

AN ANALYSIS OF THE EFFICIENT MARKET THEORY: ACTIVE VERSUS PASSIVE  
INVESTMENT MANAGEMENT IN EDUCATIONAL INSTITUTION ENDOWMENT  
FUNDS

A Thesis  
by  
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## FOREWORD

The research detailed in this thesis will be submitted to *The Journal of Investing*, a peer-reviewed journal owned by Institutional Investor Journals. The thesis has been prepared according to the journal's author guidelines.

## ABSTRACT

### AN ANALYSIS OF THE EFFICIENT MARKET THEORY: ACTIVE VERSUS PASSIVE INVESTMENT MANAGEMENT IN EDUCATIONAL INSTITUTION ENDOWMENT FUNDS. (August 2011)

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In the seven year period, 2002-2008, a majority of university endowment funds studied outperformed a calculated passive return with their active strategies. This return was calculated using a weighted average of appropriate indices based on predefined asset classes used by the educational institutions in this study. However, these results may have been affected by the larger endowments in the study. Endowments over \$100 million in size outperformed passive returns on average while smaller endowments did not. Many studies have supported the efficient market theory, indicating it is difficult for active strategies to outperform passive strategies. However, the university endowment funds examined in this study appear to have outperformed the broader market indices using their individual active strategies.

## ACKNOWLEDGEMENTS

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# AN ANALYSIS OF EFFICIENT MARKET THEORY: ACTIVE VERSUS PASSIVE INVESTMENT MANAGEMENT IN EDUCATIONAL INSTITUTION ENDOWMENT FUNDS

Since the introduction of the efficient market theory, which states that stock prices reflect all information currently available resulting in fair prices for all assets, much industry and scholarly debate has developed as to whether it is possible to “beat the market” with an active investment strategy. An active investment strategy involves choosing particular assets, those that the investor believes to be underpriced, to obtain a higher rate of return than would have been earned through a passive investment strategy in which one invests in index funds which simply mirror the performance of the market. The investment industry is divided into those that believe implementing an active strategy enables an investor to beat the market and those that believe implementing a passive strategy is the most efficient portfolio management style in the long run.

These debates have led to much research and many studies to determine which investment strategy, in fact, produces the highest return in the long run, as this is the ultimate goal of every investor. Overwhelmingly, the vast majority of previous research has concluded that passively managed index funds outperform those funds managed by active managers (Sharpe [1966, 1991], Jensen [1968], Gruber [1996], and Malkiel [1995, 2003, 2005]). This is not to say that it is not possible for an active manager to choose an investment that outperforms the market in the short-term. However, in the long run, empirical evidence has shown that a passive strategy results in higher returns.

There are several factors that contribute to these higher returns. Typically, an active strategy requires much more ongoing trading to take advantage of inefficiencies in the

market as they arise and then dispose of these assets when the market meets the appropriate value. This ongoing trading results in increased fees and tax liability. Due to these consequences of active investing, the popularity of passive investing has increased substantially, resulting in incredible growth of index fund options in recent years (Waring and Siegel [2005]).

However, there are important advantages of active investing to take note of as well. In the United States' fluctuating economy, the importance of diversification is increasing. An active strategy enables fund managers to invest in alternative opportunities, such as natural resources, which is becoming increasingly common in today's investment climate. Unusual investments like these require the aid of an expert, further increasing the value of an active manager and making it more challenging for smaller universities to participate in these options (Strout [2005] and Thatcher [2009]).



## **BACKGROUND**

Although extensive research regarding active versus passive investing has been completed, as Blanchett [2010] explains not all funds are created equal. In his study, he builds on the work of Reinker and Tower [2004] and selects the “good-guy” actively managed mutual funds to make his comparisons, rather than the typical, high-expense funds. He argues that many active versus passive studies tend to disregard valuable attributes when selecting funds for comparison. He is able to conclude that his high-quality active manager “good-guys” were able to outperform using an active strategy. However, it can be very challenging to find an adequate sample of portfolios for analysis to determine any sound conclusions in this debate.

In responding to this notion of “good-guy” managers introduced by Blanchett [2010], we expand on the population researched by Haight, Engler, and Smith [2004, 2006]: college endowment funds and their managers. This previous research has defined these funds and their management’s important fiduciary role through a series of surveys to the top 200 US college endowment fund managers extracted from the 2004 National Association of College and University Business Officer’s (NACUBO) Endowment Study. The researchers describe how endowment funds are unique in that these large accounts are often the prime source for funding new initiatives and maintaining the quality of programs in an environment of stressed state budgets and rising employment costs. Haight, Engler, and Smith conclude their 2004 study with stating, “College endowment investment policy committees have a fiduciary responsibility to manage their funds in a manner that provides the greatest opportunity for capital growth over time.”

The importance of these endowments should ensure that their officers are utilizing the best techniques available to maximize long-term growth and qualify as “good guy” managers. As mentioned previously, the basic goal of every investor is to maximize his or her return. University endowment funds may even be more committed as often in smaller universities, endowment funds are depended on for large portions of university revenue and budget expenses, in addition to capital expenditures. Typically the amount a university is able to spend from these funds is directly tied to the returns of the fund (Brown [1999]).

Based on previous research supporting a passive strategy and the immense responsibility of these funds to support the university and its mission, one must question if the foundation advisory boards managing these funds are fulfilling their fiduciary duty when they pursue an active management strategy. If foundation boards are not able to consistently choose investments that outperform the market, it could be argued that these boards are not acting responsibly and a passive strategy should be invoked (Brown [1999], Clark and Wooton [1995]).

The purpose of this study is to test the hypothesis that passive investing provides higher returns on average than does an active strategy by examining a large selection of university endowment investments and returns. This sample enables what could be called a “good guy” comparison (Blanchett [2010]). Blanchett defines a “good guy” comparison as one that uses funds managed by high-quality, active managers in its examination of portfolio performance. Given that university endowment funds have a fiduciary duty to fulfill and should be performing better than average in their active strategies (otherwise these fund managers would have the fiduciary responsibility to pursue a passive strategy), the managers of these funds should qualify as “good guy” managers.

## **DATA SELECTION**

The National Association of College and University Business Officers (NACUBO) publishes an annual report, based on surveys sent out to college and university endowment managers, that provides current year data regarding endowment size, asset allocation, and returns as well as ten years of historical return data. Due to confidentiality requirements, the data are identified by code rather than by the name of the institution, and these codes change each year making it difficult to obtain asset allocation data for a series of years for one institution.

This has greatly restricted previous research regarding this data set. Clark and Wooton's [1995] study uses the ten year historical returns from the 1992 NACUBO study to compare risk-adjusted returns to Standard & Poor's 500 Index and the Wilshire 5000 Index but does not consider asset allocations. Similarly, Brown's [1999] study uses historical returns published in the 1995 NACUBO study to compare risk-adjusted returns to broader indices and discloses, "NACUBO changes the code each year, making it difficult to obtain a series of more than one year for individual endowment holdings and for more than ten years for individual endowment returns." Both of these studies concluded that the endowment funds did outperform on average on a risk-adjusted basis. However, we were able to obtain permission to link the codes through the years enabling us to work with a large data set that spanned seven years (2002 through 2008<sup>1</sup>) in which we could calculate passive returns based on endowment holdings.

Over the seven-year period NACUBO had data for over 1,100 institutions. We restricted this data set to institutions with a fiscal year ending June 30 who reported net returns and actual asset allocations for all years in our proposed period. We implemented

these restrictions to enable us to calculate comparable compound returns for each institution for the seven-year period. This provided a total of 307 institution endowment funds over seven years, resulting in a sample of 2,149 annual returns to analyze. We also used the target asset allocation provided by 1,906 of the 2,149 portfolios. The endowment funds of these 307 institutions represented more than \$100 billion in investments as of 2010, ranging in value from \$3 million to nearly \$14 billion with an average value of approximately \$450 million per institution.

## **THE STUDY**

To complete the data analysis, both the actual and target asset allocations for each institution and year were used to calculate passive returns for each portfolio and compared to the active return actually earned. Passive returns were calculated using appropriate annual returns for index funds that represent each of the predefined asset classes used by the universities and provided in NACUBO reports as shown in Exhibit 1. For the predefined asset class of “Other,” we used an average of all of the indices used in this study since there was no indication or description of how each institution classified this asset class. Similarly, since the asset class of “Natural Resources” was not defined, we used an equal weighting of the DJ UBS Commodity Index, the NCREIF Timberland Index, and the DJ US Oil & Gas Index as a proxy for this asset class to represent the most common natural resource investment options.

**Exhibit 1: Index Funds Used for Passive Return Calculations**

NACUBO Asset Class	Index Used
US Equity	Wilshire 5000
Non-US Equity	MSCI AC World Ex U.S.
US Fixed Income	Barclays Capital Aggregate
Non-US Fixed Income	JPMorgan GBI Global Ex-US
Public Real Estate	MSCI US REIT
Private Real Estate	NCREIF Natl Property Index
Cash	90-Day U.S. TBill Index
Other	Average of all indices used
Hedge Funds	HFRI Fund of Funds - Composite
Venture Capital	Cambridge Assoc US VC Index
Private Equity	Cambridge Assoc US Private Eq Index
Natural Resources	Blended Nat Res Index**

\*\* Blended Nat Res Index is a composite index based on equal-weighting of the DJ UBS Commodity Index, NCREIF Timberland Index, and DJ US Oil & Gas Index.

Based on both the provided actual and target asset allocation of each endowment fund for each year, passive returns for both actual and target asset allocations were calculated using a weighted average of returns from the above passive index funds. Finally, after passive returns and summary descriptive statistics were calculated (ie., mean, standard

deviation, minimum, and maximum), a paired  $t$ -test for the means of two samples was performed to determine if there is a significant difference (statistically greater than zero) between the means of the actively and passively managed funds (based on actual allocations) at the 0.05 significance level, the standard level of significance used to justify a claim of a statistically significant effect (Fisher [1956]).

## RESULTS

When comparing 2,149 portfolios, 1,211 outperformed the passive actual asset allocation returns and 938 underperformed. Of 307 schools, 178 outperformed more often than underperforming over seven years. Only two institutions outperformed every year during the period. Average passive returns for actual asset allocations were 6.31% for all portfolios from 2002 through 2008, while average active actual returns were 7.02% for this period. Annual average returns are shown in Exhibit 2 for the calculated actual allocation passive, target allocation passive, and active actual returns.

**Exhibit 2: Annual Average Returns for Actual Active Returns and Passive Returns for Both Actual and Target Asset Allocations with Shaded Significant Differences Based on Annual *P*-values Resulting from a Paired *T*-Test for the Means of Two Samples – Actual Active Returns versus Passive Returns for Actual Asset Allocation**

Averages	Passive Actual Returns	Actual Active Returns	<i>P</i> -Values for <i>T</i> -test	Passive Target Returns	S&P 500 Returns	Number of Out-performing Schools	Percentage of Out-performing Schools
2002	-5.91	-6.10	4.16E-01	-6.65	-17.98	131	42.50%
2003	3.21	2.79	8.76E-03	3.11	0.25	120	39.00%
2004	15.23	15.93	9.66E-05	15.05	19.10	192	62.30%
2005	8.77	9.73	6.87E-07	8.88	6.30	180	58.80%
2006	10.80	11.39	6.48E-04	10.53	8.63	172	55.80%
2007	16.82	18.12	1.92E-10	16.30	20.59	201	65.30%
2008	-4.76	-2.70	8.24E-16	-4.39	-13.11	215	69.80%
Overall	6.31	7.02	2.37E-20	6.25	3.40	1211	56.40%



Results indicate that the active strategies of university endowment funds, on average, perform stronger than the passive returns calculated for both actual and target asset allocations. This is true for all years excluding 2002 and 2003. In addition, the active strategies outperformed the S&P 500 for all years excluding 2004 and 2007.

These results were validated by the outcome of the paired  $t$ -test for the means of two samples. This test determines if the difference in the means is statistically greater than zero. The  $p$ -values, provided from the paired  $t$ -tests, were determined annually for the means of the active actual returns and the passive returns based on actual asset allocations.  $P$ -values that are less than the significance level of 0.05 allow us to reject the null hypothesis, which states that the means are the same. This is true for all years with the exception of 2002. In 2002, we are unable to conclude that the means are statistically different, somewhat discrediting the results for one of the two years in which these portfolios did not outperform the market on average. Therefore, the differences between the active and passive returns are statistically greater than zero for most years showing that these institutions were able to outperform the market the majority of the time. The summary descriptive statistics of all annual returns calculated are shown in Exhibit 3.

**Exhibit 3: Summary Descriptive Statistics for Annual Returns for Actual Active Returns and Passive Returns for Both Actual and Target Asset Allocations**

Year	Calculated Returns	Mean	Std. Dev.	Min	Max
2002	Active Actual	-6.1	4.2	-19.2	10.1
	Passive Actual	-5.9	2.5	-14.7	3.1
	Passive Target	-6.6	2.2	-13.5	0.6
2003	Active Actual	2.8	2.9	-14.7	9.8
	Passive Actual	3.2	1.0	-0.8	6.2
	Passive Target	3.1	0.9	-0.4	6.3
2004	Active Actual	15.9	3.8	-0.6	24.9
	Passive Actual	15.2	2.7	0.1	22.7
	Passive Target	15.1	2.2	3.3	20.3
2005	Active Actual	9.7	3.4	-11.4	19.5
	Passive Actual	8.8	1.3	1.6	12.4
	Passive Target	8.9	1.1	5.5	12.8
2006	Active Actual	11.4	3.1	-2.7	21.7
	Passive Actual	10.8	2.2	-0.8	19.6
	Passive Target	10.5	2.0	3.2	19.9
2007	Active Actual	18.1	2.8	5.6	27.8
	Passive Actual	16.8	2.2	2.9	22.3
	Passive Target	16.3	2.1	0.1	21.3
2008	Active Actual	-2.7	4.0	-13.1	8.3
	Passive Actual	-4.8	1.8	-10.5	3.8
	Passive Target	-4.4	1.8	-10.9	0.9

In addition, actual active returns outperformed passive returns for both actual and target asset allocations for all portfolios over the seven-year period as indicated by the  $p$ -value of  $2.37 \times 10^{-20}$  resulting from the paired  $t$ -test for the means of actual active returns and passive actual asset allocation returns presented in Exhibit 2. Summary descriptive statistics for all portfolios over the seven-year period are provided in Exhibit 4.

**Exhibit 4: Summary Descriptive Statistics for Total Returns for All Portfolios, 2002-2008 - Actual Active Returns and Passive Returns for Both Actual and Target Asset Allocations**

Annual Returns	Mean	Std. Dev.	Min.	Max.
Actual Active Returns	7.02	9.25	-19.20	27.80
Passive Actual Returns	6.31	8.68	-14.73	22.73
Passive Target Returns	6.25	8.56	-13.49	21.32

As indicated in Exhibit 4, the returns spanned a large range and sometimes very large differences in calculated passive actual asset allocation returns versus actual active returns were observed. These differences ranged from actual returns being as much as 2235 basis points lower than calculated passive returns for actual asset allocations to 1903 basis points higher. In addition, though active strategies have higher means on average, they also represent higher risk as indicated by the larger standard deviation. Greater risk provides increased opportunities for both losses and returns. This is illustrated in the larger range of returns shown by the active strategies.

We also calculated compound returns for each institution over the seven-year period and compared these to the calculated compound passive returns for both actual and target asset allocations as shown in Exhibit 5.

**Exhibit 5: Summary Descriptive Statistics for Compound Returns for All Institutions, 2002-2008 - Actual Active Returns and Passive Returns for Both Actual and Target Asset Allocations**

Institution Compound Returns for 2002-2008	Mean	Std. Dev.	Min.	Max.
Actual Active Returns	6.63	1.92	-0.96	12.85
Passive Actual Returns	5.95	0.88	0.56	8.71
Passive Target Returns	5.33	1.65	-0.89	7.85

The compound return results reinforce the previous results; the active strategies tend to outperform the calculated passive returns for these university endowment funds over a period of seven years. This is reinforced by a p-value of  $1.25 \times 10^{-13}$  given by a paired *t*-test for the means of the actual active returns and the passive returns for actual asset allocations. The compound returns spanned a large range as well, although differences only ranged from actual returns being 477 basis points lower than calculated passive returns for actual asset allocations to 758 basis points higher.

Although average active returns have proven to be higher than average passive returns on an annual basis, a compounded basis, and overall, there is a concern that the results may be driven by institutions with larger endowment funds utilizing a professional investment staff. To evaluate this concern, we separated the institutions by endowment size as of 2010 (NACUBO) for those reporting, using class sizes similar to those used in previous studies and by NACUBO, and compared returns over the seven-year period based on these classes as shown in Exhibit 6.

**Exhibit 6: Summary Descriptive Statistics for Returns by Endowment Size as of 2010, 2002-2008 - Actual Active Returns and Passive Returns for Both Actual and Target Asset Allocations**

Endowment Size	Returns	Mean	Std. Dev.	Min	Max
< \$50,000,000 n=56 institutions, 392 portfolios	Active Actual	5.6	8.9	-19.2	27.8
	Passive Actual	6.0	8.5	-13.7	21.3
	Passive Target	6.3	8.7	-11.5	20.3
\$50,000,000 - \$100,000,000 n=56 institutions, 392 portfolios	Active Actual	6.5	8.9	-14.2	24.9
	Passive Actual	6.5	9	-11.3	22.7
	Passive Target	6.4	8.8	-11.6	21.3
\$100,000,000 - \$500,000,000 n=104 institutions, 728 portfolios	Active Actual	7	9.4	-16.6	24.6
	Passive Actual	6.4	8.9	-11.9	21.7
	Passive Target	6.2	8.8	-11.6	21.1
\$500,000,000 - \$1,000,000,000 n=40 institutions, 280 portfolios	Active Actual	7.7	9.5	-16.7	23.8
	Passive Actual	6.3	8.6	-9.5	19
	Passive Target	6.2	8.2	-8.6	17.9
> \$1,000,000,000 n=27 institutions, 189 portfolios	Active Actual	9.9	9	-11.4	27.8
	Passive Actual	6.3	8	-9.8	19.4
	Passive Target	6	7.7	-9.8	18.8

As indicated in Exhibit 6, the size of the endowment fund did have an effect on average returns and the performance of active strategies. Average returns over the seven-year period steadily increase with endowment size. In addition, those with endowments of less than \$50 million in size actually underperformed with their active strategies, confirmed by a *p*-value of 0.0063. Also, those with endowment size between \$50 and \$100 million, had average active and passive returns that were not statistically different, indicated by a *p*-value

of 0.8265 suggesting on average, these schools neither outperformed nor underperformed. Institutions with endowments in size greater than \$100 million all outperformed the passive strategies as indicated by the  $p$ -values  $2.601 \times 10^{-7}$ ,  $2.505 \times 10^{-12}$ , and  $4.777 \times 10^{-27}$  respectively by asset class. However, these institutions represent the larger portion of the sample whose average endowment size is approximately \$450 million.

## **SUMMARY AND CONCLUSIONS**

This paper has provided a snapshot of university endowment performance over a period of seven years and has illustrated that it is possible for these institutions to outperform the market as mirrored by index funds with their active strategies. However, the higher risk associated with these active strategies must also be considered. For institutions that rely on their endowment funds to meet current fiscal needs, this risk must be acknowledged.

In addition, we must note that outperformance is only achieved routinely for those institutions with larger endowments (greater than \$100 million in size). Also, average returns tend to increase with endowment size. This could be true for a number of reasons. Clearly, larger endowments generally have some advantages such as an increased investment staff aiding with strategy. Also, institutions with smaller funds may be more likely to have an increased amount of risk aversion if their endowment funds represent a large amount of their wealth and income. Regardless, these smaller institutions must examine their current portfolios and techniques to enhance their future performance.

It appears that the average endowment board, especially those with at least average endowment size, is acting in its fiduciary capacity when an active strategy is employed even though, historically, active management may not have produced the best results. This validates Blanchett's (2010) assertion that it is possible for "'high quality' or 'good guy' active managers" to generate value.

Although this may appear to be a success for those in favor of active investment management, it is important to note that these endowment funds, like Blanchett's Vanguard funds, are unique. They benefit from advantages such as low fees, large in-house staffs, and

little turnover. However, as Blanchett urges in his 2010 article, “This is not to say other low-cost, high-quality active managers...cannot outperform as well.”



## **ENDNOTES**

- <sup>1</sup> Although 2009 and 2010 NACUBO data were available at the time this article was written, they were excluded from this analysis because the predefined asset allocation classes were changed greatly in 2009.

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## VITA

Brandy Elaine Hopkins (Hadley) has described herself as a professional learner and advocate for education. She was born in 1985 in California, where she later graduated from high school in 2002 and received her Associate of Science degree from Victor Valley College in 2004. She further pursued her education in North Carolina where she received her Bachelor of Science degree in 2009 and her Master of Business Administration degree in 2011, both from Appalachian State University. In July 2011, Mrs. Hadley began work toward her Ph.D in Finance at The University of Tennessee.

Brandy is a member of Phi Kappa Phi, Gamma Beta Phi, Beta Gamma Sigma, and Alpha Chi. While at Appalachian State University, she served as Treasurer for the Graduate Student Association Senate and as a voting member on the Academic Policies & Procedures Committee. In addition, she participated in three study abroad programs to London, China, and Brazil. She has also been featured as a speaker at several university and community events including a featured interview on Inside Appalachian. She credits her success to the support of her family, especially her husband, Preston, and children, Joey (10) and Cloey (5).