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# EVALUATING REAL ESTATE MUTUAL FUND PERFORMANCE USING THE MORNINGSTAR UPSIDE/DOWNSIDE CAPTURE RATIO

James L. Kuhle, California State University, Sacramento
Eric C. Lin, California State University, Sacramento

**ABSTRACT**

*The purpose of this research is to explore the viability of utilizing the Morningstar upside/downside capture ratio (UDCR) as viable measure of mutual fund risk and its relation to return. This research examines and compares result of the Sharpe ratio to the Morningstar upside/downside capture ratio (UDCR) in an effort to determine if the UDCR might better explain the ex-post performance of the mutual funds examined. Three sectors of 268 mutual funds are examined; these include domestic equity real estate, domestic equity value funds, and global equity real estate as defined and reported on the Morningstar database. This research considers the traditional measures of risk which include the standard deviation of returns along with the Sharpe ratio. The empirical results suggest that UDCR may provide a more accurate fit in explaining real estate mutual fund returns than the Sharpe Ratio.*

**JEL**: G10, G11, G17

**KEYWORDS**: Real Estate, Mutual Funds, Morningstar, Sharpe Ratio

## INTRODUCTION

Investors today have a plethora of mutual funds to select from. At the end of 2015, there were over 15,000 mutual funds in the United States with combined assets of $18.1 trillion, according to the Investment Company Institute (ICI), a trade association of U.S. investment companies. In mid-2016, 44.4 percent of US households owned shares of mutual funds or other US-registered investment companies—including exchange-traded funds, closed-end funds, and unit investment trusts—representing an estimated 55.9 million households and 95.8 million investors. The investor who is interested in real estate mutual funds also has a considerable selection with over two thousand reported on the Morningstar© data base.

This research focuses on real estate mutual funds as existing literature reveals that the unique risk characteristics of real estate asset provide significant portfolio diversification benefits for including such assets in a diversified portfolio. Kuhle (1987), Grissom et al. (1987), Georgiev et al. (2003), Chen et al (2005) and Lee (2010) provide evidence of how real estate investments can reduce risk in a mix-asset portfolio and/or enhance the completeness of the financial market. Utilizing more robust financial econometrics techniques, Chaudhry et al. (2010), Fei et al (2010) and Lee (2014) show support of the diversification benefits documented in earlier studies. Moreover, recent studies [e.g., Lizieri (2013) and Luchtenberg and Seiler (2014)] investigating portfolio diversification benefits of real estate investments following the financial crisis of 2008-2009 contend that real estate investments provide significant diversification benefits even during substantial market declines in both the stock market and the real estate markets. In sum, the inclusion of real estate assets in a diversified portfolio is non-trivial and thus cannot be ignored.

This research examines and compares result of the Sharpe ratio to the Morningstar upside/downside capture ratio (UDCR) in an effort to determine if the UDCR might better explain the ex-post performance of the mutual funds examined. In other words, this study considers the traditional measures of risk which include the standard deviation of returns along with the Sharpe ratio and how these conventional measures of risk performance in relation to that of the UDCR. The purpose of this research is to consider first the performance of domestic equity real estate funds in comparison to equity value funds and equity global real estate funds. This study is intended to evaluate the potential for using the UDCR as a viable measure of performance in identifying mutual fund return potential for future study. Secondly, this research examines a comparison between the Sharpe ratio and the UDCR by comparing correlation coefficients of the three mutual fund sector category returns for the UDCR, standard deviations, and the Sharpe ratio. The empirical results suggest that UDCR may provide a more accurate fit in explaining real estate mutual fund returns than the Sharpe Ratio.

The remainder of this paper is organized as follows: The next section presents a review of relevant literature. The paper then describes the mutual fund sample/data and research methodology, followed by discussion of the results of the empirical analysis. The final section is the conclusion.

## LITERATURE REVIEW

It is widely accepted that the Sharpe Index [Sharpe (1966, 1994)] is one of the most widely used methods for calculating risk-adjusted return. Meyer and Rasche (1992) show that the Sharpe index is an adequate risk-return performance measure given that certain conditions regarding investor risk tolerance and expected rates of return are satisfied. The research work of Eling and Schuhmacher (2007), Eling (2008) and Schuhmacher and Eling (2012) utilize rank-order correlation technique and other similar empirical approaches to examine the efficacy of various performance measures and conclude that the widely known Sharpe index is the appropriate risk-adjusted measure.

Nevertheless, the Sharpe Index can be inaccurate when risky assets such as mutual funds that do not have return property based on the normal distribution assumptions. Certain risky assets may have a high degree of kurtosis or negative skewness in return distributions. The Sharp ratio also tends to have shortcomings when it is used to analyze portfolios with significant non-linear risk functions, such as futures/options, warrants, and in some cases mutual funds. The Sharpe ratio uses the standard deviation of returns in the denominator as its proxy of total portfolio risk, which assumes that returns are normally distributed. Previous studies have documented that returns on financial assets may not be normally distributed and thus, the Sharpe ratio may not be an adequate performance measure.

Given the weaknesses of the Sharpe Index, alternative risk-adjusted return methods have considered over the years, including the Treynor Index [see Treynor (1962, 1965)] and the Sortino Ratio [see Sortino and van der Meer (1991), Sortino and Price (1994) and Sortino and Forsey (1996)]. Researchers have argued that the Treynor index; however, does not include any value gained for superior portfolio management gains. A list of portfolios ranked based on the Treynor index is useful only when the portfolios are actually sub-portfolios within the context of a larger, fully diversified portfolio. Otherwise, portfolios with varying total risk, but identical systematic risk or beta risk, will be ranked the same. Another weakness of the Treynor index is its use of ex-post beta data. Investments will inevitably perform differently in the future than they did in the past. For instance, a mutual fund carrying a beta of 1.5 will not likely be 1.5 times as volatile as the market forever. By the same token, a portfolio cannot be expected to generate 10% returns over the next decade because it generated 10% returns over the last 10 years.

While the Sharpe index considers both upside and downside risks (total return volatility), the Sortino ratio essentially ignores the upside volatility and reflects the negative portion of the total risk. The Sortino ratio

is a variation of the Sharpe index, in that it uses only the negative portion of the standard deviation as the measure for volatility. By using only the downside volatility, the Sortino ratio argues that the investor should only be concerned with downside "risk" and pay little attention to upside volatility. It has been claimed that the Sortino ratio may be more robust in performance measure than the Sharpe index since most risk-adverse investors are more concerned about downside risk or return volatility in a down market [see Sortino and Van der Meer (1991), Sortino and Price (1994) and Sortino and Forsey (1996)].

Since the Sharpe Ratio is an appropriate risk-return measure for mutual funds, this study examines the performance of the Sharpe Index relative to that of the Morningstar upside/downside capture ratio. The UDCR is readily available from the Morningstar mutual fund database. Investors can easily obtain the Morningstar proprietary ratios to determine their mutual fund investment selection.

The Morningstar upside/downside capture ratio shows you whether a given fund has gained more or lost less than the broad market benchmark during periods of market strength and weakness, and if so, by how much. Upside capture ratios for funds are calculated by taking the fund's monthly return during months when the benchmark had a positive return and dividing it by the benchmark return during that same month. Downside capture ratios are calculated by taking the fund's monthly return during the periods of negative benchmark performance and dividing it by the benchmark return. Morningstar© displays the upside and downside capture ratios over one-, three-, five-, 10-, and 15-year periods by calculating the geometric average for both the fund and index returns during the up and down months, respectively, over each time period. This study considers only the three year upside/downside capture ratios.

An upside capture ratio over 100 indicates a fund has generally outperformed the benchmark during periods of positive returns for the benchmark. Meanwhile, a downside capture ratio of less than 100 indicates that a fund has lost less than its benchmark in periods when the benchmark has been in the red. If a fund generates positive returns, however, while the benchmark declines, the fund's downside capture ratio will be negative (meaning it has moved in the opposite direction of the benchmark). All stock funds' upside and downside capture ratios are calculated versus the S&P 500.

Within the context of this study, the upside/downside capture ratio for each mutual fund was used to aggregate each of the three fund categories. The average for each category was calculated by adding the value of each upside ratio value to each downside ratio value for each on the funds within each category. If the result of the calculation was positive, this would be a fund which outperformed the market index. By definition the market index would have a composite upside (100) minus the downside (100) value of zero (100-100). Therefore, any stock with a composite upside/downside ratio which is positive, by definition, would outperform the index.

## DATA AND METHODOLOGY

The sample for this research consists of three different mutual fund sectors. This included seventy-one domestic equity real estate funds, one hundred and thirty two domestic equity value funds, and sixty five equity global real estate funds as reported in the Morningstar database. Return data was reported on all 268 funds for the last three years.

Table 1 summarizes the data collected and calculated for each mutual fund sector category. The first row of Table 1 records the average annual returns for three years for the three sector categories. This data was collected for a time period of August 2013 through July 2016. All mutual funds in the data set had their annual returns calculated using equation 1:

$$R_i = {[P_{i+1} - P_i]}/{P_i} \qquad [1]$$

Where:

$R_i$ = the annual rate of return
$P_{i+1}$ = the price of the Mutual fund at the end of the year
$P_i$ = the price of the Mutual fund at the beginning of the year

The annual return values were then calculated for each of the mutual funds within the following sectors:

1. The domestic US real estate mutual fund equity sector
2. The US value fund mutual fund equity sector
3. The Global real estate mutual fund sector

The domestic US real estate mutual fund equity sector category contained a total of 71 mutual funds that received the Morningstar 4 and/or 5 star rating. The US value fund mutual fund equity sector included a total of 132 mutual funds that qualified with the Morningstar 4 and/or 5 star rating. Finally, the Global real estate mutual fund sector included 65 mutual funds that qualified with the Morningstar 4 and/or 5 star rating.
In addition to the actual ex-post return calculations from equation [1], standard deviations of return were calculated for each mutual fund using equation 2:

$$s = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(x_i - \bar{x})^2} \qquad [2]$$

Table 1: Descriptive Statistics for the Three Categories of Funds

| | US Real Estate Mutual Funds (N=71) | US Value Funds (N= 132) | Global Real Estate Funds (N= 65) |
|---|---|---|---|
| Average Returns | 9.64% | 7.85% | 8.34% |
| Average Standard Deviation of Returns | 1.46% | 2.01% | 1.10% |
| Average Sharpe Ratio | 0.72 | 0.63 | 0.71 |
| Standard Dev. Sharpe Ratio | 0.11 | 0.15 | 0.08 |
| Average Beta | 0.94 | 0.92 | 0.89 |
| Standard Deviation of Beta | 0.14 | 0.34 | 0.07 |
| Average UDC Ratio Margin | 38.16 | -18.82 | 26.94 |
| Standard Dev. of Over/Under Margin | 9.98 | 12.75 | 7.13 |

*Table 1 summarizes the statistics that were used in this study. Starting with the average returns for the three different fund categories down to the standard deviations of each of the statistics calculated and used for each variable including the Sharpe ratio and the Upside/Downside Capture Ratio.*

## RESULTS

Table 1 summarizes the statistics that were generated in this study. The first line, average returns for each of the three categories reveals that the US real estate mutual fund category actually outperformed the other two categories with an average return of 9.64% versus 7.85% for the US value fund category, and 8.34% for the global real estate fund category. The standard deviation of returns were calculated for the three categories as 1.46% for the US real estate mutual fund category, 2.01% for the US value fund category, and 1.10% (lowest) for the Global mutual fund category.

The next line of Table 1 reports the average Sharpe ratio for each mutual fund category. The US and Global real estate mutual funds have the highest Sharpe ratios at 0.72 and 0.71, while the value fund category has

the lowest Sharpe ratio at 0.63. The Sharpe Ratio is a measure for calculating risk-adjusted return, and this ratio has become the industry standard for such risk calculations. The next line calculates the standard deviation of the Sharpe ratio and it is interesting to note that the two real estate fund categories have the lowest standard deviations among the three categories, with the Global real estate mutual funds having the smallest deviation at a value of 0.08 which is almost half of what the domestic fund categories exhibit.

The fifth line of Table 1 reports the average beta value, where beta is a measure used in fundamental analysis to determine the volatility of an asset or portfolio in relation to the overall market. To calculate the beta of a security, the covariance between the return of the security and the return of market must be known, as well as the variance of the market returns. Beta is calculated using historic monthly data for each of the mutual funds in this data set. It is interesting to note that the beta values for all three categories are relatively close in value. However, the standard deviation of beta values is noticeably smaller for the Global real estate date set. This may suggest a close similarity in returns among the Global real estate mutual funds.

The next line in Table 1 is the average upside/downside capture ratio. The upside/downside capture ratio shows you whether a given fund has gained more or lost less than the broad market benchmark during periods of market strength and weakness, and if so, by how much. Upside capture ratios for funds are calculated by taking the fund's monthly return during months when the benchmark had a positive return and dividing it by the benchmark return during that same month. Downside capture ratios are calculated by taking the fund's monthly return during the periods of negative benchmark performance and dividing it by the benchmark return. Morningstar© displays the upside and downside capture ratios over one-, three-, five-, 10-, and 15-year periods by calculating the geometric average for both the fund and index returns during the up and down months, respectively, over each time period. This study considers only the three year upside/downside capture ratios.

An upside capture ratio over 100 indicates a fund has generally outperformed the benchmark during periods of positive returns for the benchmark. Meanwhile, a downside capture ratio of less than 100 indicates that a fund has lost less than its benchmark in periods when the benchmark has been in the red. If a fund generates positive returns, however, while the benchmark declines, the fund's downside capture ratio will be negative (meaning it has moved in the opposite direction of the benchmark). All stock funds' upside and downside capture ratios are calculated versus the S&P 500.

Within the context of this study, the upside/downside capture ratio for each mutual fund was used to aggregate each of the three fund categories. The average for each category was calculated by adding the value of each upside ratio value to each downside ratio value for each on the funds within each category. If the result of the calculation was positive, this would be a fund which outperformed the market index. By definition the market index would have a composite upside (100) minus the downside (100) value of zero (100-100). Therefore, any stock with a composite upside/downside ratio which is positive, by definition, would outperform the index.

The average UDC ratio was calculated for each mutual fund in each group considered and this average for each group is reported in line seven of Table 1. The US real estate mutual fund category has the greatest positive number with an aggregate value of +38.16. The Global real estate mutual fund category scored a +26.94, with the value fund category actually scoring an aggregate value of -18.82, indicating that the value fund mutual category underperformed the market index. Table 2 presents the calculated values for the Z scores for a one-tailed test between the various mutual fund categories is based on formula 3.

$$z = \frac{\bar{x}_1 - \bar{x}_2 - \Delta}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}} \quad [3]$$

where $\bar{x}_1$ and $\bar{x}_2$ are the means of the two samples, Δ is the hypothesized difference between the population means (0 if testing for equal means), $\sigma_1$ and $\sigma_2$ are the standard deviations of the two samples, and $n_1$ and $n_2$ are the sizes of the two samples.

Table 2: Calculated Z Scores for the Three Categories of Fund Returns

| Fund Category | US Value Funds (N= 132) | Global Real Estate Funds (N= 65) |
|---|---|---|
| US Real Estate Mutual Funds (N=71) | 7.21* | 5.91* |
| US Value Funds (N= 132) | - | -1.64 |

*Table 2 reports the Z-score statistic that determines if two mean values are significantly different from one another. In this case, two of the three categories were significantly different from the comparison among categories. *Significant at the α = 0.05 level*

Table 2 would suggest that, at least for the three-year period examined, that generally the two real estate mutual fund categories performance (as measured by average mean returns), exceeded those returns of the US value (equity) funds. Specifically, a statistically significant value of 7.21 was calculated for the Z value between means for the returns of the US real estate mutual fund category and the value fund mutual fund category. In addition, there was a significant statistical difference (Z score = 5.91) between the US real estate mutual fund category and the Global real estate mutual fund category. Table 3 presents the calculated values for the correlation coefficients among the three different groups of mutual funds in this study.

Table 3: Correlation Statistics for the Three Categories of Funds

| Fund Category | Correlation of Fund Returns with UDC Ratio | Correlation of Fund Returns with Sharpe Ratio |
|---|---|---|
| Us real estate mutual funds (n=71) | 0.933 | 0.409 |
| Us value funds (n= 132) | 0.789 | 0.927 |
| Global real estate funds (n= 65) | 0.912 | 0.773 |

*Table 3 presents the correlation values among the various category returns with the Morningstar UDCRs and Sharpe ratios.*

The results displayed in Table 3 would suggest that the UDCR appears to be a better fit for explaining returns for real estate than for equity mutual funds. The correlation coefficient for US real estate mutual funds return with the UDCR is 0.933. This is significantly greater than the Sharpe Ratio of 0.409, thereby suggesting that the UDCR may better predict the overall performance of the US real estate funds. Further, the UDCR also appears to be a better predictor for the Global real estate mutual fund category as well, with a correlation coefficient of 0.912 versus 0.773 for the Sharpe ratio. While these are preliminary results, they would suggest the UDCR may provide a more accurate fit in explaining real estate mutual fund returns.

## CONCLUDING COMMENTS

Various risk-return measures of mutual funds have been examined in the existing literature. The purpose of this research is to explore the viability of utilizing the Morningstar upside/downside capture ratio (UDCR) as viable measure of mutual fund risk and its relation to return. This research investigates and compares result of the Sharpe Ratio to the Morningstar upside/downside capture ratio (UDCR) in an effort to determine if the UDCR might better explain the ex-post performance of the 268 mutual funds examined.

Three sectors of mutual funds are examined; these include domestic equity real estate, domestic equity value funds, and global equity real estate as defined and reported on the Morningstar database.

This study demonstrates that the Morningstar Upside/Downside Capture Ratio (UDCR) outperforms the Sharpe Ratio, in terms of capturing investment return of different categories of real estate mutual funds. The results suggest the UDCR may provide a more accurate fit in explaining real estate mutual fund returns. The Morningstar proprietary risk measure is thus a useful tool for investors evaluating the investment performance of real estate mutual funds. The conclusion supports the use of the UDCR rather than the conventional Sharpe Ratio in performance evaluation of real estate mutual funds.

This research is the first attempt to study the viability of the Morningstar UDCR. The sample of mutual funds and study time periods are limited. Future study should extend the UDCR across other mutual fund sub-sectors to see if similar results occur and extend the sample period to 5-10 years or beyond to further shed light on the performance of the UDCR. This would produce further evidence on the importance of the Morningstar upside/downside capture ratio.

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## BIOGRAPHY

James L. Kuhle, PhD, is a Professor of Finance at California State University, Sacramento. He has published more than 40 peer-reviewed papers and currently teaches finance courses including Introduction to Corporate Finance and Investments. His research interests are related to stock and real estate assets as they relate to efficient market analysis. He can be reached at kuhlejl@csus.edu.

Eric C. Lin, PhD, CFP® is an Associate Professor of Finance at California State University, Sacramento. He is the Program Director for the financial planning degree program at the College of Business Administration. His teaching and research interests are in investments, personal financial planning, and behavioral finance. He currently serves on the board of directors of the Financial Executives International (FEI) Sacramento Chapter. He can be reached at lin@csus.edu.