MEKETA
INVESTMENT GROUP

Alternative Risk Premia

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CONTRIBUTORS
Lauren Giordano
Ryan Lobdell, CFA, CAIA
Frank Benham, CFA, CAIA

This primer describes the investment strategy commonly known as Alternative Risk Premia. It provides an overview of and answers the types of questions institutional investors would be likely to ask when considering an investment in this area.

Alternative Risk Premia ("ARP") strategies invest in non-traditional risk premia. That is, rather than investing in stocks, bonds, or other assets that generate their returns from traditional betas, ARP strategies are designed to benefit from alternative betas such as value, momentum, and carry. Because they are designed to be void of traditional risk premia, their returns should be uncorrelated with the movements of global capital markets. Theoretically, this makes ARP strategies a potentially valuable diversifier.

What are risk premia?

Investments are "risky," meaning that their price could decline and result in a loss for investors. Typically, the "riskier" an investment is, the higher the potential return or gain is expected to be to compensate the investor for taking on that risk. This compensation for accepting a particular kind of risk is referred to as a "risk premium."[1] A risk premium helps to describe the relationship between risk and expected returns. Hence, investors would expect a higher risk premium for investing in riskier assets. For example, US equities, are expected to achieve long-term returns above those for investment grade bonds, given that equities are generally considered to be riskier than bonds. That is, US equities, have a higher risk premium than investment grade bonds.

[1] Technically, a risk premium is the higher return expected (ex-ante) or received (ex-post) in exchange for taking on risk that is in addition to the risk-free rate. The risk-free rate is the rate of return for an asset that (theoretically) has zero risk.

Types of traditional risk premia

Traditional risk premia are called "traditional" because they are pervasive, utilized heavily, and generally obtained/measured via long-only investing. Traditional risk premia are often divided into three categories: equity, credit, and interest rate. Each of the three categories are distinguished based on the type of risk being measured.

Equity risk premia describes the riskiness of and excess returns that are generated by a particular stock (or the stock market) above the risk-free return.

ex: S&P 500 return – Cash return = Equity Risk Premia

Credit risk premia describes the additional risk (above the risk-free rate) that arises from lending money that has the potential for default. It is the premium received for investing in the bonds of an entity (e.g., a corporation) that has the potential to default.

ex: Bloomberg Corporate Bond return – 10-year Treasury Bond return = Credit Risk Premia

Interest rate risk premia is the excess return generated by bonds to compensate for potential losses due to interest rate changes. Sensitivity to changes in interest rates is typically measured via duration, with longer duration bonds being more vulnerable to rising interest rates.

ex: 10-Year Gov Bond return – Cash return = Interest Rate Risk Premia

What are alternative risk premia?

ARP is a type of risk premia like those listed in the section above. However, while equity, credit, and interest rate risk premia are "traditional" and related to the market, ARP is "non-traditional" and not related to the broad market. By being "alternative" to the traditional market, the returns of strategies investing in these alternative risk premia should be uncorrelated to the rest of the traditional market. Put differently, the returns of ARP strategies should not be driven by the movements of the broad stock and bond markets.

Alternative Risk Premia managers seek to construct portfolios of these factors in a way that produces positive expected returns while also being uncorrelated to the traditional markets. Managers will purchase some assets outright (i.e., "go long") while short selling, (i.e., "shorting" or betting against) other, sometimes related, assets. The net effect of these positions can be targeted and sized for desired outcomes such as hedging effects and/or enhanced returns.

Types of ARP strategies

Some alternative risk premia are well known and adopted in the investment community, while others are less popular or not as widely used. Importantly, these factors can typically be applied across the four major asset classes (equities, bonds, currencies, and commodities). The most common premia used in ARP strategies are listed and described below.

Value

The value strategy targets buying (i.e., going "long") relatively cheap assets and short selling (i.e., "shorting") relatively expensive assets. The "behavioral" theory supporting value investing argues that investors consistently misprice value for several reasons, including overconfidence and the extrapolation of past returns.

Momentum

The momentum strategy refers to buying assets that have recently performed well (i.e., positive "momentum") and selling assets that have recently performed poorly (i.e., negative "momentum"). This approach is based on the assumption that the winners will continue to do well and the losers will continue to do poorly.

Carry

The carry strategy targets buying high-yielding assets and selling low-yielding assets. In essence, it involves borrowing at a low cost (e.g., low interest rates) and lending/investing at a higher return (e.g., higher interest rates).

Defensive

The defensive strategy targets going long on lower risk ("safer") assets and shorting, higher risk ("riskier") assets. The underlying theory is that the risk-adjusted returns of lower risk, higher-quality assets may outperform those of riskier assets.

Volatility

The volatility risk premium strategy is based on the compensation investors can earn for providing insurance against market losses. Investors can capitalize on this phenomenon, where implied volatility may be higher than realized volatility, via the options market.

Trend

Some managers also allocate to trend following within their ARP strategy. Trend is similar to the momentum strategy, but instead of an asset's performance being compared to the rest of the market, it is compared to its own history.

Why invest in alternative risk premia?

Alternative Risk Premia has the potential to provide several benefits to investors seeking to diversify their portfolio. The most prominent benefit of ARP is diversification. ARP strategies use traditional assets but generate non-traditional returns. As such, ARP aims to provide diversification away from traditional risk premiums. Another benefit of ARP is that it has relatively low costs and fees in comparison to many other strategies that seek to provide diversification benefits (e.g., traditional hedge funds).

To illustrate ARP's diversification benefits, the following sections analyze two variations of diversification.[2] The first is ARP's correlation to the major asset classes found in most investors' portfolios, and the second is ARP's correlation to hedge funds.

[2] The Bloomberg GSAM Cross Asset Risk Premia 6% VT Index is used to represent ARP in this paper unless otherwise noted. See the Appendix for more information on this and other ARP indices.

Diversification relative to other asset classes

It is often important for investors to be adequately diversified amongst different asset classes in a portfolio. Just because a portfolio looks like it has many different categories (or "slices"), that does not necessarily mean the portfolio is well diversified. Investors need to take a deeper look, below the surface of asset titles, and see what

risks each "slice" exposes the investor to. If these risks are overlapping and highly correlated, a portfolio may not be adequately diversified. Alternative Risk Premia strategies are designed to accept risks that are uncorrelated with those of the major asset classes.

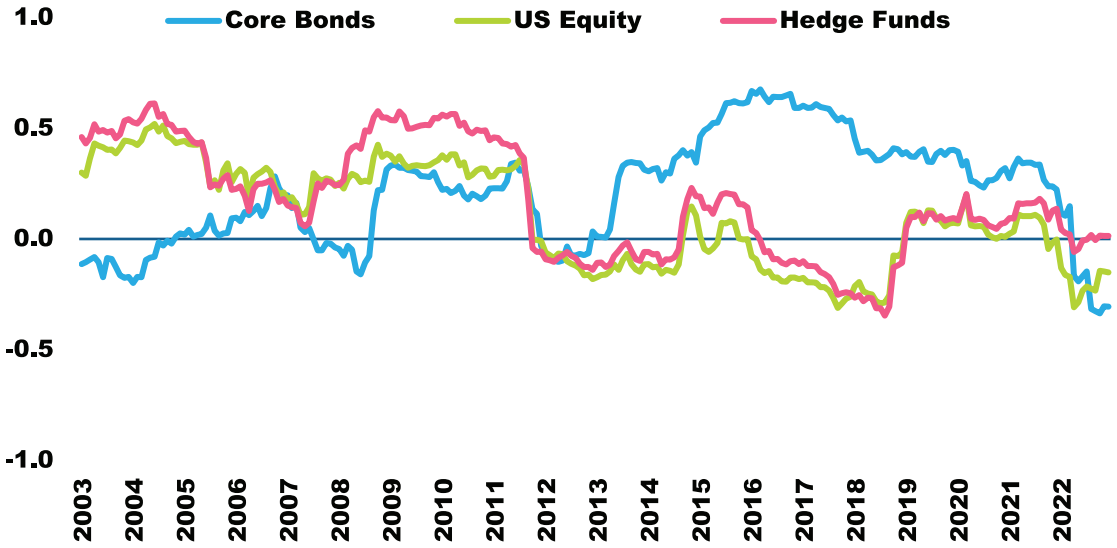

FIGURE 1
Rolling 3-Year Correlation to ARP

Source: Bloomberg, annualized monthly returns as of December 2022. Data sourced as of March 2023. Indices used: Russell 3000, Bloomberg US Aggregate Bond Index, HFRI Weighted Composite Index, and Bloomberg GSAM Cross Asset Risk Premia 6% VT Index.

Figure 1 illustrates how ARP is largely uncorrelated with major asset classes. There have been brief periods where each asset has shown a moderate correlation to ARP, but none have shown a consistent pattern of high long-term correlation (either positive or negative). On average, the historical correlation has tended to be near zero.

Even though these asset classes have not exhibited a consistently strong correlation, it does not mean ARP cannot or will not go down (or up) when these asset classes do. A low/insignificant correlation implies that there is no predictability in whether ARP moves with the asset classes (i.e., it is a coin flip). This low correlation means that, when added to a portfolio, ARP has on average offered the historical benefit of returns that do not necessarily behave like the major asset classes.[3]

[3] See the Appendix for ARP's average historical correlations to other major asset classes.

Diversification from hedge funds

Alternative Risk Premia is occasionally compared to hedge funds because both are thought to target "alternative" sources of return relative to long-only investments in traditional asset classes. However, ARP and hedge funds are quite different. While both may engage in short-selling or invest in assets besides traditional stocks and bonds, that is where most of the similarities end. Hedge fund is a general term used to describe a broad array of strategies, only a small sub-set of which may invest in the same markets as ARP. Further, many hedge fund strategies seek to have a positive beta – and hence a fairly high correlation – with the broad markets, while others may seek to exhibit a negative correlation.

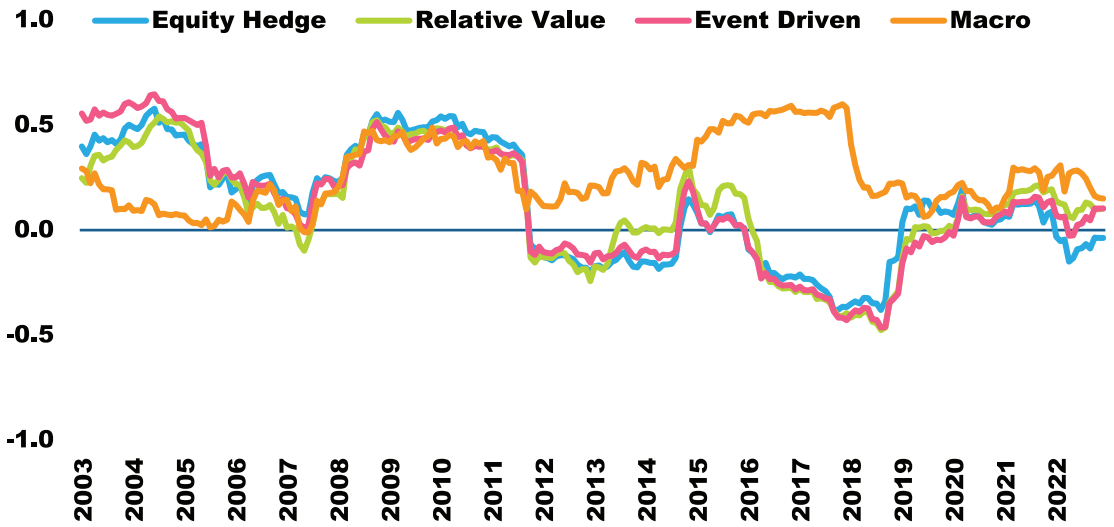

FIGURE 2
Rolling 3-Year Correlation to the Major Hedge Fund Categories

Source: Bloomberg, annualized monthly returns as of December 2022. Data sourced as of March 2023. Indices used: Bloomberg GSAM Cross Asset Risk Premia 6% VT Index, Hedge Fund Research HFRI Equity Hedge TR Index, Hedge Fund Research HFRI Relative Value Total Index, Hedge Fund Research HFRI Event-Driven TR Index, Hedge Fund Research HFRI Macro Total Index.

Figure 2 exemplifies this distinction between ARP and the most common hedge fund categories. The four hedge fund categories all follow roughly the same pattern, though Macro did stray from the group from roughly 2012 to 2019. If ARP and these hedge fund categories were targeting the same diversification benefit, then the rolling 3-year correlation would be consistently higher (e.g., between 0.5 and 1.0). Instead, the rolling 3-year correlation of each category has averaged only slightly above zero since 2000. There have been a few times where correlation was elevated, particularly during and after market downturns such as the Global Financial Crisis ("GFC"). However, these spikes did not last for long and did not move very high (e.g., significantly over 0.5).

These four hedge fund categories, like the aggregate hedge fund category in Figure 1, do not demonstrate a substantial or consistent correlation to ARP, having alternated between negative and positive correlations. As such, hedge fund strategies provide a different diversification benefit than that of ARP. We expect this to continue in the future, given the manner in which the respective strategies are constructed.

How has ARP performed?

Though the underlying concept of Alternative Risk Premia has been around for many years, ARP as a stand-alone strategy has only become popular in recent years. Unfortunately, this means historical performance data for ARP strategies is limited, as is the depth and breadth of available ARP indices.

In this paper, we use the Bloomberg GSAM Cross Asset Risk Premia 6% VT Index ("GSAM") as a proxy for ARP performance. The index began in 1999 and is an equal risk-weighted exposure of the Bloomberg GSAM US Equity Multi Factor Index and the GSAM Macro Risk Premia Index. The index was chosen because it has one of the oldest inception dates, is one of the most common ARP indices, is comprised of many ARP strategies that invest globally across asset classes, and because its performance is similar to that of other ARP indices for their overlapping periods.[4]

[4] See the Appendix for more information on ARP indices and their characteristics.

Historical returns

Alternative Risk Premia's average performance over the last 20 years has been comparable to that of riskier asset classes, such as high yield bonds and public equities.

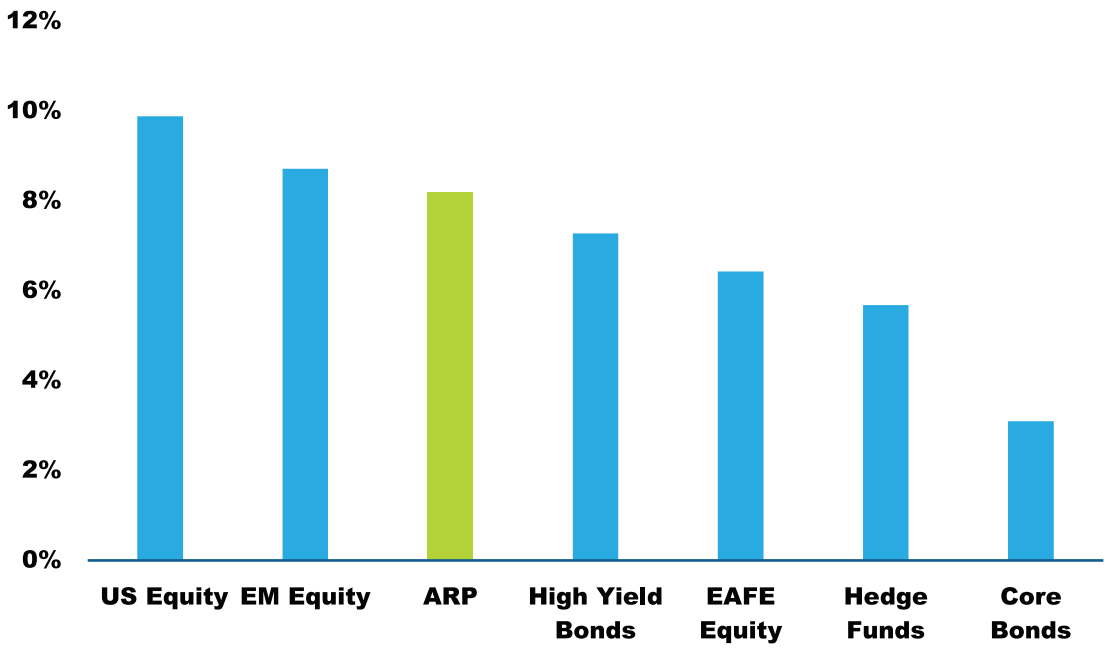

FIGURE 3
Trailing 20-Year Average Annualized Returns

Source: Bloomberg, annualized monthly returns as of December 2022. Data sourced as of March 2023. Indices used: Bloomberg Barclays US Corporate High Yield Bond Index, MSCI EM, Russell 3000, Barclays US Aggregate Bond Index, HFRI Weighted Composite Index, MSCI EAFE, and Bloomberg GSAM Cross Asset Risk Premia 6% VT Index. Note that all historical performance presented throughout this document is net of fees.

Note, however, that ARP's historical returns were inflated by performance during the 2003 to 2008 period (see Figure 4). Like hedge funds, ARP returns grew significantly in the pre-GFC years only to subsequently decline during the GFC. Alternative Risk Premia's post-GFC performance had, for the most part, held steady above both hedge funds and core bonds. However, ARP's performance during and after the Covid-19 pandemic was below both hedge funds and core bonds until mid-2022, when it surpassed core bonds.

Figure 4 compares Alternative Risk Premia's rolling 3-year return performance to that of hedge funds and core bonds. It shows that this subpar performance during Covid-19 is not a new trend. ARP returns have been gradually yet steadily declining over the past decade. This decline does not necessarily mean all of ARP's underlying strategies have performed poorly, only that some have, and to an extent that has dragged down the overall return. This is perhaps due to betas being arbitraged away at the margins as investors become increasingly aware of and adopt some of the strategies that seek to take advantage of these betas. As a result, we believe ARP's recent returns are more indicative of the future for ARP strategies and that investors should not expect high single-digit returns from ARP. Rather, it is likely that the future returns of ARP will more closely resemble those of hedge funds or investment grade bonds.

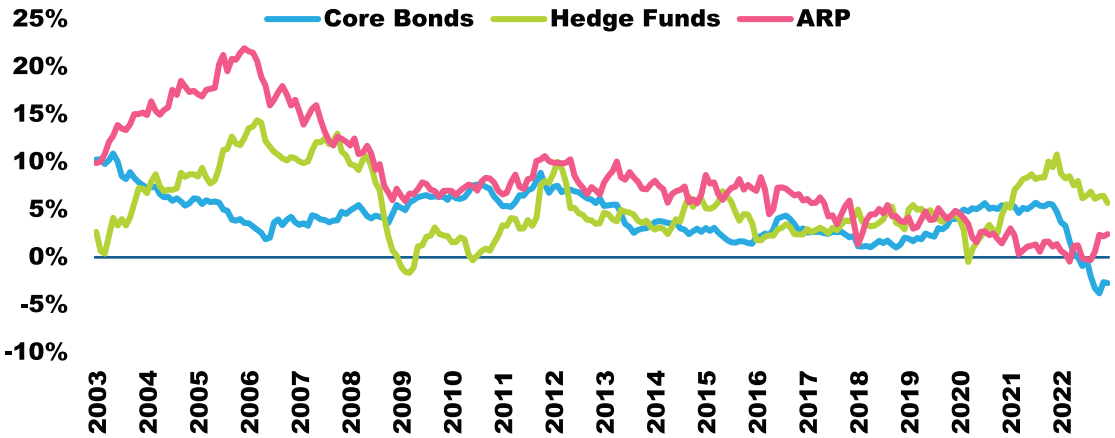

FIGURE 4
Rolling 3-Year Returns

Source: Bloomberg, annualized monthly returns as of December 2022. Data sourced as of March 2023. Indices used: HFRI Weighted Composite Index, Bloomberg US Aggregate Bond Index, and Bloomberg GSAM Cross Asset Risk Premia 6% VT Index.

Volatility

Over the past 20 years, Alternative Risk Premia's volatility has been below that of public equities and comparable to that of hedge funds. It is worth noting that ARP strategies can be levered to target a desired volatility level.

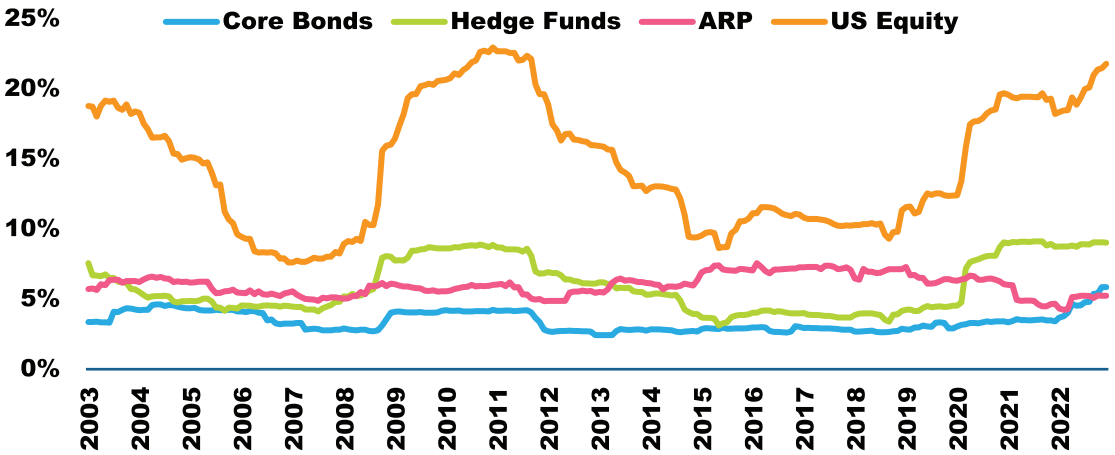

FIGURE 5
Annualized Rolling 3-Year Volatility

Source: Bloomberg, annualized monthly returns as of December 2022. Data sourced as of March 2023. Indices used: Russell 3000, Bloomberg US Aggregate Bond Index, HFRI Weighted Composite Index, and Bloomberg GSAM Cross Asset Risk Premia 6% VT Index.

The historically low volatility of ARP strategies, combined with their low correlation with other asset classes that was described earlier, makes them a potentially attractive strategy for investors to consider for their portfolio.

Investing in ARP

Universe size

The universe of dedicated ARP strategies is rather limited in size and scale. For example, as of 2021 ARP was less than 1% of the size of the hedge fund marketplace.[5] In theory, this could pose an obstacle for large investors utilizing ARP strategies (i.e., large investors may experience difficulty making meaningful allocations unless they have the resources to manage the allocation in house). However, the highly liquid nature of ARP strategies means they could be managed at scale.

[5] Sources: Reuters, SG Alternative Investments. As of September 2021, the size of the hedge fund universe was approximately $4 trillion while the size of the ARP universe was approximately $33 billion.

Assets under management ("AUM") in Alternative Risk Premia peaked in 2018, as illustrated in Figure 6. While AUM has been decreasing ever since, this decline has more recently begun to taper off.

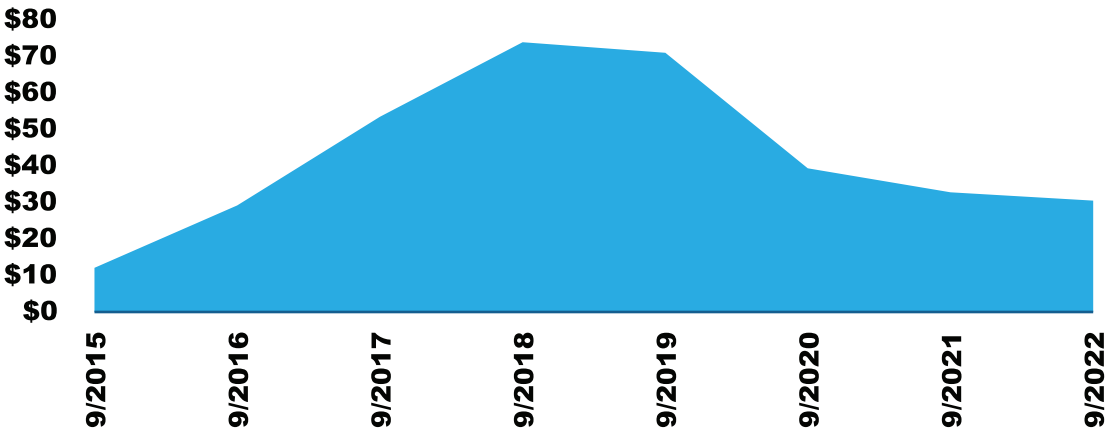

FIGURE 6
Global ARP AUM (in billions of USD)

Source: SG Alternative Investments. Data as of September 30, 2022.

Figure 7 illustrates the number of managers who employ strictly ARP strategies. Just as with total AUM, the number of global ARP managers peaked in 2018 and has since been declining.

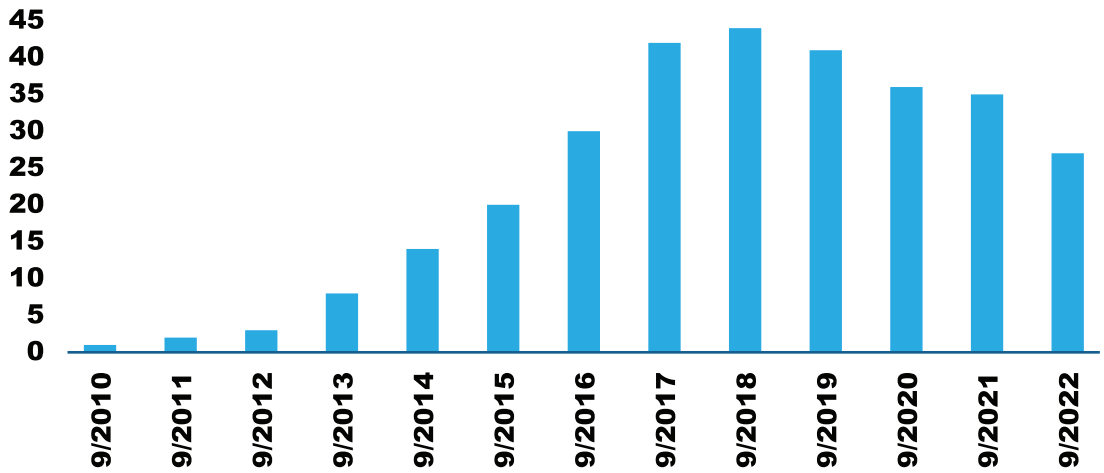

FIGURE 7
Number of Global ARP Managers

Source: SG Alternative Investments. Data as of September 30, 2022.

The decline in AUM is likely a direct result of the lagging performance of ARP strategies over the past five years. Several years of persistent low returns has corresponded with declines in ARP assets held in portfolios as well as declines in the number of ARP funds and managers.

Portfolio construction and manager selection

Manager selection is very important when building ARP into a portfolio. The nature of ARP's strategy leaves a wide range of possible investments and results in a wide level of dispersion among managers. Interquartile spreads are perhaps the best way of measuring the level of return dispersion. They can also be viewed as the potential value that is achievable when selecting superior managers (or that can be detracted by subpar managers).

Figure 8 depicts the interquartile spread of ARP, investment grade bonds, US large cap equity, and hedge funds. ARP is represented by the ten largest ARP managers, as defined by the SG Multi Alternative Risk Premia ("SG MARP") index. Among the ten largest ARP managers, it is evident that fund performance varies significantly. ARP shows a larger spread than that of the other asset classes, which implies a heightened importance to manager selection. Note that the relatively high level of return dispersion for ARP may be partly because the universe being measured only contains ten funds.

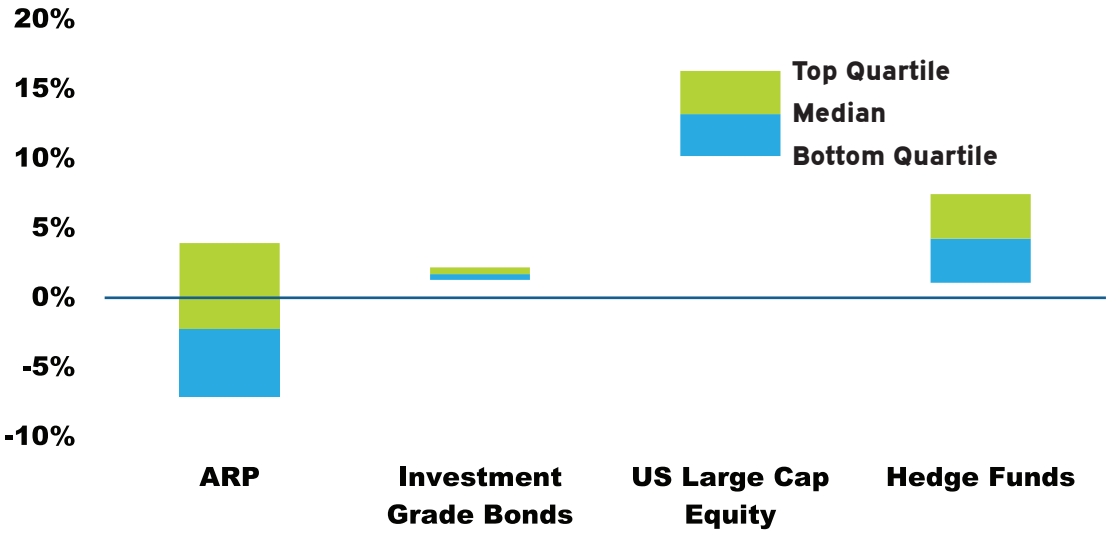

FIGURE 8
Trailing 5 Year Interquartile Returns

Sources: Interquartile spreads are based on Meketa's analysis of Trailing 5-Year Returns as of October 2022. Data for US Large Cap Equity, Investment Grade Bonds, and Hedge Funds is from eVestment. Data for ARP is from SG Alternative Investments. ARP performance is proxied by the SG MARP Index, which measures the performance of the 10 largest multi-asset and multi-risk premia strategy managers and is based on manager-provided returns. Hedge Fund and ARP data are net of fees, while Investment Grade Bonds and US Large Cap Equity data are gross of fees.

While ARP managers, in theory, harvest the same risk premia, in practice the numerous smaller design choices of a fund, when aggregated, can result in meaningful dispersion between strategies and across manager performance. This dispersion among ARP strategies is due to several factors that are listed below:

- → Differences in allocations across the premia;
- → Differences in how the premia are measured (e.g., some value premia may only use P/B while others may incorporate other metrics or include intangibles);
- → Differences in what assets are traded (e.g., some may exclude single name equities);
- → Differences in what premia are traded (e.g., some allocate to short volatility);
- → Differences in portfolio construction and risk management.

This level of return dispersion has implications for investors. For example, when an investor selects an active core bond fund, they are often fairly confident that the return the manager produces will closely resemble that of the Bloomberg Aggregate benchmark, as well as their core bond peers. But that is not necessarily the case for ARP strategies. As with other asset classes where return dispersion is elevated, an investor can build a portfolio of multiple ARP funds to reduce dispersion to a level that is suitable for them.

Investors can construct an Alternative Risk Premia portfolio using any combination of alternative risk premia. Which premia to include, and in which weights, varies. Investors may choose to allocate to ARP by investing in funds with ARP-only mandates or in funds that utilize ARP strategies as one part of a broader, overarching strategy.

Implementation considerations

The vast majority of ARP managers offer comingled funds, mutual funds, or private investment funds, though separately managed accounts are also available. ARP funds are typically structured as open-ended vehicles that provide monthly or daily liquidity. There is no minimum investment needed for many ARP funds, as there are mutual fund options available.

Fees and costs tend to be lower than for traditional hedge fund strategies.[6] Typically, ARP strategies do not have performance fees, and management fees are lower than most hedge fund strategies. In Meketa's experience, these management fees tend to be a flat rate around 75 to 150 basis points.[7] ARP's lower fees are a product of having a systematic process applied to the largest, most liquid markets (e.g., equities, fixed income, currencies, commodities).

[6] Source: Preqin, "2022 Preqin Global Hedge Fund Report."

[7] Based on Meketa's observation from past public RFP processes with clients.

Role in a portfolio

This section analyzes ARP's impact on a theoretical portfolio as well as ARP's performance during times of economic upturns and downturns.

Asset allocation benefits

In Figure 9 below, we show the impact of including different Alternative Risk Premia allocations in a theoretical portfolio. For the purpose of this exercise, we consider three theoretical portfolios: no ARP, 5% ARP, and 10% ARP.[8]

[8] These 5% and 10% ARP portfolio allocations are intended only for demonstrative purposes; it is not intended to suggest a target allocation for investors.

Asset Class	No ARP	5% ARP	10% ARP
Global Equity	40	38	36
Private Equity	10	10	10
Investment Grade Bonds	35	32	29
High Yield Bonds	5	5	5
Hedge Funds	5	5	5
TIPS	5	5	5
Alternative Risk Premia	*0*	*5*	*10*
Expected Return	**7.7%**	**7.7%**	**7.7%**
Expected Standard Deviation	**10.6%**	**10.3%**	**10.0%**
Sharpe Ratio	**.45**	**.47**	**.48**

FIGURE 9
Impact of Adding ARP

Source: Based on the 20-year assumptions from Meketa's 2023 Capital Markets Expectations.

The results support the thesis that adding Alternative Risk Premia can lower risk while maintaining similar target returns, thus making the portfolio more efficient (as illustrated by the higher Sharpe ratios). By adding a modest ARP allocation, a diversified portfolio can lower the expected standard deviation. For example, the "No ARP" portfolio's standard deviation is 10.6%, however, after adding a 5% and 10% allocation to Alternative Risk Premia, standard deviation drops to 10.3% and 10.0%, respectively.

Diversification during downturns

Another way to view ARP's diversification effect is to compare how it performed during times of market downturns. Because ARP has a limited history, three major downturns that occurred during or after 2000 are analyzed. Figure 10 shows that ARP outperformed both US stocks and hedge funds in all three scenarios. During the popping of the technology media and telecom ("TMT") bubble and the Global Financial Crisis, ARP not only performed better but was able to generate positive returns. During the Covid-19 market shock, ARP's performance was negative, but the drawdown was nowhere near as severe as that experienced by US stocks.

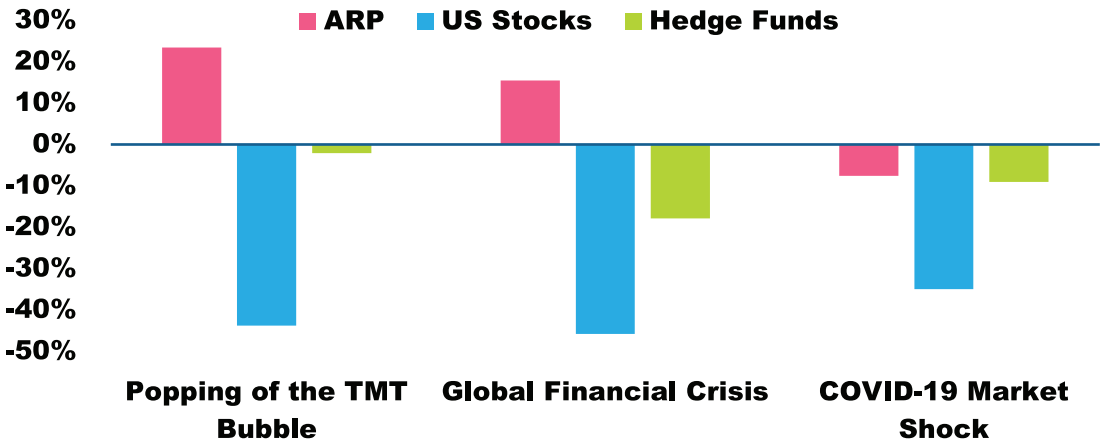

FIGURE 10
Performance During Downturns

Sources: ARP performance is represented by the Bloomberg Alternative Risk Premia Balanced RC 6% AF ER USD Index, which Meketa uses as a proxy for ARP when conducting scenario analysis within our Asset Allocation tool. Returns are cumulative for the time period over which the scenario occurred. Dates for the three events in order are: Apr 2000 - Sep 2002, Oct 2007 - Mar 2009, Feb 2020 - Mar 2020.

This further illustrates how ARP is not correlated to traditional asset classes. While riskier asset classes generally performed poorly during the market downturns, ARP generated returns that were separate and uncorrelated. Generating returns uncorrelated to traditional asset classes means that ARP may have different "bad times" than the rest of the market. These different "bad times" result in ARP having the potential for relative outperformance during times of economic downturns, thus mitigating total portfolio losses.

Diversification during upturns

Similar to the section above, this section assesses ARP's diversification effect by comparing its performance during times of four major economic upturns that occurred during or after 1998.

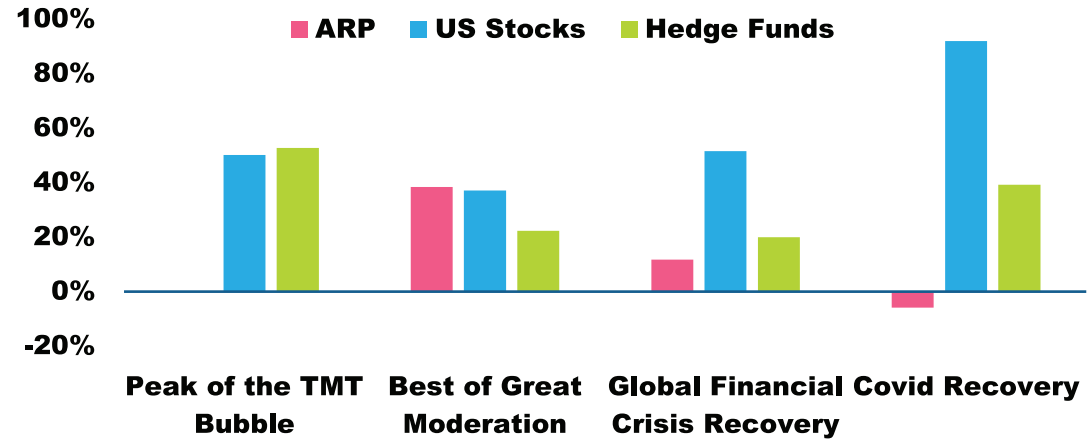

FIGURE 11
Performance During Upturns

Sources: ARP performance is represented by the Bloomberg Alternative Risk Premia Balanced RC 6% AF ER USD Index, which Meketa uses as a proxy for ARP when conducting scenario analysis within our Asset Allocation tool. Returns are cumulative for the time period over which the scenario occurred. Dates for the four events in order are: Oct 1998 - Mar 2000, Apr 2003 - Feb 2004, Mar 2009 - Nov 2009, Apr 2020 – Dec 2021.

Just as Alternative Risk Premia has the potential for different "bad times," it also has the potential for different "good times." These different "good times" mean that ARP may not keep pace with traditional assets such as equities during economic upturns. This can be seen in Figure 11 during the Peak of the TMT Bubble, the recovery from the Global Financial Crisis, and the Covid Recovery. Yet, ARP produced higher returns than both US stocks and hedge funds during the Best of the Great Moderation period. Thus, Alternative Risk Premia produced returns that have done both better and worse during market upturns.

Conclusion

Alternative Risk Premia are designed to harvest risk premiums across the global capital markets in a manner that avoids exposure to traditional risk premia and thus makes them uncorrelated with the major asset classes used by investors. ARP strategies invest in factors such as momentum, carry, value, defensive, and volatility, among others. Due to the wide range of strategies and possible investments, manager selection and portfolio construction are important when investing in ARP strategies.

Over the past 20 years, ARP has been uncorrelated (on average) with the major asset classes. Moreover, ARP's ability to have different "bad times" (or "good times") has resulted in returns that may or may not correspond to the rest of the market during economic downturns and upturns. An allocation to Alternative Risk Premia can help generate returns uncorrelated with traditional asset classes, thus acting as a diversifier within a multi-asset class portfolio.

Appendix 1 | ARP indices

There are several Alternative Risk Premia indices, each representing a different mix of assets and strategies. The table below lists some of the most common indices and the main characteristics of each.

ARP Indices	Characteristics
Bloomberg GSAM Cross Asset Risk Premia 6% VT Index (BGSRP06)	· Popular index in the ARP universe · Composed of the Bloomberg GSAM US Equity Multi Factor Index and the Bloomberg GSAM Macro Risk Premia Index · Multi-strategy and cross-asset classes · Began in 1999
Bloomberg GSAM US Equity Multi Factor Index (BGSUSEMF)	· Part of the GSAM Cross Asset Risk Premia Index · Exposure to momentum, value, low risk and quality factors in the US Equity market · Composed of: Bloomberg GSAM US Equity Momentum L/S Index, GSAM US Equity Value L/S Index, GSAM US Equity Low Risk L/S Index, and GSAM Equity Quality L/S Index · Began in 2007
Bloomberg GSAM Macro Risk Premia Index (BGSMARP)	· Part of the GSAM Cross Asset Risk Premia Index · Exposure to trend, carry and value factors in commodities, currencies, bonds, and equities using futures and forwards · Composed of: Bloomberg GSAM Cross Asset Trend Index and the GSAM Cross Asset Carry and Value Index · Began in 1999
SG Multi-Alternative Risk Premia Index (NEIXMARP) *Despite being a very common ARP index, it is not used to represent ARP in this paper due to its short history	· One of the most common indexes · Focuses only on 10 largest ARP managers (by AUM) · Managers invest across risk premia factors and asset classes · Not investible · Began in 2015
Barclays Alternative Risk Premia Balanced RC 6% AF ER USD Index (BXIIAB6U)	· Represents a multi-strategy, global ARP perspective · This index is used in Meketa's Capital Markets Expectations · Began in 2007
Eurekahedge Multi-Factor Risk Premia Index (EHFI900)	· Focuses only on ARP strategies by large global banks · Includes allocations to traditional strategies (passive exposures to well-known asset-based risk premia) · Investments across risk premia strategies and asset classes · Began in 2010
S&P Global: Alternative Risk Premia Indices	· Multiple indices, each ARP strategy has its own index · No combined/total multi-strategy ARP benchmark · Not widely used · Most of the indices began around 2013

FIGURE 12
Characteristics of ARP Indices

Source: "Bloomberg GSAM Cross Asset Risk Premia 6% Volatility Target Index", July 2021. "Bloomberg GSAM US Equity Multi Factor Index," July 2021. "Bloomberg GSAM Macro Risk Premia Index," July 2021. Societe General, "SG Multi Alternative Risk Premia Index," July 2021. Barclays, "Alternative Risk Premia Indices." Eurekahedge, "Multi-Factor Risk Premia Index." S&P Dow Jones Indices, "Alternative Risk Premia."

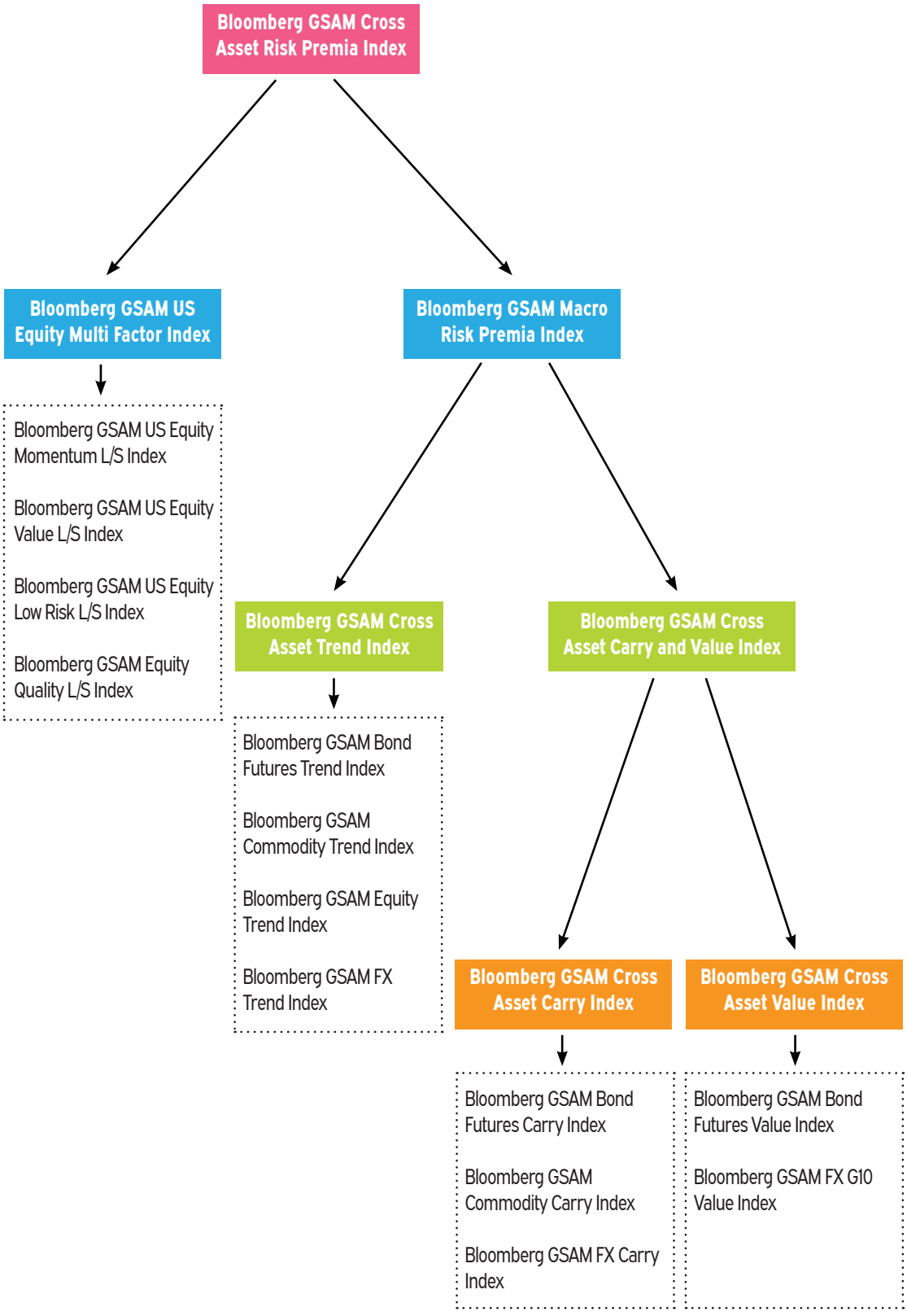

FIGURE 13
Diagram of Bloomberg GSAM Cross Asset Risk Premia Constitutes

Source: Bloomberg, "Bloomberg GSAM Cross Asset Risk Premia 6% Volatility Target Index," July 2021.

Appendix 2 | GSAM and SG MARP index comparison

The Bloomberg GSAM Cross Asset Risk Premia 6% VT Index was chosen to represent ARP throughout this paper. The other commonly used index is the SG Multi Alternative Risk Premia Index ("SG MARP"). The SG MARP is a non-investable index of funds that focuses only on the 10 largest ARP managers. The downside is that it has a limited history as it only began in late 2015. Both the GSAM and SG MARP are popular in the ARP universe, employ multiple ARP strategies, and invest across asset classes. Due to the SG MARP's limited history, it is difficult to construct historical performance and meaningful comparisons. Thus, the Bloomberg GSAM was chosen to represent ARP.

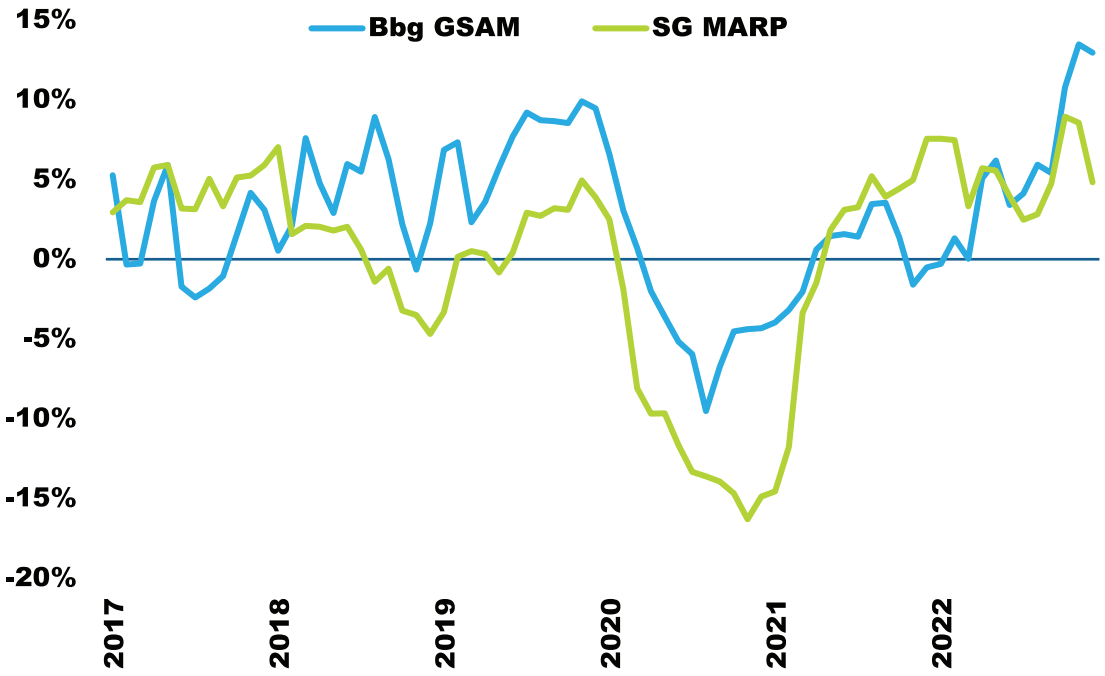

FIGURE 14
GSAM and SG MARP Rolling 1-Year Returns

Source: Bloomberg, annualized monthly returns as of December 2022. Data sourced as of March 2023. Indices used: SG Multi Alternative Risk Premia Index and Bloomberg GSAM Cross Asset Risk Premia 6% VT Index.

As shown above, the GSAM and SG MARP depict similar trends, though the SG MARP appears to be smoother and slightly lagged.

Appendix 3 | ARP correlations

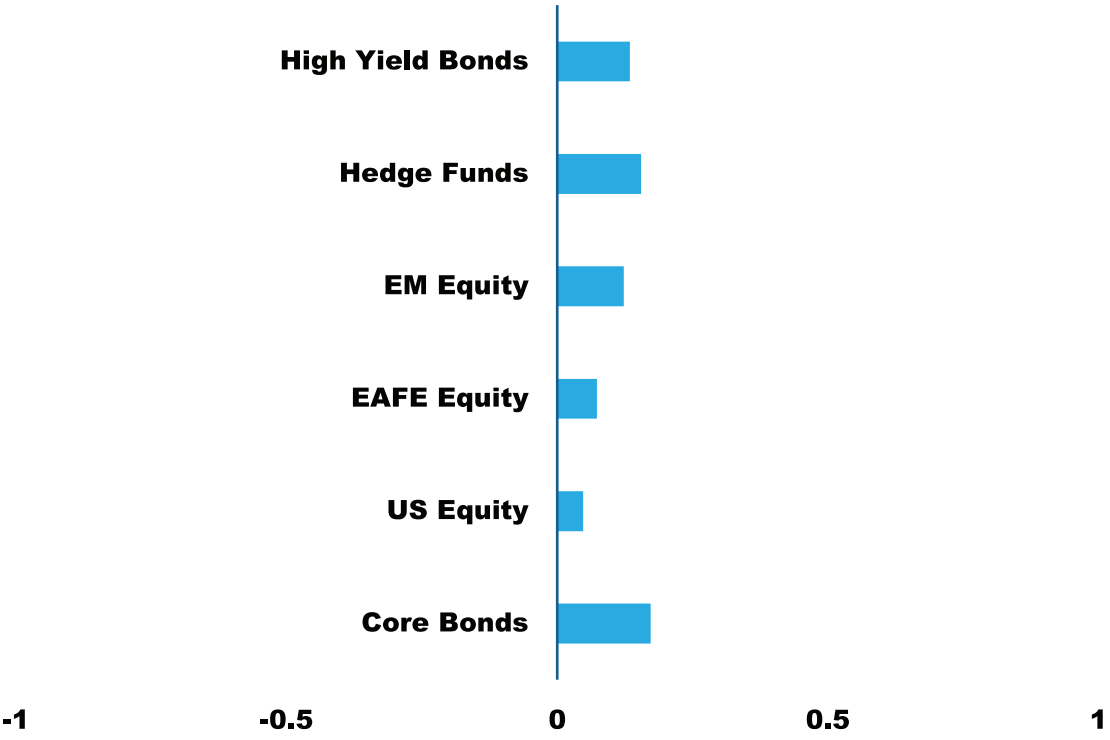

FIGURE 15
Average Correlation with the Major Asset Classes Over the Last 20 Years

Source: Bloomberg, annualized monthly returns as of December 2022. Data sourced as of March 2023. Indices used: Bloomberg US Corporate High Yield Bond Index, MSCI EM, Russell 3000, Bloomberg US Aggregate Bond Index, HFRI Weighted Composite Index, MSCI EAFE, and Bloomberg GSAM Cross Asset Risk Premia 6% VT Index.

Figure 15 illustrates how ARP has been, on average, historically uncorrelated with the major asset classes. Each bar depicts that asset class's average correlation to ARP over the past 20 years. All of the major asset classes show only a small positive correlation to ARP; however, none show a strong (significant) correlation.

Appendix 4 | ARP, factor investing, & smart beta

ARP is sometimes used interchangeably with related factor-based investing and smart beta strategies. The concepts are quite similar, though the differing terminology can lead to confusion. Factor based investing, or factor investing, is an investment strategy where specific macroeconomic or stylistic factors are targeted when building a portfolio. Because ARP targets specific factors (or strategies) that are unrelated to the traditional market, it is considered a type of factor investing.

Smart beta is an investment strategy that targets expected returns from long-term assets that are not tied to the traditional market. It targets the same diversification benefit as ARP but differs in implementation. Specifically, smart beta invests via a long-only approach, while ARP engages in both long and short-selling assets. Moreover, because smart beta strategies are long-only, they are essentially the same as long-only factor investing.

Appendix 5 | Interquartile returns for ARP strategies

The level of return dispersion for the ten largest ARP managers can vary considerably from one year to the next. For example, from 2016 through 2019, the interquartile spread was approximately 5.5%, but in 2020 and 2021, it was 13% and 21%, respectively.

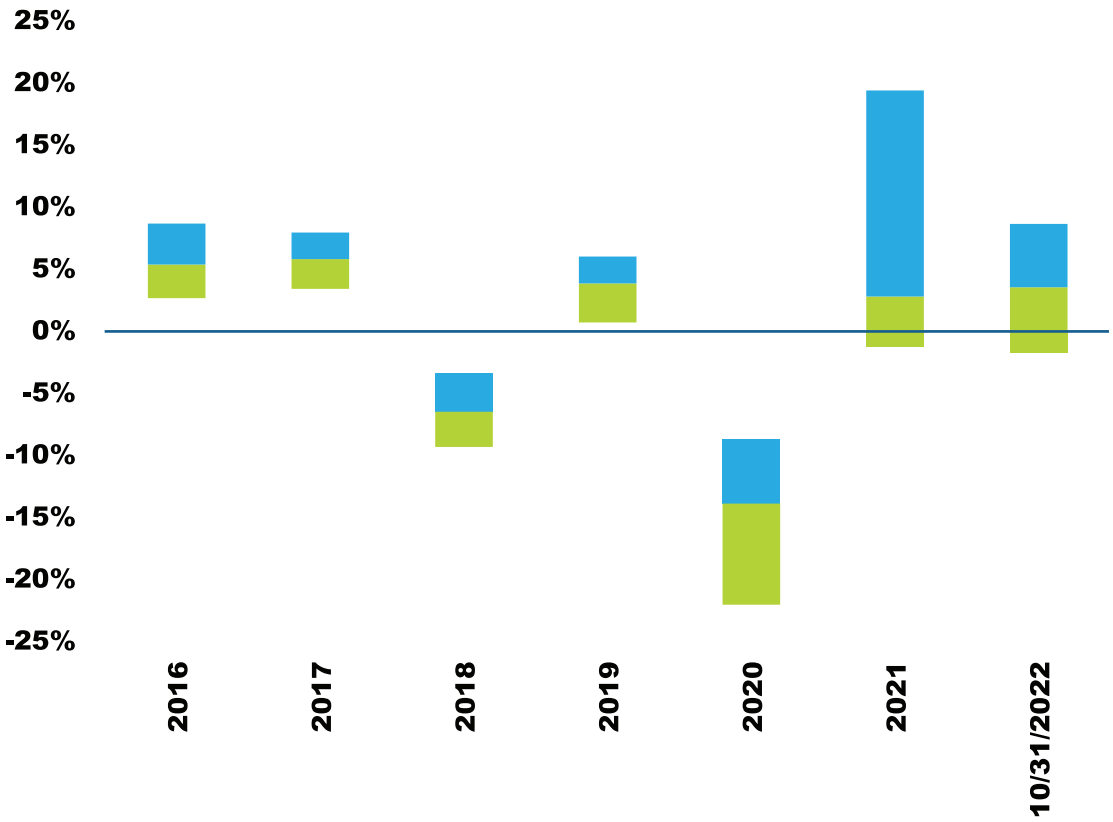

FIGURE 16
Interquartile Returns by Calendar Year

Source: SG Alternative Investments. Data as of October 31, 2022. The SG MARP Index measures the performance of the 10 largest multi-asset and multi-risk premia strategy managers by year and is based on manager-provided daily net returns.

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