Do Hedge Funds add value in Pension portfolios?

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Alternatives in general and hedge funds in particular, offer an attractive complement to the traditional 60/40 asset allocation framework used by many pension plans. The analysis in this paper has shown that a carefully constructed hedge fund portfolio can outperform the 60/40 strategy benchmark over time, even as it protects the portfolio against capital drawdown. The key, we believe, is making sure that the hedge fund portfolio has a 60/40 allocation as its benchmark and outperforms it in a consistent manner. It should not be surprising, that this approach is becoming increasingly more common among the more sophisticated pension.

I. The 60/40 Allocation

Pension Funds have traditionally used a 60/40 asset allocation policy, i.e. allocated 60% of plan capital to equities and 40% to fixed income. There were two main reasons for this allocation:

- Fixed income has a low to negative correlation to equities over the short term which was expected to effectively mitigate portfolio drawdown,
- Over the long term, both equities and fixed income have positive expected returns and the 60/40 portfolio was expected to generate the required 7% to 8% return that the Pension Plan needs to help them meet future obligations.

The need for a new approach to asset allocation arises because these reasons are no longer valid.

- Given the current low level of interest rates on fixed income instruments and the lower bound of zero on these rates, the maximum potential appreciation in fixed income assets is small. Consequently a 40% allocation to fixed income will be too small to meaningfully reduce portfolio drawdown when equities have large negative returns.
- The low level of interest rates on fixed income instruments will adversely impact the ability of a pension portfolio that has 40% allocated to fixed income from generating the required 7% to 8% annual returns.

Pension plan managers have been seeking alternative asset allocation strategies – that will enable them to generate the required returns without increasing their short-term drawdown risk. The consequences of short term drawdown risk are both real and significant in that they affect the annual contributions of the pension plan sponsor.

The use of hedge funds is one approach that is finding increasing interest among pension plan managers. This paper presents a perspective on how this interest is shaping expectations that pension plan managers have from their hedge fund investments.

Performance over time

To better assess the benefits of adding hedge fund investments to a pension plan portfolio, we start off by analyzing the risk and return characteristics of a static 60/40 allocation that does not include any hedge fund investments. We assume, in this paper, that the 60/40 allocation reflects a 60% allocation to the S&P 500 Index and 40% to the Barclays US Aggregate Bond Index. The growth in the value of an investment in this portfolio from 1990 until 2012 is shown in Figure 1 and the annualized returns of this portfolio over different time periods is given in Table 1.

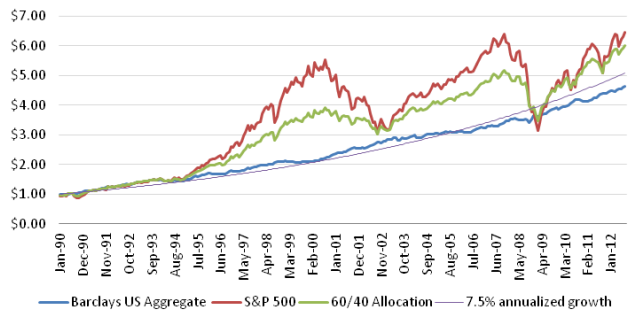


Figure 1: Value of an investment since 1990

	1yr	3yr	5yr	7yr	10yr	12yr
Barclays US Agg	5.8%	6.5%	6.7%	5.7%	5.5%	6.3%
S&P 500	18.0%	13.6%	1.3%	4.2%	6.5%	1.3%
60/40 portfolio	13.3%	11.1%	3.9%	5.2%	6.4%	3.6%

Table 1: Annualized returns for different time frames

From Table 1, we see that the performance of a 60/40 portfolio over the last twelve years has fallen short of the actuarial returns of 7% to 8% required by most state pension plans. In fact, over this period, equities have delivered an annualized return of less than 1.5%, which, in turn, has resulted in the 60/40 portfolio delivering an annualized return of less than 4%. Figure 2 gives the growth in the value of an investment of a 60/40 portfolio over two different time periods - from January 2000 through June 2012, and from January 2007 through June 2012.

Figure 2 makes it clear that an investment in a 60/40 portfolio in 2000 would have underperformed the actuarially required annualized rate of return of 7.5% by nearly 35%. Moreover, over the past five years, the 60/40 portfolio would have underperformed the 7.5% benchmark return by about 15%. In fact, Figure 3 suggests that the static 60/40 portfolio has not

been a compelling investment for investors requiring an annualized return of 7% for any period of less than 20 years.

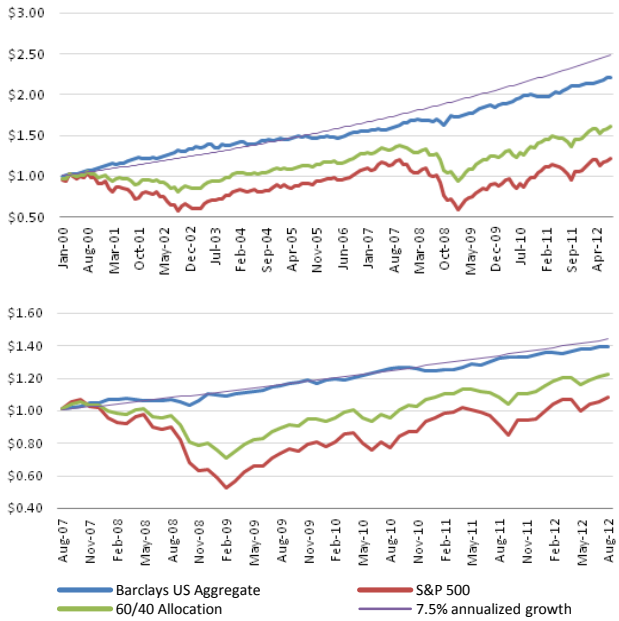


Figure 2: Value of an investment from 2000 (top) and from 2007 (bottom)

Consequences for Pension Plans

The inability of state pension plans to meet their actuarial required rate of return has resulted in these plans becoming significantly underfunded and a consequent increased liability for the respective governments. Estimates of the total magnitude of the unfunded public pension liability in the U.S. have ranged between $730 billion and $4.4 trillion. Most financial economists believe that the actual magnitude is closer to $4.4 trillion. An unfunded liability of $4.4 trillion would represent 33% of the U.S. GDP of $13.32 trillion in 2011. To put this in perspective, the 2011 Social Security Trustees report estimates the unfunded U.S. Social Security obligations through 2085 at about $6.55 trillion.

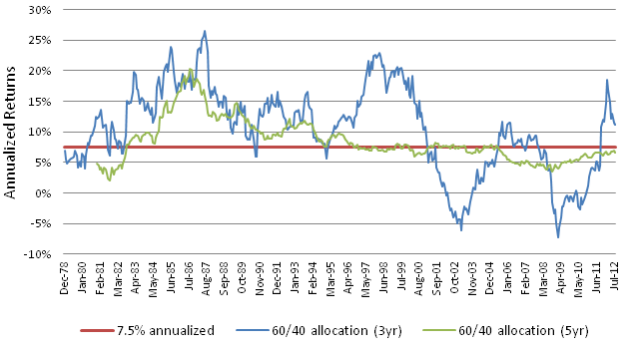


Figure 3: Annualized returns for the 60/40 portfolio (rolling 3years and 5years)

Figure 4 lists the five US states with the largest unfunded pension liabilities using discount rates assumed by the respective governments as well as those calculated using current US Treasury yields.

Liabilities based on government financial statements ($billions and % underfunded)			
1.	California	$154.2	(32% underfunded)
2.	Illinois	$85.4	(57% underfunded)
3.	Ohio	$75.3	(39% underfunded)
4.	New Jersey	$62.9	(63% underfunded)
5.	Texas	$53.7	(30% underfunded)
Liabilities discounted using Treasury yields ($billions and % underfunded)			
1.	California	$475.7	(59% underfunded)
2.	Illinois	$219.1	(77% underfunded)
3.	Ohio	$216.9	(65% underfunded)
4.	New Jersey	$188.2	(60% underfunded)
5.	Texas	$166.4	(47% underfunded)

Figure 4: Five States with the largest unfunded pension liabilities

II. Risk Disconnect

In our static 60/40 portfolio, as mentioned earlier, we assumed an allocation of 40% to the Barclay's US Aggregate Bond Index. In addition to US Treasuries, the index also includes allocations to high grade mortgages and corporate bonds, and as such bears some modest credit risk. By its very nature credit risk is correlated to equities, and the obvious question is whether eliminating this credit risk will have any implications for the risk and return of the 60/40 portfolio. It can be seen from Table 2 that by substituting the Barclay's US Aggregate Bond Index allocation with a 100% allocation to US Treasuries does not fundamentally change the risk or return characteristics of the 60/40 portfolio.

	60% S&P 500 + 40% Barclays US Agg	60% S&P 500 + 40% US Treasuries
Annualized Returns	8.2%	8.2%
Annualized Volatility	9.4%	9.1%
Risk Contribution from US Equities	0.96	0.97
Correlation to US Equities	0.99	0.98

Table 2: Return and risk from 1990 through 2012

This result is not surprising given the pair wise correlations among different asset classes as shown in Table 3, specifically the negative correlation between equities and investment grade corporate bonds for the period from 1990 through 2012. In fact, US Treasuries and Investment Grade Bonds are the only asset classes showing negative correlations to equities.

It is well recognized that the correlations between asset classes are not static but change significantly during periods of market stress. Table 4 shows the pair-wise correlations between these same asset classes during the financial crisis of 2007-2008. By comparing Table 4 with Table 3 it is clear that the correlations between Equities (regardless of market capitalization) and High Yield bonds are higher during periods of market stress. Consequently, a portfolio with a heavy allocation to both equities and high yield becomes riskier during a crisis than anticipated by

the correlations in Table 3. US Treasuries and Investment Grade Bonds, continue to exhibit the desired negative correlation to equities even in market stress periods. However, as discussed earlier, in the current near-zero interest rate environments, these two asset classes alone will be unable to provide adequate returns to compensate for a negative return on equities.

	US Large Cap Stocks	US Mid Cap Stocks	US Small Cap Stocks	US Treasury	US IG Corp Bonds	US HY Corp Bonds	Global Stocks ex-US
US Large Cap Stocks	1.00						
US Mid Cap Stocks	0.81	1.00					
US Small Cap Stocks	0.88	0.98	1.00				
US Treasury	-0.11	-0.22	-0.40	1.00			
US IG Bonds	-0.21	-0.20	-0.19	-0.23	1.00		
US HY Bonds	0.61	0.63	0.68	-0.09	-0.51	1.00	
Global Stocks ex-US	0.90	0.83	0.82	-0.33	-0.25	0.72	1.00

Table 3: Asset class correlation since 1990

	US Large Cap Stocks	US Mid Cap Stocks	US Small Cap Stocks	US Treasury	US IG Corp Bonds	US HY Corp Bonds	Global Stocks ex-US
US Large Cap Stocks	1.00						
US Mid Cap Stocks	0.93	1.00					
US Small Cap Stocks	0.94	0.99	1.00				
US Treasury	-0.47	-0.50	-0.51	1.00			
US IG Corp Bonds	-0.64	-0.69	-0.70	-0.07	1.00		
US HY Corp Bonds	0.88	0.90	0.90	-0.29	-0.81	1.00	
Global Stocks ex-US	0.89	0.81	0.81	-0.34	-0.64	0.86	1.00

Table 4: Asset Class correlation during 2007-2008

III. The 60/40 allocation going forward

Given that a 60/40 allocation has not met return targets over a number of years, nor helped mitigate risk during market stress, investors continue to seek investment approaches that are intrinsically better. The industry has addressed the inadequacy of 60/40 allocation by resorting to other portfolio construction approaches such as Risk Parity, Minimum Variance, and Maximum Diversification to meet desired return targets without compromising on risk.

A slightly different approach for investors is to be opportunistic and allocate to new strategies or even asset classes that offer better returns for lower risk than the portfolio of equities and bonds. Examples of this approach include allocations to private equity, real assets and even hedge funds. This is the approach we wish to develop further in this paper.

IV. The Using a 60/40 target allocation as a reference portfolio

In this approach, investors are opportunistic and use the 60/40 portfolio as a benchmark against which they evaluate all other investments in terms of risks and returns. Only investments that exceed the risk adjusted returns of the 60/40 portfolio are considered for inclusion in the portfolio. For example, an investment opportunity expected to generate returns exceeding that of a 60/40 portfolio by say 200 basis points, but with the same risk characteristics as that of the 60/40 portfolio will be considered for inclusion in the portfolio. If it does get included in the portfolio, then 60/40 of its funding could be from equity investments and the balance 40% from the fixed income investments. This ensures that the overall risk profile of the portfolio remains unchanged, even as its expected return is higher. An investment considered for inclusion, but with a higher risk than the 60/40 portfolio will have more than 60% of its funding from equity investments, while investments with lower risk than the 60/40 portfolio will similarly have less than 60% of its funding from equity investments.

A slight deviation from this approach is to have a large fraction of the portfolio invested in the 60/40 benchmark, and the remaining fraction in opportunistic investments. For example, 75% of the total assets of a portfolio could be invested with 45% in equities and 30% in fixed income (60/40 ratio). The remaining 25% of the portfolio assets could be invested opportunistically with no specific constraint on risk.

By way of illustration consider an investor who allocates 75% of portfolio assets to the 60/40 strategy benchmark, and the remaining 25% of portfolio assets to one of three alternative indices based on the best Sharpe ratio over the previous 12 months. The three alternative indices considered are:

- Hedge Fund Event-Driven Index
- Hedge Fund Macro Systematic Index
- 60/40 Strategy Benchmark

Figure 5 illustrates the result of this investment strategy as well as the results of a second illustrative strategy which allocates 60% of portfolio assets to the 60/40 strategy benchmark, and 25% and 15% of the portfolio to the strategies with the best and second best Sharpe ratio over the previous 12 months. It is quite possible that the entire portfolio may be allocated to the strategy benchmark if that has the best Sharpe ratio over the previous 12 months. In the illustrative example, the portfolio is allocated 100% to the strategy benchmark, 23% of the time.

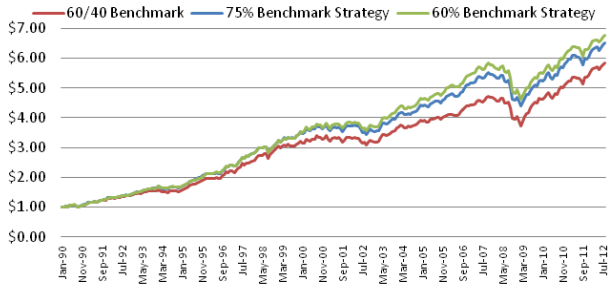


Figure 5: Historical performance for two simple strategies

In the illustrative example we used historical returns as the basis for our allocation decisions. Ideally, we should use expected returns as the basis for the decision.

V. Why allocate to Hedge Funds?

The previous section presents an approach that blends an opportunistic investment style to what remains, a static allocation framework. Hedge funds offer one opportunistic

investment alternative that should be considered for inclusion in a 60/40 allocation.

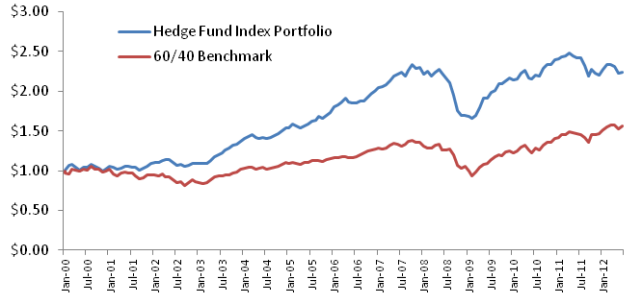
Table 5 provides the correlations of five different hedge fund strategies to equities and bonds. The most interesting take away from this table is that the correlations of the different hedge fund strategies to equities and bonds are quite different from one another.

	US Large Cap Stocks	US Mid Cap Stocks	US Small Cap Stocks	US Treasuries	US IG Bonds	US HY Bonds	Global Stocks ex-US	HFRI Equity Hedge	HFRI Event Driven	HFRI EM	HFRI Macro
HFRI Equity Hedge	0.77	0.88	0.85	-0.31	-0.21	0.68	0.93	1.00			
HFRI Event Driven	0.74	0.83	0.81	-0.34	-0.30	0.77	0.83	0.91	1.00		
HFRI EM	0.73	0.79	0.72	-0.25	-0.28	0.70	0.89	0.91	0.87	1.00	
HFRI Macro	0.17	0.26	0.29	0.10	0.00	0.16	0.37	0.49	0.42	0.49	1.00
HFRI Relative Value	0.58	0.65	0.55	-0.25	-0.44	0.78	0.72	0.75	0.81	0.75	0.23

Table 5: Hedge fund correlations (2000-2012)

Some hedge fund strategies such as macro and relative value strategies have higher correlations to fixed income than they do to equities while other hedge fund strategies such as equity hedged, event driven or emerging markets have much higher correlations to equities than they do to fixed income.

To analyze the merits of including hedge funds in a 60/40 portfolio, we use HFRI Indices to represent the five hedge fund strategies discussed in Table 5, to construct a portfolio with the same risk as 60/40 portfolio. The allocations to the different HFRI indices are adjusted so that the overall hedge fund sub portfolio has the same beta as that of 60/40 portfolio. Figure 6 shows the performance and risk characteristics of the hedge fund portfolio – the returns obtained are substantially improved over the 60/40 Benchmark with lower volatility and realized maximum drawdown.



	60/40 Benchmark	Hedge Fund Index Portfolio
Annualized Returns	3.8%	6.8%
Annualized Volatility	10.0%	8.5%
Maximum Drawdown	32.5%	29.2%

Figure 6: Performance and risk measure since 2000 for an illustrative hedge fund index portfolio

VI. Importance of Manager Selection to Hedge Fund Portfolios

While the above analysis suggested that an allocation to hedge funds indices increases the risk-adjusted return of the overall portfolio, we believe that a well constructed portfolio of actual hedge funds can do even better. Specifically, our research suggests that the alpha generated by hedge funds is correlated to their beta exposure. The alpha generated by hedge funds with high or low beta exposures tends to, on average, be higher than the average alpha generated by the hedge fund universe (Figure 7). This research finding suggests using a barbell approach to hedge fund portfolio construction i.e., using a mix of low and high beta managers and sizing them appropriately to obtain the required beta exposure.

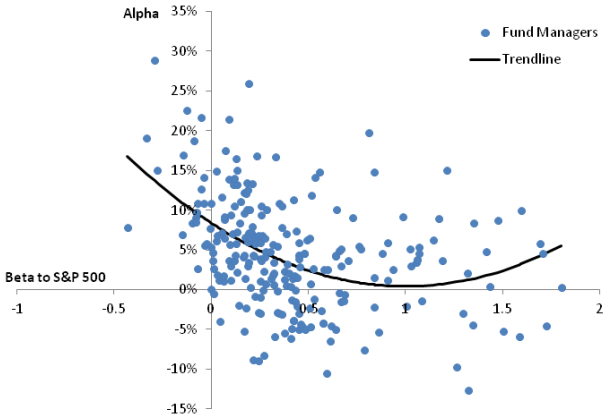


Figure 7: Alpha generated by managers with varying S&P 500 betas

To illustrate the barbell approach and its efficacy, we created a diversified hedge fund portfolio of 15 managers, 8 of which are high beta managers (in Equity Hedged, and Event Credit strategies) and the remaining 7 are low beta managers (in Global Macro, Absolute Return, CTA strategies). The rolling 3-year beta to S&P 500 Index of this illustrative portfolio varied between 0.45 and 0.60 over the past 5 years, a range consistent with the beta of a 60/40 static portfolio.

Figure 8 compares the 3-year rolling annualized volatility of the hedge fund portfolio with that of the 60/40 strategy benchmark. The first interesting observation is that the volatility range of the hedge fund portfolio is significantly lower than that of the 60/40 strategy benchmark. An equally interesting observation is that the hedge fund portfolio protects capital much better during times of market stress (2007-2008) and does so without sacrificing much of the upside during normal market conditions (Figure 9). The drawdown of the hedge fund portfolio over this period was 17.4%, which was significantly lower than that of the 60/40 portfolio which had a drawdown of to 32.5% over the same period.

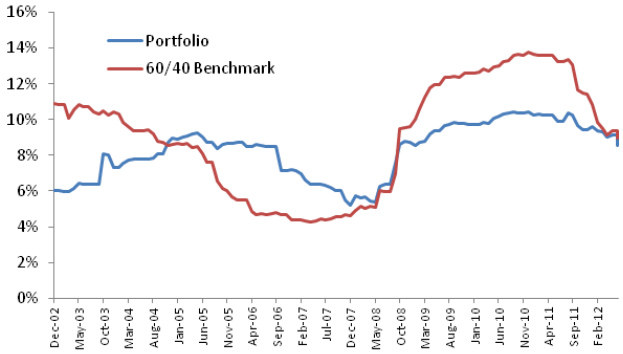


Figure 8: Annualized 3 year rolling standard deviation

Figure 9 compares the historical performance of the hedge fund portfolio with that of the strategy benchmark and the Hedge Fund Index portfolio from Figure 6 for the period 2000 to 2012 in the top pane, and for the period 2007 to 2012 in the bottom pane.

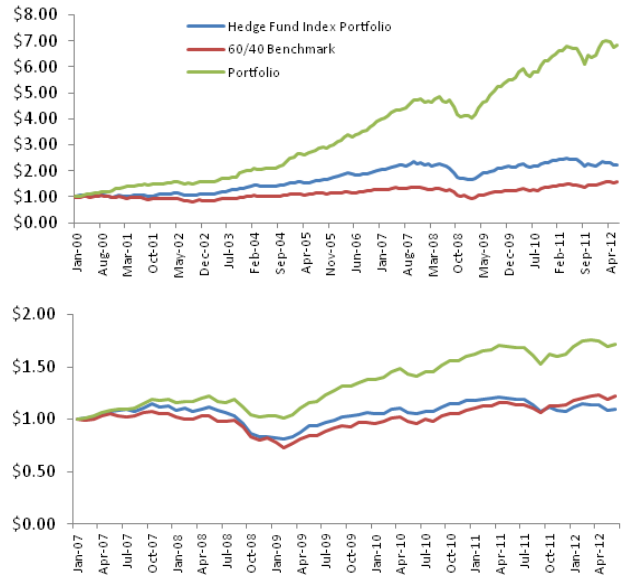


Figure 9: Performance since 2000 (top) and since 2007 (bottom)

It is worth noting that, even though the hedge fund portfolio has a slightly lower beta to S&P 500 Index than the 60/40 portfolio, it has performed well both over shorter and longer term time horizons. In fact, as shown in Figure 10, the performance of the hedge fund portfolio has more than kept pace with the strategy benchmark in a strong equity bull market since 2009.

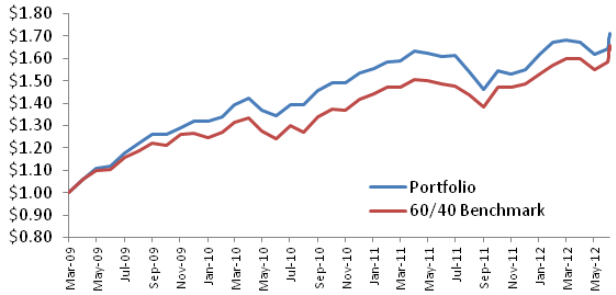


Figure 10: Performance since March 2009

VII. Conclusions

Alternatives and hedge funds in particular, offer an attractive complement to the traditional 60/40 asset allocation framework used by many pension plans. The analysis in this paper has shown that a carefully constructed hedge fund portfolio can outperform the 60/40 strategy benchmark over time, even as it protects the portfolio against capital drawdown. The key, we believe, is making sure that the hedge fund portfolio has a 60/40 allocation as its benchmark and outperforms it in a consistent manner. It should not be surprising, that this approach is becoming increasingly more common among the more sophisticated pension plans.