage Held (1000s of sqf)	1,025	1,356	267	581	1,212
Fraction of Space Held by These Institutions	0.0066	0.01	0.0016	0.0033	0.0071
Net Square-Footage Turned Over by These Institutions, in each Submarket-Quarter (1000s of sqf)	109.71	381.51	0.75	3.32	27.28

Table 2: Decile Returns Tests, Private Institutions, Quarterly Sorts

This table shows distributional statistics for the returns to the bottom-decile submarkets and top-decile submarkets, by holdings and trades, for private institutions (NCREIF members). Decile sorts are undertaken at the end of each quarter t, and returns are reported for one year going forward (quarters $t+1$ through $t+4$) two years (quarters $t+1$ through $t+8$), three years, and four years. The table then reports distributions across the entire panel of quarters and submarkets. Further, below each set of distributional statistics, we report a t-statistic testing the null that the means of the two distributions are the same against the two-sided alternative. Positive t-statistics indicate that the mean for the top decile returns is greater than that for the bottom. We also report a Kolmogorov-Smirnov test, testing the null that the two distributions are the same, against the alternative indicated by the point estimate of the difference of means. The *Positive Alternative* states that the CDF of the top-decile returns lies above that of the CDF for the bottom-decile returns, which means that the overall distribution of top decile returns is *less* than that of bottom decile returns. The *Negative Alternative* states the opposite. The last statistic in each section (KS_λ) shows results from a KS test for distributions of Sharpe Ratios, with the alternative hypotheses defined analogously.

Panel A: Private Institutions (NCREIF Members), Quarterly Fractional Holdings

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.0804	0.1143	0.0373	0.0936	0.1453
Top Decile	0.0634	0.1327	-0.0121	0.0749	0.1445
t-test, $Top - Bot$	-2.94^{**}				
KS-test, Positive Altern.	0.12^{***}				
KS_λ, Positive Altern.	0.09^{***}				
Two-Year Returns					
Bottom Decile	0.1857	0.1964	0.0877	0.2051	0.3141
Top Decile	0.1593	0.2345	0.0026	0.1559	0.3007
t-test, $Top - Bot$	-2.49^{*}				
KS-test, Positive Altern.	0.15^{***}				
KS_λ, Positive Altern.	0.1^{***}				
Three-Year Returns					
Bottom Decile	0.322	0.264	0.1653	0.3281	0.5163
Top Decile	0.2749	0.3129	0.0633	0.2453	0.4694
t-test, $Top - Bot$	-3.17^{**}				
KS-test, Positive Altern.	0.17^{***}				
KS_λ, Positive Altern.	0.11^{***}				
Four-Year Returns					
Bottom Decile	0.4757	0.326	0.2604	0.4859	0.7262
Top Decile	0.395	0.3884	0.1463	0.3497	0.6048
t-test, $Top - Bot$	-4.16^{***}				
KS-test, Positive Altern.	0.18^{***}				
KS_λ, Positive Altern.	0.19^{***}				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Panel B: Private Institutions (NCREIF Members), Quarterly Trades

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.0682	0.1222	0.0044	0.0836	0.1418
Top Decile	0.0743	0.1229	0.0191	0.0884	0.1492
t-test, $Top - Bot$	1.06				
KS-test, Negative Altern.	0.04				
KS_λ, Negative Altern.	0.04				
Two-Year Returns					
Bottom Decile	0.1635	0.2134	0.0273	0.1761	0.3015
Top Decile	0.1779	0.2189	0.0541	0.1957	0.3222
t-test, $Top - Bot$	1.35				
KS-test, Negative Altern.	0.06°				
KS_λ, Negative Altern.	0.05°				
Three-Year Returns					
Bottom Decile	0.2845	0.2829	0.0875	0.2885	0.4699
Top Decile	0.3035	0.2948	0.0883	0.305	0.5064
t-test, $Top - Bot$	1.28				
KS-test, Negative Altern.	0.05				
KS_λ, Negative Altern.	0.03				
Four-Year Returns					
Bottom Decile	0.4177	0.348	0.1635	0.4229	0.6504
Top Decile	0.438	0.3621	0.1754	0.4249	0.6639
t-test, $Top - Bot$	1.06				
KS-test, Negative Altern.	0.05				
KS_λ, Negative Altern.	0.02				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^\circ: p < .1$.

Table 3: Decile Returns Tests, REITs, Quarterly Sorts

This table shows distributional statistics for the returns to the bottom-decile submarkets and top-decile submarkets, by holdings and trades, for REITs. Decile sorts are undertaken at the end of each quarter t, and returns are reported for one year going forward (quarters $t+1$ through $t+4$) or two years (quarters $t+1$ through $t+8$), three years, and four years. The table then reports distributions across the entire panel of quarters and submarkets. Further, below each set of distributional statistics, we report a t-statistic testing the null that the means of the two distributions are the same against the two-sided alternative. Positive t-statistics indicate that the mean for the top decile returns is greater than that for the bottom. We also report a Kolmogorov-Smirnov test, testing the null that the two distributions are the same, against the alternative indicated by the point estimate of the difference of means. The *Positive Alternative* states that the CDF of the top-decile returns lies above that of the CDF for the bottom-decile returns, which means that the overall distribution of top decile returns is *less* than that of bottom decile returns. The *Negative Alternative* states the opposite. The last statistic in each section (KS_λ) shows results from a KS test for distributions of Sharpe Ratios, with the alternative hypotheses defined analogously.

Panel A: REITs, Quarterly Fractional Holdings

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.1057	0.12	0.065	0.1223	0.1782
Top Decile	0.1004	0.1259	0.047	0.1149	0.173
t-test, $Top - Bot$	-0.63				
KS-test, Positive Altern.	0.09^{*}				
KS_λ, Positive Altern.	0.05				
Two-Year Returns					
Bottom Decile	0.2293	0.2223	0.1344	0.2754	0.3674
Top Decile	0.2174	0.2286	0.09	0.2473	0.377
t-test, $Top - Bot$	-0.75				
KS-test, Positive Altern.	0.09^{*}				
KS_λ, Positive Altern.	0.07				
Three-Year Returns					
Bottom Decile	0.3879	0.2925	0.2188	0.4408	0.5639
Top Decile	0.3618	0.301	0.1367	0.3709	0.5784
t-test, $Top - Bot$	-1.18				
KS-test, Positive Altern.	0.11^{**}				
KS_λ, Positive Altern.	0.09^{*}				
Four-Year Returns					
Bottom Decile	0.5531	0.3512	0.3217	0.564	0.7402
Top Decile	0.4942	0.3603	0.2033	0.4534	0.7352
t-test, $Top - Bot$	-2.09^{*}				
KS-test, Positive Altern.	0.16^{***}				
KS_λ, Positive Altern.	0.13^{**}				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Panel B: REITs, Quarterly Trades

	Mean	Stand. Dev.	1st Quartile	Median	3rd Quartile
One-Year Returns					
Bottom Decile	0.0899	0.1147	0.0498	0.1021	0.1513
Top Decile	0.0918	0.1207	0.0465	0.1021	0.156
t-test, $Top - Bot$	0.24				
KS-test, Negative Altern.	0.04				
KS_λ, Negative Altern.	0.03				
Two-Year Returns					
Bottom Decile	0.1885	0.1999	0.0907	0.2124	0.3049
Top Decile	0.2013	0.2115	0.0947	0.2182	0.337
t-test, $Top - Bot$	0.87				
KS-test, Negative Altern.	0.08				
KS_λ, Negative Altern.	0.04				
Three-Year Returns					
Bottom Decile	0.3097	0.2635	0.1529	0.3084	0.4634
Top Decile	0.344	0.2769	0.1455	0.3431	0.5044
t-test, $Top - Bot$	1.69°				
KS-test, Negative Altern.	0.08				
KS_λ, Negative Altern.	0.04				
Four-Year Returns					
Bottom Decile	0.4357	0.3094	0.2451	0.417	0.5942
Top Decile	0.4844	0.3367	0.225	0.4381	0.6911
t-test, $Top - Bot$	1.89°				
KS-test, Negative Altern.	0.08				
KS_λ, Negative Altern.	0.04				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^\circ: p < .1$.

Table 4: Decile Returns Tests, Private Institutions, One-Year Sorts

This table shows distributional statistics for the returns to the bottom-decile submarkets and top-decile submarkets, by holdings and trades, for private institutions (NCREIF members). Decile sorts are undertaken at the end of each quarter t, in this case for the preceding year (quarters $t-3$ through t). For fractional holdings, we sort on the one-year moving average, while for trades we sort on the one-year moving sum. Returns are reported for one year going forward (quarters $t+1$ through $t+4$) or two years (quarters $t+1$ through $t+8$), three years, and four years. The table then reports distributions across the entire panel of quarters and submarkets. Further, below each set of distributional statistics, we report a t-statistic testing the null that the means of the two distributions are the same against the two-sided alternative. Positive t-statistics indicate that the mean for the top decile returns is greater than that for the bottom. We also report a Kolmogorov-Smirnov test, testing the null that the two distributions are the same, against the alternative indicated by the point estimate of the difference of means. The *Positive Alternative* states that the CDF of the top-decile returns lies above that of the CDF for the bottom-decile returns, which means that the overall distribution of top decile returns is *less* than that of bottom decile returns. The *Negative Alternative* states the opposite. The last statistic in each section (KS_λ) shows results from a KS test for distributions of Sharpe Ratios, with the alternative hypotheses defined analogously.

Panel A: Private Institutions (NCREIF Members), Annual Fractional Holdings

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.0764	0.1121	0.0308	0.0944	0.1426
Top Decile	0.0626	0.1347	-0.0135	0.0711	0.1421
t-test, $Top - Bot$	-2.29^{*}				
KS-test, Positive Altern.	0.12^{***}				
KS_λ, Positive Altern.	0.08^{**}				
Two-Year Returns					
Bottom Decile	0.1821	0.1962	0.079	0.2059	0.3113
Top Decile	0.1556	0.2346	$-5e-04$	0.1558	0.2973
t-test, $Top - Bot$	-2.41^{*}				
KS-test, Positive Altern.	0.16^{***}				
KS_λ, Positive Altern.	0.09^{**}				
Three-Year Returns					
Bottom Decile	0.3192	0.2614	0.1604	0.3338	0.5108
Top Decile	0.271	0.3114	0.0649	0.254	0.453
t-test, $Top - Bot$	-3.14^{**}				
KS-test, Positive Altern.	0.17^{***}				
KS_λ, Positive Altern.	0.13^{***}				
Four-Year Returns					
Bottom Decile	0.4774	0.3146	0.2715	0.5015	0.7247
Top Decile	0.3953	0.3825	0.1555	0.3562	0.6036
t-test, $Top - Bot$	-4.17^{***}				
KS-test, Positive Altern.	0.19^{***}				
KS_λ, Positive Altern.	0.21^{***}				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Panel B: Private Institutions (NCREIF Members), Annual Trades

	Mean	Stand. Dev.	1st Quartile	Median	3rd Quartile
One-Year Returns					
Bottom Decile	0.066	0.1242	0.0054	0.0801	0.139
Top Decile	0.068	0.1211	0.0067	0.0882	0.1445
t-test, $Top - Bot$	0.33				
KS-test, Negative Altern.	0.06°				
KS_λ, Negative Altern.	0.06°				
Two-Year Returns					
Bottom Decile	0.1663	0.2228	0.0271	0.1799	0.3061
Top Decile	0.1678	0.2141	0.0327	0.1891	0.3086
t-test, $Top - Bot$	0.13				
KS-test, Negative Altern.	0.03				
KS_λ, Negative Altern.	0.08**				
Three-Year Returns					
Bottom Decile	0.2931	0.2855	0.094	0.3139	0.4755
Top Decile	0.2928	0.2957	0.0767	0.2833	0.4957
t-test, $Top - Bot$	−0.02				
KS-test, Negative Altern.	0.04				
KS_λ, Negative Altern.	0.05				
Four-Year Returns					
Bottom Decile	0.44	0.3458	0.1853	0.4515	0.6704
Top Decile	0.429	0.3623	0.1728	0.3961	0.6549
t-test, $Top - Bot$	−0.55				
KS-test, Negative Altern.	0.04				
KS_λ, Negative Altern.	0.06				

*** : $p < .001$, ** : $p < .01$, * : $p < .05$, ° : $p < .1$.

Table 5: Decile Returns Tests, REITs, One-Year Sorts

This table shows distributional statistics for the returns to the bottom-decile submarkets and top-decile submarkets, by holdings and trades, for REITs. Decile sorts are undertaken at the end of each quarter t, in this case for the preceding year (quarters $t-3$ through t). For fractional holdings, we sort on the one-year moving average, while for trades we sort on the one-year moving sum. Returns are reported for one year going forward (quarters $t+1$ through $t+4$) or two years (quarters $t+1$ through $t+8$), three years, and four years. The table then reports distributions across the entire panel of quarters and submarkets. Further, below each set of distributional statistics, we report a t-statistic testing the null that the means of the two distributions are the same against the two-sided alternative. Positive t-statistics indicate that the mean for the top decile returns is greater than that for the bottom. We also report a Kolmogorov-Smirnov test, testing the null that the two distributions are the same, against the alternative indicated by the point estimate of the difference of means. The *Positive Alternative* states that the CDF of the top-decile returns lies above that of the CDF for the bottom-decile returns, which means that the overall distribution of top decile returns is *less* than that of bottom decile returns. The *Negative Alternative* states the opposite. The last statistic in each section (KS_λ) shows results from a KS test for distributions of Sharpe Ratios, with the alternative hypotheses defined analogously.

Panel A: REITs, Annual Fractional Holdings

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.1009	0.1232	0.0563	0.1251	0.1797
Top Decile	0.0946	0.1282	0.0418	0.1106	0.1715
t-test, $Top - Bot$	-0.71				
KS-test, Positive Altern.	0.08°				
KS_λ, Positive Altern.	0.05				
Two-Year Returns					
Bottom Decile	0.2191	0.2293	0.1134	0.2689	0.3663
Top Decile	0.2013	0.2318	0.0668	0.2369	0.3547
t-test, $Top - Bot$	-1.05				
KS-test, Positive Altern.	0.09°				
KS_λ, Positive Altern.	0.07				
Three-Year Returns					
Bottom Decile	0.373	0.2951	0.2003	0.3988	0.5542
Top Decile	0.3336	0.2922	0.1161	0.351	0.5173
t-test, $Top - Bot$	-1.72°				
KS-test, Positive Altern.	0.12^{**}				
KS_λ, Positive Altern.	0.08				
Four-Year Returns					
Bottom Decile	0.5397	0.3636	0.315	0.5261	0.7356
Top Decile	0.4638	0.3415	0.1981	0.4126	0.6887
t-test, $Top - Bot$	-2.59^{**}				
KS-test, Positive Altern.	0.17^{***}				
KS_λ, Positive Altern.	0.13^{**}				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Panel B: REITs, Annual Trades

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.0803	0.1133	0.0362	0.0968	0.1435
Top Decile	0.0905	0.1243	0.0516	0.098	0.1623
t-test, $Top - Bot$	1.2				
KS-test, Negative Altern.	0.08°				
KS_{λ}, Negative Altern.	0.1^{*}				
Two-Year Returns					
Bottom Decile	0.1657	0.2053	0.0702	0.1883	0.2957
Top Decile	0.2021	0.2235	0.0882	0.2236	0.3549
t-test, $Top - Bot$	2.29^{*}				
KS-test, Negative Altern.	0.14^{**}				
KS_{λ}, Negative Altern.	0.07				
Three-Year Returns					
Bottom Decile	0.274	0.2642	0.1284	0.2714	0.4375
Top Decile	0.3463	0.286	0.1262	0.3449	0.5314
t-test, $Top - Bot$	3.34^{***}				
KS-test, Negative Altern.	0.15^{***}				
KS_{λ}, Negative Altern.	0.09°				
Four-Year Returns					
Bottom Decile	0.4068	0.3111	0.1829	0.3806	0.5965
Top Decile	0.4873	0.3401	0.2045	0.4717	0.7313
t-test, $Top - Bot$	2.94^{**}				
KS-test, Negative Altern.	0.12^{*}				
KS_{λ}, Negative Altern.	0.13^{**}				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Table 6: Decile Returns Tests, NCREIF Fund Categories, One-Year Trades

This table shows distributional statistics for the returns to the bottom-decile submarkets and top-decile submarkets, by trades, for NCREIF funds, by Fund Type. Decile sorts are undertaken at the end of each quarter t, in this case for the preceding year (quarters $t-3$ through t). For fractional holdings, we sort on the one-year moving average, while for trades we sort on the one-year moving sum. Returns are reported for one year going forward (quarters $t+1$ through $t+4$) or two years (quarters $t+1$ through $t+8$), three years, and four years. The table then reports distributions across the entire panel of quarters and submarkets. Further, below each set of distributional statistics, we report a t-statistic testing the null that the means of the two distributions are the same against the two-sided alternative. Positive t-statistics indicate that the mean for the top decile returns is greater than that for the bottom. We also report a Kolmogorov-Smirnov test, testing the null that the two distributions are the same, against the alternative indicated by the point estimate of the difference of means. The *Positive Alternative* states that the CDF of the top-decile returns lies above that of the CDF for the bottom-decile returns, which means that the overall distribution of top decile returns is *less* than that of bottom decile returns. The *Negative Alternative* states the opposite. The last statistic in each section (KS_λ) shows results from a KS test for distributions of Sharpe Ratios, with the alternative hypotheses defined analogously.

Panel A: All Open-Ended Funds

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.0611	0.1217	0.0018	0.0817	0.1356
Top Decile	0.0683	0.1172	0.0139	0.0854	0.1414
t-test, $Top - Bot$	1.21				
KS-test, Negative Altern.	0.06°				
KS_λ, Negative Altern.	0.08**				
Two-Year Returns					
Bottom Decile	0.1546	0.2151	0.0214	0.1736	0.292
Top Decile	0.1681	0.2125	0.0271	0.1869	0.3003
t-test, $Top - Bot$	1.2				
KS-test, Negative Altern.	0.06°				
KS_λ, Negative Altern.	0.09**				
Three-Year Returns					
Bottom Decile	0.2793	0.2861	0.0886	0.28	0.4418
Top Decile	0.3051	0.2898	0.0889	0.3096	0.4953
t-test, $Top - Bot$	1.61				
KS-test, Negative Altern.	0.08*				
KS_λ, Negative Altern.	0.06				
Four-Year Returns					
Bottom Decile	0.4214	0.3405	0.1873	0.426	0.6233
Top Decile	0.4511	0.3567	0.1902	0.4283	0.6749
t-test, $Top - Bot$	1.45				
KS-test, Negative Altern.	0.05				
KS_λ, Negative Altern.	0.07°				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Panel B: Separate Accounts

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.0692	0.1197	0.0176	0.0875	0.1458
Top Decile	0.078	0.1262	0.028	0.091	0.1504
t-test, $Top - Bot$	1.39				
KS-test, Negative Altern.	0.06°				
KS_λ, Negative Altern.	0.04				
Two-Year Returns					
Bottom Decile	0.1701	0.2153	0.0617	0.1942	0.3132
Top Decile	0.1805	0.2086	0.0716	0.2055	0.3136
t-test, $Top - Bot$	0.9				
KS-test, Negative Altern.	0.04				
KS_λ, Negative Altern.	0.05				
Three-Year Returns					
Bottom Decile	0.2983	0.2732	0.1324	0.3032	0.4762
Top Decile	0.3059	0.2696	0.113	0.3082	0.4749
t-test, $Top - Bot$	0.49				
KS-test, Negative Altern.	0.03				
KS_λ, Negative Altern.	0.05				
Four-Year Returns					
Bottom Decile	0.4376	0.3159	0.2282	0.416	0.6404
Top Decile	0.4536	0.3304	0.2181	0.4503	0.6615
t-test, $Top - Bot$	0.82				
KS-test, Negative Altern.	0.05				
KS_λ, Negative Altern.	0.06				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Panel C: Closed-End Funds

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.0693	0.1299	-0.0036	0.085	0.1587
Top Decile	0.0635	0.124	0.0053	0.0826	0.1398
t-test, $Top - Bot$	-0.77				
KS-test, Positive Altern.	0.08^{*}				
KS_{λ}, Positive Altern.	0.02				
Two-Year Returns					
Bottom Decile	0.1676	0.2396	0.0028	0.1833	0.3325
Top Decile	0.1568	0.2113	0.0205	0.1779	0.2856
t-test, $Top - Bot$	-0.78				
KS-test, Positive Altern.	0.09^{*}				
KS_{λ}, Positive Altern.	0.02				
Three-Year Returns					
Bottom Decile	0.2992	0.3304	0.0501	0.297	0.528
Top Decile	0.2839	0.2714	0.0849	0.2873	0.452
t-test, $Top - Bot$	-0.79				
KS-test, Positive Altern.	0.08^{*}				
KS_{λ}, Positive Altern.	0.01				
Four-Year Returns					
Bottom Decile	0.4458	0.4108	0.145	0.4275	0.7379
Top Decile	0.4274	0.3189	0.2015	0.4094	0.636
t-test, $Top - Bot$	-0.74				
KS-test, Positive Altern.	0.09^{*}				
KS_{λ}, Positive Altern.	0.04				

$^{***} : p < .001$, $^{**} : p < .01$, $^{*} : p < .05$, $^{\circ} : p < .1$.

Table 7: Decile Returns Tests, Private Institutions, One-Year Sorts, from 1995

This table shows distributional statistics for the returns to the bottom-decile submarkets and top-decile submarkets, by holdings and trades, for private institutions (NCREIF members), starting at Q1, 1995 (the start of the REIT sample). Decile sorts are undertaken at the end of each quarter t, in this case for the preceding year (quarters $t-3$ through t). For fractional holdings, we sort on the one-year moving average, while for trades we sort on the one-year moving sum. Returns are reported for one year going forward (quarters $t+1$ through $t+4$) or two years (quarters $t+1$ through $t+8$), three years, and four years. The table then reports distributions across the entire panel of quarters and submarkets. Further, below each set of distributional statistics, we report a t-statistic testing the null that the means of the two distributions are the same against the two-sided alternative. Positive t-statistics indicate that the mean for the top decile returns is greater than that for the bottom. We also report a Kolmogorov-Smirnov test, testing the null that the two distributions are the same, against the alternative indicated by the point estimate of the difference of means. The *Positive Alternative* states that the CDF of the top-decile returns lies above that of the CDF for the bottom-decile returns, which means that the overall distribution of top decile returns is *less* than that of bottom decile returns. The *Negative Alternative* states the opposite.

Panel A: Private Institutions (NCREIF Members), Annual Fractional Holdings, from 1995

	Mean	**Stand. Dev.**	**1st Quartile**	**Median**	**3rd Quartile**
One-Year Returns					
Bottom Decile	0.0857	0.1146	0.0535	0.1045	0.1501
Top Decile	0.077	0.1371	0.0225	0.0874	0.152
t-test, $Top - Bot$	-1.29				
KS-test, Positive Altern.	0.12^{***}				
Two-Year Returns					
Bottom Decile	0.2035	0.1989	0.1302	0.2242	0.3267
Top Decile	0.1905	0.2326	0.0696	0.193	0.3302
t-test, $Top - Bot$	-1.07				
KS-test, Positive Altern.	0.16^{***}				
Three-Year Returns					
Bottom Decile	0.3543	0.259	0.2255	0.3745	0.5516
Top Decile	0.3259	0.2956	0.1344	0.2994	0.4881
t-test, $Top - Bot$	-1.73°				
KS-test, Positive Altern.	0.16^{***}				
Four-Year Returns					
Bottom Decile	0.5208	0.3049	0.3403	0.5384	0.7509
Top Decile	0.4589	0.3473	0.2126	0.3902	0.6569
t-test, $Top - Bot$	-3^{**}				
KS-test, Positive Altern.	0.21^{***}				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Panel B: Private Institutions (NCREIF Members), Annual Trades, from 1995

	Mean	Stand. Dev.	1st Quartile	Median	3rd Quartile
One-Year Returns					
Bottom Decile	0.0761	0.1274	0.0256	0.09	0.1523
Top Decile	0.0797	0.122	0.0374	0.0988	0.1501
t-test, $Top - Bot$	0.55				
KS-test, Negative Altern.	0.06°				
Two-Year Returns					
Bottom Decile	0.1923	0.2241	0.0747	0.2177	0.3314
Top Decile	0.1954	0.2113	0.0864	0.217	0.3306
t-test, $Top - Bot$	0.26				
KS-test, Negative Altern.	0.05				
Three-Year Returns					
Bottom Decile	0.3323	0.2767	0.1479	0.3508	0.5062
Top Decile	0.3408	0.283	0.1476	0.3258	0.5307
t-test, $Top - Bot$	0.51				
KS-test, Negative Altern.	0.05				
Four-Year Returns					
Bottom Decile	0.4848	0.3193	0.2479	0.4864	0.7045
Top Decile	0.4921	0.3428	0.2331	0.447	0.7015
t-test, $Top - Bot$	0.34				
KS-test, Negative Altern.	0.05				

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Table 8: Regression Results for Stock-Trade Relationships

Dependent variable: $trade_{t,t+1}$. This table shows regression results, testing whether trades are associated with stock availability or future high returns. The dependent variable is trade for the year starting t and ending $t+1$, while the independent variables are stock growth the previous year ($t-1$ to t) and two-year returns, starting the year after the trade (from $t+1$ to $t+3$).

Panel A: Private Institutions (NCREIF Members)

	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
$(Intercept)$	0.0022	8.64^{***}	0.0015	3.69^{***}
$2.yr.return_{t+1,t+3}$	−0.0008	−0.95	−0.0007	−0.84
$stock.growth_{t-1,t}$	0.0134	2.74^{**}	0.0168	3.06^{**}
$Hotel$			−0.0049	−1.49
$Industrial$			−0.0002	−0.43
$Office$			0.0020	4.35^{***}
$Retail$			0.0004	0.5
N	6465		6465	
$\overline{R}^2$	0.001		0.006	
F	4.528		7.547	

Panel B: REITs

	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
$(Intercept)$	−0.0110	-11.36^{***}	−0.0106	-7.96^{***}
$2.yr.return_{t+1,t+3}$	0.0411	16.01^{***}	0.0386	14.44^{***}
$stock.growth_{t-1,t}$	0.0304	1.28	0.0355	1.49
$Industrial$			0.0020	1.49
$Office$			−0.0012	−0.92
$Retail$			−0.0069	-2.82^{**}
N	2992		2992	
$\overline{R}^2$	0.078		0.082	
F	128.122		54.717	

$^{***}: p < .001$, $^{**}: p < .01$, $^{*}: p < .05$, $^{\circ}: p < .1$.

Panel C: Private Institutions, Subcategories

	Core Open-Ended Funds			
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
$(Intercept)$	0.0005	3.39***	0.0003	1.28
$2.yr.return_{t+1,t+3}$	0.0022	4.91***	0.0022	4.78***
$stock.growth_{t-1,t}$	0.0003	0.11	−0.0006	−0.22
$Hotel$			0.0013	0.74
$Industrial$			0.0001	0.53
$Office$			0.0004	1.43
$Retail$			0.0001	0.27
N	5679		5679	
$\overline{R^2}$	0.004		0.004	
F	12.11		4.482	

	Non-Core Open-Ended Funds			
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
$(Intercept)$	0.0007	4.94***	−0.0001	−0.62
$2.yr.return_{t+1,t+3}$	0.0015	2.93**	0.0016	3.18**
$stock.growth_{t-1,t}$	0.0011	0.49	0.0017	0.73
$Hotel$			−0.0002	−0.09
$Industrial$			0.0008	2.84**
$Office$			0.0016	5.56***
$Retail$			0.0017	2.81**
N	3557		3557	
$\overline{R^2}$	0.002		0.01	
F	4.384		7.058	

	All Open-Ended Funds			
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
$(Intercept)$	0.0010	6.33***	0.0002	0.86
$2.yr.return_{t+1,t+3}$	0.0032	5.88***	0.0034	6.16***
$stock.growth_{t-1,t}$	0.0009	0.28	0.0006	0.16
$Hotel$			0.0012	0.54
$Industrial$			0.0006	2.12*
$Office$			0.0014	4.65***
$Retail$			0.0015	2.53*
N	6029		6029	
$\overline{R^2}$	0.005		0.009	
F	17.341		9.802	

	Separate Accounts			
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
$(Intercept)$	0.0007	2.57*	0.0001	0.38
$2.yr.return_{t+1,t+3}$	−0.0008	−1.07	−0.0009	−1.26
$stock.growth_{t-1,t}$	0.0291	4.02***	0.0281	3.86***
$Hotel$			0.0015	0.23
$Industrial$			0.0002	0.42
$Office$			0.0016	4.24***
$Retail$			−0.0002	−0.32
N	5668		5668	
$\overline{R^2}$	0.003		0.006	
F	8.95		7.168	

	Closed-Ended Funds			
	Coefficient	**t-statistic**	**Coefficient**	**t-statistic**
$(Intercept)$	0.0007	5.28***	0.0006	2.98**
$2.yr.return_{t+1,t+3}$	−0.0022	−5.22***	−0.0024	−5.62***
$stock.growth_{t-1,t}$	0.0072	3.13**	0.0095	3.78***
$Hotel$			−0.0043	−2.25*
$Industrial$			−0.0005	−1.99*
$Office$			0.0008	3.43***
$Retail$			−0.0011	−2.18*
N	4362		4362	
$\overline{R^2}$	0.008		0.018	
F	19.557		14.217	

$*** : p < .001$, $** : p < .01$, $* : p < .05$, $^\circ : p < .1$.