Investing Like the Harvard and Yale Endowment Funds

Michael W. Azlen, *CAIA*
Frontier Investment Management

Ilan Zermati
Frontier Investment Management

Introduction

The US University Endowment Funds ("US Endowment Funds"), such as Harvard and Yale, have been leaders in diversified multi-asset class investing for over two decades. Through this approach to investing and with a large exposure to alternative asset classes, they have consistently achieved attractive annual returns with moderate risk. This paper explores whether investors can benefit by applying these investment principles to their own portfolios.

The rationale for investing across multiple asset classes is supported by Modern Portfolio Theory. This theory, developed by Nobel Prize winner Harry Markowitz, demonstrates that the risk-adjusted returns of a portfolio can be improved by diversification across assets with varied correlations. Modern Portfolio Theory is at the heart of the investment philosophy of the Harvard and Yale University Endowment Funds, and is the foundation upon which their portfolios are constructed.

In their seminal study into the importance of asset allocation, Brinson, Hood & Beebower (1986)[1] and Ibbotson et al. (2000)[2] determined that the vast majority of the variability of a portfolio's returns emanated from the long-term or strategic asset allocation of the portfolio (Table 1). Therefore, an investor constructing an indexed portfolio with a similar asset allocation to the top performing Endowments should, in theory, achieve similar return/risk characteristics to these successful investors.

The US Endowment Funds are exceptionally well resourced and have access to the best fund managers and private equity programs, which contributes significantly to their investment success. However, in this paper we demonstrate that by adopting similar asset allocation principles, it is possible for smaller investors to obtain high levels of risk-adjusted returns for their own portfolios; superior to that of traditional equity/ bond portfolios and to most balanced investment funds.

Research	Brinson (1986)	Brinson (1991)	Ibbotson (1999)	Ibbotson (2000)
Percentage	94%	92%	81%	88%
Active Return	-1.1%	-0.1%	-0.3%	-0.4%

Table 1: Percentage of Return Explained by Asset Allocation[1,2]

	Alternative Allocation (%)	10 Year Return (A)	15 Year Return (A)	20 Year Return (A)
Global Equity/Bond Portfolio (60:40)	0%	4.9%	5.3%	6.0%
Average US Endowment Fund (NACUBO)	30%	5.0%	5.2%	6.8%
Endowment Funds > $1bn	39%	5.7%	6.5%	7.8%
Endowment Funds Top 5	44%	6.9%	8.8%	11.2%
Super Endowments (Harvard/Yale)	45%	6.9%	9.2%	11.5%

Table 2: US Endowment Funds relative to a Traditional Portfolio (to June 2016)[5,6,7]

Overview

University Endowment funds are non-taxable vehicles established to contribute towards the future funding requirements of colleges and universities. Their funding comes from a combination of legacies, gifts and investment returns. They employ an investment philosophy focused around diversification whilst taking advantage of a long term investment time horizon which allows them to invest a portion of capital in less liquid assets whilst also being tolerant of market volatility. This in turn ensures the pursuit of long term investment objectives as opposed to reacting to shorter term market movements.

In the US in 2016, there were 805 Endowments which represented $515 billion in combined endowment assets; the largest fund being Harvard University with $35.7 billion under management.[3]

Oxford and Cambridge[4]

In the UK, University Endowment funds are smaller in size. The Cambridge and Oxford University Endowment funds manage approximately £2.5 billion. Similar to the US endowment funds, the two UK endowment funds have a broad asset allocation which does not change by a large amount each year. However, Cambridge and Oxford have an allocation to equities of approximately 70% in contrast to an average allocation of approximately 50% to equities (public and private) for most US Endowment Funds.

Why study the US Endowment Funds

Examining the strategies of the US Endowment Funds is of relevance to investors for the following reasons:

- US Endowment Funds have consistently achieved superior investment returns. This is especially the case for the "Super Endowments" of Harvard and Yale. They have achieved an average 20 year annualised return of 11.5 per cent, 5.4 per cent greater than the returns of a traditional 60/40 global equity/ bond portfolio[5] (Table 2).
- US Endowment Funds have diverse portfolios with exposure to multiple asset classes including significant exposure to alternative asset classes. This emphasis on diversification provides inspiration for smaller investors looking to meet their own personal long-term investment objectives at a time when many investors are looking at ways to diversify from large bond holdings into alternative asset classes (Chart 1).
- US Endowment Funds typically have long-term investment horizons and stable, strategic asset allocations over time; asset allocations that rely less on market timing for generating returns with lower trading costs.

This paper will focus on US Endowment Funds, assessing their current asset allocation as well as the relationship between investment performance, fund size and relative allocations to alternative asset classes. Following this, we will evaluate the performance of a set of Endowment Index Portfolios, created by applying the average annual asset allocation of the five largest Endowment funds to a selection of indices. This will provide a robust means of assessing the merits of adopting an "endowment style" investment strategy as well as providing insight into the importance of strategic asset allocation as a driver of portfolio returns and risk.

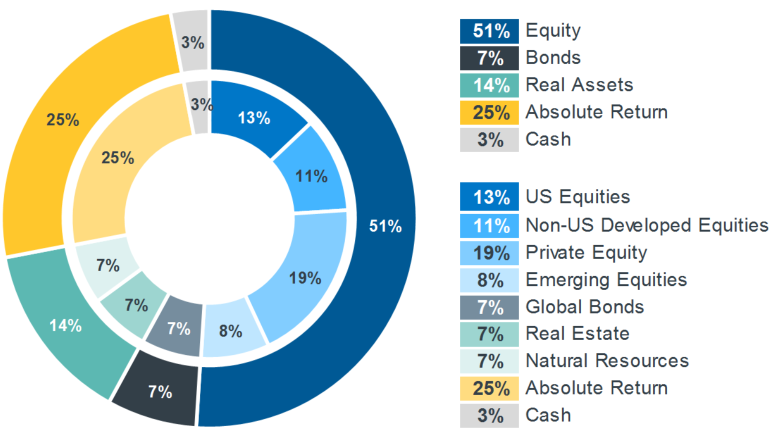

Chart 1: Asset Allocation of the top US Endowment Funds > $ 1billion 2016[6]

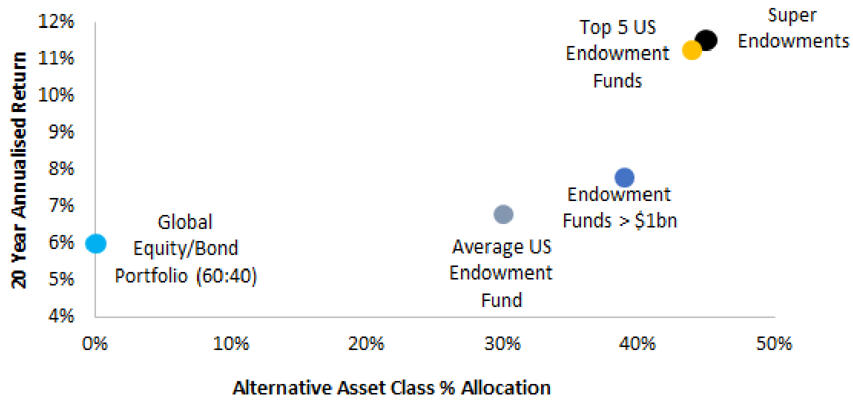

Chart 2: 20 Year Returns and Alternative % Allocations[3,5,6,7]

Endowment Asset Allocation

The average US endowment fund held roughly 70 per cent in traditional asset classes (public and private equity, bonds and cash) with the remaining 30 per cent invested in alternative assets. Comparatively, the Largest 20 Endowments and the Super Endowments (in reference to their size) of Harvard and Yale held 55 per cent in traditional asset classes with the remaining 45 per cent allocated to alternatives.[4] This additional diversification employed by the larger US Endowment Funds is one of the reasons for their superior long-term investment performance. In particular, the larger Endowments have sizeable allocations to alternative asset classes such as real estate, commodities, natural resources and absolute return strategies which can be seen to be positively correlated with long term performance (Chart 2).

The Top Five Endowments

Frontier places particular emphasis on the asset allocation methodology of the largest five endowment funds "Top Five Endowments" which include Harvard and Yale. These funds have consistently been five of the better performing US Endowments with annual returns placing them in the top 10 of over 800 US Endowments in a majority of years. For the 20 years to June 2016 the annualised returns for the Top Five was 11.2%, greater than the vast majority of their peers and those of a traditional portfolio at 6.0% (Table 3).

The Harvard Endowment Fund is the largest at $35.7 billion whilst the Yale Endowment Fund is the second largest at $25.4 billion and the Top Five account for $132 billion which represents 26% of the 805 Endowment funds' assets. These funds have been pioneers in multi-asset investing.

Like US Endowment Funds in general, the asset allocations of the Top Five Endowments has been very stable over-time, changing by an average of only 5% per year over the past fifteen years. A large part of this annual change is due to asset class price movements since the "target allocations" of these investors are stable, long-term and strategic.

These stable allocations reflect their long-term investment horizon and willingness to remain invested throughout economic cycles. They generally do not seek to tactically time the markets.

Index Investing Using the Asset Allocations of the Top Five Endowments

The superior returns, long-term investment horizons, and stable asset allocations of the Top 5 Funds make benchmarking to their asset allocations attractive. Academic research by Gary Brinson and Robert Ibbotson et al have confirmed that the strategic asset allocation of a portfolio is the dominant driver of both return and risk (Table 1).

In this paper, we create an Endowment Index Portfolio ("EIP") that applies the Top 5 asset allocation to a set of indices. This will allow us to determine whether a multi-asset portfolio is able to deliver superior risk- adjusted returns relative to that of a traditional portfolio. In addition, it will provide insight into the importance of strategic asset allocation and also the amount of "alpha" generated by the Top 5 Endowments. We also create a second endowment index portfolio that substitutes the Cambridge Associates Private Equity Index (non-investable) with an investable proxy index that offers investors daily liquidity, in line with the rest of the Endowment Index Portfolio.

	Harvard	Yale	Top 5 Endowments	60:40 Equity/Bond
Size ($ billion)	35.7	25.4	132.1	N/A
Annual Return 2015/16	-2.0%	3.4%	1.2%	0.8%
10 Yr Ann. Returns	7.6%	10.0%	6.9%	4.9%
15 Yr Ann. Returns	8.3%	10.2%	8.8%	5.3%
20 Yr Ann. Returns	11.8%	13.7%	11.2%	6.0%
Manager	Narv Narvekar	David Swenson	-	-
Investment Style	Multi-Asset	Multi-Asset	Multi-Asset	Equity/Bond

Table 3: Top Five Endowment Funds as at June 2016[5,6,7]

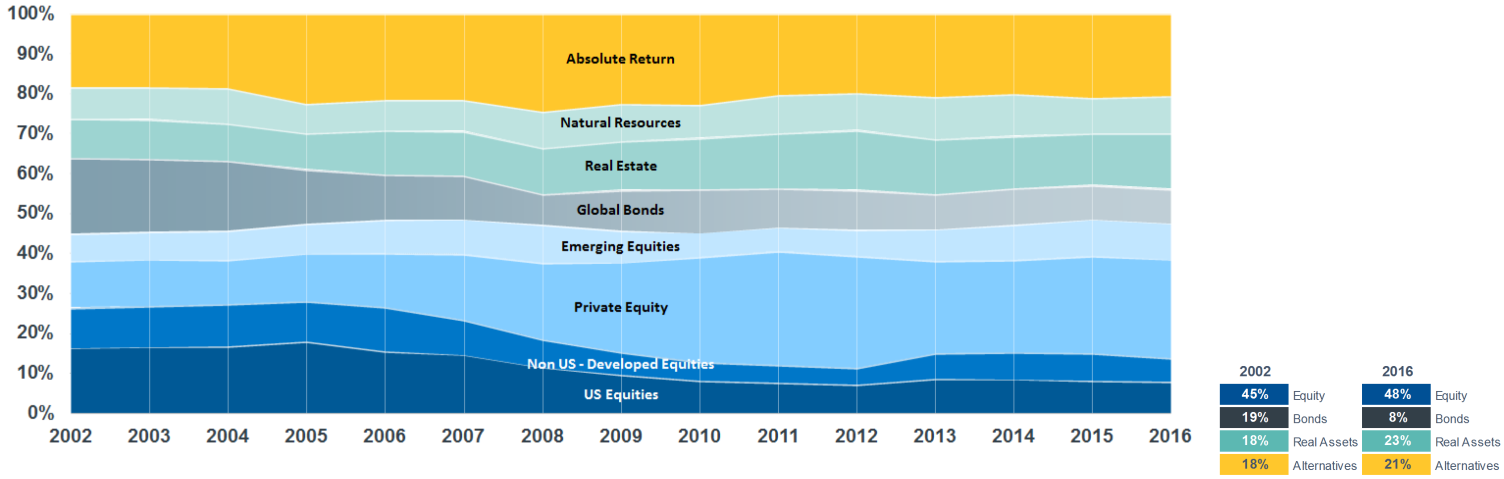

Chart 3: Top Five Endowments Asset Allocation over time[6]

Methodology

The first step was to take the average annual asset allocation of the five largest US Endowments funds at yearly intervals from July 1996 to June 2016. The only asset allocation adjustments made were to reallocate Cash so that the portfolio could be directly comparable to a fully invested portfolio. Further analysis of the underlying exposures allowed us to divide the Equity allocation into "US Domestic," "International," and "Emerging" components. A major benchmark index was selected to represent the returns from each asset class. (See Appendix A) For Private Equity we use the Cambridge Associates Private Equity Index and as a liquid Private Equity proxy, the LPX 50 Index. The asset allocation for 2016 is presented in Chart 4 and places 56 per cent of the portfolio in equity/bond asset classes with the remaining 44% allocated to alternative asset classes.

Portfolio returns were calculated by multiplying asset class weights by index returns in USD from July 1996 to June 2016 (20 years) and rebalanced annually every 30th June.

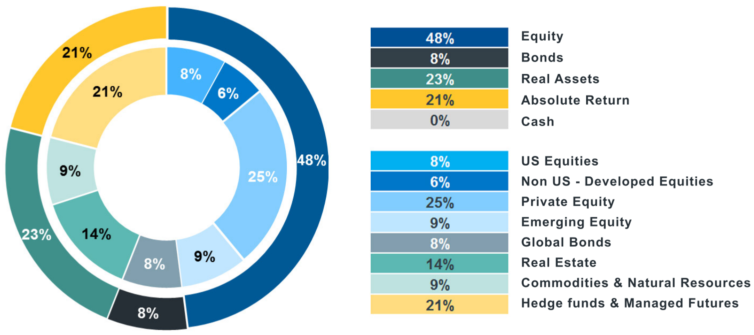

Chart 4: Endowment Index Portfolio 2016 Asset Allocation

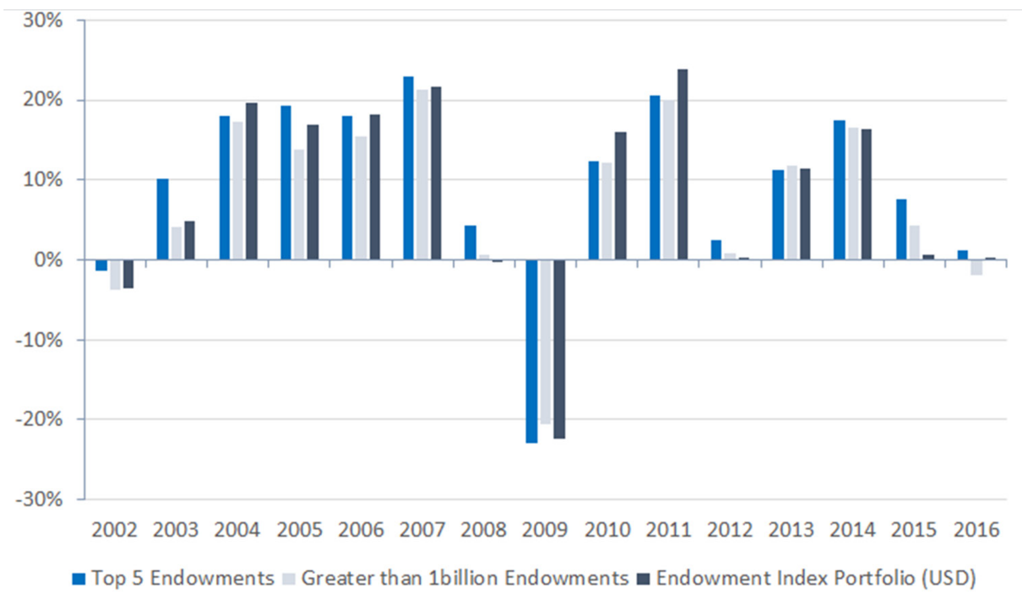

Chart 5: Top 5 vs Endowment Index Portfolios Fiscal Year Returns[6]

	15Y Return (Annual Data)	20Y Return (Annual Data)	20Y Volatility (Annual Data)	20Y Return / Volatility Ratio *	15/20 Yr. Avg EIP % of Return Captured
Top 5 US Endowment Funds by Assets	8.8%	11.2%	11.4%	1.0	
Top 5 US Endowment Funds by Assets (GBP)	9.7%	12.0%	12.5%	1.0	
Endowment Funds > $1bn (94 Institutions)	6.5%	7.8%	10.9%	0.7	
Average US Endowment Fund (805 Institutions)	5.2%	6.8%	10.1%	0.7	
Endowment Index Portfolio (USD)	7.5%	8.4%	11.5%	0.7	81%
Endowment Index Portfolio (Liquid Private Equity USD)	6.5%	7.3%	13.7%	0.5	69%
US Equities (S&P 500 TR)	5.8%	7.9%	17.0%	0.5	
Global Equity/Bond Portfolio (60:40)	5.3%	6.0%	9.5%	0.6	
Endowment Index Portfolio (GBP)	8.3%	9.2%	12.1%	0.8	
Endowment Index Portfolio (Liquid Private Equity GBP)	7.3%	8.1%	14.2%	0.6	
UK Equities (MSCI UK TR)	4.6%	6.2%	13.9%	0.4	
Global Equity/Bond Portfolio (60:40 GBP)	6.1%	6.9%	10.0%	0.7	
IA Mixed Investment 40-85% Shares Sector	4.5%	5.4%	9.9%	0.5	

Table 4: Relative Performance of Endowment Index Portfolio (July 2001 to June 2016)[3,5,6,7,8]

For comparison purposes, an Endowment Index Portfolio hedged into GBP was also calculated. All returns are shown gross of fees and access costs. The resulting performance of the Endowment Index Portfolio is shown in Table 4 above and the annual returns are shown in Chart 5.

The Endowment Index Portfolio ('EIP') generated a 20 year annualised return of 8.4% (9.2% hedged into GBP) since July 1996, relative to 6.0% for a Global Equity/Bond portfolio and 6.8% for the average Endowment Fund.

Comparatively, the EIP utilizing a liquid private equity proxy index generated an annualised return of 7.3% (8.1% hedged into GBP) with only slightly greater volatility, highlighting the attractive returns that can be still be obtained without sacrificing liquidity.

The Endowment Index Portfolio generated a 15 year annualized return of 7.5% which was less than the Top 5 Endowments but still captured 85% of their return with similar levels of volatility and substantially outperformed a traditional equity/bond portfolio which generated 5.3%.

Over the 20 year period and using annual return data, the EIP has a correlation of 94% to the Top 5 Endowment funds with an R squared of 88% indicating that the EIP is a good "fit" (T-Stat =2.13).

Out-performance versus Global Equity/Bond portfolios over long periods of time illustrates the benefits of a globally diversified asset allocation with significant allocations to alternative asset classes. Relative to an Equity/Bond portfolio, the Endowment Index Portfolio increased the 20 year annualized return by 38%. In addition, Equity/Bond portfolios have experienced a twenty year period of declining interest rates that have been a key driver of bond returns. Going forward, bonds have a low probability of generating these high historical returns.

While the EIP performance is not as strong as the Top 5, it still manages to capture 81% of their return thereby supporting Brinson/Ibbotson's et al findings that strategic asset allocation drives the majority of the variability of portfolio returns. It also confirms that the top performing and elite Endowment Funds generate alpha of 1.3% to 2.8% per year, which is consistent with other academic research on Endowments. (See Appendix B)

Summary

The Top 5 Endowment Funds have consistently achieved attractive investment returns with moderate volatility due to their multi-asset approach to investing, their strategic approach to asset allocation, and their significant exposure to alternative asset classes. Whilst the financial crisis of 2008 negatively impacted the performance of the US Endowment Funds, their long term investment strategy has prevailed to the extent that long term total and risk-adjusted returns remain superior to those of traditional portfolios.

Whilst most investors do not have access to the superior resources of the larger Endowment funds, this research note demonstrates that by applying their multi-asset principles to an investable index based portfolio, there is considerable scope for achieving risk-adjusted returns that have historically been superior to those of more traditional portfolios.

Appendix A

Benchmark Indices Used

Each asset class referred to in this note is represented by a relevant market index which is used to construct the Endowment Index Portfolio "EIP." All indices are total return. Asset class index returns used are gross and have not been adjusted for management fees and access costs.

Important Notes and Source Data

This material is for information purposes only and is not a solicitation for investment.

The contents of this document are based upon sources of information believed to be reliable. Frontier has taken reasonable care to ensure the information stated is factually true. However, Frontier makes no representation, guarantee or warranty that it is wholly accurate and complete.

The "Endowment Index Portfolio" is a hypothetical portfolio that has been created by Frontier to calculate the historical investment performance achieved over a twenty year period through applying the average annual asset allocations of the Top 5 Endowment

Asset Class	Benchmark
US Equities	S&P 500 TR Index
Non US - Developed Equities	MSCI EAFE TR Index
Private Equity - Illiquid	Cambridge Associates Private Equity Buyout Index
Private Equity - Liquid	LPX50 TU Index
Emerging Equities	MSCI Emerging Markets TR Index
Global Bonds	Barclays Global Aggregate Bond Index
Real Estate	DJ Global Select REIT TR Index
Natural Resources	S&P Global Natural Resources TR Index
Hedge Funds and Managed Futures	Credit Suisse Hedge Fund Index
Global Equities	MSCI World TR Index

Funds to a set of broad market indices (selected from Appendix A) with rebalancing on 30 June of each year, gross of all fees and expenses. The Endowment Index Portfolio does not constitute an investment vehicle available to purchase by an investor. Therefore, the performance presented does not represent the performance of a real portfolio and may be subject to biases making it an unreliable indicator of performance. Past performance is no guarantee of future results and no assurance can be provided that any portfolio described herein would yield favorable investment results in the future. These performance tables and results are hypothetical in nature and do not represent trading in actual accounts.

PAST PERFORMANCE IS NOT INDICATIVE OF FUTURE PERFORMANCE

Appendix B: Academic Research on Endowments

"Do (Some) University Endowments Earn Alpha?"

Barber, Brad M. and Wang, Guojun, *Financial Analysts Journal*, (May 7, 2013).

In this research paper, Barber and Wang aim to determine if the average Endowment fund earns an abnormal return (alpha) relative to standard benchmarks. Using a three and five factor model, they find that 95% and 99% respectively of the returns of the average Endowment can be explained by the performance of the underlying asset classes.

Some important quotes from the paper are below:

"The fact that the average allocations to asset classes explain the returns for top-performing and elite institutions provides insights into the mechanism used to generate the strong returns earned by these endowments. Specifically, these results suggest that manager selection and dynamic (or tactical) asset allocation do not generate alpha for top-performing and elite institutions. Rather, large strategic allocations to alternative investments explain much of the documented cross sectional variation in performance."

"In summary, the average endowment earns a mean return very close to average benchmark returns, and virtually all the time-series variation in endowment returns can be explained by these benchmark returns. Thus the average Endowment could easily match the returns earned on its investments by indexing."

"There is intriguing evidence of performance persistence. Elite institutions and top-performing endowments earn reliably positive alphas relative to simple public stock and bond benchmarks of about 1.7% to 3.8% per year." (driven by allocations to hedge funds and private equity)

This academic research is further evidence that indexing the asset allocation of top performing and elite endowment funds has merit. Part of Frontier's process involves examining the asset allocation of the top twenty Endowment funds but in particular, we look at the asset allocation of the top five endowments including Harvard and Yale.

Footnotes and References

1. Gary P. Brinson, L Randolph Hood and Gilbert l. Beebower, "Determinants of a Portfolio Performance", *The Financial Analysts Journal*, July/August 1986.

2. Roger G. Ibbotson and Paul D. Kaplan, "Does Asset Allocation Policy Explain 40%, 90% or 100% of Performance?", *The Financial Analysts Journal*, January/February 2000.

3. National Association of College and University Business Officers Report ("NACUBO") (2016).

4. Cambridge and Oxford University Annual reports 2015.

5. Equity/Bond Portfolio calculated by Frontier applies a 60% weighting to the MSCI World Total Return Index and a 40% weighting to the Barclays Global Aggregate Bond Index rebalanced annually 30th June. Portfolio is gross of fees.

6. US University Endowment Annual Reports.

7. 10, 15 and 20 year annualized returns for the Top 20 US Endowment Funds by Assets and the Top 5 Endowments are calculated by Frontier from multiple data sources including the annual report of each Endowment Fund. 15 Year annualized returns for the Average US Endowment Fund and Endowment Funds > $1bn is calculated by Frontier.

8. Bloomberg, Investment Association Monthly data.

Authors' Bios

Michael W. Azlen, *CAIA, CFP*
Frontier Investment Management LLP

Michael Azlen has a total of 27 years experience spanning the entire spectrum of asset management including proprietary trading, hedge funds and multi asset investing. Michael founded Frontier Investment Management in London in 2004 growing the business to more than $700 million in AUM and successfully sold the firm in 2013. Michael now works with select clients to advise them on the creation and management of low cost "Endowment Style" multi asset portfolios.

Mr. Azlen holds a Sloan Masters Degree in Leadership and Strategy from London Business School and is both a Chartered Alternative Investment Analyst (CAIA) and a Certified Financial Planner (CFP).

Michael is a regular speaker at investment conferences and is a guest lecturer on the graduate degree programs at London Business School.

Ilan Zermati
Frontier Investment Management LLP

Ilan Zermati joined Frontier in 2015 and is a portfolio manager on its multi asset investment fund range.

He started his career at LD Capital as a Portfolio Manager Assistant before moving to Amundi Asset Management as Investment Analyst on the Credit/Fixed Income desk.

He graduated in Financial Markets & Risk Management from the Audencia Nantes School of Management and has a masters degree from the Shanghai University of Finance and Economics.