

## Defined Benefit Plans and Hedge Funds: Enhancing Returns and Managing Volatility

*This quarterly edition of Prime Brokerage Perspectives examines the risk-return characteristics of hedge funds with a view to the investment needs of defined benefit pension plans and concludes that hedge funds can be well-suited to the investment profiles and funding requirements of such allocators.*

### Introduction

Once the province mostly of ultra high net worth individuals and family offices, hedge fund investors have become increasingly institutional over the last decade, largely as a result of the influx of institutional investors such as endowments, foundations, pensions and sovereign wealth funds. In years past, hedge fund investors were concerned primarily with alpha generation and achieving outsized returns. Today's highly institutionalized hedge fund investor base, comprised increasingly of pension funds, is focused largely on capital preservation, managing volatility and minimizing correlation to broader market indices.

To a substantial degree, such concerns are a function of pension plans' investment profiles as well as the acute asset-liability issues they face. Defined benefit ("DB") plans tend to have lengthier investment horizons based largely on their obligations to future retirees. Pension plans fund those obligations through several sources, the most significant of which is the returns generated through their investment portfolios. Because pensions' funding obligations are long term and tend to increase over time, it is important for them to avoid significant drawdowns. Accordingly, DB plans have considerably less tolerance for volatility than traditional hedge fund investors such as family offices and ultra high net worth individuals.

This *Perspectives* piece is intended primarily, albeit not exclusively, for pension plans that are considering or re-evaluating hedge fund allocations. The purpose of this report is twofold: (1) provide DB plan allocators with an explanation as to why hedge funds may be well suited to their investment profiles and objectives over the long term; and (2) explain how beta-sensitive pensions can use hedge funds to manage volatility over the market cycle. Specifically, this report shows that:

- *Hedge funds historically have provided superior risk-adjusted returns over the long term relative to conventional asset classes despite their recent underperformance to traditional risk assets such as equities;*

- *Hedge funds offer lower volatility than long-only managers and may provide greater downside protection during times of market stress;*
- *By adding hedge funds to their portfolios, pensions may be able to meaningfully reduce portfolio volatility over time<sup>1</sup> and increase their Sharpe ratios across the market cycle. Hedge funds can also help pension plans mitigate steep drawdowns and, therefore, interruptions to the rate at which their portfolios compound.*

We conclude that, because hedge funds can help pension plans control downside portfolio risk and, potentially, meet long-term return targets, they should be considered as a core component in pensions' investment portfolios.

### The Institutionalization of Hedge Fund Investors

#### A Changing Investor Base

Over the last decade, there has been a structural shift in the composition of the hedge fund investor base. Originally, hedge fund allocators were primarily ultra high net worth individuals and family offices. Such investors were attracted to hedge funds by the prospect of outsized returns. Over time, institutional investors grew as a share of the hedge fund investor base while the share comprised of ultra high net worth individuals and family offices gradually declined. The first hedge fund inflows from institutional investors came mostly from endowments and foundations that adopted the "endowment model" popularized by David Swenson of Yale University. Swenson propounded the benefits of adding diversified alpha streams in less liquid investments to institutional portfolios rather than limiting allocations to long-only strategies and passive beta investments. For "early adopter" institutional investors, hedge funds offered attractive diversification benefits because, unlike long-only strategies, they are not limited to weighting positions around a benchmark.

Starting around 2003, institutional investors, including public and corporate pension plans, began scaling up their allocations to hedge funds. Institutional investors comprised an estimated 25% of hedge fund allocations in 2003; that number increased to 43% in 2007<sup>2</sup> and, by 2012, 85% of the hedge fund investor base consisted of institutional investors.<sup>3</sup> During the same

<sup>1</sup> To capture longer-term trends, this report refers to the sixteen years from 1997 through 2012.

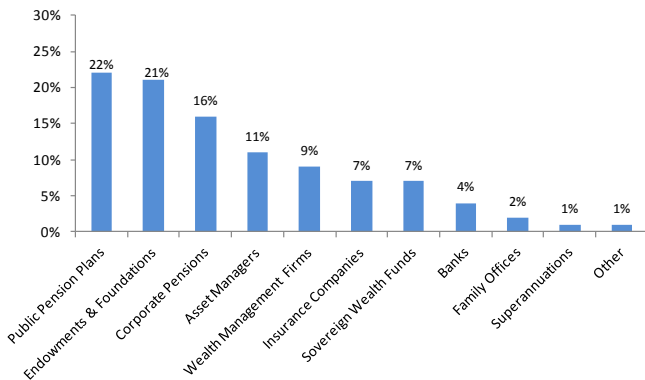
<sup>2</sup> See J.P. Morgan Asset Management, *Evaluating Hedge Funds in a Low-Growth and Low-Yield Environment*, February 2013, at 3.

<sup>3</sup> Preqin

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period, the share of institutional hedge fund allocations from public and corporate pension plans also increased. By the end of 2012, pensions accounted for 38% of all capital invested in hedge funds among institutional allocators.

**Figure 1: Investor capital allocated to hedge funds (2012)**



Source: Preqin

### Pension Plan Catalysts

Institutional investors tend to seek diversification, bond-like volatility and low correlation with other portfolio assets. Institutional investors are highly focused on capital preservation since they rely on investment income to meet funding obligations. That is especially so for pension plans, which looked to hedge funds for diversified alpha streams and reduced volatility. For example, since 1982, state and municipal pensions have accrued an estimated \$4.8 trillion in revenue, \$2.9 trillion or 61% of which is estimated to have come from investment earnings.<sup>4</sup> (Employer, or taxpayer, contributions account for \$1.3 trillion, or 26%, of the total, while employee contributions account for \$623 billion or 13%.)<sup>5</sup>

Because investment earnings account for the majority of pensions' revenues, any shortfall in those earnings must be made up through higher member contributions or a reduction in benefits. For example, leading into and during the financial crisis, from June to December 2008, public pensions with assets of \$500 million or more lost an estimated \$621 billion, or 22%, of the market value of their assets.<sup>6</sup> As a result, such plans experienced a pronounced decline in their funding ratios, i.e., the difference between the assets they hold and the benefit obligations owed to current and future retirees. Consequently, since 2008, many pensions have reduced their return assumptions from around 8.0% to 7.77%.<sup>7</sup> In June 2012, for example, CalPERS lowered the expected rate of return on its portfolio from 7.75% to 7.50%.

<sup>4</sup> U.S. Census Bureau.

<sup>5</sup> NASRA Issue Brief: *Public Pension Plan Investment Return Assumptions*, March 18, 2013, at 1-2.

<sup>6</sup> ING Retirement Research Institute, *Public Pension Plans in Focus*, 2011.

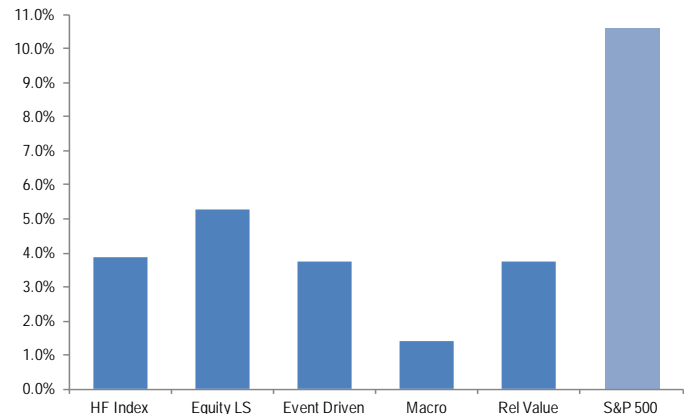
<sup>7</sup> NASRA Issue Brief, at 3.

Funding ratios among corporate plans also were reduced as a result of the financial crisis. Partly as a result, most corporate pension plans are less than 80% funded today. DB plans must therefore seek out investments that can help them meet return targets while mitigating excessive downside risk.

### Long-Term Performance and Returns

In recent times, hedge funds have come under criticism because of their underperformance relative to the broader equity markets. In the first quarter of 2013, the major hedge fund strategies – equity hedge, relative value, event driven and global macro – lagged the S&P 500 Index by an average of 7% (See Figure 2). In the aggregate, hedge funds trailed the S&P 500 Index by 6.74% during the quarter.<sup>8</sup>

**Figure 2: S&P 500 Index vs. hedge fund performance, first quarter 2013**



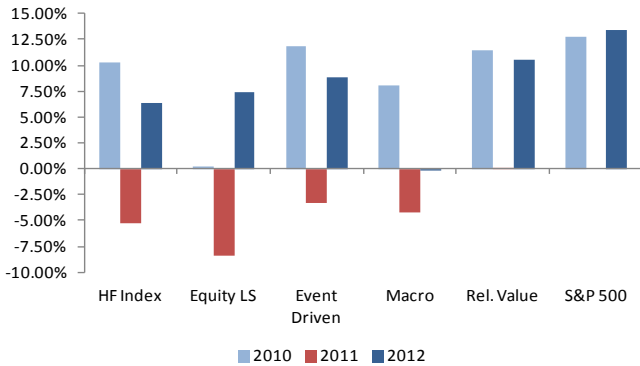
Source: Hedge Fund Research, Bloomberg

That pattern was not limited to the first quarter of 2013. The HFRI Fund Weighted Composite Index, an equal-weighted index of single-manager funds across strategies, underperformed the S&P 500 Index by nearly 5% annually from 2010 through 2012 (See Figure 3). This pattern reflects the run-up in equity markets as they rebounded from their post-crisis lows, receding tail risk as the sovereign crisis in Europe eased and gradual improvements in economic data.

<sup>8</sup> As measured according to the HFRI Fund Weighted Composite Index.

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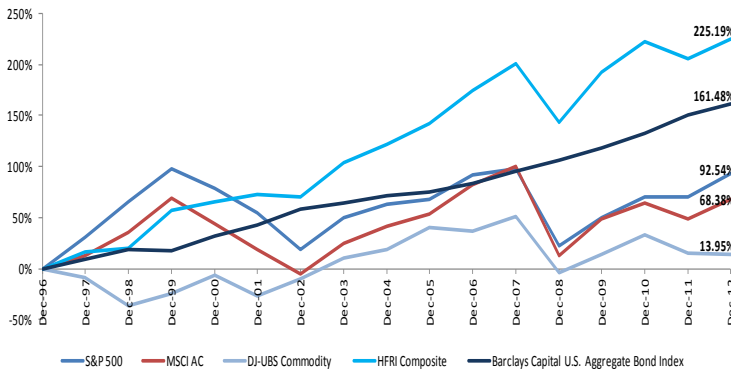
**Figure 3: Equities vs. hedge fund performance, 2010-2012**



Source: Hedge Fund Research, Bloomberg

Over a longer period, however, a different picture emerges. During the sixteen years from 1997 through 2012, hedge funds delivered superior cumulative returns to domestic and international equities, commodities and fixed income by substantial margins (See Figure 4).

**Figure 4: Cumulative hedge fund and other risk asset returns, 1997-2012**



Source: Hedge Fund Research, Bloomberg

During that same sixteen-year period, each of the major hedge fund strategy indices<sup>9</sup> delivered higher annualized returns than the S&P 500 (See Table 1). In fact, over that time, hedge funds delivered superior annualized returns in comparison to conventional asset classes, including equities (See Table 2).

**Table 1: Annualized hedge fund strategy returns vs. S&P 500 Index, 1997-2012**

	Equity Hedge	Event Driven	Relative Value	Global Macro	S&P 500
<b>Annualized Returns</b>	9.80%	9.51%	8.36%	7.75%	6.08%
<b>Cumulative Returns</b>	279.10%	284.58%	240.77%	220.81%	92.54%

Source: Hedge Fund Research, Bloomberg

<sup>9</sup> HFRI Equity Hedge Index, HFRI Event Driven Index, HFRI Relative Value index and HFRI Macro (Total) Index.

**Table 2: Annualized hedge fund returns vs. other risk assets, 1997-2012**

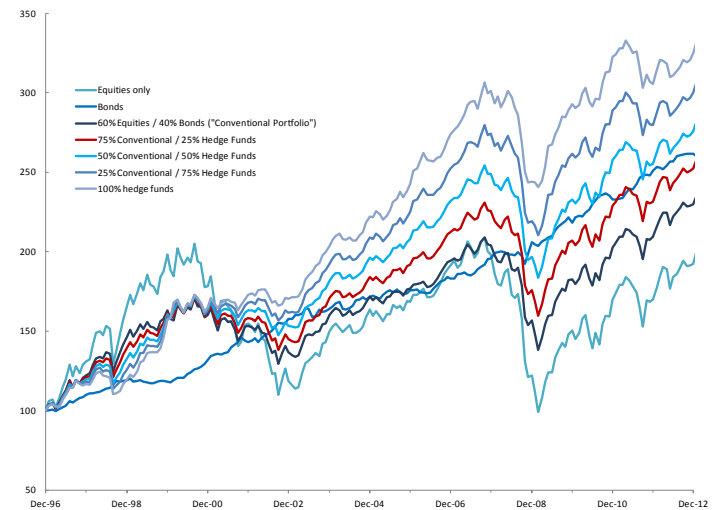
	Hedge Funds	Bonds	S&P 500	MSCI AC	Commodities
<b>Annualized Returns</b>	8.24%	6.24%	6.08%	5.60%	2.88%
<b>Cumulative Returns</b>	225.19%	161.48%	93%	68.38%	13.95%

Source: Hedge Fund Research, Bloomberg

### Increasing Returns with Hedge Fund Allocations

Accordingly, adding a hedge fund allocation to a hypothetical portfolio consisting of 60% equities and 40% bonds would have meaningfully increased returns during those sixteen years (See Figure 5). A 25% hedge fund allocation would have increased the portfolio's annualized returns by 0.53%; adding a 50% allocation to the portfolio would have increased its annualized returns by 1.08%; and reducing the 60%/40% equities/bonds allocation to 25% of the portfolio while increasing the hedge fund allocation to 75% would have increased the portfolio's annual returns by 1.64%. A portfolio comprised solely of hedge funds would have higher annualized returns of 2.21%.

**Figure 5: Hedge fund and traditional asset allocation performance, 1997 – 2012**



Source: Hedge Fund Research, Bloomberg

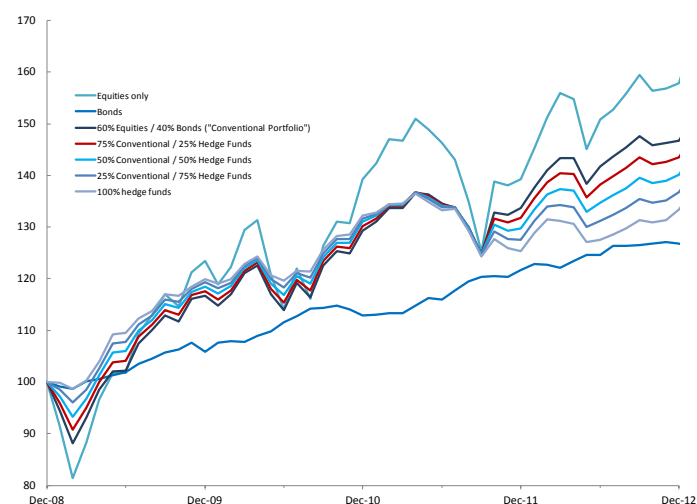
While hedge funds have delivered superior returns relative to equities over the long term, many pension plans understandably are focused primarily on hedge fund performance in the years subsequent to the financial crisis, believing the industry has changed fundamentally as a result of stricter oversight, more regulation and increased conservatism among managers. Accordingly, the remainder of this analysis centers largely on the post-crisis period.

During that time, from 2009 through 2012, introducing a hedge fund allocation to the hypothetical portfolio comprised 60% of equities and 40% of bonds would not have been additive. Adding a 25% hedge fund allocation to the portfolio

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would have reduced its annualized returns by -0.24%; adding a 50% allocation to the portfolio would have decreased its annual returns by -0.48%; and reducing the 60%/40% equities/bonds allocation to 25% of the portfolio while increasing the hedge fund allocation to 75% would have reduced the portfolio's annual returns by -0.72%. These results are partly the consequence of equities having rallied from their post-crisis nadir along with current central bank easing, which has pushed investors into riskier assets such as equities as they search for yield.

**Figure 6: Hedge fund and traditional asset allocation performance, 2009 – 2012**



Source: Hedge Fund Research, Bloomberg

As the following discussion shows, however, hedge funds still delivered superior risk-adjusted returns over the same time period with higher Sharpe ratios, lower volatility and, therefore, steadier rates of compounding.

It should be noted, also, that over time hedge funds are able to avoid sharp drawdowns because, unlike conventional asset classes, and equities in particular, they have an asymmetric return profile; this means they capture upside in rising markets, albeit to a lesser extent than equities, but they have smaller losses than equities during market declines (See Table 3). That pattern was true for every strategy listed in Table 3 as well as the HFRI Composite. Indeed, this is a common theme across different hedge fund strategies. Hence, from 2009 through 2012, using the HFRI Composite as a proxy, equities outperformed hedge funds by 2.3% on average when the market was up but were down by an average of -3.2% in excess of hedge funds when the market declined. Stated differently, hedge funds captured 41% of the upside during months when equity markets showed positive returns but only 29% of downside during months when equity markets produced negative returns.

The asymmetric returns of hedge funds allow for steady compounding over time because they require fewer rebounds in the wake of losses during market declines.

**Table 3: Hedge funds' asymmetric return profile in comparison to equities, 2009 – 2012<sup>10</sup>**

Strategies	Market Up		Market Down	
	Avg Ret%	Avg Ret%	% Captured	% Captured
HFRI Composite	1.6%	-1.3%	41%	29%
Equity Hedge	2.1%	-2.1%	54%	48%
Event Driven	1.8%	-1.0%	46%	23%
Macro	0.6%	-0.6%	14%	13%
Relative Value	1.4%	0.0%	36%	0%
Short Bias	-3.4%	2.9%	-88%	-64%
Sys Diversified	0.3%	-0.4%	8%	10%
Distressed	1.7%	-0.7%	45%	15%
Merger Arbitrage	0.7%	-0.2%	19%	4%
Convertible Arbitrage	2.2%	-0.4%	58%	10%
Equity Neutral	0.5%	-0.6%	12%	14%
<b>S&amp;P</b>	<b>3.8%</b>	<b>-4.5%</b>	<b>32%</b>	<b>15%</b>

Source: Hedge Fund Research, Bloomberg

### Volatility

Because pensions depend on investment income to meet funding obligations, they strive to avoid significant drawdowns, which reduce the rate at which capital compounds and require substantial time from which to recover. As a case in point, the S&P 500 Index declined by -38% from September 2008 to March 2009 and did not return to its pre-crisis levels until the first quarter of 2012.

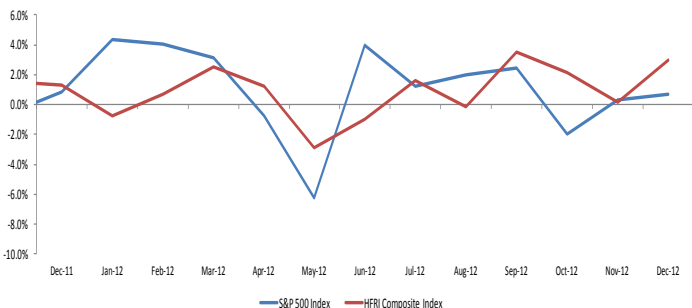
Historic data show that hedge funds offer investors lower volatility than long-only managers<sup>11</sup> at different points in the market cycle and provide greater downside protection during times of stress. In 2012, for instance, hedge funds underperformed equities but, as Figure 7 shows, they were considerably less volatile. The S&P 500 Index had 11% volatility in 2012 as measured by the standard deviation, whereas hedge fund volatility was only 5%. Moreover, while the S&P 500 experienced a maximum month-to-month drawdown of -6.3% in 2012, hedge funds recorded a maximum month-to-month drawdown of only -2.6%.

<sup>10</sup> It should be noted that the capture ratio averages shown in Table 3 do not include short bias or the HFRI Composite.

<sup>11</sup> We use the S&P 500 as a proxy for long-only equity strategies.

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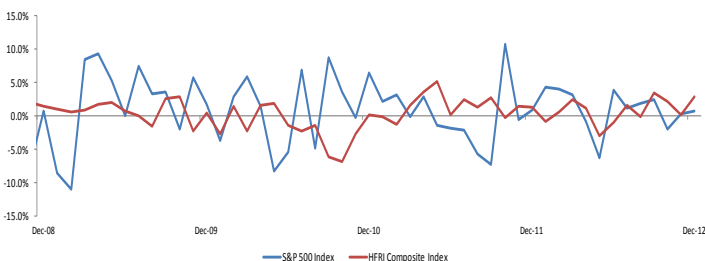
**Figure 7: S&P 500 and HFRI Composite rolling returns, 2012**



Source: Hedge Fund Research, Bloomberg

A similar pattern holds true during the years since the financial crisis. From 2009 through 2012, hedge funds delivered consistently less volatility than equities and provided greater downside protection to mitigate losses. As Figure 8 illustrates, hedge fund volatility was materially lower than equity volatility during the period in question. While the annual volatility of hedge funds was 7.05%, the annual volatility of the S&P 500 (17.12%) was more than double. Further, during that time, hedge funds had a maximum month-to-month drawdown of -3.9% as compared with -11.0% for the S&P 500.

**Figure 8: S&P 500 and HFRI Composite rolling returns, 2009-2012**

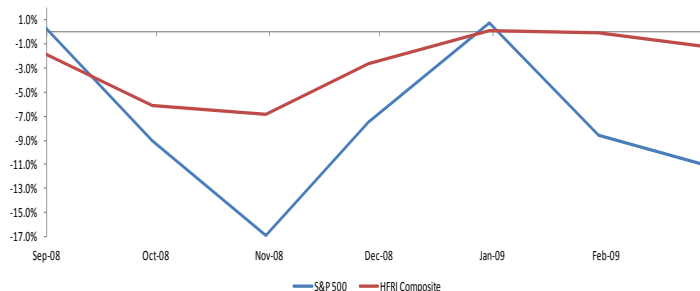


Source: Hedge Fund Research, Bloomberg

Historic data suggests that hedge funds also provide investors with greater downside protection during acute periods of market stress. For instance, from September 2008 through February 2009, the period surrounding the collapse of Lehman Brothers, the S&P 500 Index had a maximum month-to-month drawdown of -16.9%. Hedge funds, by contrast, had a maximum month-to-month drawdown of -6.8% (See Figure 9). The S&P 500's cumulative loss over those six months was therefore -42.7% in contrast to only -7.3% for hedge funds.

Moreover, throughout that period, during which the VIX monthly average was 43.77, the monthly volatility of the S&P 500 was 19.19% whereas hedge funds had month-over-month volatility of only 9.21%.

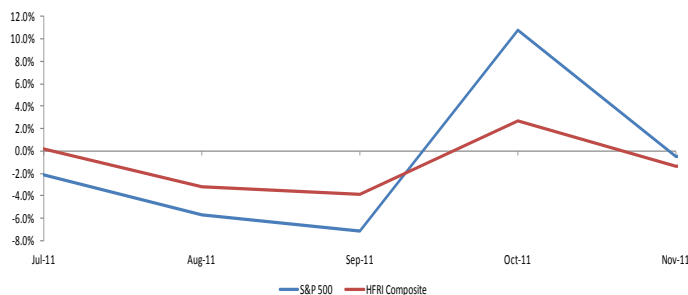
**Figure 9: S&P 500 and HFRI Composite rolling returns, September 2008 – February 2009 (Lehman Bros. crisis)**



Source: Hedge Fund Research, Bloomberg

Similarly, from July through October of 2011, amidst the U.S. downgrade and the EU debt crisis, the S&P 500 and the HFRI Fund Weighted Composite had maximum month-to-month drawdowns of -7.18% and -3.89%, respectively (See Figure 10). Consequently, the S&P 500 had a higher four-month loss (-7.30%) than that the HFRI Fund Weighted Composite (-6.67%). Hedge fund volatility (5.79%) was again materially lower than equity volatility (17.79%) throughout this period when the VIX monthly average was 27.08.

**Figure 10: S&P 500 and HFRI Composite rolling returns, July – October 2011 (U.S. downgrade and EU debt crisis)**



Source: Hedge Fund Research, Bloomberg

### Managing Volatility with Hedge Fund Allocations

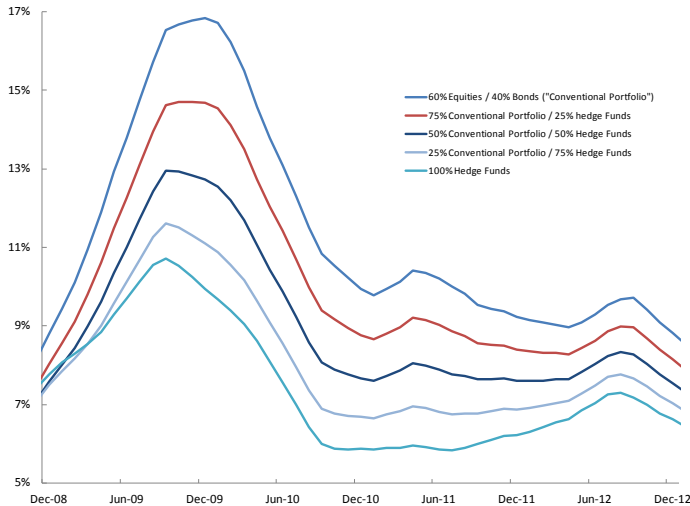
Because hedge funds provide stable returns on a relative basis, investors can use hedge fund allocations to reduce the volatility of their overall portfolios. As Figure 11 demonstrates, adding hedge funds to a hypothetical equity portfolio would have meaningfully reduced its volatility during the period from 2009 through 2012. More specifically, as shown in Figure 12, adding a 25% hedge fund allocation to a hypothetical 60%/40% equities/bonds portfolio would have reduced its month-over-month volatility by -1.11%; reducing the 60%/40% portion to 50% while raising the hedge fund allocation to 50% would have decreased volatility by -2.06%; reducing the 60%/40% allocation to 25% while raising the hedge fund allocation to 75% would have decreased monthly volatility by -2.81%; and a portfolio comprised solely of hedge funds would have had -3.29% less volatility.



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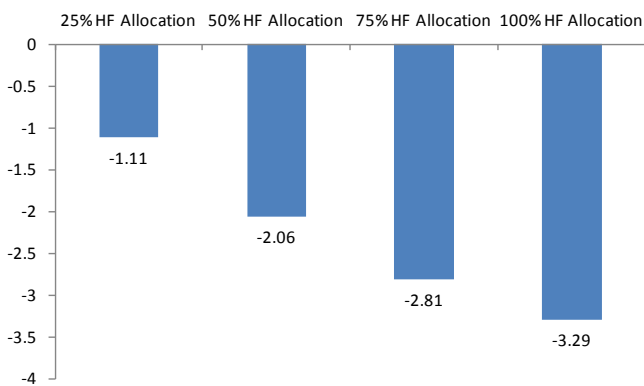
Furthermore, as Figure 11 illustrates, hedge funds are of most use in helping to reduce portfolio volatility during periods of pronounced market volatility and stress.

**Figure 11: Portfolio composition and volatility**



Source: Hedge Fund Research, Bloomberg

**Figure 12: Reduction in volatility with addition of hedge funds to portfolio, 2009 – 2012**



Source: Hedge Fund Research, Bloomberg

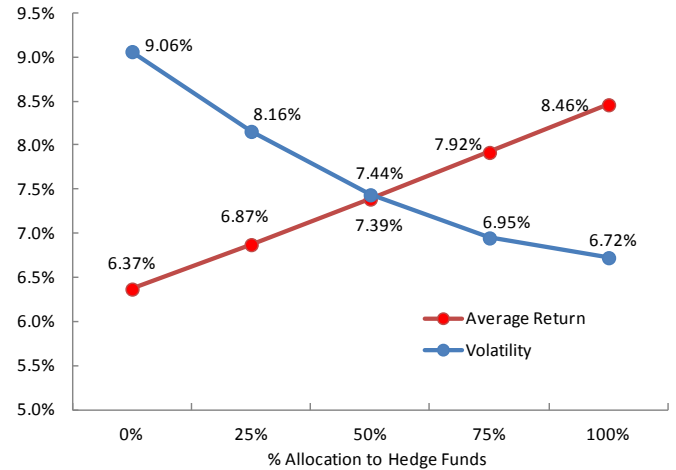
Over time, lower volatility along with downside protection may allow for fewer, and less pronounced, interruptions to the rate at which a portfolio compounds. Fewer interruptions may enable pensions to adjust their return assumptions with less frequency and, potentially, by lower amounts. In sum, hedge funds can help pensions to achieve “steadier state” investing.

### Risk-Return

With stable returns and low volatility, hedge funds have produced an attractive risk-return profile over time. As Figure 13 illustrates, introducing a hedge fund allocation to a hypothetical portfolio consisting initially of 60%/40% equities

and bonds not only curtails volatility but also adds incrementally to returns.

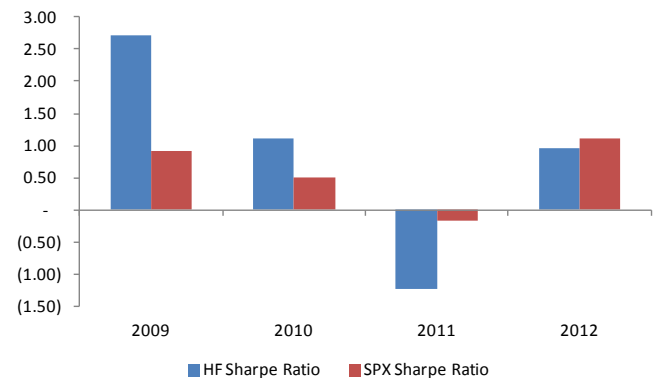
**Figure 13: Risk-return profile of conventional portfolio with addition of hedge funds**



Source: Hedge Fund Research, Bloomberg

Given their risk-return profile, hedge funds have yielded superior overall Sharpe ratios to equities in the years subsequent to the financial crisis, from 2009 through 2012 (See Figure 14). Over that period, hedge funds had higher Sharpe ratios than equities in two of the four years while equities had superior Sharpe ratios during the other two years. During that time, though, hedge funds had an average Sharpe ratio of 0.89 compared with 0.58 for equities. Over a longer horizon, from 1997 through 2012, hedge funds delivered higher Sharpe ratios than equities 68.8% of the time. During that extended period, hedge funds had a Sharpe ratio of 0.9 versus 0.3 for equities.

**Figure 14: Sharpe ratios of hedge funds and equities, 2009 – 2012**

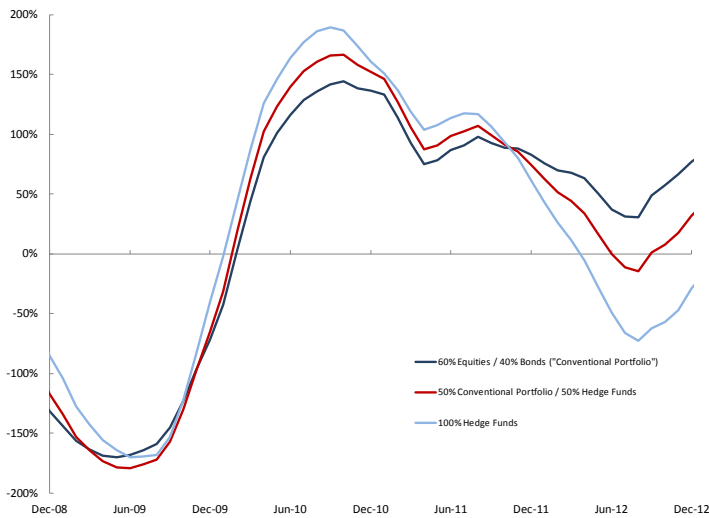


Source: Hedge Fund Research, Bloomberg

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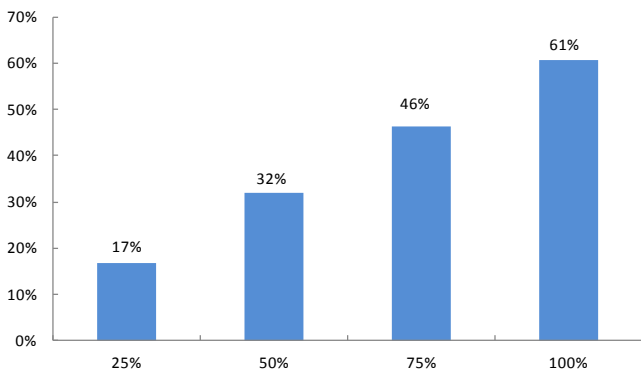
In the same way that investors can use hedge fund allocations to reduce portfolio volatility, they may also be able to use hedge funds to increase the risk-return profile of their portfolios. From 2009 through 2012, adding a 25% hedge fund allocation to the hypothetical portfolio would have yielded a 17% increase in its Sharpe ratio; a 50% hedge fund allocation would have resulted in a 32% improvement to the portfolio's Sharpe ratio; and increasing the hedge fund allocation to 75% of the portfolio would have resulted in a 46% Sharpe ratio increase (See Figures 15-17).

**Figure 15: Sharpe ratios and portfolio allocation (monthly rolling)**



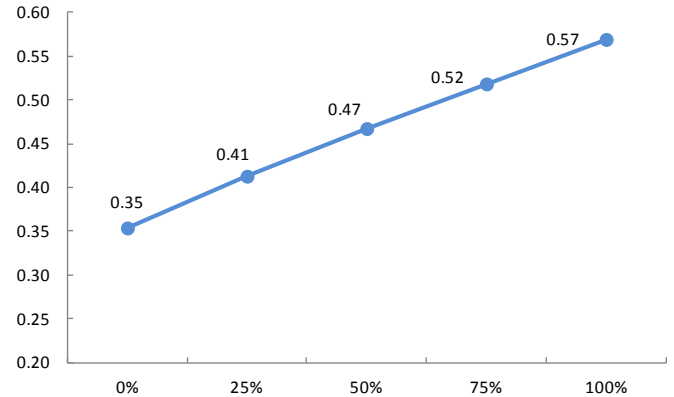
Source: Hedge Fund Research, Bloomberg

**Figure 16: Sharpe ratio percentage improvement, 2009 – 2012**



Source: Hedge Fund Research, Bloomberg

**Figure 17: Sharpe ratio improvement, 2009 – 2012**



Source: Hedge Fund Research, Bloomberg

### Conclusion

Institutional investors face the twin pressures of needing returns while avoiding significant volatility. Pension plans, more specifically, face acute and mounting asset-liability gaps. Pensions are therefore under pressure to target investments that can meet their targeted rates of return without taking undue risk. Hedge funds certainly offer no silver bullets but, as the preceding discussion highlights, they may be able to help pension plans enhance investment returns over the intermediate and long term. Additionally, by introducing a hedge fund allocation to their portfolios, DB plans may be able to reduce volatility and increase downside protection. Pensions that already invest in hedge funds can achieve the same result by increasing those allocations. Less volatility and smaller drawdowns will meaningfully boost the rate at which pensions' portfolios compound. Over time, hedge funds can enable pension plan investors to increase the risk-return profile of their portfolios. Steadier compounding will, in turn, better prepare pension plans to meet their funding obligations to current and future retirees.

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