Are Hedge Fund Managers Better Able to Forecast Real Estate Security Returns than Others?

A cause may be the incentive fees paid to hedge fund managers.

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In this article, we conduct an analysis, based on the Thomson Ownership Database (hereafter, TOD), whose methodology is borrowed from Hartzmark [1991]. The basic empirical approach is to measure the market-adjusted return on individual real estate securities, which includes return data for both REITs and real estate operating companies. Next, we regress this return over time on the ownership position of real estate security hedge fund investors, controlling for size, book-to-market, and momentum. We also estimate similar regressions for

1. bank and trust managers,
2. pension funds,
3. investment advisors,
4. insurance companies, and
5. endowment funds.

We then test whether real estate security hedge fund managers are better able to forecast returns than others.

THEORETICAL FRAMEWORK

Superior Management Hypothesis

Why might we expect hedge fund managers to have superior forecasting ability? The theory is based on Starks [1987]. In her model, hedge fund managers receive an incentive fee with an option-like payoff structure, while all other investment advisors are paid a fixed percentage of the total funds under management.[1] This incentive fee allows hedge funds to recruit and retain fund managers of

high quality. High-quality managers are the best forecasters of returns, and of course, the better the forecast, the higher the residual value of the fund after the prescribed risk-adjusted payments to fundholders. This is what makes high-quality fund managers worth their pay.

If true, and if hedge fund managers have superior forecasting abilities, then we would expect real estate security hedge funds to adjust their positions in a stock depending on the strength of their conviction. Hartzmark [1991] proposed a test of this hypothesis, which can be conducted by estimating the regression

$$R_{it+1} = a_j + b_j IO_{ijt} + \varepsilon_{ijt} \tag{1}$$

where:

R_{it+1} = the market-adjusted return on real estate securities i at time $t+1$,

IO_{ijt} = the ownership position in real estate security i at time t for manager type j (expressed as a percentage of total outstanding shares of real estate security i), and

ε_{ijt} = a random error term.

The leads and lags of R_{it+1} and IO_{ijt} in Equation (1) are our own addition; otherwise, the model is identical to the one used by Hartzmark. The hypothesis in Equation (1) is that IO_{ijt} will forecast R_{it+1}.

The coefficient b_j is assumed to differ across hedge funds (h), bank and trusts (b), pension funds (p), investment advisors (a), insurance companies (i), and endowment funds (e). As a consequence, we estimate Equation (1) separately for each manager type and compare the results. Estimates of b_j provide information on differences in forecasting ability. We are interested in testing whether the b_j terms across equations are equal. This test involves estimating Equation (1) as a single equation

$$\begin{pmatrix} R_{it+1} \\ R_{it+1} \\ \vdots \\ R_{it+1} \end{pmatrix} = a_h \begin{pmatrix} 1 \\ 0 \\ \vdots \\ 0 \end{pmatrix} + a_b \begin{pmatrix} 0 \\ 1 \\ \vdots \\ 0 \end{pmatrix} + \cdots + a_e \begin{pmatrix} 0 \\ 0 \\ \vdots \\ 1 \end{pmatrix} + b \begin{pmatrix} IO_{iht} \\ IO_{ibt} \\ \vdots \\ IO_{iet} \end{pmatrix} + \begin{pmatrix} \varepsilon_{iht} \\ \varepsilon_{ibt} \\ \vdots \\ \varepsilon_{iet} \end{pmatrix} \tag{2}$$

and testing the appropriateness of this restricted specification against the unrestricted specification

$$\begin{pmatrix} R_{it+1} \\ R_{it+1} \\ \vdots \\ R_{it+1} \end{pmatrix} = a_h \begin{pmatrix} 1 \\ 0 \\ \vdots \\ 0 \end{pmatrix} + a_b \begin{pmatrix} 0 \\ 1 \\ \vdots \\ 0 \end{pmatrix} + \cdots + a_e \begin{pmatrix} 0 \\ 0 \\ \vdots \\ 1 \end{pmatrix} + b_h \begin{pmatrix} IO_{iht} \\ 0 \\ \vdots \\ 0 \end{pmatrix} + b_b \begin{pmatrix} 0 \\ IO_{ibt} \\ \vdots \\ 0 \end{pmatrix} + \cdots + b_e \begin{pmatrix} 0 \\ 0 \\ \vdots \\ IO_{iet} \end{pmatrix} + \begin{pmatrix} \varepsilon_{iht} \\ \varepsilon_{ibt} \\ \vdots \\ \varepsilon_{iet} \end{pmatrix} \tag{3}$$

using a standard Chi-square test (for panel data).

Adverse Selection Hypothesis

Why might we expect real estate security hedge fund managers to have only the semblance of superior forecasting ability? Carpenter [2000] develops a formal model in which incentive fees (like the incentive fees of hedge fund managers) encourage portfolio managers to take on excessive amounts of risk. Her model suggests that the impact of option compensation contracts is to increase the manager's appetite for risk when asset values are low or when the fund is doing poorly. Carpenter also stresses that when asset values rise, hedge fund managers may target lower volatility, because the leverage inherent in the option compensation contract will tend to magnify their exposure to the asset volatility. Hence, if hedge fund managers are risk averse, they may actually choose in some situations to lower (rather than increase) volatility compared to the no-incentive-fee outcome.

These considerations suggest two points. The first is that incentive fees may cause hedge funds to take on more risk than the average investor does. The second is that hedge funds may achieve a high return primarily by taking on high risk. Statistically, this means that the relation between R_{it+1} and IO_{ijt} in Equation (1) may be spurious if the incentive fee structure causes hedge fund managers to choose riskier portfolios.

In an attempt to test this hypothesis, we estimate a latent model of IO_{ijt} in which

$$IO_{ijt} = \alpha_j + \beta_j X_{it} + \mu_{ijt} \tag{4}$$

where:

X_{it} = a vector of firm characteristics for real estate security i at time t, and

μ_{ijt} = a random error term.

Writing Equation (4) in this way creates challenges. Here IO_{ijt} is a left-censored variable at zero and right-censored at up to 9.99% for most real estate securities. The right-censoring occurs owing to the so-called five-or-fewer rule for REITs, which restricts the five largest shareholders to owning no more than 50% of a REIT's shares. To satisfy the five-or-fewer rule, many REITs have provisions in their organization charters prohibiting any shareholder from owning more than a set percentage of the trust's stocks, typically 9.99%.[2] Thus, we have a heteroskedasticity problem, a large number of outcomes with a very small equity ownership stake. To correct for this censoring problem, we estimate Equation (4) using the logistics of IO_{ijt}, such that $\log(IO_{ijt}/(1-IO_{ijt}))$. Note that as a robustness check, our main results and conclusion do not change if we use $\log IO_{ijt}$ instead of $\log(IO_{ijt}/(1-IO_{ijt}))$ as the measure of institutional ownership in our model.

A total of five variables are used as the regressors in Equation (4). The real estate securities' beta and residual standard deviation (estimated from a CAPM model) are included as a measure of firm volatility. If incentive fees cause hedge funds to take on excessive risk, then the expected signs of these two variables are positive. Dividend yield is included as a measure of the cost of selling short. When a hedge fund shorts a real estate security, it must borrow shares at one price and sell the borrowed shares, hoping the price will fall by the time the stock must be purchased in order to return the shares. Meanwhile, if a dividend is announced, the hedge fund must cover this cost. With an average annual dividend yield between 4% and 6%, this is not a small cost. Therefore, as the dividend yield increases, we would expect a negative relation between IO_{ijt} for hedge funds and dividend yield.

Finally, we expect hedge funds (as well as other institutional investors) to prefer real estate securities that are more liquid, which we measure by smaller bid-ask spreads and greater trading volume.[3]

ECONOMETRIC ISSUES

Simultaneous-Equation Bias

Our research improves upon Hartzmark's [1991] estimation method by estimating Equation (1) using an instrumental variable (IV) approach. The approach involves two stages. In the first stage, we estimate Equation (4) and use the predicted value of the regressions as the instrumental value. In the second stage, we regress R_{it+1} on this predicted value, not IO_{ijt}; that is, in the second stage, we estimate the regression

$$R_{it+1} = a_j + b_j \hat{I}_{ijt} + \varepsilon_{ijt} \quad (5)$$

where:

$\hat{I}_{ijt}$ = the stage one predicted value of IO_{ijt}.

Equation (5) eliminates the problem of spuriousness in correlation, where the correlation between R_{it+1} and IO_{ijt} may be inflated because of the incentive hedge fund managers have to take on excessive amounts of risk. Nevertheless, we also provide several checks of the model.

In one such test (and the one reported herein), we estimate

$$R_{it+1} = a_j + b_j \hat{I}_{ijt} + c_j BV_{it} + d_j BM_{it} + e_j M_{it} + \varepsilon_{ijt} \quad (6)$$

where:

BV_{it} = real estate security firm size (measured by the logarithm of book value of property),
BM_{it} = real estate security book-to-market value ratio, and
M_{it} = momentum returns.

We would expect R_{it+1} to be inversely related to BV_{it}; that is, that returns on small real estate securities (low BV_{it}) are high given their risk.[4] In contrast, we would expect a positive relation between R_{it+1} and BM_{it}; that is, firms with a high book-to-market ratio should earn higher average returns that firms with a low book-to-market ratio. Fama and French [1992] argue that this result is due to the fact that firms with a high book-to-market ratio are fundamentally riskier (i.e., have poor growth prospects) than firms with a low book-to-market ratio. Therefore, the high expected return on firms with a high book-to-market ratio is fair compensation for the risk involved.[5]

Jegadeesh and Titman [1993] find evidence that stock returns tend to exhibit short-term momentum; that is, stocks that have done well over the previous year, in terms of momentum, continue to have higher returns than stocks without those characteristics. Thus, to the extent that this pattern holds true for real estate securities, we expect to find a positive relation between momentum and R_{it+1}.

Heteroskedasticity in Errors

We need to exercise some caution in the use of Equations (5) and (6). When we pool the data and

EXHIBIT 1

Summary Statistics

Panel A. Number of Investments

Ownership Types	1997	1998	1999	2000	2001	2002	2003	2004	Average % Increase
Pension Fund	490	643	836	693	1014	1267	1595	1606	
(% change)		31.22%	30.02%	-17.11%	46.32%	24.95%	25.89%	0.69%	20.28%
Hedge Fund	82	189	128	210	423	516	714	776	
(% change)		130.49%	-32.28%	64.06%	101.43%	21.99%	38.37%	8.68%	47.54%
Investment Advisor	4526	6011	6694	6877	7716	9342	10523	10742	
(% change)		32.81%	11.36%	2.73%	12.20%	21.07%	12.64%	2.08%	13.56%
Investment Advisor/Hedge Fund	1073	1038	1359	1536	172 9	2019	2313	2765	
(% change)		-3.26%	30.92%	13.02%	12.57%	16.77%	14.56%	19.54%	-100.00%
Bank and Trust	748	963	1096	1093	1287	1517	1706	1676	
(% change)		28.74%	13.81%	-0.27%	17.75%	17.87%	12.46%	-1.76%	12.66%
Endowment	68	68	29	45	87	49	69	58	
(% change)		0.00%	-57.35%	55.17%	93.33%	-43.68%	40.82%	-15.94%	10.34%
Insurance Company	489	689	774	1001	1142	1083	1267	1129	
(% change)		40.90%	12.34%	29.33%	14.09%	-5.17%	16.99%	-10.89%	13.94%
Others	381	700	755	822	997	1216	1423	1559	
(% change)		83.73%	7.86%	8.87%	21.29%	21.97%	17.02%	9.56%	24.33%
All Institutional Investors	7857	10301	11671	12277	14395	17009	19610	20311	
(% change)		31.11%	13.30%	5.19%	17.25%	18.16%	15.29%	3.57%	14.84%

Panel B. Market Value of Investments in Real Estate Securities (in billions)

Ownership Types	1997	1998	1999	2000	2001	2002	2003	2004	Average % Increase
Pension Fund	$3.99	$6.88	$8.95	$8.04	$12.98	$12.92	$14.01	$16.70	
fraction of total	6.63%	7.49%	11.42%	10.57%	12.84%	11.79%	11.02 %	9.98%	10.73%
(% change)		72.39%	30.02%	-10.13%	61.46%	-0.43%	8.39%	19.24%	25.85%
Hedge Fund	$0.59	$1.16	$0.56	$1.08	$1.55	$1.64	$1.74	$2.75	
fraction of total	0.98%	1.27%	0.72%	1.42%	1.54%	1.50%	1.37%	1.64%	1.35%
(% change)		96.18%	-51.45%	91.04%	43. 82%	5.94%	6.17%	57.71%	35.63%
Investment Advisor	$44.10	$65.52	$53.58	$50.67	$65.99	$73.41	$84.26	$109.57	
fraction of total	73.24%	71.31%	68.39%	66.62%	65.31%	66.99%	66.27%	65.47%	67.19%
(% change)		48.56%	-18.22%	-5.45%	30.25%	11.23%	14.79%	30.03%	15. 89%
Investment Advisor/Hedge Fund	$7.71	$9.38	$9.60	$10.80	$12.91	$13.51	$17.55	$26.82	
fraction of total	12.80%	10.21%	12.25%	14.20%	12.78%	12.32%	13.80%	16.03%	13.08%
(% change)		21.69%	2.36%	12.51%	19.57%	4.59%	29.91%	52.86%	20.50%
Bank and Trust	$1 .17	$1.86	$1.24	$1.09	$1.23	$1.84	$2.36	$3.69	
fraction of total	1.94%	2.02%	1.59%	1.43%	1.22%	1.68%	1.85%	2.21%	1.71%
(% change)		58.86%	-33.21%	-12.29%	13.14%	48.96%	28.29%	56.84%	22.94%
Endowment	$0.40	$0.45	$0.29	$0.44	$1.10	$1.07	$1.01	$0.78	
Frac tion of total	0.66%	0.49%	0.37%	0.58%	1.08%	0.98%	0.80%	0.47%	0.68%
(% change)		13.21%	-34.89%	51.60%	146.87 %	-2.11%	-5.48%	-22.80%	20.91%
Insurance Company	$1.53	$3.12	$2.35	$2.65	$4.15	$3.99	$4.62	$4.68	
Fraction of total	2.54%	3.39%	3.00%	3.49%	4.11%	3.64%	3.64%	2.80%	3.44%
(% change)		103.81%	-24.57%	12.90%	56.50%	-3.91%	15.86%	1.17%	23.11%

EXHIBIT 1 (*Continued*)

Others	$0.73	$3.51	$1.77	$1.29	$1.13	$1.20	$1.60	$2.35	
Fraction of total	1.21%	3.82%	2.26%	1.69%	1.12%	1.10%	1.26%	1.41%	1.81%
(% change)		383.83%	-49.58%	-27.35%	-12.18%	6.42%	33.31%	46.63%	54.44%
All Institutional Investors	$60.22	$91.88	$78.35	$76.06	$101.05	$109.58	$127.16	$167.35	
(% change)		52.58%	-14.73%	-2.93%	32.86%	8.45%	16.04%	31.61%	17.70%

Panel C. Average Percent Equity Stake of Investments in Real Estate Securities

Ownership Types	1997	1998	1999	2000	2001	2002	2003	2004	Average % Increase
Pension Fund	0.70%	0.59%	0.67%	0.75%	0.61%	0.49%	0.44%	0.41%	
(% change)		-15.52%	13.65%	11.03%	-18.36%	-19.80%	-10.40%	-6.48%	-6.55%
Hedge Fund	1.56%	1.31%	1.65%	1.08%	0.72%	0.57%	0.44%	0.46%	
(% change)		-15.58%	25.84%	-34.90%	-33.33%	-20.97%	-22.72%	4.48%	-13.88%
Investment Advisor	0.87%	0.76%	0.70%	0.62%	0.56%	0.60%	0.65%	0.69%	
(% change)		-11.84%	-8.80%	-10.26%	-10.21%	7.30%	8.18%	5.31%	-2.90%
Investment Advisor/Hedge Fund	0.80%	0.78%	0.71%	0.63%	0.55%	0.55%	0.57%	0.72%	
(% change)		-3.49%	-8.75%	-10.90%	-12.16%	-1.35%	4.25%	27.07%	-0.76%
Bank and Trust	0.16%	0.16%	0.10%	0.10%	0.08%	0.10%	0.10%	0.12%	
(% change)		-2.23%	-35.23%	-3.35%	-17.66%	23.21%	2.41%	20.93%	-1.70%
Endowment	0.76%	0.74%	0.92%	0.93%	0.83%	1.59%	1.05%	0.74%	
(% change)		-2.80%	25.48%	0.67%	-10.79%	92.43%	-33.98%	-30.04%	5.85%
Insurance Company	0.33%	0.31%	0.27%	0.18%	0.18%	0.20%	0.2 0%	0.20%	
(% change)		-6.47%	-11.75%	-32.44%	-0.52%	12.33%	-0.36%	-1.59%	-5.83%
Others	0.20%	0.36%	0.22%	0.15%	0.10%	0.13%	0.12%	0.12%	
(% change)		75.69%	-38.32%	-32.15%	-31.21%	29.26%	-12.52%	-0.07%	-1.33%
All Institutional Investors	5.37%	5.00%	5.24%	4.44%	3.63%	4.23%	3.57%	3.45%	
(% change)		-6.95%	4.88%	-15.39%	-18.06%	16.49%	-15.68%	-3.31%	-5.43%

estimate Equations (5) and (6), we are implicitly assuming that the error term is homoskedastic (i.e., that the variance of the errors across different real estate securities is the same). This assumption is almost certainly not correct in this case which means that the coefficient estimates of b_j can easily turn out to be insignificant even though they may be significant.

This study uses a straightforward fixed-effects model to correct for this problem. The model follows that of Balestra and Varadharajan-Krishnakumar [1987]. In the first stage of our estimation, we regress IO_{ijt} on X_{it}, including real estate security-specific fixed effects which precludes the use of most covariates used in other studies; for example, 0-1 variables for apartment REITs, office REITs, industrial REITs, mall REITs, real estate, and so forth. Next, we fit the second-stage regression, substituting IO_{ijt} with its predicted values.

The value of b_j should be better estimated with this model. The real estate security-specific dummy variables remove all comparisons across real estate securities from the sample, producing residuals having the required properties; namely, that their mean is zero and that they are uncorrelated with the independent variables.

DATA

To determine the extent to which publicly traded real estate securities, including publicly traded REITs and real estate operating companies, are held by bank and trusts, endowment funds, hedge funds, investment advisors,

insurance companies, and pension funds, we use TOD.[6] The TOD reports the security holdings of institutional investors with greater than $100 million of securities under discretionary management. The data are compiled from SEC 13-F filings. The frequency of the data is annual, from 1997 to 2004.

The TOD data are highly comprehensive. Two categories of hedge fund investors are provided: stand-alone funds (like Cliffwood Partners), and funds that are sponsored by investment advisors (like Henderson Global Investors). Stand-alone real estate security hedge funds are by far the smaller of the two categories with 5% of total hedge fund holdings. In contrast, real estate security hedge funds that are sponsored by investment advisors account for the remaining 95% of total hedge fund holdings. We have decided against combining these two hedge fund categories into one. In this way, we can test whether the two groups have different forecasting abilities.

TOD is not usually thought of as the best source of hedge fund information. Unfortunately, TOD does not identify short sales. Fortunately, there are several ways to work around this limitation.

The return data in this study are from CRSP. The returns are adjusted by the return of the market portfolio (simple market-adjusted returns) and dated one-year ahead. The dates for these data are June-ends of every year. This dating imparts a conservative bias to our tests, the sort of conservative bias that one wants when testing for superior forecasting abilities.

The firm financial data (including dividend yield, book value of real estate assets, and the book-to-market ratio) are from Compustat. We use the real estate security dividends at June-end from Compustat to compute dividend yield. We use (the logarithm of) book value of real estate assets at June-end as a measure of firm size.[7] We use the ratio of the real estate security book-to-market value of equity at June-end as a measure of default risk which is likely to be higher (prices are likely to lower) for real estate securities with higher risks and expected returns.

Bid-ask spreads are measured as the ask quote minus the bid quote, divided by share price at June-end of every year. Trading volume is the number of shares traded over the previous twelve months, divided by shares outstanding at June-end of every year. Momentum is measured by the previous twelve-month returns (relative to the market return), ending June-end of every year. These data are from CRSP.

Beta and residual standard deviation are estimated, using OLS, from a standard CAPM model on value-weighted market returns over a rolling five-year period, ending June-end of every year.

HEDGE FUND HOLDINGS OF REAL ESTATE SECURITIES

Exhibit 1 provides a breakdown of major institutional holders of real estate securities. The breakdown reveals two important characteristics about this market. First, hedge fund holdings have grown consistently over the sample period, not only absolutely, but also in relation to other institutional investors. By contrast, investment advisor holdings have declined in relative terms over the sample period. Yet, investment advisors are still the

EXHIBIT 2

Percentage of Total Equity Ownership across Firm Characteristics Quintiles for Each Institutional Type

Panel A. Market Capitalization Quintiles

	Pension Funds	Hedge Funds	Investment Advisors	Investment Advisor/ Hedge Funds	Banks and Trusts	Endowment Funds	Insurance Company
1 (low)	0.2%	0.5%	7.3%	1.2%	0.1%	0.0%	0.2%
2	0.6%	1.5%	14.2%	3.1%	0.3%	0.1%	0.3%
3	1.5%	1.4%	23.0%	5.5%	0.6%	0.6%	0.8%
4	4.1%	1.4%	35.6%	7.6%	1.1%	0.2%	1.4%
5 (high)	6.4%	0.5%	39.7%	8.6%	1.1%	0.3%	2.1%
5(high) - 1(low)	6.2%	0.0%	32.3%	7.5%	1.0%	0.3%	1.8%
t-statistic	**22.49*** **	**-0.04**	**26.03*** **	**19.10*** **	**19.41*** **	**10.68*** **	**10.60*** **

Panel B. Beta Quintiles

	Pension Funds	Hedge Funds	Investment Advisors	Investment Advisor/ Hedge Funds	Banks and Trusts	Endowment Funds	Insurance Company
1 (low)	3.4%	0.5%	27.8%	5.4%	0.8%	0.5%	1.2%
2	4.0%	1.0%	28.7%	5.9%	0.8%	0.4%	1.4%
3	4.8%	1.0%	31.6%	7.2%	0.9%	0.5%	1.5%
4	4.2%	1.5%	32.3%	8.3%	0.9%	0.2%	1.4%
5 (high)	2.2%	1.7%	27.9%	7.3%	0.9%	0.2%	0.8%
5(high) - 1(low)	-1.2%	1.2%	0.1%	1.9%	0.1%	-0.3%	-0.4%
t-statistic	**-2.96*** **	**5.58*** **	**0.04**	**2.81*** **	**0.71**	**-1.18**	**-2.81*** **

EXHIBIT 2 (*Continued*)

Panel C. Residual Standard Deviation Quintiles

	Pension Funds	Hedge Funds	Investment Advisors	Investment Advisor/ Hedge Funds	Banks and Trusts	Endowment Funds	Insurance Company
1 (low)	4.4%	0.4%	30.0%	6.2%	0.9%	0.3%	1.5%
2	4.3%	0.7%	32.1%	7.3%	0.9%	0.5%	1.4%
3	4.0%	0.8%	30.1%	7.1%	0.9%	0.2%	1.3%
4	2.5%	1.3%	26.9%	6.7%	0.9%	0.5%	0.9%
5 (high)	1.4%	2.0%	20.4%	4.9%	0.6%	0.1%	0.6%
5(high) - 1(low)	-3.0%	1.5%	-9.5%	-1.3%	-0.2%	-0.2%	-0.9%
t-statistic	-8.3***	6.26***	-5.39***	-2.3**	-2.34**	-2.73***	-6.42***

Panel D. Dividend Yield Quintiles

	Pension Funds	Hedge Funds	Investment Advisors	Investment Advisor/ Hedge Funds	Banks and Trusts	Endowment Funds	Insurance Company
1 (low)	1.3%	2.2%	19.2%	5.0%	0.5%	0.2%	0.4%
2	4.1%	1.5%	32.0%	6.3%	0.7%	0.3%	1.9%
3	4.0%	0.8%	29.6%	6.4%	0.8%	0.5%	1.3%
4	2.5%	0.6%	23.5%	5.1%	0.7%	0.2%	0.9%
5 (high)	1.4%	1.0%	19.1%	4.3%	0.7%	0.0%	0.4%
5(high) - 1(low)	0.1%	-1.2%	-0.1%	-0.7%	0.2%	-0.2%	0.0%
t-statistic	0.7	-3.06***	-0.1	-1.34	2.13**	-4.02***	0.06

Panel E. Momentum Quintiles

	Pension Funds	Hedge Funds	Investment Advisors	Investment Advisor/ Hedge Funds	Banks and Trusts	Endowment Funds	Insurance Company
1 (low)	2.5%	1.7%	24.8%	6.1%	0.7%	0.2%	0.9%
2	3.8%	0.6%	30.5%	7.2%	0.8%	0.2%	1.5%
3	4.5%	0.9%	29.7%	6.5%	0.8%	0.4%	1.3%
4	4.2%	0.5%	30.8%	6.9%	1.0%	0.5%	1.3%
5 (high)	2.9%	1.5%	28.3%	6.3%	1.0%	0.4%	1.1%
5(high) - 1(low)	0.5%	-0.1%	3.5%	0.3%	0.3%	0.1%	0.2%
t-statistic	1.31	-0.25	1.78	0.41	2.35**	0.89	1.62

*Note: t-statistics are reported in bold in the last row of each panel. *, ** and *** denote significance at the 10, 5, and 1, percent levels, respectively.*

dominant institutional holder of real estate securities in the U.S., accounting for 65% of the entire market. And second, total hedge fund involvement in this market accounts for $29.5 billion, or 18%, of the overall market. Pension funds themselves directly hold $16.7 billion. All other institutional investors hold $11.4 billion.

Percentage distributions of asset holdings for the six institutional types are presented in Exhibit 2. The theory for hedge funds predicts extreme asset allocations. The evidence suggests that stand-alone hedge funds prefer real estate securities with a higher beta, a higher residual standard deviation, and a lower dividend yield. The *t*-statistics testing whether the differences between these high-low portfolios are different from zero range from −3.06 to 5.58. All of these comparisons are bivariate relationships for IO_{ijt}.

Hedge funds sponsored by investment advisors prefer real estate securities that are larger, have a higher beta, and a lower residual standard deviation. The *t*-statistics for the differences between these high-low portfolios are all statistically significant at the 95% confidence level.

With respect to pension fund holdings, one can see that there are notable differences (as the theory would predict) between hedge fund investors and pension funds. Pension funds would appear to prefer real estate securities that are larger, have a lower (as opposed to a higher) beta, and a lower (as opposed to a higher) residual standard deviation. This evidence is generally consistent with the findings in Ciochetti, Craft, and Shilling [2002].

There also are notable differences between hedge fund investors and investment advisors. It is clear from Exhibit 2 that investment advisors have a strong preference for real estate securities that are larger and have a lower residual standard deviation. These results are not unexpected given the rules prohibiting investment advisors and pension funds from investing in what are perceived to be risky assets.

EVIDENCE ON FORECASTING ABILITIES

Our first step is the estimation of Equation (4) with real estate security-specific fixed effects included. We estimate this equation separately for hedge funds, banks and trusts, pension funds, investment advisors, insurance companies, and endowment funds; our dependent variable is IO_{ijt}. The sample period is from 1997 to 2004. We again test whether hedge fund investors prefer real estate securities with a higher beta and a higher residual standard deviation, now in a multiple-regression framework. Here the results, as shown in Exhibit 3, are not

EXHIBIT 3

Determinants of Equity Ownership by Different Types of Institutional Investors

	Pension Funds	Hedge Funds	Investment Advisors	Investment Advisor/ Hedge Funds	Banks and Trusts	Endowment Funds	Insurance Company
Beta	0.619	-1.505	-0.254	0.352	-0.377	-1.998	-0.326
	0.038**	**0.045****	**0.265**	**0.240**	**0.245**	**0.061***	**0.404**
Residual Variance	-1.517	16.868	-6.962	-6.173	-9.861	58.945	-8.469
	0.606	**0.021****	**0.007*****	**0.046****	**0.004*****	**0.000*****	**0.028****
Bid-Ask Spread	-0.402	-1.700	-0.273	-0.813	-0.334	-1.193	-0.087
	0.120	**0.037****	**0.005*****	**0.000*****	**0.068***	**0.761**	**0.709**
Log(Trading Volume)	0.611	1.159	0.520	0.843	0.605	0.207	0.657
	0.000***	**0.000*****	**0.000*****	**0.000*****	**0.000*****	**0.377**	**0.000*****
Dividend Yield	-1.778	-2.182	-7.555	-7.558	-6.825	-5.166	-9.537
	0.186	**0.475**	**0.000*****	**0.000*****	**0.000*****	**0.396**	**0.000*****
Log(Book Value of Properties)	-0.004	-0.089	-0.037	-0.046	0.026	-0.039	-0.021
	0.859	**0.129**	**0.042****	**0.033****	**0.273**	**0.488**	**0.441**
Constant	-5.361	-9.573	-1.328	-4.544	-5.975	-8.541	-5.600
	0.000***	**0.000*****	**0.000*****	**0.000*****	**0.000*****	**0.000*****	**0.000*****
Number of Observations	564	410	641	615	611	202	584
r-square	0.255	0.008	0.525	0.3801	0.278	0.010	0.452
F-test	10.69	11.98	30.19	32.08	18.86	4.46	16.79
Prob > F	**0.000*****	**0.000*****	**0.000*****	**0.000*****	**0.000*****	**0.000*****	**0.000*****

*Note: Exhibit 3 presents first-stage logistic estimates of Equation (4), including real estate security-specific fixed effects. The model is estimated separately for banks and trusts, endowment funds, hedge funds, investment advisors, insurance companies, pension funds, and investment advisor/hedge funds. The firm financial characteristics include real estate securities beta, residual variance, bid-ask spread, log(trading volume), dividend yield, and log(book value of property). The p-values are reported in bold below the coefficient estimates, and *, **, and *** denote significance at the 10-, 5-, and 1-percent levels, respectively.*

nearly as precise as those reported in Exhibit 2. The dominant result of Exhibit 3 is a clear preference among virtually all institutional investors for real estate securities that are more liquid. It would also seem that hedge funds sponsored by investment advisers have, as theory would predict, a clear preference for real estate securities that have a low dividend yield.

Using these first-stage estimates, we then calculate the predicted value of IO_{ijt}. Exhibit 4 contains the second-stage results of regressing R_{it+1} on $\hat{I}_{ijt}$. In this simple set-up, we generally find no evidence of superior forecasting skill. This finding probably reflects an omitted-variable bias.

It is interesting to note that when we regress R_{it+1} on our first-stage predicted value, $\hat{I}_{ijt}$, plus controls for BV_{it}, BM_{it}, and M_{it}, we now find some evidence of superior forecasting skill as shown in Exhibit 5. The results suggest that there is a large and statistically significant coefficient on $\hat{I}_{ijt}$ for both stand-alone hedge fund investors and pension funds.

We also estimated a second-stage equation with controls for BV_{it}, BM_{it}, and M_{it}, and tested for cross-equation constraints. In the bivariate case of banks and trusts, and hedge funds, the cross-equation constraints were easily rejected at a 95% confidence level. However, in the bivariate case of pension funds and hedge funds, the cross-equation constraints cannot be rejected. Statistically, this means that both pension funds and hedge funds are from the same population.

A final modification to the model was to rank the stocks in the sample for each period based on R_{it}, and then to group the stocks into two groups based on these ranks. If stocks with low returns are natural candidates for short sales, then a larger IO_{ijt}—or a larger $\hat{I}_{ijt}$—in this regression model should forecast a more negative R_{it+1}. In contrast, if stocks with high returns are natural candidates for a long position, then a larger IO_{ijt}—or a larger $\hat{I}_{ijt}$—in this regression model should forecast a more positive R_{it+1}. The results for these two models (not reported here) were largely the same as those in Exhibit 5 with the following exception. The results generally suggest that hedge funds are much better forecasters of windfall gains than windfall losses.

CONCLUSION

A technique developed by Hartzmark [1991] was used to test the hypothesis that real estate security hedge fund managers have superior forecasting abilities relative to other institutional investors. The test requires regressing returns on equity ownership positions. From the results of this study it appears that hedge funds, as predicted by the theory, do have some superior forecasting skills (especially when compared to bank and trust managers, investment advisors, insurance companies and endowment funds). The evidence also shows that hedge funds prefer

EXHIBIT 4

Predictability of 1-Year-Ahead Real Estate Security Returns

	Pension Funds	Hedge Funds	Investment Advisors	Investment Advisor/ Hedge Funds	Banks and Trusts	Endowment Funds	Insurance Company
Ownership	-0.037	0.020	-0.155	-0.100	-0.160	0.090	-0.150
	0.513	**0.481**	**0.000*** **	**0.001*** **	**0.000*** **	**0.023** **	**0.000*** **
Constant	0.003	0.262	-0.031	-0.170	-0.690	0.660	-0.593
	0.990	**0.096***	**0.449**	**0.068***	**0.000*** **	**0.008*** **	**0.001*** **
Number of Observations	564	410	641	615	611	202	584
r-square	0.000	0.004	0.005	0.005	0.009	0.047	0.014
F-test	0.43	0.50	17.89	11.01	19.62	5.32	19.07
Prob > F	**0.513**	**0.481**	**0.000*** **	**0.001*** **	**0.000*** **	**0.023** **	**0.000*** **

*Note: Exhibit 4 presents second-stage estimates of Equation (5). The estimation procedure follows the two-stage least squares for panel-data models used by Balestra and Varadharajan-Krishnakumar [1987]. The model is estimated separately for banks and trusts, endowment funds, hedge funds, investment advisors, insurance companies, pension funds, and investment advisor/hedge funds. First-stage estimates are reported in Exhibit 3. The p-values are reported in bold below the coefficient estimates, and *, **, and *** denote significance at the 10-, 5-, and 1- percent levels, respectively.*

EXHIBIT 5

Predictability of 1-Year-Ahead Real Estate Security Returns after Controlling for Time-Varying Risk Premiums

	Pension Funds	Hedge Funds	Investment Advisors	Investment Advisor/ Hedge Funds	Banks and Trusts	Endowment Funds	Insurance Company
Ownership	0.302	0.131	-0.014	0.023	0.001	0.090	-0.017
	0.000* **	**0.000*** **	**0.778**	**0.560**	**0.987**	**0.038***	**0.717**
Log(Market Values)	-0.448	-0.440	-0.249	-0.280	-0.268	-0.140	-0.231
	0.000* **	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **	**0.061***	**0.000*** **
Book-to-Market	0.002	0.000	-0.001	-0.001	-0.000	0.000	0.002
	0.594	**0.893**	**0.720**	**0.621**	**0.990**	**0.970**	**0.507**
Momentum	0.195	0.0292	0.142	0.170	0.173	0.165	0.137
	0.001* **	**0.660**	**0.013** **	**0.004*** **	**0.003*** **	**0.156**	**0.022** **
Constant	4.133	3.887	1.704	2.020	1.870	1.652	1.553
	0.000* **	**0.000*** **	**0.000*** **	**0.000*** **	**0.004*** **	**0.007***	**0.012** **
Number of Observations	551	400	622	599	595	197	569
r-square	0.004	0.003	0.005	0.004	0.006	0.059	0.008
F-test	14.02	108.48	9.19	8.18	9.50	2.70	8.11
Prob > F	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **	**0.000*** **	**0.034** **	**0.000*** **

*Note: Exhibit 5 presents second-stage estimates of Equation (6), controlling for firm size (market value), default risk (book-to-market), and momentum. The estimation procedure follows the two-stage least squares for panel-data models used by Balestra and Varadharajan-Krishnakumar [1987]. The model is estimated separately for banks and trusts, endowment funds, hedge funds, investment advisors, insurance companies, pension funds, and investment advisor/hedge funds. First-stage estimates are reported in Exhibit 3. The p-values are reported in bold below the coefficient estimates, and *, **, and *** denote significance at the 10-, 5-, and 1- percent levels, respectively.*

real estate securities that are larger, have a higher beta, and a higher residual standard deviation.

ENDNOTES

[1]The rationale provided for this structure is the 1970 Amendment to the Investment Advisers Act of 1940, which prohibits mutual funds and their investment advisers from receiving an incentive fee unless the fee is symmetric around a chosen index; that is, the fee decreases for underperforming the index in the same way in which the fee increases for outperforming the index.

[2]The five-or-fewer rule does not apply to large pass-through entities such as mutual funds, pension funds, and large partnerships. As a result, one might expect mutual funds, pension funds, and large partnerships to have higher equity ownerships in real estate securities than other investors (which, in turn, could lead to some monitoring benefits), (See, e.g., Del Guercio and Hawkins [1999].) However, real estate securities themselves tend to be relatively illiquid, and large shareholders in less liquid markets may be stuck with their equity stakes. This realization may explain why the average holdings of real estate securities per each institution do not vary much across the different manager types in our data.

[3]See Gompers and Metrick [2001] and Del Guercio [1996]. Using cross-section variation in institutional ownership, the authors show that institutional investors prefer stocks with large market capitalizations and thick markets.

[4]See Banz [1981] who finds that portfolios of small-firm stocks earn consistently higher average returns than those of large-firm stocks.

[5]Lakonishiok, Shleifer, and Vishny [1994] and Barberis, Shleifer, and Vishny [1998] offer a substantially different treatment in which they argue that investors irrationally extrapolate firms' past fundamental growth and thus undervalue stocks with a high book-to-market ratio.

[6]TOD provides detailed ownership information on twelve categories of institutional investors. The twelve categories include bank and trusts, endowment funds, hedge funds, investment advisors, insurance companies, pension funds, research firms, corporations, foun-

dations, venture capital, private equity, and holding companies. There are six dominant categories which are the first six categories. Given that, we have collapsed these twelve categories into seven categories—pension fund, hedge fund, investment advisor, bank and trust, research firm, insurance company, and others.

[7]The size effect may also be an ignorance effect, since small firms tend to be followed by fewer analysts and receive less media coverage (Barry and Brown [1984]).

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