



Alternative Premia, Alternative Price

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Key Points

- Alternative risk premia (ARP) consist of a range of strategies that offer a premium for either taking risks others do not wish to bear or for exploiting market anomalies.
- ARP have increased in popularity over the last few years with a spate of new product launches.
- ARP are a viable investment proposition for many investors, bringing diversification and added return potential to traditional portfolios.
- Not all implementations are created equal, and care must be taken when choosing a provider.
- We recommend investment in ARP products to those looking for alternative sources of return at reasonable fee levels.

Introduction

ARP strategies have risen to prominence over the last few years, fueled by investors' desire for diversification and an advancing understanding over what should be categorized as alpha and beta. We believe these strategies can aid diversification within a portfolio and allow investors access to sources of return that are different from traditional equity and bonds, at a reasonable price point.

In this paper we discuss:

- Evolution of ARP
- Defining ARP
- Overview of ARP strategies
- Role of ARP in portfolios

Evolution of ARP

The existence of the equity risk premium (excess return earned by investing in stocks above the risk-free rate) is widely accepted

by today's investor. Markowitz¹ was amongst the first to link investment return and risk and enabled the "risk premia" of different investments to be measured. This ability to measure the risk premia of different assets led to a realization amongst investors that not all investing was skill-based and there were gains to be generated by just investing in an index like the FTSE 100 or S&P 500. What had previously been thought of as alpha² was actually beta.³

As markets evolved, a plethora of indices sprung up across asset classes, allowing investors access to ever-more-exotic investment strategies with corresponding "exotic betas." During this period, we also witnessed the growth of the hedge fund industry, which usually charged both management and performance fees for what many claimed was alpha.⁴ These strategies promised and delivered outstanding returns through investing in an unconstrained manner across or within certain markets.

As hedge funds evolved, some market practitioners examined whether hedge fund strategies were in part also targeting risk premia and whether these could be extracted in a systematic manner. For example, was merger arbitrage a pure alpha strategy, or were the majority of the returns generated simply by taking deal risk? Perhaps returns could be generated by investing in all deals rather than trying to select the "best" ones. A few found success with this bottom-up approach, and the first ARP products were launched in the mid- to late 2000s with varying degrees of success.

At the same time as the first ARP products were appearing, a similar revolution was occurring in the equity long-only space. Here, "smart beta" or "factor-based investing"⁵ products were appearing that looked to capture the returns from well-known equity (and later fixed income) factors such as Value in a simple, transparent, rules-based manner. The main differences between smart beta and ARP are as follows:

1. Smart beta is concerned with long-only investing, whereas ARP are mainly implemented in a long/short manner.
2. Smart beta is concerned mainly with single-stock equity investing,⁶ whereas ARP strategies can be applied across all asset classes.

After the global financial crisis, interest in ARP generally fell away as equity markets surged. However, after the difficult markets

of 2011, interest in ARP was reignited and more ARP products came to market, at first launched by banks and soon after by asset managers. These offerings are generally characterized by lower fees than traditional hedge funds, exposure to a number of different risk premia, and high levels of transparency into the mechanics behind the various implementations.

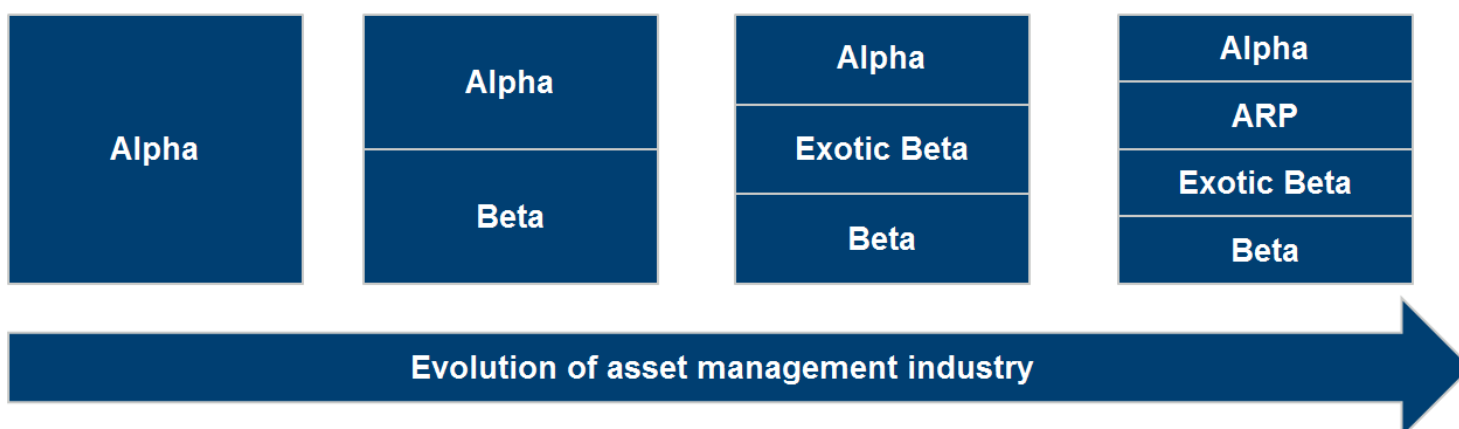
Defining ARP

There are a multitude of definitions of ARP. Broadly speaking, the definition breaks down as follows:

- The "alternative" part of the ARP definition can be thought of, in general terms, as an ability to go long or short and an ability to invest across asset classes.
- The term "risk premia" can be thought of in two ways:
 - First, as accepting a premium for taking on a risk that others do not wish to hold (i.e., providing insurance against tail risk to other market participants)
 - Second, other types of strategies better characterized as market anomalies⁷ than reward for bearing a well-defined risk

Let's delve further into the two ways to think of risk premia.

- **Providing insurance against tail risk:** An example would be a short volatility strategy, a simple expression of which would be selling straddles (appropriately hedged)⁸ on an index. In this case, the seller receives an option premium for bearing the risk of a large increase in volatility, which generally accompanies a large fall in the market. As with other forms of insurance, the strategies can be successful over the long term (which is why insurers exist!) but prone to large payouts when the insured event occurs (i.e. the market experiences a large fall).⁹
- **Market anomalies:** We believe the most obvious is momentum (or trend-following) across asset classes, which is included as a strategy in many risk premia products, but is not a reward for bearing a certain kind of risk and does not have a return distribution that is negatively skewed. There are several behavioral explanations as to why momentum, or trend-following is successful, and has proved to have been so over many years,¹⁰ but this strategy does not bear the hallmarks of



a risk premia strategy as just defined; it has a tendency to perform well in volatile periods and displays positive skew.

So there are two distinct explanations as to what qualifies as alternative risk premia. As a general rule, these strategies will also display the following characteristics:

- **Intuitive:** There must be a sound rationale as to why the premia exist. This can be a behavioral or economic explanation.
- **Well known:** There must be strong academic evidence of the existence of such premia and a conventional way of implementing them. However, some practitioners may employ a greater degree of sophistication than others.
- **Scalable:** The premia need to be sufficiently scalable and liquid so that they are a viable trading strategy and would not disappear due to trading costs.
- **Value add:** The premia need to have a positive expected return over time.
- **Persistent:** The premia need to demonstrate persistence over time and the ability to potentially persist in the future.

In the general lexicon, ARP strategies have come to mean strategies that display most, if not all of the five qualities above, whether they are a market anomaly or a reward for bearing risk. ARP products normally contain both types of investment opportunities—providing insurance and exploiting market anomalies. The reason for this is that the return profile of some market anomalies sits nicely alongside that of certain insurance premia, meaning a combination of the two can be a compelling proposition.

Overview of ARP Strategies

There have been a large number of product launches in this space over the last couple of years. These range from a customized approach, where an asset manager or bank will offer a menu of up to 100 risk premia to choose from, to products that feature five or more premia in a traditional fund format, where sizing of the individual premium is included as part of the package. Although there are a bewildering number of ARP strategies available, they generally fall into four buckets:

- Momentum
- Value
- Carry
- Other

The first three buckets can generally be applied across equities, fixed income, commodities, and currencies whilst the fourth generally encompasses risk premia strategies that are difficult to generalize and in some cases are asset class-specific. Examples of all can be found in the academic literature; however, in many cases the “devil is in the details” in terms of implementation. Most of the strategies would be executed through equities, futures and forwards.

*Momentum*¹¹

As an ARP strategy, momentum comes in two forms: time series and cross sectional. Time series momentum is commonly referred to as trend following, which is a strategy widely used within managed futures. This exploits the well-known anomaly that markets tend to trend. The second type, cross-sectional, looks at relative performance within an asset class, rather than absolute performance across asset classes.^{12,13} A number of behavioral explanations have been posited for why the momentum phenomenon exists, based mostly on investor under and overreaction, such as investors underreacting to short-term news and overreacting to long-term news.^{14,15}

*Value*¹⁶

Value strategies look to buy cheap assets and sell expensive assets. The origins of value investing date back to the early 1930s and are based on the work of Benjamin Graham and David Dodd, who noticed that after the Great Depression, many stocks seemed cheap compared to book value and created a strategy that looked to buy “cheap” stocks that displayed certain characteristics. Such a strategy proved successful, with Warren Buffett being a well-known advocate of such an approach. The value phenomenon has since been expanded to encompass other asset classes¹⁷—for example, in bonds an investor could go long bonds with the highest real yield (ex-ante cheap) and short bonds with the lowest real yield (ex-ante expensive).

*Carry*¹⁸

Carry strategies involve the search for yield and favor investing in high-yielding assets over low yielding assets regardless of valuations. Carry is the return derived merely from holding an asset, independent of any price movements, and is most well-known as a strategy exploited in currency markets, where investors buy high-yielding currencies or currencies that have high nominal interest rates and borrow in lower-yielding currencies. However, the strategy can be extended to other asset classes—for example, dividends could represent carry within stocks and the slope of the yield curve within fixed income.

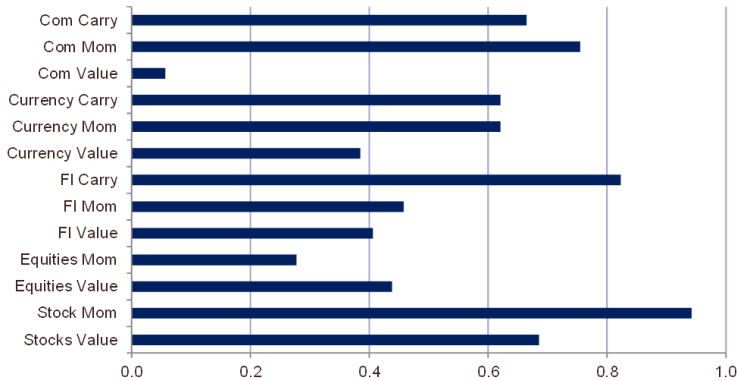
Other

There are a large number of potential risk premia strategies not covered by the first three categories. One example would be the short volatility strategy mentioned above, which could be extended across asset classes. There are also risk premia styles such as quality and size, which are long/short implementations of “smart beta” factors.

How Have the Various Strategies Performed

Most ARP products have quite short track records, as this is an investment style that has established itself only recently. As such, we use backtests for any meaningful performance analysis, with all the caveats that entails.¹⁹ As these strategies can be scaled up or down relatively easily (subject to capacity constraints) to meet a range of risk and return combinations, it appears more useful to examine the ratio of risk to return rather than the absolute level of return. Hence, the Sharpe ratio is used rather than nominal risk and return metrics.

Sharpe Ratios of Various ARP



Source: AQR, Aon Hewitt

Note: “Com” is short for “commodities.” “Mom” is short for “momentum.” Stocks represent single-name strategies whilst equities represent equity indices. Momentum represents cross-sectional rather than time series momentum.

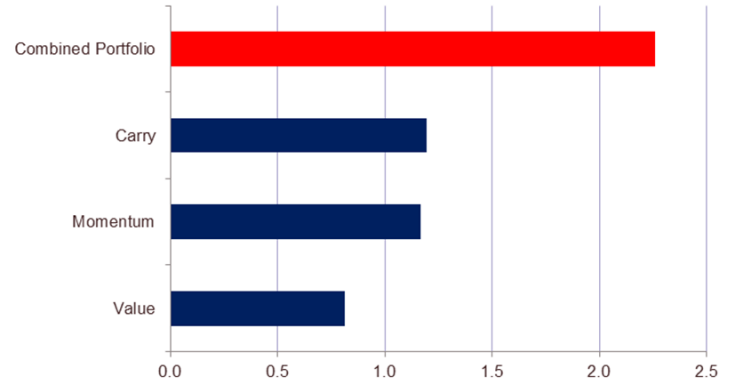
Strategy Sharpe Ratios

As can be seen from the above, individual Sharpe ratios of the strategies are positive for the period under review, spanning 26 years, ranging from 0.1 to more than 0.9. Some have achieved better risk-adjusted returns than others, but all of the strategies have added value over long periods of time.

Although strategies like those above are available on a stand-alone basis, increasingly asset managers are approaching the market with strategies that combine a number of the above premia in a single product. The main reason for this is the power of diversification at the ARP level, combining a number of strategies with low correlation, and a positive Sharpe ratio can create a portfolio with a much higher Sharpe ratio. The lower the correlation, the greater the increase in Sharpe ratio (all else being equal).

We can see from the below that the correlation between individual substrategies is low. In fact, the average pairwise correlation stands at 0.14. This means that creating a portfolio of these strategies should produce much higher risk-adjusted returns than individually allocating to any single strategy.²⁰ This is in fact what we find. Finally, we can take this one step further and create a portfolio that is diversified across asset classes and different premia.²¹

Sharpe Ratios of Various ARP Strategies and Portfolios



Source: AQR, Aon Hewitt

Here we can see how the combined portfolio had a much higher Sharpe ratio than the single-strategy portfolios, which in themselves exhibited higher Sharpe ratios than the underlying ARP. We can also view this using simpler risk metrics:

Annualised Excess Return (gross of fees and trading costs)	22.6%
Annualised Volatility	10.0%
Sharpe Ratio	2.3%

The simulation above does not account for trading costs, other fees (including management fees), market impact, and market constraints. However, if we put market constraints to one side (and there are managers running strategies such as those above with billions of dollars), we can have reasonably conservative estimates for both management fees (1% per annum (“p.a.”) and trading costs (3% p.a.) for ARP strategies based on conversations with asset managers operating these types of strategies. Adjusting for these on a linear basis results in the following.

Annualised Excess Return (gross of fees and trading costs)	17.8%
Annualised Volatility	10.0%
Sharpe Ratio	1.8%

Although ‘live’ track records of these strategies are limited, there are reputable managers operating in this area with track records of one to five years. Realized Sharpe ratios have been between 0 and

Correlations period 1990 - March 2016

	Stock Value	Stocks Mom.	Equities Value	Equities Mom.	FI Value	FI Mom.	FI Carry	Currency Value	Currency Mom.	Currency Carry	Com Value	Com Mom.	Com Carry
Stock Value	1.0												
Stocks Mom.	-0.7	1.0											
Equities Value	0.2	-0.2	1.0										
Equities Mom.	-0.2	0.2	-0.2	1.0									
FI Value	0.0	0.0	0.1	0.0	1.0								
FI Mom.	0.0	0.1	-0.1	0.1	-0.3	1.0							
FI Carry	0.1	0.1	-0.1	0.0	-0.2	0.1	1.0						
Currency Value	0.2	-0.2	0.1	0.0	0.1	-0.1	-0.1	1.0					
Currency Mom.	-0.1	0.3	-0.1	0.2	-0.2	0.1	0.1	-0.3	1.0				
Currenc Carry	0.1	0.0	-0.1	0.2	-0.1	-0.1	0.3	0.0	0.3	1.0			
Com Value	0.1	-0.1	0.1	-0.1	0.0	0.0	0.1	0.1	-0.1	0.0	1.0		
Com Mom.	0.0	0.1	-0.1	0.2	-0.1	0.0	0.0	0.0	0.2	0.1	-0.5	1.0	
Com Carry	0.0	0.0	-0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	-0.4	0.5	1.0

Source: AQR, Aon Hewitt

1.2 with annualized returns of 0% to 10% and realized annualized volatility of 5% to 10%. The difference between the simulation above and realized performance of managers could be attributed to real-life implementation constraints as well as uncertainty over historical costs/opportunities. Our view is that Sharpe ratios in the region of 0.5 – 1 are more realistic going forward than those in the historical backtests above.

Expected Excess Returns (net of estimated fees and trading costs)	3%-10%
Expected Volatility	6%-10%
Sharpe Ratio	0.5-1

Role of ARP in Portfolios

If the expected risk and return statistics are achieved by an ARP strategy, it would be a compelling addition to a traditional 60/40 portfolio,²² even with a moderate level of correlation. What we find is that the correlation of a traditional portfolio to the ARP portfolio described above is very low:

Taken together, the respectable expected returns of ARP portfolios coupled with the very low correlations to traditional allocations, you may conclude that the addition of such strategies could have an advantageous impact on a traditional portfolio:

Correlations Period 1990 - March 2016

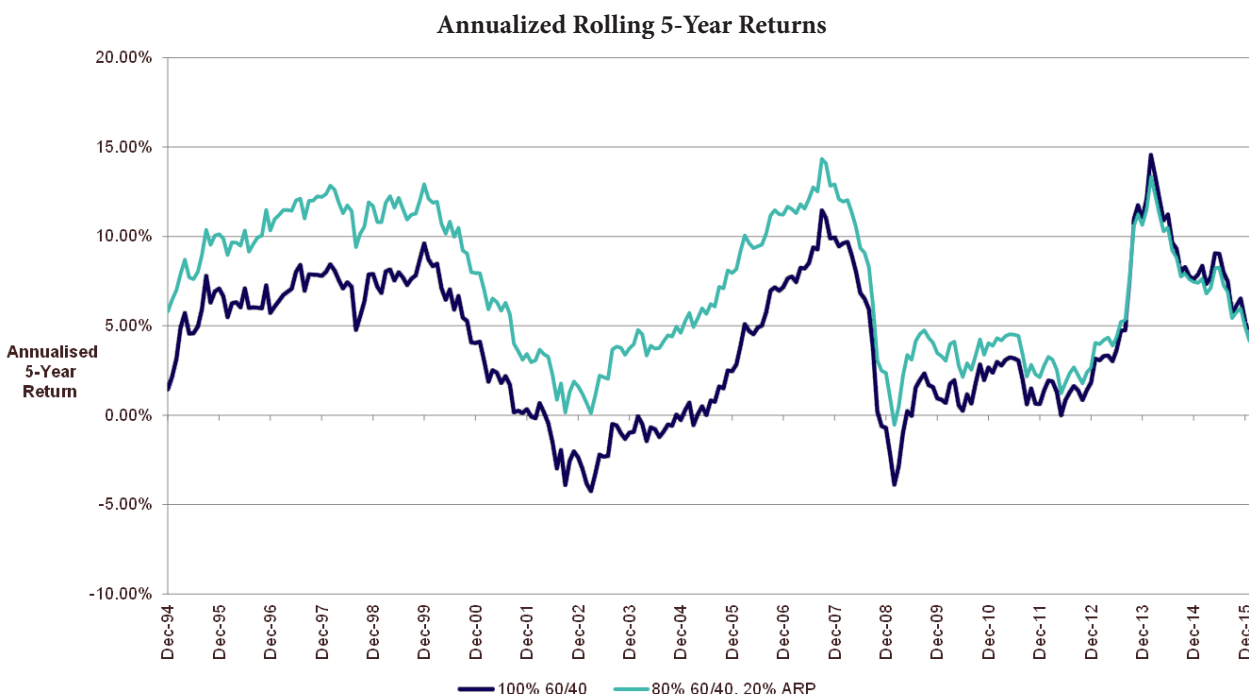
	Value	Momentum	Carry	ARP Portfolio	Equities	Bonds	60/40 Portfolio
Value	1.0						
Momentum	-0.5	1.0					
Carry	-0.1	0.3	1.0				
ARP Portfolio	0.2	0.5	0.8	1.0			
Equities	0.0	0.0	0.2	0.2	1.0		
Bonds	-0.2	0.1	0.1	0.0	0.3	1.0	
60/40 Portfolio	0.0	0.0	0.3	0.1	1.0	0.5	1.0

Source: AQR, Aon Hewitt

Although the below likely overestimates the improvement in outcome by utilizing ARP strategies, due to the inflated Sharpe Ratio, the low correlation of these strategies to traditional portfolios means that outcomes may still be significantly improved over many time frames using the more realistic expected risk and return metrics above (e.g. a Sharpe of 0.5-1).²³ It is interesting to note the convergence between the rolling five-year returns in recent times. We would attribute this to the solid performance from equity and bond markets that we have seen in recent years, which is unlikely to be sustained.

However, rather than just adding ARP strategies to traditional portfolios, we see a number of uses for these strategies:

1. For investors looking for diversification to traditional assets at an attractive price point, ARP could be a relevant option, to be considered alongside multi-asset funds. This could include investors who have previously been put off by the higher fees charged by hedge funds.
2. For investors looking to build out a hedge fund allocation, the core building blocks could initially be ARP funds. These could be supplemented and replaced with hedge fund managers who generate alpha over time, or a long-term core/satellite approach could be adopted, with the addition of hedge funds that exploit opportunities not targeted by ARP strategies. It should be noted that the correlation between hedge funds and ARP portfolios is generally low, as hedge funds can generate alpha and may be targeting one or two specific approaches rather than the multi-strategy approach of a typical ARP portfolio.



Source: AQR, Aon Hewitt. The chart above is net of a presumed management fee of 1% per annum for the ARP portfolio and net of estimated trading costs of 3% per annum for the ARP portfolio. It assumes costless exposure to the index strategies. The estimated management fee is based on our conversations with asset managers as are estimated transaction costs. These have been applied linearly at the portfolio level rather than the underlying strategy level and assume the ability to scale up or down at zero cost. As such, they are merely indicative.

3. Larger investors may wish to consider a principal component analysis²⁴ of their existing portfolios to identify certain ARP that may be underrepresented, and allocate to the relevant single sleeves accordingly.

As for the number of ARP funds an investor may wish to allocate to, that will depend on individual circumstances. Due to the inherent diversification with the funds, an allocation to one fund may be sufficient and should contain the governance burden of adding managers to the portfolio. We believe two or three managers is likely to be the optimal allocation, as we expect a significant degree of dispersion within this space, and there are enough nuances in approach from different managers to warrant such an approach. Finally, in terms of how much of a portfolio should be allocated to such strategies that would again depend on individual circumstances and risk/return objectives. However, it should be enough to make a difference²⁵ and may potentially come from traditional assets for those clients who do not have many diversifiers — or it may come from hedge funds for those who wish to rationalize their exposure or replace some of their hedge funds with ARP funds.

Further Considerations

Not all providers are equally equipped to provide a diversified portfolio of risk premia. Some of the details we would consider when looking at these providers are listed below:

Trading is not trivial

Trading costs for these strategies can be significant, depending on a number of factors. First, the underlying instruments being traded; as a general rule, equity-based strategies will usually be more expensive than futures-based strategies. Costs may also depend on the sophistication of both the trading platform and the trading strategy. The trading platform of the manager is important as it needs to be set up to trade large volumes of different instruments at low costs. The sophistication of the trading strategy can also increase or decrease costs. For example, more regular rebalancing will potentially increase costs; however, it may also mean the strategy is at all times more focused on the specific risk premia it is trying to isolate. A trade-off needs to be made, and previous experience in this space can help the decision-making process.

Strategy smorgasbord

We have only scratched the surface of the available universe of specific ARP. There are many others, which raises the question of how many should be included in a portfolio. Theoretically, continuing to add ARP with low correlation and positive Sharpe ratios to each other in a portfolio should continue to increase the Sharpe ratio of that portfolio, up to a point. However, we prefer to see managers sticking to strategies where they have some experience, expanding the universe only when they have performed appropriate research and have developed a robust strategy. We would prefer managers to target a small number of ARP effectively rather than offer a whole suite of completely generic ARP.

Devil is in the details

There is no standard implementation of the ARP strategies discussed above. The choice of parameters is at the discretion of the provider. Hence, the same strategy can have wildly different

outcomes depending on the construction. Although at face value many of the ARP appear relatively simple, on closer inspection there are a large number of choices to make when implementing a specific strategy. These choices are not only about how to implement specific strategies, but also about how to combine these strategies. For this reason, careful review of strategies and the available offerings is helpful when considering an investment in ARP.

Out-of-sample performance is limited

Most of the providers of ARP have launched diversified products only within the last few years, hence out-of-sample performance is limited. We have observed wide-ranging performance with net realized Sharpe ratios over the last few years, generally anywhere from 0 to above 1 on products that target 5% to 10% volatility. We believe this is more realistic than the backtested Sharpe ratios achieved in the above analysis, but is still compelling.

Strategy crowding

As this area grows in popularity, we believe further assets will flow into these strategies—particularly if they perform well and more providers begin to offer products. There is a question as to whether the strategies will continue to work as effectively in such a scenario. This is outside the scope of this paper and is an issue that should be revisited as the market grows.

Fees

ARP are not classified as alpha strategies and because of this, fees are lower than standard hedge fund fees. Typically, the fees for an ARP product featuring multiple premia would be from 0.7% per annum to 1% per annum management fee and 0% to 10% performance fee, with target volatilities of 6% to 10%. Higher volatility targets will generally command higher fees with the price point similar to multi-asset strategies on a unit risk basis.

Conclusion

Alternative risk premia strategies have exploded in popularity over the last few years driven by an increasing understanding of the demarcation between alpha and beta, and the potential for these strategies to add diversification to traditional portfolios. We are of the view that these strategies can offer sources of return that are different to traditional equities and bonds, at a price point that is appealing compared to hedge funds and competitive compared to actively managed long only and multi asset-strategies. As with other actively managed strategies, care must be taken in the evaluation and selection of these products.

Although these strategies do not provide alpha in the traditional sense, they do provide alternative sources of return, many that are not present in traditional portfolios. There are large discrepancies in implementation and strategy construction, and existing experience and platforms in trading systematic strategies can be an advantage. Going forward, we would expect relatively high performance dispersion within this space, closer to that seen in hedge funds than other actively managed strategies due to large variance in skillsets. Thus, while there is the potential to add significant value, we believe manager selection is critical to successful investing in this area.

Endnotes

1. "Portfolio Selection," Harry Markowitz, *The Journal of Finance*, Vol. 7, No. 1 (1952).
2. Alpha is a term used to denote manager skill.
3. Beta is a term used to denote the return available from the market; e.g., an investment in an S&P 500 tracker would have a beta of roughly 1 to the S&P 500 index.
4. The hedge fund industry grew from an estimated \$39 billion in 1990 to an estimated \$3.0 trillion in December 2016 (HFR).
5. "10 Insights on Rules-Based and Factor Investing," Aon Hewitt (2015).
6. More recently, attempts have been made to adapt the smart beta framework to fixed income investing.
7. Capital Fund Management, in particular, uses the market anomaly/insurance for risk illustration of Risk Premia. See "Risk Premium Investing—A Tale of Two Tails," CFM, 2015.
8. A straddle is the sale/purchase of a put and a call of the same strike. Such a strategy is not affected by changes in the price level of the index but is exposed to a change in volatility of the index. A short volatility strategy is profitable over time because investors are willing to overpay for market insurance.
9. Such strategies can be described as negatively skewed—they make regular and consistent small gains but can suffer large losses. Past performance is no guarantee of future results.
10. "Two Centuries of Trend Following," Capital Fund Management (2015); "A Century of Evidence on Trend-Following Investing," AQR (2014).
11. "Time Series Momentum," Moskowitz et al. (2011).
12. "Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency," Jegadeesh and Titman (1993).
13. For time series momentum, a security's own past return predicts its future return. For cross sectional momentum, a security's outperformance relative to peers predicts future relative outperformance ("Time Series Momentum," Moskowitz, Ooi and Pedersen (2010)).
14. "A Unified Theory of Underreaction, Momentum Trading, and Overreaction in Asset Markets," Hong and Stein (1999).
15. "The Disposition Effect and Underreaction to News," Frazzini (2006).
16. "Security Analysis," Graham and Dodd, 1934.
17. "Value and Momentum Everywhere," Asness, Moskowitz, and Pedersen (2013).
18. "Carry," Kojien et al. (2015).
19. The data for the following charts has been sourced from AQR, which manages a number of products within this space. The strategies shown do not represent all of the strategies that AQR manages. All data is shown from January 1990 through March 2016 except for FI Carry, Momentum, and Value, which is from February 1990 and Commodity Value, Momentum, and Carry, which is from May 1990. Momentum represents cross-sectional momentum strategies. All data presented is gross of fees and gross of trading costs. Any returns shown are excess of cash. Volatility has been normalised to 10% per annum for all strategies and combinations of strategies. Returns shown are a backtest and do not represent returns realised by any investor.
20. Taking this one step further, if strategies have a zero correlation to each other, the Sharpe ratio of a portfolio of such strategies will increase by the square root of the number of such strategies added. However, very few strategies are completely orthogonal to each other. See also Correlation and portfolio construction, Metolius Capital, 2013.
21. In this case, we will follow a naïve allocation of 33% to Carry, 33% to Momentum, and 33% to Value resulting in a portfolio of 13 different ARP. Carry, Momentum, and Value portfolios are equally weighted allocations to the relevant strategies above, rebalanced monthly.
22. The "traditional portfolio" is a 60/40 mix of equities and bonds, with equities represented by the MSCI World Index and bonds by the Barclays Global Aggregate Bond Index.
23. For reference, the 60/40 portfolio has a Sharpe ratio of approximately 0.4 over the period.
24. A principal component analysis will decompose the portfolio into the main set of factors that are driving its returns.
25. "Go Big or Go Home: A Case for an Evolution in Risk Taking," Mike Sebastian/Aon Hewitt, June 2012.

Author Bio



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Matthew serves as a Principal within Liquid Alternatives Manager Research at Aon Hewitt and is based in London. His research is focused on global macro, managed futures and other quantitative managers. His role includes sourcing, evaluating, conducting due diligence, and monitoring hedge funds on a global basis. Additionally he is involved in educating clients on various hedge fund strategies and implementing hedge funds within a wider portfolio.

Matthew joined in May 2011 from Fitzwilliam Asset Management, where he was a member of the Investment Committee running multi-strategy and commodity fund of hedge funds. Prior to that he was an Audit Supervisor at BDO, a large professional services firm. His role involved overseeing the audits of, and providing advice to, large to mid-sized companies in the property, mining and professional services arena.

Matthew graduated from University College London in 2001 with a first in Economics and Philosophy. He is a CAIA charterholder, an ACA charterholder and a Fellow of the ICAEW.



Chris Walvoord
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Chris leads Aon Hewitt's Global Liquid Alternatives Team within Global Investment Management. He oversees research and investment activities across a variety of liquid alternative strategies. His group is responsible for researching, recommending and monitoring managers for both advisory and delegated client portfolios.

Prior to joining AHIC in 2016, Chris was a portfolio manager and a member of the investment committee at William Blair. Chris was the lead PM for the custom hedge fund business at Blair which managed client specific portfolios for large institutional clients

William Blair entered the fund of hedge funds business by acquiring Guidance Capital, a fund of hedge funds firm founded in 2001, where Chris was one of five equity partners.

Prior to joining Guidance Capital, Chris managed an unconstrained bond strategy at the Northern Trust. Chris began his investment career in the Capital Markets Strategies Group at Nuveen. Prior to Nuveen Chris worked as an engineer in Motorola's Automotive Electronics Group.

Chris earned an M.B.A. degree in finance from The University of Chicago Booth School of Business, an M.S in Mechanical Engineering from the University of California Berkeley and a B.S. in Mechanical Engineering from the University of Illinois.