Do Fund Managers of Global Real Estate Funds Exhibit Superior Skill?

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This study analyzes US-domiciled actively managed global real estate funds (GREMFs) from 1/2010 to 12/2023. The results show superior selectivity and adverse market timing skills of fund managers. On average, GREMFs deliver alpha ranging from 2.52 percent to 2.75 percent per year after controlling for premiums offered by the market, size, value, and momentum effects. The alpha range increases to 4.65 percent annually after including the quadratic term of excess market returns. The results also show that many funds exhibit superior selectivity skills, thus making a case for investors to invest in actively managed GREMFs rather than investing in passive indices. However, the results also indicate that GREMFs are unable to manage beta loadings to their advantage.

Keywords: global real estate funds, abnormal performance

INTRODUCTION

Mutual funds are one of the easiest and most cost-effective investment methods to invest in a diversified portfolio. That is perhaps one of the main reasons retail and institutional investors pour their funds into these investment vehicles. According to the Investment Company Institute Factbook 2024, by the end of 2023, the combined net assets under management were $ 25.5 trillion by mutual funds in the United States alone. In 2023, the net capital inflow into these mutual funds was $292 billion. Given the size of this industry, researchers and practitioners are continuously engaged in analyzing these investment vehicles, and interestingly, the findings of research studies to date are mixed at best. Therefore, evaluating the performance and other attributes of actively managed mutual funds in the US and across the globe is informative and timely.

Investment in real estate is another interesting aspect of active management. Investors either invest in real estate directly or through funds such as mutual funds and REITs to get exposure to income and growth opportunities available in the real estate sector. According to the National Association of Real Estate Investment Trusts (NAREIT hereafter), more than 900 REITs are listed globally, managing nearly $20 trillion worth of assets. According to the same website (NAREIT), the number of REITs worldwide has increased from 120 to 940 in a 30-year period, which is equivalent to an astounding 23 percent growth rate per year for REITs in more than 40 countries and regions. Another startling data shows that countries offering REITs contributed nearly 84 percent of global GDP by the end of 2022, and the combined GDP of those countries increased from $6.5 billion to approximately $84 trillion by the end of 2022. It is safe to say that investment in portfolios dedicated to the real estate sector commands a unique space within mutual funds and deserves a thorough evaluation both in terms of performance and cross-sectional correlation between a fund's performance and its attributes.

The existing literature is packed with articles dedicated to real estate funds focused on the US and those that are focused on global real estate. However, the results are inconclusive as some show the benefits of managerial talent, and others document fund managers' lack of skills. For example, research conducted by Rodriguez et al. (2014), Gallo et al. (2003), and Chou et al. (2013), among others, document the superior selection skill or timing ability of fund managers in generating better returns or alpha by fund managers focused on global real estate. Another strand of research, such as those by O'Neal and Page (2000) and MacGregor et al. (2020), among others, suggest a lack of skills or no skills exhibited by fund managers investing funds in domestic or global real estate. Kaushik and Pennathur (2012) documented superior returns but also showed that the performance dissipated and turned negative during the real estate crisis of the 2007-2008 period.

There are many reasons why investors are interested in real estate mutual funds. First, it is critical to understand the unique advantages of the real estate sector. Then it is easier to understand why regular investors would choose real estate investment trusts (REITs) and mutual funds (REMFs) as investment choices to gain exposure to the sector. For some investors, it is an easy way to get exposure to a growing sector and an income stream. Real estate is a tangible asset, and the supply of real estate may not be constrained, but it is also not available in abundance. Real estate is one sector that commands organic growth. The demand for real estate continues to grow with the expansion of business activities and the general population. Therefore, real estate is known to generate capital appreciation over a long period of time. Moreover, real estate generates regular income through rentals and leases. For some others, it is a good hedge against inflation. Generally, when interest rates go up, real estate renting becomes more profitable because leases and rentals are marked to market, i.e., those income streams go up with inflation. Real estate is also known as a good alternative to other common investments, such as equities or money market instruments, because it generally has a low or negative correlation with financial markets, making real estate a distinct category for investors seeking diversification, especially under uncertain times and extreme volatility in the financial markets. Real estate as an asset class is unique because property values are also tied up with the growth in the economy. Real estate values go up as the economy expands. Real estate can offer a better diversification choice because, within real estate, different types of properties offer different hedges and income streams (retail, commercial, urban, farm, etc.). Given all these distinct advantages, investment in real estate draws interest from both retail and institutional investors. Direct investment in real estate can be very expensive and, therefore, not a typical option for many investors, especially when they are seeking diversification benefits. The best way to get exposure to diversified real estate, a stable income stream from real estate, and professionally managed properties is to invest in funds that are invested in those diversified real estate assets. That is one of the main reasons we have witnessed a significant increase in REITs and real estate mutual funds.

This study evaluates funds that invest in global real estate over the 2010-2023 period. I specifically choose global real estate because global real estate REITs and funds have witnessed explosive growth in the last decade. According to NAREIT, Europe and the Pacific regions have observed extreme growth since 2020. China and India, the two most populous and high-growth countries in the world, started offering REITs in the early 2020s and have experienced tremendous growth since then. Moreover, despite the explosive growth, research on global real estate funds is limited compared to research on US-focused real estate funds. This study attempts to fill the gap between US-focused real estate funds and Global real estate funds (GREMF hereafter). The time period of this study is also interesting as it includes the period of global growth that started after the global recession of 2008, followed by a tumultuous period that witnessed a global shutdown during COVID-19 and higher and sticky inflation.

The paper is organized as follows. Section 2 reviews the existing literature, section 3 documents the data, the methodology is explained in section 4, section 5 discusses the empirical findings, and section 6 provides the conclusion.

LITERATURE REVIEW

Previous research on GREMFs has not only yielded a variety of findings but also sparked a significant and ongoing debate in the field. For instance, Rodriguez et al. (2014) assert that GREMFs demonstrate superior forecasting ability and outperform passive benchmarks. In contrast, MacGregor et al. (2020) argue that GREMF managers lack any discernible skills. Their study, which analyzed global real estate mutual funds against global and domestic indices, suggests that the GREMFs neither have any timing nor selectivity skills, and investors do not have any economic benefits from investing in those funds. Proponents of Global REMFs find support from Shen et al. (2010), who analyzed international REMFs and documented not only the diversification benefits for investors but also less risk and better performance. However, the same study showed that fund managers have no market-timing ability.

The general findings on real estate mutual funds are mixed at best. For example, O'Neal and Page (2000) analyzed 28 real-estate funds and found no abnormal performance. Whereas Gallo et al. (2003) documented superior performance of actively managed mutual funds. On average, their sample funds of the real-estate sector outperformed Wilshire Real Estate Securities by more than 5 percentage points per year over the 1991-2007 period. Kaushik and Pennathur (2012) find no abnormal (over or under) performance by REMFs over the 1990-2008 period; however, their results indicate superior performance by REMFs after discounting the real estate crisis of 2007-2008. Chou et al. (2013) find REMFs generate higher excess returns than the passive benchmark, thus recommending economic benefits to investors who choose to allocate certain funds to actively managed REMFs. Elyasiani et al. (2022) document that REMF managers generate economic benefits to investors, but the authors also suggest that REMF managers are average skilled. The performance is attributable to their selection ability and not due to their market-timing skills.

The literature on equity funds generally documents zero or negative selectivity skills of fund managers, and any superior performance is purely by chance, i.e., the performance is not due to skill but luck and does not persist over time. However, there are studies that document the superior skills of fund managers. Jensen (1968), in his decisive study, documented that managers do not have any skills. The research of Jensen is further supported by Khorana and Nelling (1997), who examined 147 sector funds and found no significant selectivity performance relative to other equity funds. Tiwari and Vijh (2001) analyzed the performance of total net assets (TNA)-weighted and equally weighted sector fund portfolios and documented that sector funds neither outperform nor underperform passive benchmarks. However, Bello and Janjigian (1997) analyzed 633 funds and found positive and significant selectivity skills. Their sample funds also exhibited positive market timing skills. The positive selectivity skills are supported by Avramov and Wermers (2006). They documented the significant value of active management in generating superior performance.

The literature on the market timing ability of fund managers is also mixed. For example, Edelen (1999) examined mutual funds and found negative market-timing effects. Similarly, other studies (Chen & Stockum, 1986; Becker et al., 1999; Jiang, 2003; among others) show negative or no timing ability. However, some others (Jiang et al., 2007; Lee & Rahman, 1990; Liao et al., 2017, among others) documented the positive timing ability of fund managers.

The literature documents that fund-specific attributes such as the assets under management, expense ratio, and turnover ratio, among others, are good predictors of abnormal performance. Fund-specific variables are critical in explaining abnormal performance, especially when different mutual funds are clustered together for abnormal performance estimation purposes. For example, many studies document a positive relationship between fund size and abnormal performance (Indro et al. (1999), Latzko, 1999; Amenc et al., 2004; among others), whereas some others (Hedges, 2004; Chen et al., 2004; Yan, 2008; among others) show a negative relationship between fund size and abnormal performance. Conventional thinking supports a negative relationship between a fund's expense ratio and performance; however, the literature on mutual funds documents that many times higher expense ratio improves a fund's abnormal performance (Chordia, 1996; Nanda et al.; 2000; Barber et al., 2005; among others), whereas some others (Ferreira et al. (2012), Korkeamaki & Smythe (2004), among others) found no significant connection between expense ratio and abnormal performance. Similarly, existing studies have documented a positive

relationship between a fund's turnover ratio and abnormal performance (Payne et al., 1999; Chevalier & Ellison, 1999; Wermers, 2000, among others), whereas some others (Carhart, 1997; Wermers, 2000; Jan & Huang, 2003; Edelen et al., 2013; among others) found a negative association between turnover ratio and abnormal performance.

DATA AND DESCRIPTIVE STATISTICS

The data collection process begins with the selection of equity funds from the Morningstar Direct database. I specifically focus on funds domiciled in the United States that invest in global REITs and real estate operating companies. This initial screen yields 95 unique global real estate funds. As my research focuses on the performance and market timing of actively managed retail funds, I exclude any fund classified as an index or institutional fund. It is important to note that a fund may offer multiple share classes, each with the same holdings but different fees and loads. For empirical purposes, I select the oldest share class. This choice ensures consistency and comparability in the data, as the oldest share class is likely to have a longer performance history. The final sample is 33 unique retail global real estate funds.

The monthly returns of Fama-French factors, such as SMB (difference in returns between small and large capitalization stocks), HML (difference in returns between high and low book-to-market stocks), Carhart momentum factor, MOM (difference in returns between stocks with high and low past returns), and monthly risk-free returns, are taken from the website of Kenneth French. The monthly returns of the sample funds, along with fund and manager-specific variables such as turnover ratio, expense ratio, manager tenure, total net assets, fund's investment in its top 10% holdings, cash holdings, investment in common stocks and the number of holdings, are obtained from the Morningstar Direct database. A benchmark selection, a pivotal step in the research, is crucial to estimating the alpha of sample funds. I use the FTSE EPRA/NAREIT Ex-US global developed index, a widely accepted benchmark for estimating the abnormal performance of global real estate mutual funds. The Morningstar Direct database is also used to obtain the monthly returns of the passive benchmark.

Given that this study uses monthly data to estimate the performance and different skills of actively managed GREMFs, annual data points such as the expense and turnover ratios are divided by 12 to adjust for monthly equivalent purposes. This adjustment is consistent with the existing literature and ensures the accuracy of the analysis. The practice of selecting only those funds with at least 36 monthly returns is also adhered to, as this provides a robust dataset. After removing funds with less than 36 monthly observations, 18 unique US-domiciled retail global real estate funds are used for empirical purposes.

Table 1, panel A reports descriptive statistics of the sample funds. The average size (net assets under management) over the fourteen-year period is $641.94 million. On an individual basis, the average net assets under management (TNA) at any point in time is $632.62 million, ranging from the lowest of $0.14 million to the highest of $1.10 billion. The TNA figures suggest that most of the sample funds belong to the small-cap category. The average monthly turnover ratio is 6.82 percent per month (81.89 percent per year). The highest turnover ratio (137.82 percent per year) is observed in 2010, whereas the lowest, 62.05 percent, is observed in 2023. Overall, the turnover ratio suggests that, on average, a fund manager relies on a buy-and-hold strategy rather than an aggressive buy-and-sell strategy. On average, a fund generated 0.58 percent return per month (6.91 percent per) year before fees and expenses, with the highest of 25.41 percent in 2012 and the lowest of -26.55 percent in 2022. I am not surprised by the negative return in 2022. The global economy experienced a steep decline in growth due to the war in Europe, higher average inflation, and the continued health crisis from COVID-19. The descriptive statistics reveal that, on average, sample funds are fully invested, with only 1.81 percent allocation to cash and 95.47 percent allocation to equity. On average, managers stay with the fund for seven years, showing the stability of the sample funds' investing style. On average, a fund invests in 125 different holdings. This further strengthened the diversification and risk-averse allocation by fund managers. The expense ratio charged by funds, on average, is 1.14 percent per year. This resonates well with the existing literature on actively managed mutual funds where funds, on average, charge anywhere between 0.75 percent and 1.5 percent as the annual expense ratio. It also appears that despite investing in many different securities, portfolio managers invest

almost 1/3 of the investment in the best ideas. The investment in the 10 percent holdings is 34.08 percent on average.

TABLE 1
PANEL A: DESCRIPTIVE STATISTICS OF SAMPLE FUNDS

Year	Ret	Turn	Cash	Equity	TTOP	Tenure (year)	Exp	TNA (million)	Holdings	N
2010	1.62%	11.48%	2.50%	94.57%	34.55%	7.20	0.1077%	$ 317.87	136	180
2011	-0.30%	6.83%	2.46%	94.56%	34.24%	7.20	0.1021%	$ 393.47	126	180
2012	2.12%	8.17%	2.38%	94.36%	37.52%	7.20	0.1008%	$ 459.58	109	180
2013	0.10%	7.57%	1.80%	94.91%	36.61%	7.20	0.0979%	$ 547.30	114	204
2014	1.20%	6.01%	1.63%	94.78%	35.01%	7.20	0.0972%	$ 618.95	122	216
2015	0.07%	6.00%	1.40%	95.25%	34.22%	7.20	0.0944%	$ 637.80	132	216
2016	0.37%	5.83%	1.45%	95.77%	32.64%	7.20	0.0946%	$ 607.96	130	216
2017	0.89%	6.43%	1.33%	95.69%	30.13%	7.20	0.0940%	$ 605.23	132	216
2018	-0.49%	6.49%	1.22%	96.61%	31.19%	6.84	0.0919%	$ 643.78	135	205
2019	1.84%	5.70%	1.85%	96.23%	31.20%	6.71	0.0911%	$ 805.03	136	180
2020	-0.16%	7.51%	1.60%	96.89%	33.26%	6.71	0.0901%	$ 775.94	119	157
2021	2.05%	6.81%	1.62%	96.87%	32.84%	6.71	0.0849%	$ 965.16	124	156
2022	-2.21%	5.55%	1.84%	95.57%	35.30%	6.71	0.0880%	$ 886.46	116	156
2023	0.96%	5.17%	2.20%	94.55%	38.36%	6.71	0.0902%	$ 722.57	113	156
Average	**0.58%**	**6.82%**	**1.81%**	**95.47%**	**34.08%**	**7.00**	**0.09%**	**$ 641.94**	**125**	**187**

Table 1, panel A shows the average values of fund-specific variables per year from 01/2010 to 12/2023. *Ret* is the monthly return earned by sample funds, *Turn* is the turnover ratio, is the minimum of aggregated sales or aggregated purchases of securities divided by the average 12-month total net assets of the fund, *Cash* is the average percentage of investment held as cash, *Equity* is the average percentage of investment in common stocks, *TTOP* is the fund's percentage of investment in top 10 percent holdings, *Exp* is the expense ratio, is the average expense ratio charged by the fund, *TNA(in million $)* is the average annual net assets under management, *Holdings* is the number of securities in a fund, *Tenure* is the average tenure of a fund manager, and *N* is the number of fund-year observations.

Table 1, panel B, documents the descriptive statistics of the market index and Fama-French factors. On average, the FTSE EPRA/NREIT Ex-US index generated 0.39 percent monthly return (4.69 percent annual equivalent) over the fourteen-year (2010-2023) period. The benchmark index suffered heavy losses, -22.42 percent in 2022. This is consistent with the deep economic slowdown in the global economy in that particular year. The FTSE EPRA/NAREIT Ex-US index had the best returns in 2012 (34.65 percent). The one-month T-bills rate was zero or near zero percent from 2010 to 2015 and then climbed to 0.02 percent per month (0.21 percent annually) in 2016 to 2.13 percent annually in 2019 before going back to 0 percent in 2021 (under the COVID-19 pandemic), and then jumping back to 4.83 percent in 2023. On average, the small stocks and momentum premiums are positive, whereas the value premium is negative over the fourteen-year period.

TABLE 1
PANEL B: DESCRIPTIVE STATISTICS FOR MARKET FACTORS (MONTHLY BASIS)

Year	MRET	RF	SMB	HML	MOM	N
2010	1.43%	0.01%	1.08%	-0.29%	0.56%	12
2011	-1.41%	0.00%	-0.38%	-0.70%	0.67%	12
2012	2.89%	0.01%	-0.08%	0.71%	-0.04%	12
2013	0.27%	0.00%	0.49%	0.18%	0.46%	12
2014	0.34%	0.00%	-0.54%	-0.13%	0.09%	12
2015	-0.23%	0.00%	-0.31%	-0.85%	1.73%	12
2016	0.24%	0.02%	0.54%	1.61%	-1.61%	12
2017	1.99%	0.07%	-0.35%	-0.94%	0.31%	12
2018	-0.55%	0.15%	-0.21%	-0.90%	0.92%	12
2019	1.80%	0.18%	-0.36%	-0.66%	-0.38%	12
2020	-0.42%	0.04%	1.11%	-2.88%	0.13%	12
2021	0.39%	0.00%	-0.31%	1.77%	-0.18%	12
2022	-1.87%	0.12%	-0.60%	2.47%	1.53%	12
2023	0.59%	0.40%	-0.05%	-0.86%	-1.73%	12
Average	**0.39%**	**0.07%**	**0.00%**	**-0.10%**	**0.18%**	**12**

This table shows the return on the market, risk-free rate, small minus big, high minus low, and momentum factors. **MRET** is the average monthly return of the FTSE EPRA/NAREIT Ex-US global developed index. **RF** is the average monthly yield for a one-month treasury bill. **SMB** is the difference in returns between small and large-cap stocks. **HML** is the difference in returns between high and low book-to-market stocks. **MOM** is the difference in returns between stocks with high and low past returns. **N** is the number of monthly observations.

METHODOLOGY

Abnormal Performance

I begin my analysis with the single index model:

$$r_{it} - r_{ft} = \alpha_i + \beta_{1i} * RMRF_t + \varepsilon_{i,t} \quad (1)$$

where:

- $RMRF_t$ *is* the excess monthly return on the FTSE EPRA/NAREIT Global Developed Ex-US Index over the 1-month T-bill rate,
- r_{it} - r_{ft} is the excess return on fund i over the 1-month T-bill rate,
- α_i is the measure of the portfolio's performance (Jensen's Alpha), and
- β_i is the unconditional measure of risk.

I next measure the abnormal performance using the Carhart (1997) 4-factor model:

$$r_{it} - r_{ft} = \alpha_1 + \beta_{1i} * RMRF_t + \beta_{2i} * SMB_t + \beta_{3i} * HML_t + \beta_{4i} * MOM_t + \varepsilon_{i,t} \quad (2)$$

where:

RMRF$_t$ is the excess monthly return on the FTSE EPRA/NAREIT Global Developed Ex-US Index over the 1-month T-bill rate,
SMBt is the difference in returns between small and large capitalization stocks,
HMLt is the difference in returns between high and low book-to-market stocks,
MOM$_t$ is the difference in returns between stocks with high and low past returns,

SMB and HML are the size and value of Fama and French (1993) risk factors. Both models (the single-factor CAPM and 4-factor Carhart models) estimate the selectivity skill of a fund manager. The selectivity skill is referred to as the alpha in the above-mentioned equations. A positive alpha in the equations shows the positive stock selectivity skill, and a negative alpha shows the negative selectivity skill of a fund manager. Zero alpha shows that a fund manager's selectivity is no better than the passive market, and all the returns are due to the premiums earned by the market and other contributing factors mentioned in the equations above.

Abnormal Performance and Market-Timing

I use the Treynor-Mazuy (1966) equation for both the single-factor CAPM and the 4-factor Carhart Model to test the market-timing skills of fund managers.

$$r_{it} - r_{ft} = \alpha_i + \beta_{1i} * RMRF_t + \gamma_i * (RMRF_t)^2 + \varepsilon_{i,t} \quad (3)$$

$$r_{it} - r_{ft} = \alpha_i + \beta_{1i} * RMRF_t + \beta_{2i} * SMB_t + \beta_{3i} * HML_t + \beta_{4i} * MOM_t + \gamma_i * (RMRF_t)^2 + \varepsilon_{i,t} \quad (4)$$

γ_i captures the market timing ability of the fund manager. A positive coefficient of γ_i means managers are able to increase beta loadings when the market is hot and decrease the beta when the market is slow.

Abnormal Performance and Cross-Sectional Analysis

The literature in mutual funds documents the correlation between fund-specific attributes such as expense ratio, turnover ratio, among others, and a fund's selectivity skill, alpha. Since this study is focused on the alpha generation of sample funds, I next estimate the impact of fund-specific attributes on abnormal performance. A cross-sectional analysis where alpha is dependent on fund-specific variables gives more insight into the overall performance of fund management. I use the following model to estimate the relationship between fund-specific variables and funds' abnormal performance.

$$\alpha_{it} = \beta_0 + \beta_1 Exp_{it} + \beta_2 TNA_{it} + \beta_3 Holdings_{it} + \beta_4 TTOP_{it} + \beta_5 Tenure_{it} + \beta_6 Turn_{it} + \beta_7 Equity_{it} + \varepsilon_{it} \quad (5)$$

α_{it} is estimated for each fund monthly using estimates obtained from the 4-factor Carhart model (equation 2).

$$\alpha_{it} = r_{it} - r_{ft} - \beta_{1i} * RMRF_t - \beta_{2i} * SMB_t - \beta_{3i} * HML_t - \beta_{4i} * MOM_t \quad (6)$$

α_{it} is the abnormal performance of each fund.

EXP is the average expense ratio charged by the fund. *TNA* is the average asset under management. *Holdings* show the average number of holdings the funds contain. *TTOP* is the average portion of portfolios allocated to the top 10 percent of holdings. *Tenure* is the average time managers have been with their

respective funds for years. *Turn* is the average turnover ratio, calculated as purchases or sales (whichever is less) divided by average monthly net assets. *Equity* represents the average percentage of portfolios that are allocated to equity.

It is safe to assume that as information and market dynamics change, active fund managers also rebalance portfolios to respond to those market movements. Therefore, consistent with the existing literature, I estimate time-varying alpha where betas are also expected to change over time using a rolling regression model. I use the performance of fund i in the 35 months prior to and also include month t (altogether 36 monthly observations) to estimate β_{1i}, β_{2i}, β_{3i}, and β_{4i} and then recompute monthly α_{it} using equation (6).

EMPIRICAL RESULTS

Abnormal Performance Using the Single-Factor CAPM and 4-Factor Carhart Model

Table 2, panel A, documents the findings of the single-factor CAPM model. The results show that the U.S. domiciled actively managed funds that mainly invest in global REITs and real estate operating companies outperform the benchmark, FTSE EPRA/NAREIT Developed Ex-US Index by 0.229 percent a month (2.748 percent per year) and this alpha is statistically highly significant (p-value <0.0001). Further, the results show that the correlation between the excess returns of simple funds and the benchmark is positive and statistically highly significant. For every 1 percent increase in the market return, the sample funds return increases by 0.84 percent per month (p-value < 0.0001). The findings are robust and based on Newey-West heteroscedasticity and autocorrelation-adjusted standard errors.

TABLE 2
PANEL A: ABNORMAL PERFORMANCE BASED ON THE SINGLE-FACTOR CAPM

Variable	Estimate	p-value
α (monthly percent)	0.229***	<0.0001
β	0.8383***	<0.0001
N	2618	
***, **, and * represent statistical significance at the 1%, 5%, and 10% level respectively.		

This table reports the monthly alpha estimate of the sample of global real estate mutual funds over the period 2010-2023 by using the single-factor market model. The first row of the table reports the alpha estimates from the OLS model, and the second row reports the beta coefficient of the benchmark (sensitivity of funds' excess returns to the excess benchmark's returns). Results are based on Newey-West heteroscedasticity and autocorrelation-adjusted standard errors.

$$\textbf{Model: } r_{it} - r_{ft} = \alpha_i + \beta_i * RMRF_t + \varepsilon_{i,t}$$

The dependent variable is the individual fund's monthly excess return over the corresponding 1-month T-bill rate. N is the number of fund month observations for the estimation period.

On an individual basis, 94.44 percent (17 out of 18 funds) have positive alpha, whereas only one fund shows negative alpha. A good number, 8 of 17 positive alpha funds (47.05 percent), are also statistically significant, with at least a 90 percent or better confidence interval. The results are tabulated in Table 2, panel B.

TABLE 2
PANEL B

	2010-2023
	α (N=18)
Positive	17
Negative	1
PS	8
NS	0

The panel shows the distribution of sample funds' alpha using the single-factor market model. PS denotes positive and significant alpha, whereas NS denotes negative and considerable alpha. N is the number of funds for the estimation period.

Next, I continue my analysis of fund alpha in a multi-index framework, using the Carhart (1997) 4-factor model. These Newey-West heteroscedasticity and autocorrelation-adjusted standard error results are reported in Table 3, panel A. The fund alpha for the portfolio of global real estate mutual funds is positive and significant. The ex-post alpha is 0.2101 percent per month. In other words, on average, a sample fund outperforms the passive benchmark by 0.2101 percent a month (2.52 percent on an annual equivalent basis) after controlling for the effect of markets and premiums from small and value stocks and the momentum effects. The coefficient of alpha is statistically highly significant. The associated p-value with the alpha is <0.001. On average, a fund's excess return is 0.8427 times more sensitive to the benchmark returns. The beta coefficient of the market index is statistically highly significant (p-value < 0.0001). On average, a fund's excess return is positively and statistically significantly impacted by the size and momentum effects, whereas a fund's excess return is negatively but statistically insignificantly impacted by the value effects. The correlation between the small stock premium and the excess return is not surprising since a majority of funds in this study belong to the small-cap category. The distribution of positive and negative alphas from the 4-factor model is documented in panel B of Table 3. Similar to the single-factor results, 17 out of 18 funds have positive alpha, whereas only one fund shows negative alpha. 7 of 17 positive alpha funds (41.18 percent) are also statistically significant, with at least a 90 percent or better confidence interval.

TABLE 3
PANEL A: ABNORMAL PERFORMANCE BASED ON THE 4-FACTOR CARHART MODEL

	Estimate	p-value
α (monthly percent)	0.2101***	<0.0001
β (RMRF)	0.8427***	<0.0001
β (SMB)	0.1843***	<0.0001
β (HML)	-0.0246	0.1031
β (MOM)	0.0759	<0.0001
N	2618	
***, **, and * represent statistical significance at the 1%, 5%, and 10% level respectively.		

The panel documents the sample funds alpha and betas estimate for the 4-factor Carhart Model.
Results are based on Newey-West heteroscedasticity and autocorrelation-adjusted standard errors.

$$\textbf{Model: } r_{it} - r_{ft} = \alpha_i + \beta_{1i} * RMRF_t + \beta_{2i} * SMB_t + \beta_{3i} * HML_t + \beta_{4i} * MOM_t + \varepsilon i_{,t}$$

The dependent variable is the individual fund's monthly excess return over the corresponding 1-month T-bill rate. N is the number of fund month observations for the estimation period.

TABLE 3
PANEL B

	2010-2023
	α (N=18)
Positive	17
Negative	1
PS	7
NS	0

The panel shows the distribution of sample funds' alpha using the 4-factor Carhart Model. PS denotes positive and significant alpha, whereas NS denotes negative and considerable alpha. N is the number of funds for the estimation period.

Abnormal Performance Using the Treynor-Mazuy (1966) Model for Single-Factor CAPM and 4-Factor Carhart Model

Results reported in Table 4 Panel A show that alpha is still positive and highly significant for the single-factor CAPM when the quadratic term of the market-excess return is added to the equation. On average, the sample funds' alpha is 0.3873 percent a month (4.65 percent per year) when the quadratic term of the market excess returns is added. The alpha is greater than earlier estimated without using the quadratic term. However, the gamma (market-timing) coefficient is negative and significant.

TABLE 4
ABNORMAL PERFORMANCE AND MARKET TIMING

	Estimate	p-value
α	0.3873***	<0.0001
β	0.8296***	<0.0001
γ	-0.6608***	<0.0001
N	2618	
***, **, and * represent statistical significance at 1%, 5%, and 10% level respectively.		

Panel A reports abnormal performance (alpha), market impact (beta), and market timing (gamma) of Global REMFs over the 2010-2023 period. Estimates and corresponding p-values are reported for the single-factor CAPM. N is the fund month observations for the estimation period.

Table 4 Panel B reports the alpha, beta loadings, and gamma for the 4-factor Carhart model. The results are identical to what is observed for the single-factor market model. Alpha is positive and statistically highly significant. GREMFs generate 0.3741 percent alpha per month (4.49 percent per year) after controlling for the premiums offered by the market, size, value, and momentum effects. Interestingly, all the explanatory variables are positive and statistically significant except for HML (value) and gamma (market timing). The findings support the general composition of GREMFs. Most of the sample funds belong to the small-cap category and tend to follow momentum effects. The adverse market timing suggests that it is not easy for fund managers to outguess the global markets and rebalance their beta loadings before markets make their moves. The result resonates well with the literature that suggests no or negative market timing ability of actively managed funds.

Panel B reports abnormal performance (alpha), beta loadings of the Fama-French and momentum factors, and market timing (gamma) of Global REMFs over the 2010-2023 period. Estimates and corresponding p-values are reported for the 4-factor Carhart model. N is the fund month observations for the estimation period.

Parameter	Estimate	p-value
α	0.3741***	<.0001
β (RMRF)	0.831438***	<.0001
β (SMB)	0.18257***	<.0001
β (HML)	-0.04916*	0.051
β (MOM)	0.057617**	0.0482
γ	-0.67832***	<.0001
N	2618	

***, **, and * represent statistical significance at 1%, 5%, and 10% level respectively.

Cross-Sectional Analysis: Rolling Alpha Using Time-Varying Beats Using the Fund-Specific Attributes

Table 5 shows the results from cross-sectional analysis where the rolling alphas estimated using rolling betas from the 4-factor Carhart model are regressed on fund-specific variables. Given the nature of cross-sectional returns, I estimate the relationship between a fund alpha and its attributes using the Newey-West heteroscedasticity and autocorrelation-adjusted standard errors model. The model shows a positive and statistically significant relationship between fund size and the alpha. The findings are interesting because a majority of studies find a negative association between fund size and abnormal performance. The finding is not surprising, given the type of funds in my sample. Most of the funds in my sample are small-cap and well-diversified globally, which gives them both the small-cap premium at a relatively low cost of diversification. The results also find support from other studies (Indro et al. (1999), Latzko, 1999; Amenc et al., 2004) that find a positive relationship between fund size and abnormal performance. Interestingly, the relationship between the expense ratio is insignificant. However, the coefficient of the expanse ratio is positive. My results find support from Barber, Oden, and Zheng (2005), who document that investors seek exceptional performance; therefore, they are not against the annual operating expenses charged by funds. However, investors do not like other fees, such as front-end load and commissions. The sample funds of this study not only yielded higher excess returns but also superior alpha, that too from a global perspective. The insignificant association between the expense ratio and performance also finds support from others (Ferreira et al. (2012), Korkeamaki & Smythe (2004), among others), who found no connection between expenses and alpha.

Other variables—turnover ratio, number of holdings, allocation in the top 10 percent holdings, allocation to stocks, and managerial tenure—do not show any significant relationship with abnormal performance. Although the coefficients are statistically insignificant, they are all positive except for investment in the top 10 percent holdings. The findings suggest that cross-sectional attributes are not a good predictor of abnormal performance for the sample funds used in this study.

TABLE 5
CROSS-SECTIONAL ESTIMATES FOR THE GREMFS

Parameter	Estimate	p-Value
Intercept	-0.00551	0.7783
Exp	11.26445	0.1566
TNA	0.00000025**	0.0336
Holdings	0.000014	0.6687
TTOP	-0.01575	0.2458
Tenure	-0.00035	0.3417
Turn	0.012065	0.7973
Equity	0.00116	0.9459
N	1988	
***, **, and * show the significance at 1%, 5%, and 10% level respectively.		

The table summarizes estimated multivariate cross-sectional regressions for GREMFs over the 2010-2023 period. The dependent variable is alpha calculated using the 4-factor beta loadings on the prior 3 years of monthly returns.
EXP is the average expense ratio charged by the fund. **TNA** is the average asset under management. **Holdings** show the average number of holdings the funds contain. **TTOP** is the average portion of portfolios allocated to the top 10 percent of holdings. **Tenure** is the average time managers have been with their respective funds for years.**Turn** is the average turnover ratio, calculated as purchases or sales (whichever is less) divided by average monthly net assets. **Equity** represents the average percentage of portfolios that are allocated to equity. **N** is the number of fund month observations used for the model.
Model

$$\alpha_{it} = \beta_0 + \beta_1 Exp_{it} + \beta_2 TNA_{it} + \beta_3 Holdings_{it} + \beta_4 TTOP_{it} + \beta_5 Tenure_{it} + \beta_6 Turn_{it} + \beta_7 Equity_{it} + \varepsilon_{it}$$

CONCLUSION

This study analyzes the performance of 18 US-domiciled global real estate mutual funds over the period 1/2010-12/2023. Both the number of Global REITs and the amount managed by those global real estate funds witnessed outstanding growth over the past thirty years. The annual average growth rate for the number of funds was approximately 23 percent per year over the 30-year period from 1990 to 2020, spanning over 40 countries across the globe. The countries that witnessed a steep growth in real estate funds experienced an astounding growth in the GDP. This study analyzed actively managed global real estate mutual funds (GREMFs) from the single-factor market model (CAPM) and 4-factor Carhart model and find superior selectivity skills exhibited by fund managers. On average, GREMFs generated alpha ranging from 2.52 percent to 2.75 percent per year after controlling for premiums offered by the market, value, size, and momentum effects. The alpha range increases to 4.65 percent per year when the quadratic term of the market excess returns is added to the model. The findings are in sharp contrast to many other studies on equity mutual funds and real estate funds that either have no alpha or negative alpha. On the contrary, the sample funds show adverse market timing skills. In other words, managers of GREMFs were unable to outguess the market and manage beta loadings to their advantage. The adverse timing results are consistent with several other studies on equity and real estate mutual funds. The results also show that most funds earned superior selectivity skills, and it suggests an economic benefit for a US-based investor to invest in actively managed global real estate funds rather than investing in a passive index. Cross-sectional analysis shows that fund-specific variables are not a good predictor of abnormal performance for the GREMFs analyzed in this study. Only the size (assets under management) shows a significant and positive relationship with abnormal performance.

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