Liquid alternatives - a tool for objectives-based portfolios

Neuberger Berman | 03 June 2015 |

Precisely at the time when advisers find that they must rely more heavily on investment portfolios to produce strong, consistent returns to fund the long, healthy retirements of their baby boomer clients, standard asset allocation models have begun to show cracks, as investors look for portfolios to deliver more certain outcomes with lower equity-induced volatility.

Most of the standard balanced funds used today look diversified, but are, in reality, dominated by equity risk, as highlighted later in this paper. It is becoming clear that standard asset allocation models don't provide the outcomes investors require. What is the way forward? Should we continue to use standard asset allocation models, in the expectation that equities will continue to drive future returns, believing that investors can live with such volatile outcomes? Or is the answer in new approaches that look to ratchet incremental returns from existing asset classes? Or is it a different approach to asset allocation?

This paper outlines a way forward, based on both academic research and the investment experience of some of the world's most successful endowment funds. Those funds' long-term performance has the characteristics many investors are currently seeking in their portfolios - long-term, consistent, superior returns with lower levels of risk.

PORTFOLIO CONSTRUCTION AT A CROSSROADS

Investment professionals - from large pension funds to financial advisers - are rethinking standard models of portfolio construction.

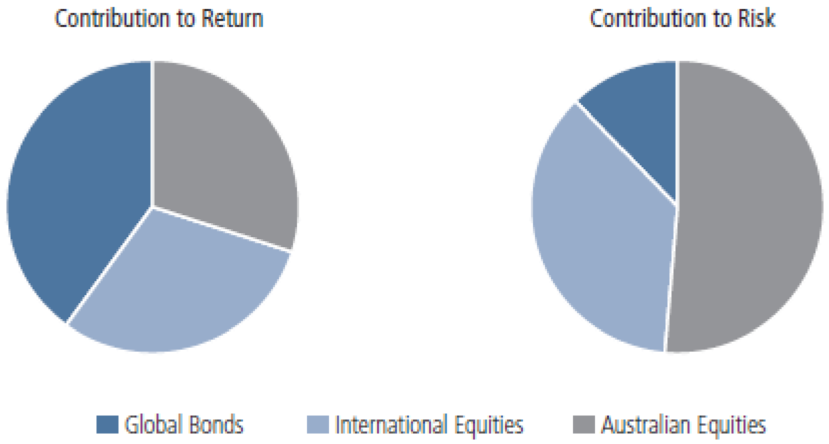
For decades, the standard risk/return relationship worked well in portfolios. There was the odd period where equity markets performed poorly, sometimes very poorly, for a few years (remember the three negative years of international equity returns in the early 2000s?). But, over the medium term, equities generally delivered on their promise of higher returns, with some shorter-term volatility. Fixed income also performed well over that extended period. The long-term bond rally based on falling inflation and interest rates added a good degree of stability and returns to portfolios. In short, standard asset allocation models worked. This made an adviser's job comparatively easy - the best to do for clients was to make sure they held as much in equities as their risk profile allowed. In times of turmoil, bonds cushioned falls.

More recently, though, the Global Financial Crisis (GFC) exposed a lot of shortcomings with the standard asset allocation models. Even those in seemingly "diversified" portfolios had portfolio values plunge, fairly much in line with equity markets. This isn't what many advisers or investors expected. Diversification didn't really do what it was supposed to.

The reality is that even if they don't look like it from an asset-weighting point of view, most "diversified" portfolios are overexposed to equity risk and returns.

Figure 1 below shows a stylised balanced fund with allocations of 30% to Australia equities, 30% to hedged international equities and 40% to global bonds. Performance was measured over the period May 2012 to November 2014. In this balanced fund, 60% of returns were sourced from equity markets, yet oer 85% of the total risk, or volatility, of the portfolio came from the equity allocation. This overexposure to equity risk drove churning portfolio values through the volatile GFC period.

Figure 1: Return and risk contribution
(May 2012 to November 2014)



Sources: Data from Neuberger Berman. For illustrative purposes only. Global Bonds is represented by the Barclays Global Aggregate AUD Hedged Index. International Equities is represented by the MSCI World AUD Hedged Index. Australian Equities is represented by the S&P/ASX 200 Index.

WHAT ARE CLIENTS LOOKING FOR NOW?

At precisely the time that the standard asset allocation models have begun to show cracks, clients' needs are changing such that their need for consistent, dependable returns is increasing – that is, they are looking for more certain outcomes. As the population ages and average longevity grows, many clients will need to fund very long and healthy retirements. After retirement, investors do not have the ability to replace lost capital, so ensuring portfolios produce stable returns, sufficient to fund long-term lifestyle needs, is paramount. This is most important in the years around retirement – say, the 10 years prior to retirement through to the 10 years after. Large losses during this time are particularly harmful as it is the time when investors are likely to have their largest investment portfolio and a diminishing ability to replace losses. That a portfolio is sensitive to when market losses occur is called sequencing risk - and it is a significant risk in retiree portfolios.[1]

Behavioural finance also tells us that investors feel losses much more deeply than gains[2]. This makes the idea that portfolios should produce consistent returns applicable to all investors, not just retirees. Loss aversion is so deeply ingrained that people will prefer consistent returns to experiencing better long-term returns with some losses.[2]

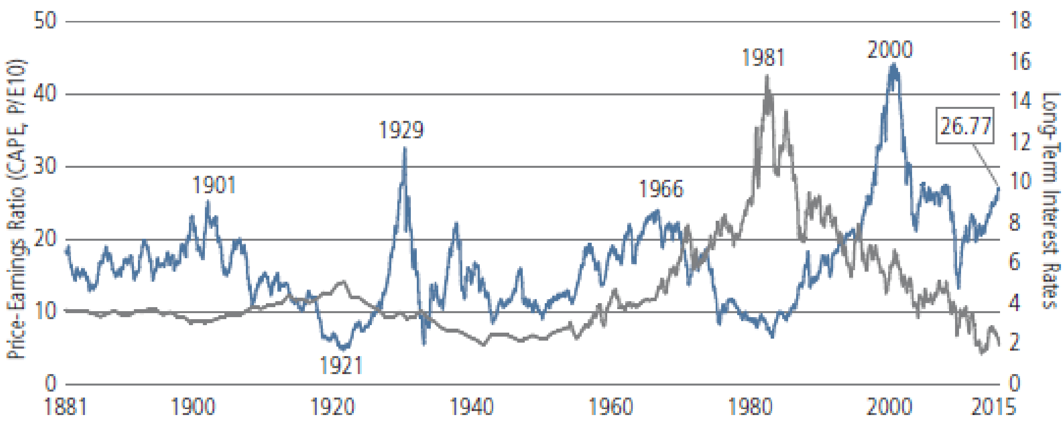
To cater for this, good-quality investment portfolios should have certain characteristics. In particular, losses and volatility of returns should be minimised.

WHAT'S THE OUTLOOK FOR MARKETS?

With portfolio returns, fairly much regardless of the risk profile of most "diversified funds," having been driven by equity market returns, while any periods of poor performance in those markets has been cushioned by bonds, what is the outlook for markets?

Although there are many views about the future of equity returns, there are some clear warning signs. Figure 2 shows the CAPE (cyclically adjusted price earnings) ratio, a valuation measure made popular by Nobel Prize winner, Robert Shiller. CAPE shows the PE ratio of the market based on 10-year earnings. When CAPEs are above average, stock market returns have generally been below average over the following decade or so.

Figure 2: Asset class yield comparison



Source: Neuberger Berman.

Current CAPEs are well above average, and are as high as they were in the lead-up to the GFC. Given the average PE ratio since 1880 has been 16.58, compared to a current level of about 27, future stock returns may be below average.

Another approach popularised by Jack Bogle, the founder of Vanguard Investments, uses the following formula to approximate future longer-term equity market returns:[3]

Current Dividend Yield + Earnings Growth + Change in PE Ratios = Returns

Currently, that equation looks like this:

1.95%[4] + 4%[5] + -4%[6] = Returns

This suggests that average equity market returns over the next 10 years will be about 2.0% per annum, including dividends.

Obviously, neither of these approaches will be completely accurate, but they do provide us with some basis for forecasting future returns. Both suggest equity returns may not be as strong over the next decade or so, as we might otherwise expect. This means equities will not drive the portfolio returns investors need to fund long retirements. Yet, equities will continue to contribute excessively to portfolio volatility.

The outlook for bonds is similarly difficult.

After decades of good returns fuelled by the long-term falls in inflation in developed nations, and various unconventional monetary policies of many nations since the GFC, many central banks have signalled that bond yields are likely to start edging up at some point in the near future. Even if this doesn't occur, at the very least, the opportunity for good long-term performance from the asset class is somewhat limited by the current very low interest rates on offer.

In terms of what future bond returns might look like, a common simple rule of thumb is that current bond yields represent the total returns from bonds. For example, if a 10-year bond is bought today and held to maturity (and assuming no default), the total return will equal the initial yield. This can be extrapolated to the asset class to provide a broad guide to potential future returns.

Australian 10-year government bond yields are around 2.7% per annum (January 2015).[7] This means that investors should expect returns of about 2.7% per annum, before fees and inflation, from such bonds over that time period. Obviously, there will be periods where returns fluctuate, but this provides some level of guidance.

Given this outlook, there is a likelihood that standard asset allocation models will not work in the same way they did prior to the GFC. To produce the results investors require, advisers must look to change the way they approach portfolio construction.

1. How do we deliver more certain outcome-orientated portfolios?

The need to ensure stability of income in retirement and more certain portfolio outcomes during the accumulation phase, has led to a growing number of advisers moving away from standard asset allocation models to objective-based or goals-based portfolios. The idea is that portfolios are built to provide more consistent returns, with the aim to produce a Consumer Price Index "plus" return target each year over a relevant time period, circumventing large drawdowns from events such as the GFC as much as possible.

This approach has a number of benefits:

- It is easier to communicate a client's progress in meeting their individual objectives, versus focusing on market performance;
- it is highly engaging for clients to track portfolios against a simplified benchmark (CPI+) that they can readily understand; and,
- clients have fewer large drawdowns and smaller losses on average, aligning the portfolio to the behavioural biases of investors.

Portfolio design in this context is much more challenging, though. Traditional "set and forget" strategic asset allocations and mainstream assets are unlikely to provide this solution. Goals-based investing requires much more diversified portfolios, with building blocks that provide true diversification, and a more active approach to asset allocation.

2. What building blocks make sense in an objective-based portfolio world?

It's no surprise that we've seen a plethora of new solutions looking to address the issues discussed above, aimed at helping portfolios provide more consistent returns with lower volatility.

Approaches such as smart beta, risk parity and factor investing aim to make the risk/return paradigm work better in this new environment. Many of these nascent solutions are innovative and interesting, and potentially offer investors ways to incrementally ratchet up returns and ratchet down risk within existing asset classes, primarily equities. Many, however, are also extremely complex and opaque in a world where transparency is the new norm.

Nonetheless, it is acknowledged that the most powerful ways to manage risk and enhance returns lies in approaches that are taken across asset classes.[8] This includes dynamic asset allocation and the use of uncorrelated assets in portfolios, which essentially means diversifying more. The Holy Grail, the easiest – "bang for the buck" – remains the incorporation of lowly or uncorrelated assets into portfolios.

3. Do hedge funds add value in objective-based portfolios?

There has been much discussion and debate about whether alternative assets such as hedge funds add value to portfolios. In particular, their performance through the GFC came under significant scrutiny.

Over the years, there have been a number of studies on hedge funds that have shown different results.

More recent work, which uses a longer data history and more advanced mathematical techniques, suggests that hedge funds provide valuable characteristics in a portfolio in terms of risk, return and diversification - the very things needed to create more certain portfolio outcomes. A number of recent studies have shown a broader spectrum of hedge fund styles do consistently add value.[9] [10]

One recent study showed that the average 1995-2009 hedge fund return of 11.13% per annum included alpha of 3.00%, with alpha being positive during every year of the past decade including during the GFC.[11]

Burton Malkeil, most famous for writing A Random Walk Down Wall Street and a leading proponent of Efficient Market Theory, found that over the period 1996 to 2003 "hedge funds tend to exhibit low correlations with general equity indices - and, therefore, are excellent diversifiers."[12]

A 2007 study found "that top hedge fund performance cannot be explained by luck, and hedge fund performance persists at annual horizons."[13] Further studies have shown that global macro, managed futures, multistrategy, and long/short equity hedge funds consistently outperformed the US 10-year Treasury bond.[14]

Further studies have shown that "directional and semidirectional hedge fund managers... have the ability to actively vary their exposure... As a result, they can generate superior returns" while on the other hand, traditional managed funds seem to have no macro-timing ability.[15]

4. Liquid and diversified hedge funds exhibit lower volatility which assists in times of market turmoil

The addition of diversified and liquid hedge fund strategies to a portfolio may reduce volatility compared to long-only investments, typically by using hedges and short positions to reduce the level of market exposure in typical long-only portfolios. Hedge fund strategies have been historically less volatile than broader markets and have outperformed on a risk-adjusted basis during periods of higher volatility for broader markets.[16] From January 1990 through September 2014, for months when the VIX (CBOE's Market Volatility Index, measuring equity market volatility)[17] closed above its historical average, the HFRI Fund Weighted Composite Index outperformed the S&P 500 Index by 76.5%, cumulatively. During the same period, when the MOVE (the fixed-income equivalent of the VIX) closed above its historical average, the HFRI Fund Weighted Composite Index outperformed the Barclays Aggregate Bond Index by 47.6%, cumulatively.[18]

Hedging seeks to reduce the effects of a negative market but may limit performance in an up market. In the current environment, this concept has been akin to fixing the roof while the sun is shining. We believe those who wish to create more certain outcomes for clients should take the time to understand how adding a liquid and diversified hedge fund investment strategy can assist in diversifying away from traditional asset classes.

5. What can we learn from leading endowment funds and their use of hedge funds?

Many large and sophisticated investors around the world currently have significant exposures to hedge funds in their portfolios. A 2013 global survey of institutional investors[19] found that the average allocation to hedge funds by pension fund respondents was around 8% of portfolios. The same metric from endowment and foundation institutional investors was closer to 25%. Most of the respondents said they planned to increase allocations to hedge funds, and most had increased their allocations to hedge funds since the GFC with some having doubled exposures.

Many of these investors do not see hedge funds as a separate asset class but as a way of accessing "opportunities" or changing the way they get exposures in traditional asset classes by lowering beta.[20] The Australian Future Fund's David Neal has said, "We do not allocate to an asset class called "hedge funds". We treat every opportunity on its merits."[21]

Many are taking a more dynamic approach to allocation of hedge funds. As a large US endowment put it: "The hedge fund portfolio is a core allocation in the overall endowment portfolio, and we have no near-term plans to decrease it in size. We believe that hedge funds can continue to generate equity like returns with one-third to one-half the risk of equities."[22]

A more recent survey of endowment funds and foundations conducted in July 2014 reported that 65% had a portfolio exposure of 10% or more to hedge funds.[23]

The Australian Future Fund

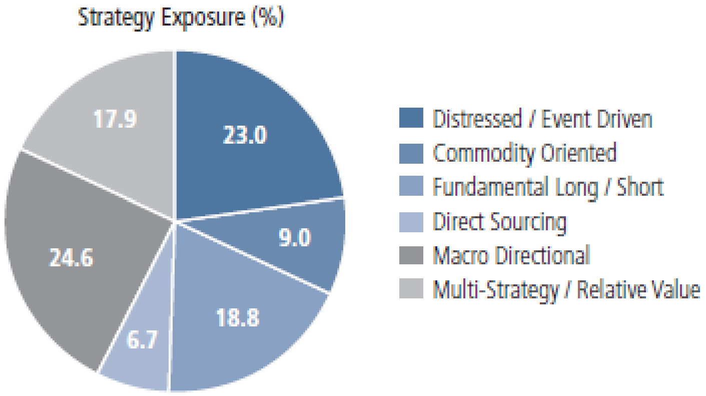
The Australian Future Fund found its alternatives programme has added return and reduced risk in the five years to June 2013.[24] Over the five years to 30 September 2014, the Fund returned 10.4% per annum compared to its target of CPI+4.5% (7.0% per annum for the period).[25] This return exceeded most Australian balanced funds but, more importantly, did so with lower exposures to equities and lower overall volatility.

Although the Future Fund does not allocate to hedge funds *per se* (it looks for "opportunities"), it currently has about 13.8% allocated to the asset class, with a medium-term target of 15.0%.

The Fund takes an active approach to hedge fund allocation. It began building exposure in distressed and event-driven funds in 2008/9, given the economic situation at the time. During 2009, it established a Macro, a Fund of Hedge Funds and a Multi-Strategy portfolio.

Since that time, commodity and volatility strategies have been added and various strategies have been refreshed. It also has a significant exposure to long/short strategies.[26]

Figure 3: Future funds strategy exposure to hedge funds (September 2012)



Source: Investment Magazine, 2012.

HARVARD MANAGEMENT COMPANY ENDOWMENT FUND

The Harvard Management Company endowment fund (the endowment fund associated with Harvard University) has about 15% allocated to alternatives and is looking to increase that in 2015. It has a very long history in investing in alternatives. Over the 20 years to June 2014, its alternatives portfolio returned around 10% per annum. Harvard Management Company said "We view the absolute return asset class as a true diversifier relative to equity markets... Our portfolio – with a beta of 0.1 to 0.2 to the S&P 500 and a nominal return of 12.2% in fiscal year 2014 – is a clear and successful expression of pure alpha generation."[27]

Why haven't more advisers started using hedge funds to assist in providing more certain outcomes?

A lot has been written about the potential pitfalls of investing in alternatives and hedge funds including:

1. **Fees** – the most common objection to alternatives is the management fees charged by some hedge fund managers. The typical alternative fund charges 2% per annum with a 20% performance fee. In a fund-of-hedge fund structure, this can be much higher. This obviously lowers the net return to investors. However, fees have been falling since the GFC.
2. **Transparency** – During the GFC, many alternatives fund structures gated (effectively, they froze redemptions), leaving many investors distressed. Advisers were not aware

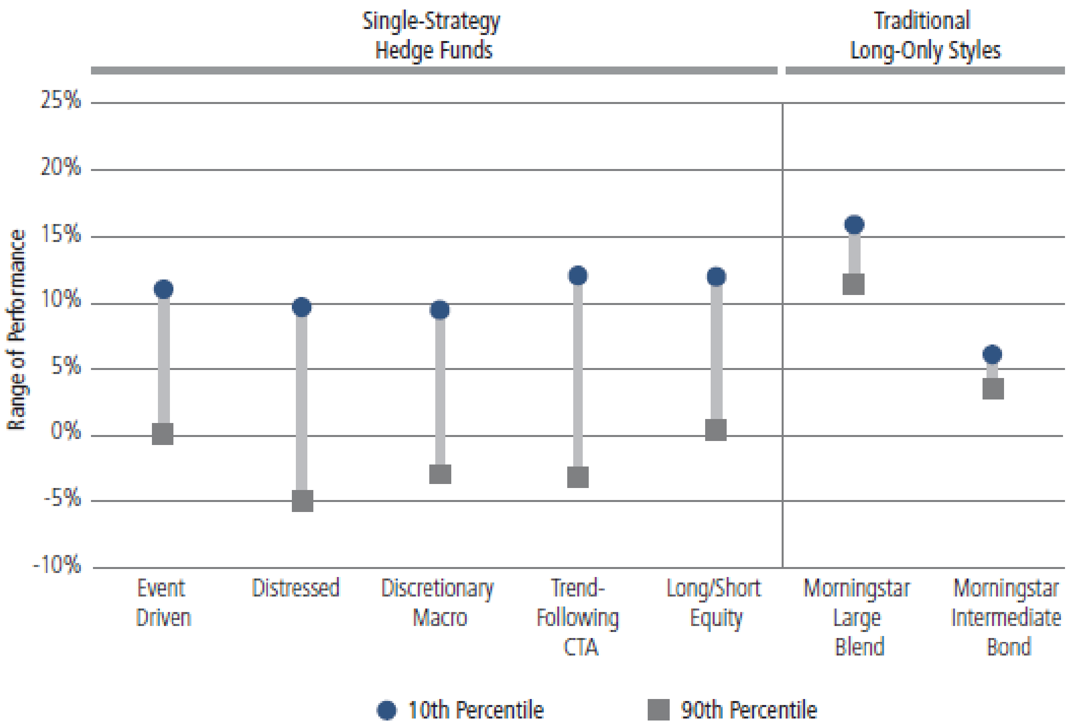
of where some of those funds were invested and may not have fully understood the true risks. Today, lack of transparency, quite rightly, is not accepted. However, many hedge funds can be secretive about fund investments. This stalemate can be difficult to resolve.

3. **Liquidity** – Many hedge funds do not provide good liquidity. Many have monthly, quarterly and even annual redemption periods with longer notice periods. This does not provide the flexibility necessary for most retail investors.

4. **Survivorship bias** – Hedge fund indices report good performance, but only funds that still exist report. When all funds, including those that have closed down, are reviewed, performance of the asset class as a whole does not look as compelling.[28]

5. **Return dispersion** – Good hedge funds deliver results, not-so-good ones don't. The dispersion in returns between good and bad hedge funds is much greater than it is for good and bad managed funds, as shown in Figure 4. Some studies put the return difference as being more than 5% per annum.[29] Research also shows that time and time again, there are a lot more not-so- good hedge funds.[30] In fact, studies suggest that less than 20% of long/short equity hedge funds have delivered significant, persistent, stable positive alpha.[31]

Figure 4: Dispersion of fund manager returns by strategy



Sources: Neuberger Berman and Morningstar.

Finding good hedge funds ones is a critical step in portfolio construction. As Harvard Management Company pointed out, "If we're looking for truly uncorrelated returns that are likely to be positive rather than negative... it turns out that... a lot of things labelled as hedge funds don't come through that screen."[32]

So, the evidence is clear – good alternatives with the right fund features can add real value in creating more certain portfolio outcomes (goals-based portfolios) with lower volatility. But, they are not easy to find and their fund structures are not appealing to most advisers and their clients.

INTRODUCING DIVERSIFIED LIQUID ALTERNATIVES

While good progress has been made within the liquid alternatives universe since the GFC, the more recent emergence of a new generation of diversified liquid alternatives products has continued to push the boundaries towards investor-friendly solutions. These diversified liquid alternatives funds have been introduced to deal with the problems discussed above. They represent one of the fastest growing sectors of the hedge fund market and, for advisers and their clients, provide a simpler way of accessing the many of the benefits of hedge funds. The example in Figure 5 highlights the differences between a diversified liquid alternatives portfolio and a hedge fund-of-fund program.

Figure 5: Hedge fund structures – traditional partnership vs liquid alternatives

	TRADITIONAL MANAGED FUND INVESTING	TRADITIONAL HEDGE FUND INVESTING
Return Objective	Relative returns	Absolute returns
Benchmark	Benchmark constrained	Unconstrained by benchmark index
Investment Strategies	Limited strategies, long-only, no leverage	Flexible strategies (long and short positions, leverage)
Market Beta	High beta to traditional asset classes	Generally low beta to traditional asset classes
Performance	Dependent on market direction	Often independent of market direction
Management Fees	Asset-based fee only; no performance fees	Generally higher asset-based fee than mutual funds; performance fees
Liquidity	Daily at NAV	Liquidity restrictions and lock-ups
Investment Size	Minimums as low as $1,000	Large minimums
Investor Base	Publicly available	Qualified purchasers
Transparency	High disclosure and transparency	Limited or no position level transparency

BRIDGING BENEFITS OF LIQUID ALTERNATIVES

Source: Neuberger Berman

As can be noted from Figure 5, diversified liquid alternatives offerings aim to offer the benefits of hedge fund investor strategies while offering clients the value and flexibility of more traditional access mechanisms. The strategy can be used as a core alternatives solution in portfolios to use as a key building block in creating more certain outcomes for clients when conbined with mainstream assets. In a way, liquid alternatives offerings are an all-in-one solution to access a range of best-of-breed hedge fund managers.

Key advantages with this type of product over the traditional hedge fund-of-fund model or single hedge fund strategies that are hard for many advisers to assess and access include:

1. **Liquidity** – Most diversified liquid hedge funds price and deal every day so investors can be assured that access to funds is easy;

2. **Transparency** – Diversified liquid alternatives can offer a very high level of transparency to underlying investors, including full security level transparency, in some instances.

3. **Lower cost** – Unlike the traditional hedge fund fee model, the underlying fund managers earn no performance fees at any level and management fees are generally lower.

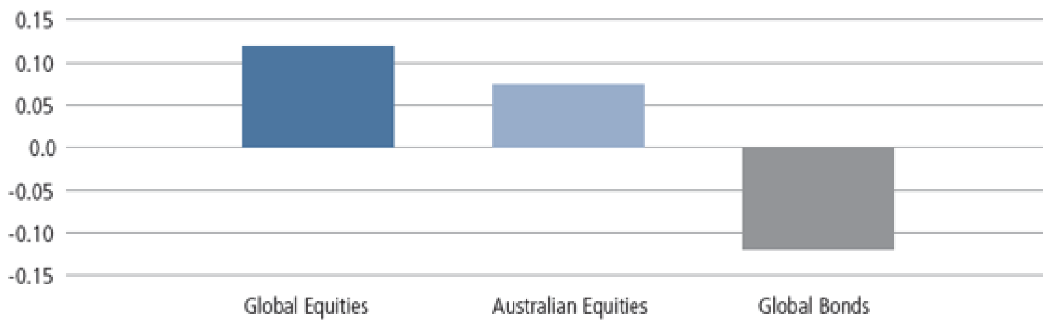
4. **Diversification** – Diversified liquid alternative funds can provide access to an actively managed set of different alternative strategies, such as Global Macro, Event Driven, Merger Arbitrage, Long Short Equity and Credit Relative Value. This level of diversification is designed to provide an effective core solution for those looking to create more certain outcomes.

1. Incorporating a diversified liquid alternatives portfolio into objective-based portfolios

To consider the potential relationship between liquid alternatives and traditional asset classes more closely, we can measure the beta of an index of hedge fund strategies to traditional asset classes. Beta is somewhat superior to a simple correlation measure, as it looks at both the direction and the size of movements between the index and traditional asset classes. Correlation only measures direction of movements. Correlation is part of the calculation for beta.

We can interpret beta in a similar way to correlation – the lower the beta, the less related the returns between liquid alternatives and the major asset classes. Figure 6 shows some performance characteristics of the HFRX Absolute Return Index over the five years to 30 April 2015. As can be seen, the Index displayed a very low beta to equities and fixed interest over the period. This suggests an ability to provide strong diversification benefits. The beta to Australian equities has also been low, suggesting that these products may be useful for Australian investors for whomallocations to Australian equities tends to be high.

Figure 6: HFRX Absolute Return Index – beta to major asset classes (30 April 2015)

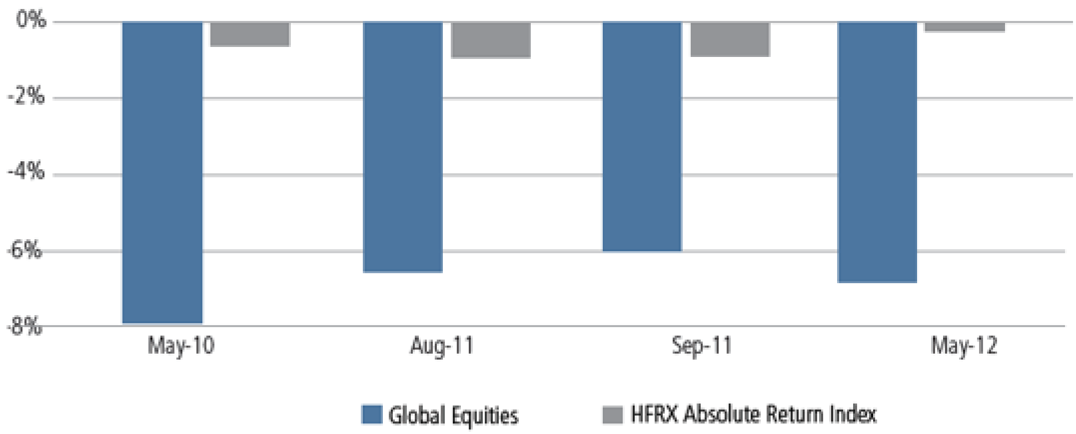


Source: Neuberger Berman. Global Bonds is represented by the Barclays Global Aggregate AUD Hedged Index. International Equities is represented by the MSCI World AUD Hedged Index. Australian Equities is represented by the S&P/ASX 200 Index.

To illustrate further how this low beta with major asset classes helps in a portfolio, Figures 7, 8 and 9 look at the performance of the HFRX Absolute Return Index during the worst four months' performance in four major asset classes – global equities, Australian equities, and global bonds – over the last five years. In all cases, the HFRX Absolute Return Index cushioned the impact of the negative return. In most of those months, it provided positive returns.

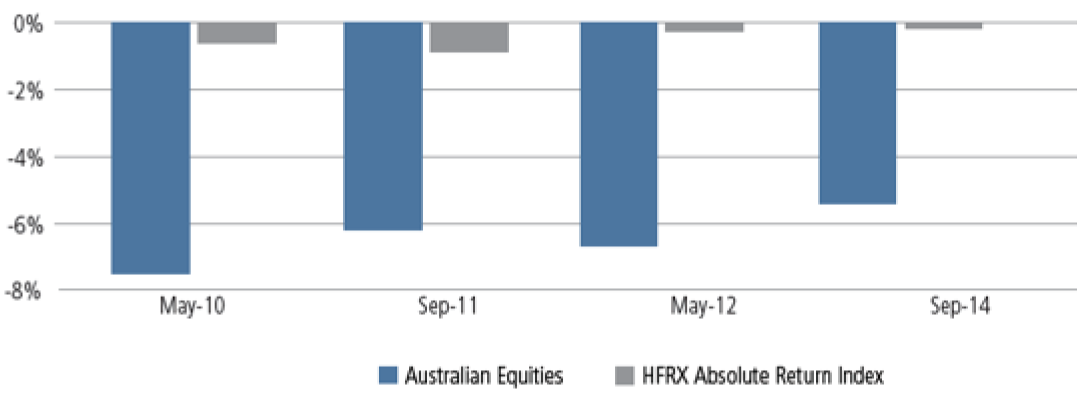
This analysis highlights how liquid alternative funds may be used as an effective part of an objective-based portfolio by improving the consistency of returns when other asset classes falter.

Figure 7: Worst four months for global equities
(30 April 2015)



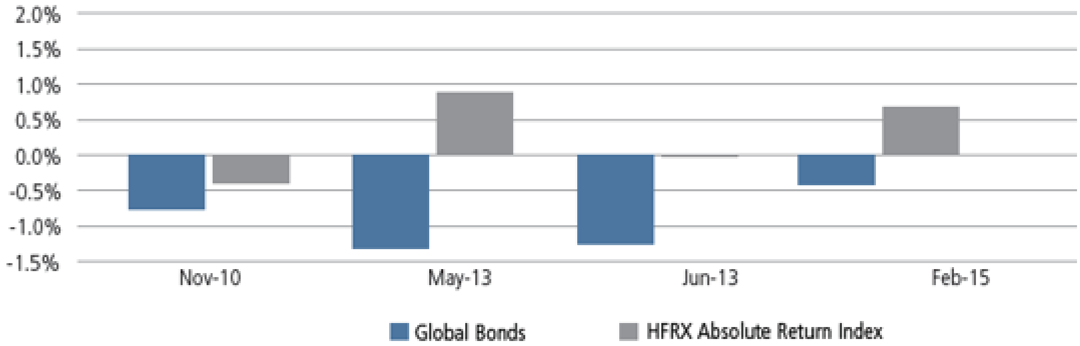
Source: Neuberger Berman. Global Equities is represented by the MSCI World AUD Hedged Index.

Figure 8: Worst four months for Australian equities
(30 April 2015)



Source: Neuberger Berman. Australian Equities is represented by the S&P/ASX 200 Index.

Figure 9: Worst four months for global bonds
(30 April 2015)



Source: Neuberger Berman. Global Bonds is represented by the Barclays Global Aggregate AUD Hedged Index.

CONCLUSION

It is clear that we have entered a new world where investors are looking for more stable and certain investment outcomes. But if advisers continue to build portfolios using strategic asset allocation approaches, investing in traditional assets classes only, it is unlikely to achieve certainty but instead repeat the mistakes of the past, especially in times of market volatility.

Leading endowment funds have achieved strong returns, with lower volatility, than standard SAA portfolios, through higher use of alternatives and hedge funds. However, accessing these important building blocks can be problematic for advisers, given the complexity and expensive of most of these strategies.

Diversified liquid alternative funds have been created to offer investors cost-effective and liquid access to a high-quality selection of best-of-breed hedge fund managers, with the fees, transparency and liquidity generally required for retail investors but, more importantly, to act as a core building block to creating more certain portfolio outcomes because of low beta to traditional asset classes. This is the key diversifying benefit of diversified liquid alternative funds.

ENDNOTES

1. Basu, A., Doran, B., and Drew, M., "Sequencing Risk: A Key Challenge to Sustainable Retirement Incomes," Finsia (Financial Services Institute of Australasia), 2012.

2. Tversky, A. and Kahneman, D., "Advances in Prospect Theory: Cumulative Representation of Uncertainty," Journal of Risk and Uncertainty, 1992.

3. Bogle, J., "Investing in the 1990's: Occam's razor revisited," The Journal of Portfolio Management, Fall 1991.

4. Yahoo Finance. Compares to an average of 4.4% since 1880.

5. This is the average earnings growth of the S&P 500 since 2000, sourced from Yahoo Finance.

6. This is the change in PE per annum needed for PEs to reach average levels again over 10 years.

7. As at January 2015.

8. Future Fund, "Annual Report 2014," Melbourne, Australia

9. Kosowski, R. Naik, N. and Teo, M., "Do hedge funds deliver alpha? A Bayesian and bootstrap analysis," Journal of Financial Economics, 2007.

10. Fund,W., and Hsieh, D., "The Risk in Hedge Fund Strategies: Theory and Evidence from Long/Short Equity Hedge Funds," Journal of Empirical Finance, 2011.

11. Ibbotson, R., Chen, P., and Zhu, K., "The ABCs of Hedge Funds: Alphas, Betas and Costs," Financial Analysts Journal, 2011.

12. Malkiel, B., and Saha, A., "Hedge Funds: Risk and Return," Financial Analysts Journal, 2005

13. Kosowski and Naik, 2007

14. Bali, Turan G. , Brown, Stephen J., and Demirtas, K. Ozgur, "Do Hedge Funds Outperform Stocks and Bonds?," Social Science Research Network, 20 September 2012.

15. Bali, T., Brown, S., and Caglayan, M., "Macroeconomic risk and hedge fund returns," *Journal of Financial Economics*, 2014.

16. Source: Bloomberg.

17. The VIX is often described as the "fear index." The higher the index, the higher the volatility of the equity markets.

18. Sources: NB Alternatives, HFR, and Bloomberg.

19. AIMA, "Beyond 60/40: The evolving role of hedge funds in institutional investor portfolios," *The Hedge Fund Journal*, May 2013.

20. In this context, beta describes "market risk". By lowering the beta of the portfolio, Neal is attempting to lower the portfolio's reliance on market performance. He is attempting instead to deliver returns that will be less reliant on market returns.

21. Future Fund, "Debt and Alternatives at the Future Fund," presentation by David Neal, Conexus Alternatives Conference, Melbourne, Australia, 2012.

22. AIMA, 2013

23. http://www.thinkadvisor.com/2014/07/30/foundations-endowments-remain-bullish-on-hedge-fun.

24. Future Fund, "Briefing," 23 October 2013, Melbourne, Australia.

25. Future Fund, "Portfolio Update at 30 September 2014," Melbourne, Australia.

26. Future Fund, 2012

27. Harvard Management Company, "Annual Endowment Report," September 2014.

28. Malkiel and Saha, 2005

29. Kosowski and Naik, 2007

30. Malkiel and Saha, 2005

31. Fung et al, 2011

32. Kermond, J., "Harvard's Post-Crisis Endowment Strategy," Harvard Management Company, January 2014.

portfolio construction forum

DISCLAIMER

This document, and the information contained in it, has been provided by Neuberger Berman Australia Pty Ltd (ACN 146 033 801), holder of Australian Financial Services Licence No. 391401 ("NB Australia").

This document is being made available by NB Australia to a person defined as a "wholesale client" under section 761G of the Corporations Act 2001 (Cth) and applicable regulations, and other such persons to whom disclosure would not be required under chapter 6D and Part 7.9 of the Corporations Act 2001 (Cth) ("Wholesale Investor"), for informational and discussion purposes only. This document is intended only for the Wholesale Investor to which it has been provided, is strictly confidential and may not be reproduced or redistributed in whole or in part nor may its contents be disclosed to any other person (other than such Wholesale Investor's agents or advisers) under any circumstances without the prior written consent of NB Australia.

No recommendation or advice is being given as to whether any investment or strategy referred to in this document is suitable for the Wholesale Investor. It should not be assumed that any investments in securities, companies, sectors or markets identified and described were or will be profitable. Investing entails risks, including possible loss of principal. Past performance is no guarantee of future results.

This document, and the information contained herein, is not, and does not constitute, directly or indirectly, a public or retail offer to buy or sell, or a public or retail solicitation of an offer to buy or sell, any fund, units or shares of any fund, security or other instrument ("Securities"), or to participate in any investment strategy.

The Wholesale Investor who receives this document should not consider it as a recommendation to purchase any Securities mentioned in it. To the extent that information in this document constitutes financial product advice, it is general financial product advice only, and provided only by NB Australia to Wholesale Investors. This document does not take into account the Wholesale Investor's investment objectives, financial situation and particular needs (including financial and tax issues) as an investor. Any Securities mentioned in this document will only be available to a Wholesale Investor to whom the provision of a disclosure document prepared in accordance with Australian law is not required. The Wholesale Investor to which this document is provided should not rely on the information contained in this document in making any future investment decision.

The information and opinions expressed in this document are subject to change without notice. NB Australia, its officers, employees and affiliates, do not represent that such information is accurate or complete, and it should not be relied upon as such. Certain information contained in this document (including any forward-looking statements and economic and market information) has been obtained from published sources and/or prepared by third parties and in certain cases has not been updated through the date of this document. While such sources are believed to be reliable, NB Australia, its officers, employees and affiliates do not assume any responsibility for the accuracy or completeness of such information. Any views or opinions expressed may not reflect those of NB Australia, or its officers, employees and affiliates as a whole. In addition, nothing in this document constitutes legal, accounting or tax advice.

None of NB Australia, its officers, employees or affiliates, make any representation or warranty, express or implied, with respect to the fairness, correctness, accuracy, reasonableness or completeness of any of the information contained in this document (including, but not limited to, information obtained from unrelated third parties), and expressly disclaim any and all responsibility or liability as to the information contained in, or omissions from, this document, including, without limitation, any implied representation or warranty with respect to such information.

Neuberger Berman is a 76-year-old private, independent, employee-owned investment manager. The firm manages equities, fixed income, private equity and hedge fund portfolios for institutions and advisers worldwide.
