Editor's Letter

An Alternative Examination of the Costs and Benefits of Allocations to Alternatives

The benefits of allocating to alternative investments are by now well documented. Unfortunately, almost all studies of the benefits of allocating to alternatives, including the one published in each issue of this journal under the title "The List: Alternative Indices," are somewhat flawed. The primary flaw of these studies is the assumption that the asset allocator can invest in a diversified index of alternatives such as CISDM's Equally Weighted Hedge Fund Index or Cambridge Associates' Private Equity Index. Of course, none of these alternative asset class benchmarks are investable and, in some cases, may not accurately represent the performance of the asset class. For example, many of the underlying funds used to create these benchmarks might be closed to new investors and/or may be subject to self-selection or backfill biases.

The main problem stemming from the use of indices is the performance dispersion of the underlying investment managers is ignored. Unlike traditional asset classes where one can invest directly in a benchmark, such as the MSCI World Equity Index, investments in alternatives require allocations to managers, and there are substantial dispersions in the performance of managers of alternative asset classes. Even if an allocator were to use investment managers for traditional asset classes, the performance dispersion of these managers is only a fraction of that of alternative investment managers.

Exhibit 1 displays the median, top-quartile, and bottom-quartile investment manager performance for various asset classes. The estimated dispersions displayed here come from different sources and cover slightly different periods. Therefore, there are bound to be some estimation errors. However, the message conveyed by this exhibit is clear. There is significant dispersion, or manager selection risk, associated with allocating to alternative investments, and studies that use benchmarks or indices to measure benefits of allocating to these asset classes ignore this important risk.

In Exhibit 1, it's obvious that the dispersion of performance is not uniform among various asset classes. Not surprisingly, the dispersion is the smallest for traditional equity and fixed income managers. On the other hand, the dispersion is quite substantial for most alternative asset classes. The implication of this exhibit is that, because of luck or skill, some investors may allocate to top managers while others, because of bad luck or poor skills, may end up with bottom quartile managers. Of course, all allocators start the process with the goal of investing in top-quartile managers, but some ended up allocating to bottom quartile managers.

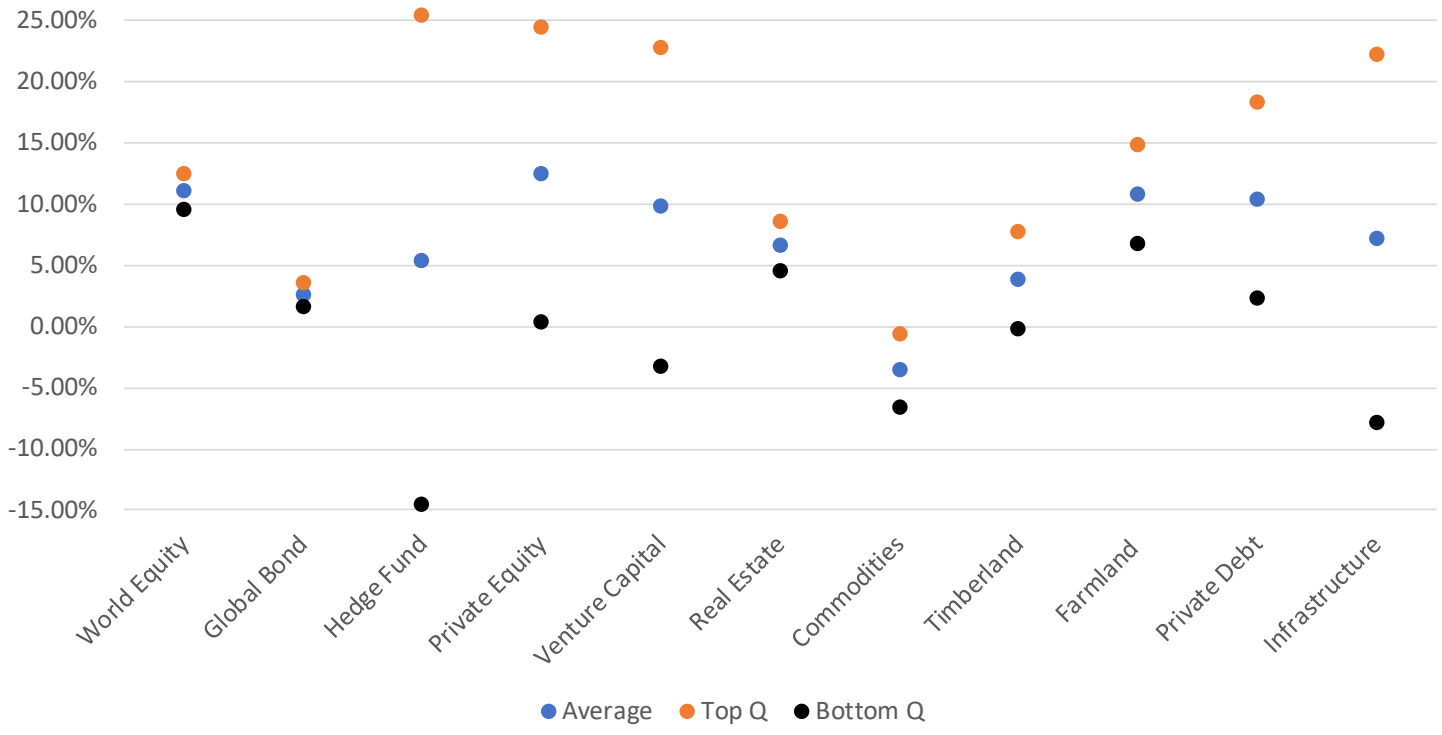

Exhibit 1: Average, Top Quartile, and Bottom Quartile Performance of Managers
Source: See Appendix

It's worth noting that this exhibit and its return information comes with three important caveats:

1. It does not reveal the type of investors (e.g., individual, institutional, etc.) that end up with allocations to poor performing managers or how much they allocate to these managers.
2. It does not account for the presence of autocorrelation (i.e., price smoothing) in the underlying indices.
3. It does not account for manager diversification within the indices (i.e., how correlated are managers that are included in an index.)

We will address the last two bullet points, as they are more important to this study.

Autocorrelation: Unlike public markets, where pricing data is available daily, private markets and other alternative investment asset classes are usually appraised and reported quarterly. Less frequent appraisals can increase the likelihood of price smoothing. Quarterly appraisals are subject to an anchoring effect, meaning current appraisals are heavily influenced by the previous quarter's appraisals. Over multiple quarters, recent prices become highly correlated to previous prices, which gives rise to autocorrelated return series. When autocorrelation is present in a series of prices, it can understate traditional risk metrics, such as standard deviation, maximum drawdowns, and correlation to other asset classes.

Sub-Manager Diversification: Many alternative investment indices are constructed by aggregating managers within the same asset class and/or those following a similar investment strategy (e.g., core real estate or venture capital). Not every manager in the index is doing the same thing, which means the performances of these managers are less perfectly positively correlated with each other. As a result, alternative indices will have much lower volatility than the average single manager because the less than perfect correlations amongst them create an additional level of diversification.

The next two sections of this piece will focus on comparing traditional investments with alternative investments, specifically how portfolio characteristics change when adjustments for smoothing and manager selection risk are included. The Traditional Approach does not adjust for autocorrelation or sub-manager diversification, but the Alternative Approach addresses both issues.

Summary of Findings

We use a simulation approach and then employ the risk-adjusted performance measure used by Morningstar for ranking mutual funds to measure the benefits of allocating to alternative asset classes. Our findings are:

- When adjusted for smoothing, the return volatility of all alternative asset classes increases. The increases are most significant for private equity, venture capital and private debt, which are less liquid than commodities or hedge funds. Other illiquid asset classes such as infrastructure, timber, and farmland also display higher volatility but not as much.
- For an average investor, the benefits of allocation to alternative asset classes are reduced by 17% when the return smoothing effect is accounted for. The decline in the benefits of allocating to alternatives is much larger for investors who have above average risk aversion. However, these investors display a much larger benefit, to begin with.
- For an average investor, the benefits of allocating to alternatives are reduced by 13% when managers' return dispersion is considered. The decline is more than twice as much for investors who are above average risk-averse.
- Finally, when both return smoothing and return dispersion are considered, the benefits of allocating to alternatives are cut by more than 50%.
- The results show that investors would benefit from allocating more capital to the due diligence process as lower manager selection risk will have a significant impact on the potential benefits of allocating to alternative asset classes.
- To the degree that funds of funds may reduce the manager selection risk and potential return dispersion, the results reported here could be used to justify the use of funds of funds as a way of accessing alternative assets.

Traditional Approach

Exhibit 2 provides the summary statistics for the traditional and alternative asset classes discussed in Exhibit 1. These statistics span a 11-year period from December 31, 2007, to December 31, 2018. Over this period, almost every asset class was positive since this was a strong period for financial markets. Across rolling one-, three-, five-, and ten-year periods, private equity was the best-performing asset class, while commodities were worst performing asset class over the same periods.

Asset Class	Return Measures					Risk Measures**			
	1-Year	3-Year	5-Year	10-Year	11-Year	Volatility	Skew	Kurt	Max DD
World Equity	-7.4%	7.3%	5.5%	11.1%	5.8%	17.5%	-0.6	0.7	-47.4%
Global Bonds	-1.1%	2.9%	1.2%	2.6%	2.8%	6.1%	0.1	0.2	-7.2%
Hedge Funds	-4.7%	3.6%	2.9%	6.0%	3.6%	8.1%	-0.5	1.8	-19.2%
Private Equity	10.4%	12.8%	12.0%	12.4%	9.0%	7.9%	-2.4	8.0	-26.6%
Venture Capital	13.3%	8.2%	10.1%	9.8%	7.2%	6.8%	-1.1	3.5	-19.8%
Real Estate	6.3%	9.5%	10.4%	6.6%	3.1%	9.7%	-3.3	13.4	-45.9%
Commodities	-11.4%	2.3%	-12.6%	-3.6%	-6.6%	27.8%	-0.9	1.7	-80.0%
Timerland	3.2%	3.1%	4.9%	3.8%	4.3%	3.6%	0.8	4.2	-5.7%
Farmland	6.6%	6.5%	8.3%	10.8%	11.2%	4.7%	1.7	2.1	0.0%
Infrastructure	9.1%	9.1%	9.7%	7.2%	8.4%	7.3%	-2.8	12.4	-23.2%
Private Debt	3.7%	7.3%	7.1%	10.4%	7.0%	8.4%	-2.0	7.2	-26.3%
Global 60/40 Portfolio	-4.9%	5.5%	3.8%	7.7%	4.6%	11.2%	-0.2	0.6	-30.5%
Alternative Portfolio*	3.4%	6.9%	6.3%	8.1%	5.7%	6.7%	-2.2	6.4	-21.1%
30% World Equity, 20% Global Bond, 50% Alternatives Portfolio	-0.8%	6.2%	5.1%	7.9%	5.2%	8.6%	-0.9	1.5	-25.4%

Exhibit 2: Asset Class Returns and Risk Measures from December 31, 2007 – December 31, 2018
Source: See Appendix
* Alternatives Portfolio is an equal-weight portfolio of hedge funds, private equity, real assets, and private debt
** Risk is measured over the entire period

A traditional, moderately aggressive portfolio consisting of 60% global stocks and 40% global bonds returned 7.7% over a rolling 10-year period. Traditional assets experienced a strong decade of performance, as global equity markets soared, and bond prices rose due to falling global interest rates. However, by looking back an additional year to include some of the worst months of the Global Financial Crisis, traditional asset returns become much more muted. A traditional global 60/40 portfolio over this time period returned 4.6%, much lower than the 10-year return of 7.7%.

Most alternative investments had a strong decade as well. For simplicity, we created a portfolio that equally weighted hedge funds, private equity (PE and VC), real assets (real estate, commodities, timberland, farmland, and infrastructure), and private debt. This "Alternatives Portfolio" outperformed a global 60/40 portfolio over rolling one-, three-, and five-year periods, while almost matching it over a rolling 10-year period. All of this is done with significantly less risk. Similar to traditional investments, a portfolio comprised of alternative investments saw a decrease in returns when we include 2008. However, the alternative portfolio actually outperformed the traditional portfolio by over 1% and did so with a fraction of the volatility of the drawdown.

We then created a portfolio comprised of 30% global stocks, 20% global bonds, and 50% alternatives. This combined portfolio generated a very similar performance to a 60/40 portfolio over the entire period. While these returns are impressive and expected given the performance figures of the two separate portfolios, the combined portfolio of traditional and alternatives reduced the global 60/40 portfolio's standard deviation and maximum drawdown by approximately 40%. In other words: similar returns, lower risk, higher risk-adjusted measures.

Now, this approach still only considers alternatives at the index level. The next section, aptly named the "Alternative Approach," will consider allocating to alternatives at the manager level, and account for variables such as autocorrelation and sub-manager diversification.

Alternative Approach

The Alternative Approach uses the following simulation to measure the potential benefits of allocating to alternative asset classes.

First, historical means, correlations, covariances, volatilities, and autocorrelations of the asset classes in Exhibits 1 and 2 are estimated from the 2007-2018 data.

Second, the estimated covariances and volatilities are adjusted for data smoothing. To perform this adjustment, we used the following equation:

$$\sigma_{ij} = \gamma_i \gamma_j \times k_{ij} \times \left(\frac{1+\rho_i}{1-\rho_i} \times \frac{1+\rho_j}{1-\rho_j} \right)^{1/2}$$

Here, σ_{ij} is the unsmoothed covariance between asset *i* and asset *j*. Note that when *i*=*j*, the unsmoothed variance is obtained. The reported (i.e., smoothed), standard deviation of asset *i* is represented by γ_i, the autocorrelation of return series of asset *i* is represented by ρ_i, and the reported correlation between asset *i* and asset *j* is represented by k_{ij}. Again, note that when *i*=*j*, k_{ij}=1.

Exhibit 3 displays the same risk measures that appeared in Exhibit 2 in their original form, but also adds an additional column that adjustments for return smoothing. As expected, we see significant increases in risk measures associated with alternative investments, both on a standalone basis and as part of a portfolio. It is important to note that while unsmoothing the returns will always lead to an increase in estimated volatility, there are occasions where the estimated maximum drawdown could actually decrease (e.g., see infrastructure investment below). This could happen especially when the sample size is not long or unsmoothing the returns makes large positive returns even larger.

Third, to generate simulated returns on asset classes, we need to account for the possibility that each asset class return could come from three different groups of managers: top quartile, bottom quartile, and median. We account for this by randomly changing the mean of the distribution from which returns are generated. Specifically, for each asset class, we assume 25% of returns come from a distribution where the mean return corresponds to the performance of a bottom quartile manager. Similarly, 25% and 50% of the returns will come from distributions corresponding to the top and median managers, respectively. When generating the simulated results, one critical assumption we make is that top quartile, bottom quartile, and median managers have the same covariance matrices, as we lack the information to calculate the covariance matrices of these groups of managers.

Fourth, the simulated returns are then used to create the portfolios that appear in Exhibit 2 and Exhibit 4 (see below). To measure the performances of these portfolios on a risk-adjusted basis, we use the expected utility approach, an approach employed by Morningstar to rank mutual funds, to rank these portfolios and, more importantly, to measure the certainty equivalent return of each asset allocation strategy.

Asset Class	Risk Measures			
	Volatility (Smoothed)	Volatility (Unsmoothed)	Maximum Drawdown (Smoothed)	Maximum Drawdown (Unsmoothed)
World Equity	17.5%	21.5%	-47.4%	-49.5%
Global Bonds	6.1%	5.3%	-7.2%	-6.8%
Hedge Funds	8.1%	11.0%	-19.2%	-23.0%
Private Equity	7.9%	15.4%	-26.6%	-40.3%
Venture Capital	6.8%	12.4%	-19.8%	-29.3%
Real Estate	9.7%	18.8%	-45.9%	-58.2%
Commodities	27.8%	33.2%	-80.0%	-84.9%
Timerland	3.6%	4.4%	-5.7%	-6.7%
Farmland	4.7%	4.9%	0.0%	0.0%
Infrastructure	7.3%	12.1%	-23.2%	-32.9%
Private Debt	8.4%	15.0%	-26.3%	-32.9%
Global 60/40 Portfolio	11.2%	13.4%	-30.5%	-31.9%
Alternative Portfolio*	6.7%	10.6%	-21.1%	-28.8%
30% World Equity, 20% Global Bond, 50% Alternatives Portfolio	8.6%	11.8%	-25.4%	-27.6%

Exhibit 3: Adjusted Asset Class Risk Measures from December 31, 2007 - December 31, 2018
Source: See Appendix

Morningstar's approach consists of applying the following model to the return series of a mutual fund or a portfolio.

$$CE = \left(\frac{1}{T} \sum_{t=1}^{T} \left(\frac{1+R_{pt}}{1+R_{ft}} \right)^{-\gamma} \right)^{-\frac{12}{\gamma}}$$

Here $\gamma > 0$ is a measure of risk aversion where a higher value of γ indicates a higher degree of risk aversion on the part of the investor. The per period return on the portfolio is given by R_{pt} while the per-period rate of return on the risk-free asset is represented by R_{ft}. Finally, *CE* is one plus the annual excess certainty equivalent return of the portfolio. For example, if *CE* = 1.05, it means that the investor will be indifferent between earning the rate of the return on the portfolio and earning a safe return of 5% per year in excess of the riskless rate. Like Morningstar, we use the calculated certainty equivalents to measure the performance of each asset allocation strategy.

The advantage of this approach is that it accounts for quarterly variation in returns. Therefore, it can account for changes in the return distribution of each asset class as mean returns are randomly changed to reflect the dispersion of performance amongst the underlying managers.

	Common Approach: No Adjustments		Adjusted Only for Dispersion		Adjusted Only for Smoothing		Adjusted for Both Smoothing and Dispersion	
Allocations	**30/20/50**	**60/40**	**30/20/50**	**60/40**	**30/20/50**	**60/40**	**30/20/40**	**60/40**
	Moderately Risk Averse Investor							
Measure of Performance	1.0274	1.0162	1.0252	1.0162	1.0230	1.0162	1.0211	1.0162
Relative Risk Adjusted	69%		56%		42%		30%	
	Above Average Risk Averse Investor							
Measure of Performance	1.0211	1.0065	1.0198	1.0065	1.015	1.0065	1.013	1.0065
Relative Risk Adjusted	225%		205%		131%		100%	
	Below Average Risk Averse Investor							
Measure of Performance	1.0363	1.0207	1.0292	1.0207	1.0283	1.0207	1.0255	1.0207
Relative Risk Adjusted	75%		41%		37%		23%	

Exhibit 4: Measures of Risk-Adjusted Performance for Various Allocation Strategies.
Source: Authors' Calculations.

Exhibit 4 presents our simulation results, which were generated using 10,000 simulations of returns on a 10-year investment horizon. The first two rows display the results when the investor's measure of risk aversion is 2, often considered to be the average degree of risk aversion. Under various scenarios, the multi-asset portfolio consisting of traditional and alternative asset classes outperforms the 60/40 portfolio that consists of only traditional asset classes.

This is the good news for investors who hold such portfolios. Using the traditional approach, the CE for the 30/20/50 portfolio is 69% greater than that of the 60/40 portfolio when no adjustments for smoothing and manager selection risk are made. However, the traditional approach uses benchmarks and indices to create the multi-asset portfolio, which significantly overestimates the benefit of holding multi-asset portfolios of traditional and alternative asset classes. When the return series is adjusted to account for manager dispersion, the CE for the 30/20/50 portfolio is greater than the 60/40 portfolio by 56%. Further, when both smoothing and manager dispersion are considered, the CE of the 30/20/50 is only 30% greater than the 60/40 portfolio.

The second set of results presents the same set of calculations when the measure of risk aversion is above average ($\gamma = 4$). We see a similar decline in the relative performance of the 30/20/50 portfolio as we account for both smoothing and manager dispersion. However, notice that the relative outperformance increases with the level of risk aversion. The reason is that the 30/20/50 portfolio has much lower volatility and, therefore, its certainty equivalent is higher than that of the 60/40 portfolio. It is worth noting that, relative to the investor with average risk aversion, the certainty equivalents are lower for the investor with above-average risk aversion.

The final set of results considers an investor with below-average risk aversion ($\gamma = 1.25$). In this case, the diversification benefits of alternatives are as highly valued, and the impacts of the return smoothing and manager selection risk are muted as well.

Implications

The analysis presented here has three broad implications. The first, and more obvious, implication is that manager dispersion, or "manager selection risk," reduces the benefits of allocating to alternative asset classes. However, even in the presence of manager selection risk, there are significant benefits to the allocating to alternative asset classes, and these benefits are even more substantial for investors with above-average risk-aversion.

The second implication is that we can measure the potential benefits of improved due diligence. For example, for average-risk aversion, there is a 0.022% decline in the certainty equivalent when manager selection risk is considered. We can use this to measure to justify the amount that we should be willing to spend on due diligence to reduce manager selection risk. For instance, for each $100 million that we plan to allocate to alternative asset classes, we could spend up to $220,000 on manager due diligence and selection costs, not an insignificant amount.

The third implication is that there are circumstances under which an asset allocator will be better off to invest in a fund of funds, reducing the manager dispersion risk of the portfolio. For example, an investor who plans to make a small allocation to a certain set of alternative asset classes would find it beneficial to select a fund of funds manager rather than assuming a significant amount of individual manager selection risk.

Appendix

As mentioned in the text, the manager dispersion figures were obtained from various sources. The following is a list of sources and time periods covered by various strategies.

1. "Guide to Alternatives, 3Q 2019," JP Morgan Asset Management. This is used as a source of dispersion of global equity, global fixed income, US core and US non-core real estate, global private equity, US venture capital, and hedge fund managers. The time period covered is 1Q 2009-1Q 2019.
2. Preqin Database. This is used as the source for infrastructure and private debt managers. In addition, we used this source to run additional checks on private equity, venture capital, and hedge fund managers. The time period covered is 1Q 2009-4Q 2018.
3. CISDM Hedge Fund Database: This is used as a source to run an additional check on the dispersion of hedge fund managers. The time period covered is 1Q 2009-1Q 2019.
4. "Insights into Efficiency and Manager Selection: A Look at Quartile Returns of Timberland Funds," Chung-Hung Fu, Timberland, and Investment Resources, 2014. This is used as a source for timberland fund managers. The time period covered is Q2 2002-Q2 2014.

We did not have reliable sources for the dispersion of commodity and farmland managers. For commodity managers, we assumed they have the same cross-sectional dispersion relative to their means as that of the global equity fund managers. For farmland fund managers, we assumed they have the same cross-sectional dispersion relative to their means as that of the timberland fund managers.

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Dr. Hossein Kazemi is the Senior Advisor to the CAIA Association's Program. Dr. Kazemi has been involved with the CAIA Association since its inception as a senior advisor and a managing director. In his current role, he helps with the development of the CAIA program's curriculum and directs the CAIA Association's academic partnership program. In addition, he serves as the editor of *Alternative Investment Analyst Review*, which is published by the Association. He has worked with universities and industry organizations to introduce them to the CAIA program. Dr. Kazemi is Michael and Cheryl Philipp Distinguished Professor of Finance at the Isenberg School of Management, the University of Massachusetts - Amherst. He is the Director of the Center for International Securities & Derivatives Markets, a nonprofit organization devoted to research in the area of alternative investments, a co-founder of the CAIA Association, and home to CISDM Hedge Fund/CTA Database and the *Journal of Alternative Investments*, the official research publication of the CAIA Association. He has over 25 years of experience in the financial industry and has served as consultant to major financial institutions. His research has been in the areas of valuations of equity and fixed income securities, asset allocation for traditional and alternative asset classes, and evaluation and replication of active management investment products. He has a Ph.D. in finance from the University of Michigan.

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