MEKETA

Long Volatility Investment Strategies Primer

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Investors can have various definitions for what "risk" means to them, and they may use different tools to manage that risk. Meketa views long volatility strategies as one "tool in the toolbox" for investors as defense against sharp, quick drawdowns in global markets. These tools may serve as the first line of defense during the initial stages of a market shock and may be part of a broader allocation to risk mitigating strategies (RMS).[1]

In this paper, we explore long volatility strategies through a variety of lenses, including how they work, how investment managers build strategies, how they have performed, portfolio use-cases, their role within an RMS framework, and more.

Key takeaways

- **Definition:** Long volatility strategies are investment approaches that aim to profit from rising levels of actual or expected volatility in financial markets. These strategies typically involve owning assets that benefit from increased market volatility, such as options or other derivative instruments.
- **Purpose and performance:** Long volatility strategies are expected to provide modest returns in most market environments. The appeal is their ability to serve as a defense mechanism against sharp, quick drawdowns in global markets, making them a crucial component of a broader risk mitigation strategy.
- **Reliability:** Long volatility has served as a more consistent and reliable hedge than most other safe haven assets (e.g., cash, gold, long Treasuries) across a broad range of market downturns. The strategy has shown low or negative correlation with global equities and credit risk, making it a valuable addition to a portfolio dominated by growth risk.
- **Role in Risk Mitigating Strategies (RMS):** Long volatility strategies are categorized as "First Responders" within Meketa's RMS framework. These strategies are intended to be the first line of protection during significant equity drawdowns, alongside long-term US Treasuries and tail risk strategies.

What are long volatility strategies?

Volatility, in its simplest form, is a measure of variability. It is a measure of how different the actual outcome was from the expected outcome. Higher volatility conveys a greater amount of uncertainty.

[1] For an in-depth look at risk mitigating strategies, see Meketa's RMS Whitepaper. https://meketa.com/leadership/risk-mitigating-strategies/

Long volatility strategies seek to benefit from rising levels of actual or expected volatility in financial markets. Specifically, the "long" in long volatility, means that the investor owns assets that may benefit from increasing volatility levels. Long volatility investment managers may invest across one or more asset classes. For example, some may pursue strategies that trade based on volatility only in equity markets, while others may invest based on volatility in rates, currencies, and commodities. Some may even invest across all asset classes. Because equity market drawdowns tend to be accompanied by sharp increases in volatility, strategies that are long equity volatility are expected to profit in such an environment.

What are some commonly referenced measures of expected market volatility?

One of the most common and widely used measures of market volatility is the Volatility Index (ticker: VIX) published by the Chicago Board Options Exchange ("CBOE"). The VIX measures the level of expected volatility of the S&P 500 Index over the next 30 days.[2] As shown in Figure 1, the two largest price spikes in the VIX occurred in the highly volatile times of the Global Financial Crisis ("GFC") in 2008-2009 as well as the Covid-19 Pandemic in 2020.

[2] The index is calculated using the mid-quote prices of the S&P 500 Index ("SPX") call and put options.

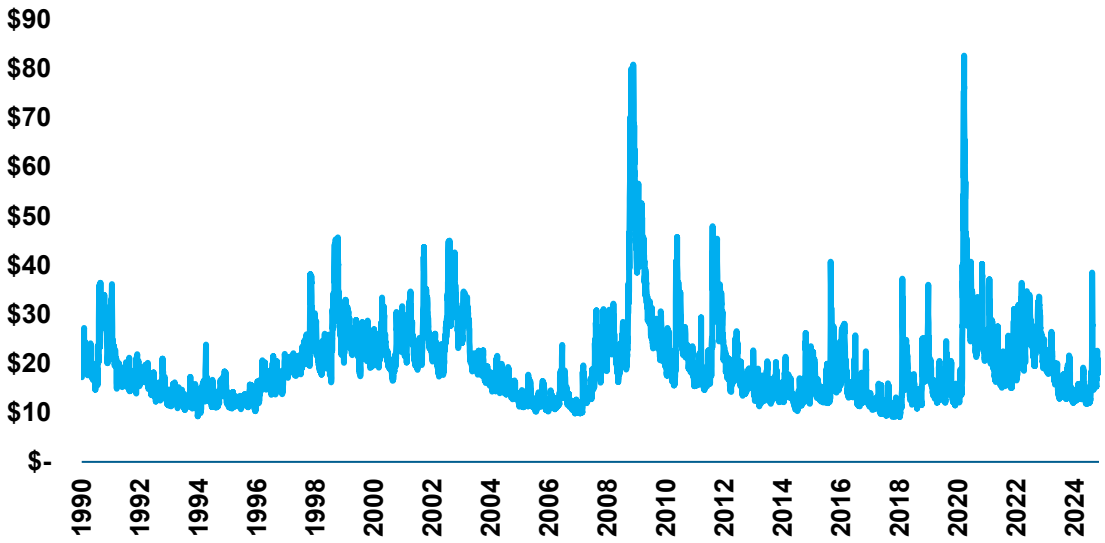

FIGURE 1
CBOE VIX Price Chart (Daily Close)

Source: FactSet, as of October 31, 2024. Represents the daily closing price.

To illustrate how the VIX moves with equity markets, Figure 2 shows the five worst days of performance in the S&P 500 since 1990 and the corresponding change in the VIX on those days. Not only were the VIX moves positive, but they were asymmetrically larger than the moves of the S&P 500. Since the VIX is a measure of expected volatility, this data implies that the market has historically expected higher bouts of volatility when there have been large negative moves in the S&P 500.[3]

[3] To further illustrate this point, the average daily performance of the VIX in the top 50 negative days of the S&P 500 was +22.6%, with the S&P 500 averaging -5.4% in those 50 days. Source: FactSet, as of October 31, 2024.

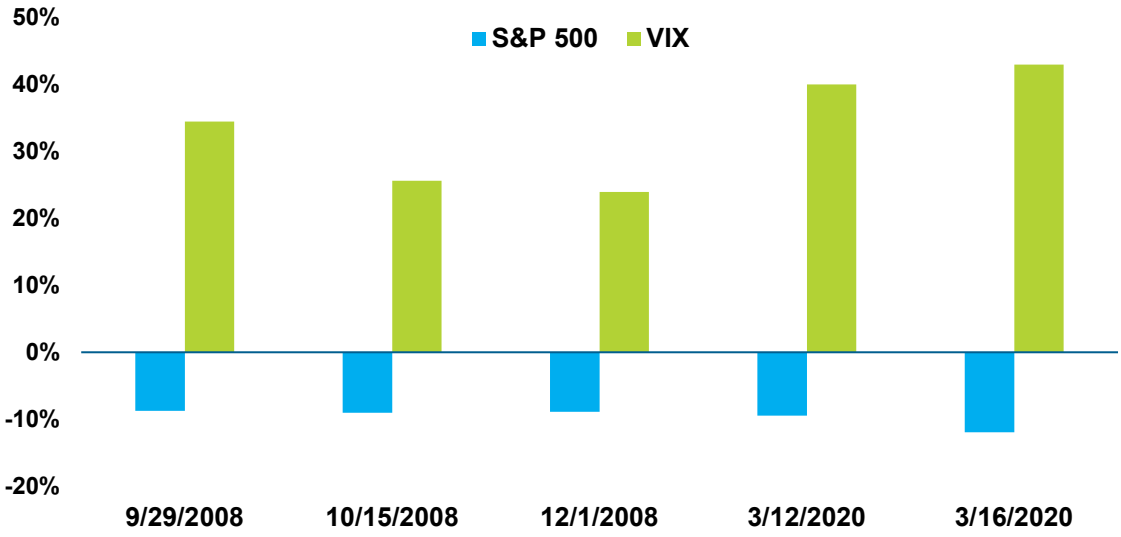

FIGURE 2
Bottom 5 Days of S&P 500 Since 1990

Source: FactSet, as of October 31, 2024. Bottom 5 days are the largest negative daily close price percentage changes of the S&P 500. Indices used: S&P 500, VIX.

While the VIX measures volatility in the equity market, the ICE BofA MOVE Index ("MOVE") measures interest rate volatility, or volatility in the fixed income market.[4] Figure 3 shows how the MOVE index, like the VIX, spiked during the GFC and Covid-19 Pandemic. MOVE also experienced higher levels during 2022 as inflation was a driving theme in rising interest rates globally. During this period, equity volatility was subdued, illustrating that different asset classes may offer distinct volatility behavior.

[4] The MOVE is calculated by measuring the implied volatility of a basket of one-month over-the-counter options on 2 year, 5 year, 10 year, and 30 year Treasuries.

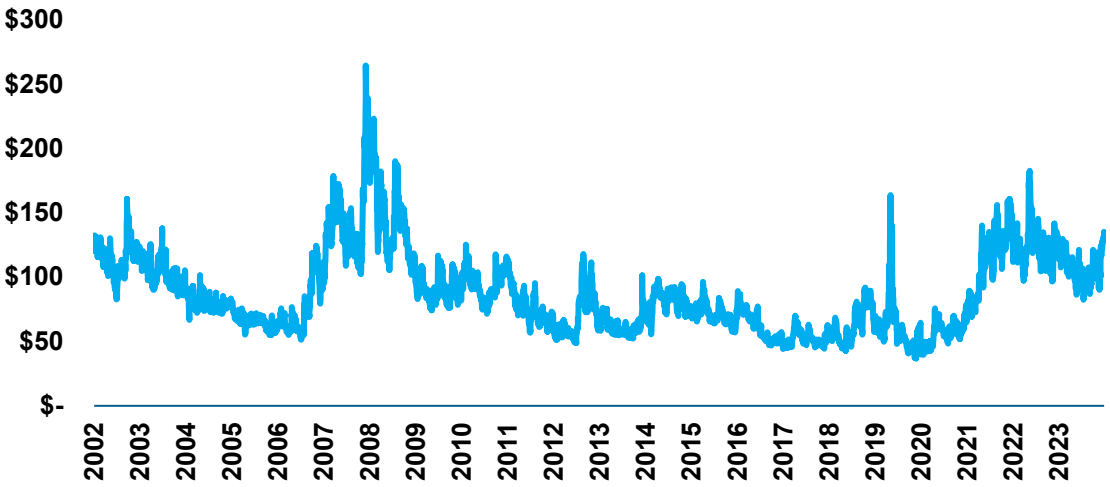

FIGURE 3
ICE BofA ML MOVE Price Chart

Source: Bloomberg, as of October 31, 2024. Represents the daily closing price.

Measures of volatility for other markets may be less straightforward. For example, due to the idiosyncratic nature of commodities, there is no single commonly cited measure, nor is there one common volatility measure for currencies ("FX").

How do long volatility strategies work?

Long volatility strategies purchase derivative securities that are linked to the volatility of an underlying asset. The strategy profits as the expected or actual volatility of the underlying asset rises or is higher than anticipated by the market.

A basic long volatility strategy might include purchasing an equivalent number of put options and call options on the S&P 500 at the same strike price, a strategy known as a straddle. This strategy would profit if the S&P 500 declines or increases by a material amount. Thus, the long volatility exposure is rewarded by volatility in either direction. This contrasts with a tail risk strategy that may purchase a put option, which would reward only a material negative move in the S&P 500.

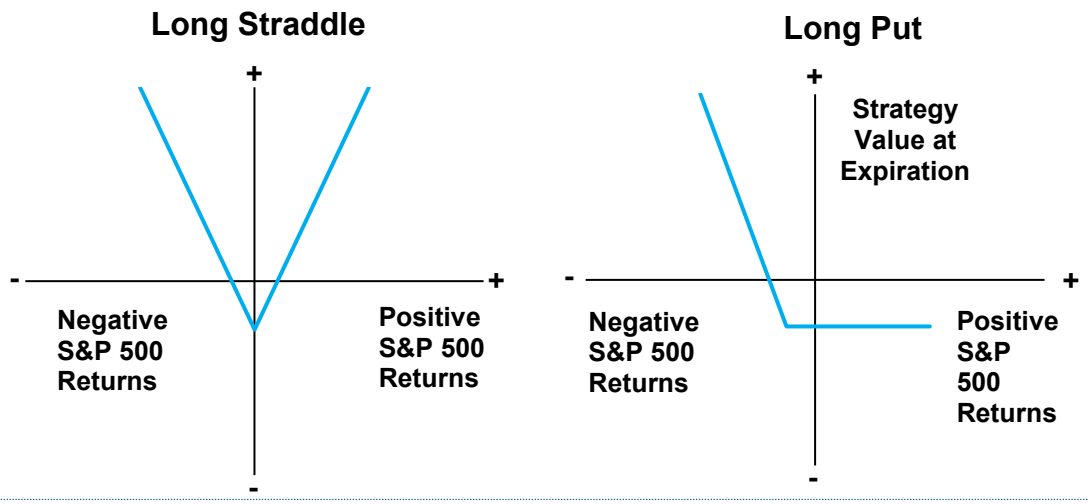

FIGURE 4 AND 5
Left Chart: Long Straddle (Long Volatility)

Right Chart: Long Put (Tail Risk)

Source: Meketa, 2024.

Long volatility strategies can exhibit high complexity. There are a wide variety of ways that an investor could express views on volatility. For example, investment managers may use different derivative instruments, including futures, forwards, options, and/or swaps. A long volatility manager may look for opportunities to buy volatility cheaply, similar to what a value investor may do with a stock.

Implied versus realized volatility

Many long volatility strategies seek to gain value from the differences in *implied volatility* and *realized volatility*. Implied volatility is a measure that indicates the market's expectations of the change in value of an asset over time. Realized volatility refers to the historic fluctuation of the value of an asset. Put simply, implied volatility is a forward-looking measure while realized volatility is a backward-looking measure. When implied volatility is higher than realized volatility, this may indicate that the option is overvalued. Likewise, when implied volatility is lower than realized volatility, options may be viewed as undervalued. Implied volatility also helps investment managers assess market sentiment and manage their own portfolio risk.

Volatility term structure

Because implied volatility is a forward-looking metric, the relationship between implied volatility and time to expiration of an option creates a term structure that investors can analyze, like how a debt investor may analyze the term structure of interest rates.[5] For example, the term structure of volatility for the VIX Futures curve is expected to shift as the market environment changes. During a benign market where volatility is low, an investor may expect that spot, or current, implied volatility on the VIX would be low, and implied volatility in a VIX futures contract that settles six months in the future would be higher.

[5] A term structure of interest rates compares interest rates of bonds and maturity dates of those bonds

How do investment managers create long volatility strategies?

Like many types of investment strategies, it is unlikely that any two long volatility investment managers will have an identical approach. For example, some managers may implement their volatility strategies within equity markets, some within rates, and some across all asset classes. Investment managers may also think about how much positive return they seek in highly elevated volatile environments. For example, is the strategy a negative returner in low volatility periods, but with the trade-off of high positive return in elevated volatility periods?

As investment managers contend with trade-offs, the strategy they use can vary on the tenor of the volatility they own. Some may seek shorter-dated instruments or structures (e.g., options contracts expiring within the next 30 days), while others may invest further out the term structure (e.g., options with contract expiration dates longer than 90 days). Some managers may vary their exposure over time. These approaches change based on the periodicity in which managers are trying to capture volatility and/or the instruments being used. Regardless of approach, long volatility managers strive to achieve positive returns in market shocks. The combination of asset class exposures, tenor, and the overall percentage of the strategy invested in volatility instruments will help determine the magnitude of the positive return goal.

The market for volatility

Investor behavior is one of the key drivers when thinking about the market for volatility and the price of protection. When global markets are performing well, some investors may be lax about seeking protection. When markets are volatile, more investors tend to seek the types of protection long volatility managers are focused on, and the price of that protection increases. This type of behavior provides opportunities for long volatility managers to buy volatility assets when they are cheap and sell them when they are expensive.

Being "long" volatility inherently requires a market where other participants are selling volatility. These participants may sell volatility to create income for their portfolio, as long volatility assets have a carrying cost that is being earned by the seller. As more investment products are created that sell volatility, the price of volatility declines. When global markets are calm, investors may presume it will stay that way and feel they can earn income by selling volatility. This creates buying opportunities for long volatility investors. Long volatility investors may view high levels of volatility selling as great buying opportunities. The price of volatility may be artificially low and not reflect the long volatility manager's estimates of implied volatility.

How are derivatives used?

Managers can use derivative instruments to trade volatility. The section below provides examples of what trades could look like for each derivative instrument.

Futures

- In a long volatility strategy, a manager may hold a long position in a VIX futures contract. If the price of the VIX increases (i.e., volatility climbs), the investor benefits.

Options

- In a long volatility strategy, a manager may buy a put option with a strike price significantly lower than the price today. If the option is not "exercised" prior to its expiration date, it "expires worthless" and the option owner's loss is the cost of the option. If the underlying asset experiences a sharp decline within the exercise period of the option, the manager will likely exercise that option after the price has breached the option's strike price.
- A manager could also create options strategies like a straddle or strangle, described earlier in this paper. Unlike the previous example, a straddle does not depend on which direction the price goes, so long as the price movement is drastic. It is purely a bet on increased volatility.
- Another common strategy investment managers will use to hedge directional risk is called **Delta Hedging**.[6] Delta hedging involves buying or selling a position of the underlying asset in addition to the option it is based on. By holding the appropriate hedge, any loss on the underlying asset will be offset by a gain in the value of the option, and vice versa. Delta hedging is a dynamic strategy, meaning that as the price of the underlying asset changes, the delta of the options will also change, requiring continuous adjustments to the hedge.

[6] Delta is a measure of how much the price of an option is expected to change for a small change in the price of the underlying asset.

Swaps

- A long volatility manager may enter into a **variance swap** with a counterparty. Variance swaps allow investors to speculate on the magnitude of future volatility of an asset. One leg of the swap will pay an amount that is determined on the realized variance of an underlying asset's price. The other leg will be a fixed amount determined at the outset of the swap. The difference between the two amounts is settled at the end.

Cost of carry

Owning options also incurs a carrying cost. In periods of elevated or rising volatility, managers expect to more than offset this cost with gains on their positions. However, during periods of low volatility, these costs can be onerous and even lead to negative returns. Hence, investment managers are constantly trying to figure out ways to reduce or offset the cost of carry.

To help offset this cost, a manager may include additional strategies in the fund that are meant to create positive returns during low volatility periods so that the fund is not paying option premiums with no payoff. These strategies may include, but are not limited to, carry, value, mean reversion, dispersion, and relative value.

How have long volatility strategies performed?

Since the inception of the Eurekahedge Long Volatility Index[7] in January 2005, it has produced an annualized return of 3.3%. During the same period, the Bloomberg US Aggregate Index gained 3.2%, while the Bloomberg US Corporate High Yield Bond Index and MSCI ACWI Index gained 6.5% and 8.4%, respectively.[8] However, an investor who evaluates long volatility based on average returns is at risk of missing the bigger picture. Unlike equities, long volatility's goal is not necessarily high absolute returns. Rather, we believe its most effective role is to provide protection and liquidity to a portfolio during times of high market volatility when traditional assets may struggle. As Figure 6 illustrates, long volatility has typically produced gains in years where equity markets were negative, including in 2022 when bonds declined alongside equities.

[7] As a proxy for long volatility strategies in this paper, we will often reference the Eurekahedge Long Volatility Hedge Fund Index, an equally weighted index of 10 constituent funds, as of October 2024. The index is designed to provide a broad measure of the performance of underlying hedge fund managers who take a net long view on implied volatility with a goal of positive absolute return. The index is not investible, and closed funds may be included in the index calculation of historical performance. The index is net of fees.

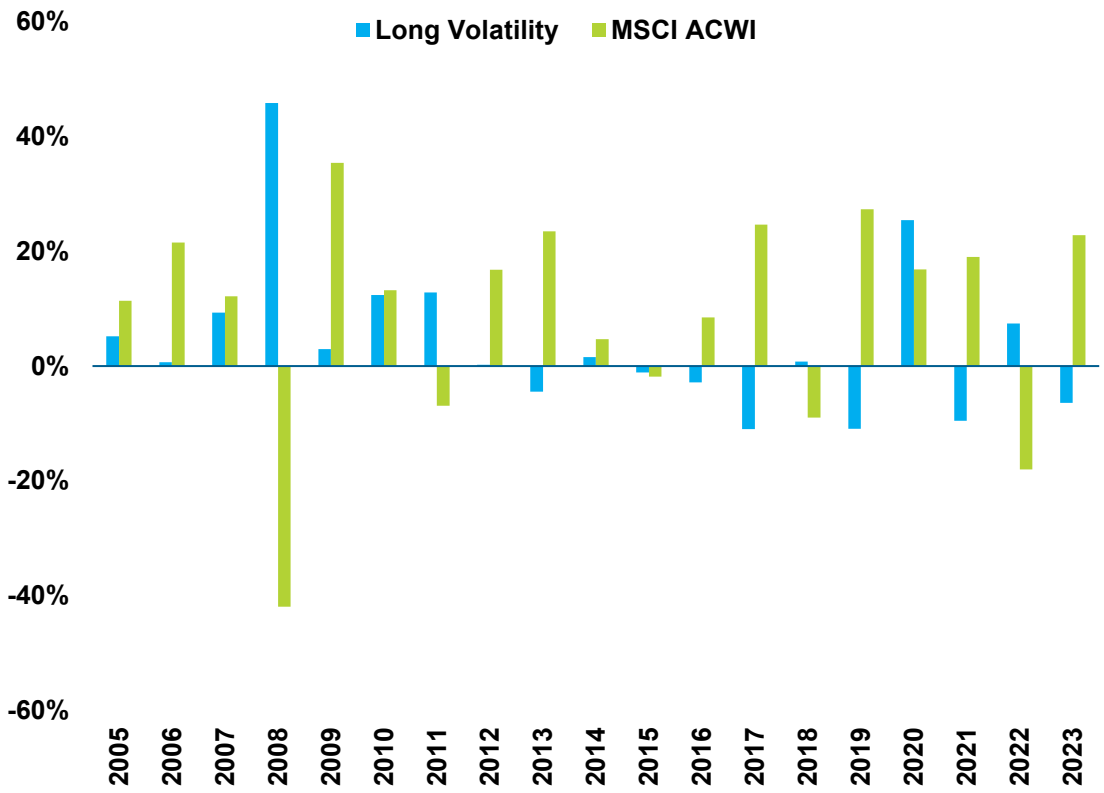

FIGURE 6
Annual Returns

Source: Investment Metrics, as of September 30, 2024. Indexes: Eurekahedge Long Volatility Hedge Fund Index, MSCI ACWI.

There may be extended periods of negative performance from a long volatility strategy, particularly when the market is stable. Figure 7 shows that the deepest drawdown occurred from early 2012 until March 2020, a period that coincided with a prolonged stable and low-volatility market.

[8] Source: Investment Metrics, as of September 30, 2024. Indexes: Eurekahedge Long Volatility Hedge Fund Index, MSCI ACWI, Bloomberg US Aggregate, Bloomberg US Corporate High Yield. For the period January 1, 2005 to September 30, 2024.

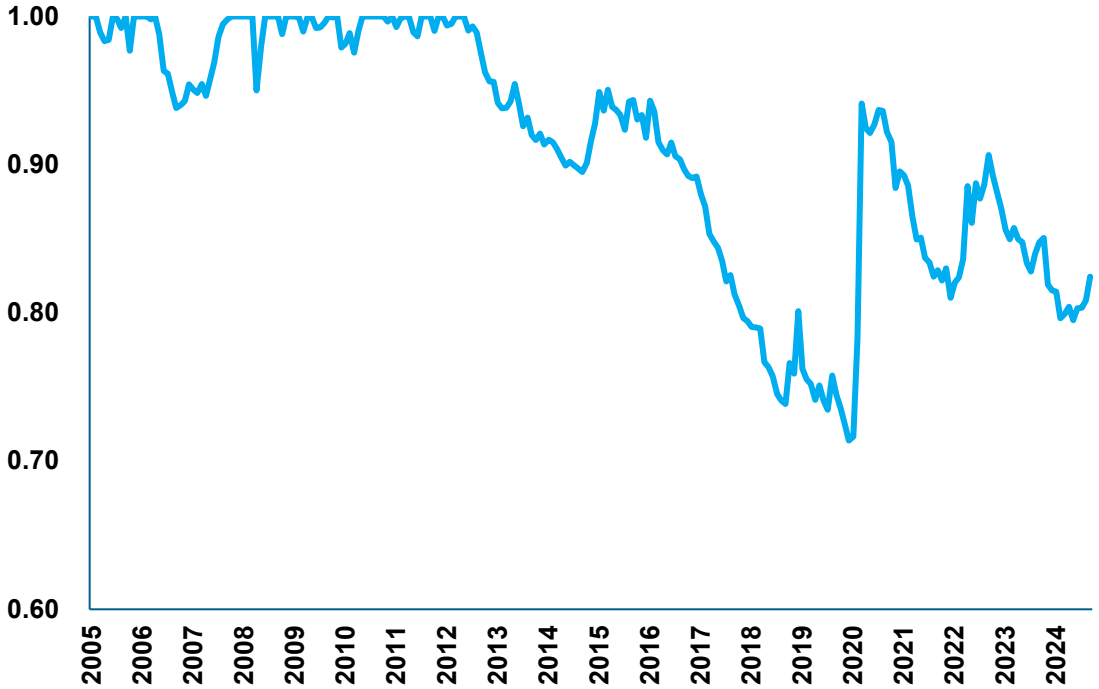

FIGURE 7
Drawdown Profile of Long Volatility

Source: Investment Metrics, as of September 30, 2024. Indexes: Eurekahedge Long Volatility Hedge Fund Index.

Low correlations and positive convexity

Long volatility strategies have the potential to provide correlation benefits to a broader investment portfolio dominated by growth risk (i.e., equities and credit). Since 2005, long volatility has exhibited a -0.46 correlation with global equity, a -0.38 correlation with high yield bonds, and a 0.03 correlation with investment grade bonds.[9] Figure 8 shows how long volatility's correlation to the Bloomberg US Aggregate has been low or even negative, while its correlation to equities and corporate high yield bonds has almost always been negative. In other words, long volatility has generally had an inverse relationship to the (relatively) riskier assets of equities and high yield bonds.

[9] Source: Investment Metrics, as of September 30, 2024. Indexes: Eurekahedge Long Volatility Hedge Fund Index, MSCI ACWI, Bloomberg US Aggregate, Bloomberg US Corporate High Yield. For the period January 1, 2005 to September 30, 2024.

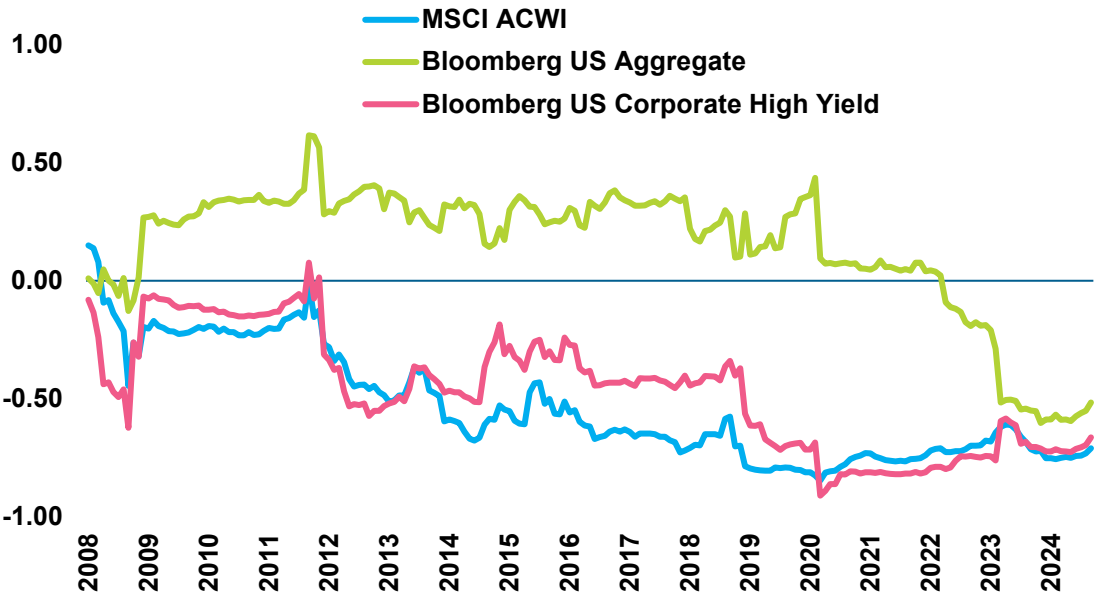

FIGURE 8
Rolling 3-Year Correlation to Long Volatility

Source: Investment Metrics, as of September 30, 2024. Indexes: Eurekahedge Long Volatility Hedge Fund Index, MSCI ACWI, Bloomberg US Aggregate, Bloomberg US Corporate High Yield.

Convexity, in this context, is the degree to which one asset's price changes relative to another asset. A unique characteristic of long volatility strategies is that they offer the potential for **positive convexity**, especially relative to equities. Positive convexity refers to a non-linear payoff profile between two investments, with a trendline that exhibits a "smile" shape (i.e., an upward-shaped curve). In this case, positive convexity means that when equity prices decline, long volatility prices gain more than they would lose if equities were to go up by the same amount (see Figure 9). The smiling shape of the trendline represents the positive convexity that long volatility has shown relative to global equities. In extremely negative historical months for equities, long volatility has been, on average, a highly positive returning strategy.

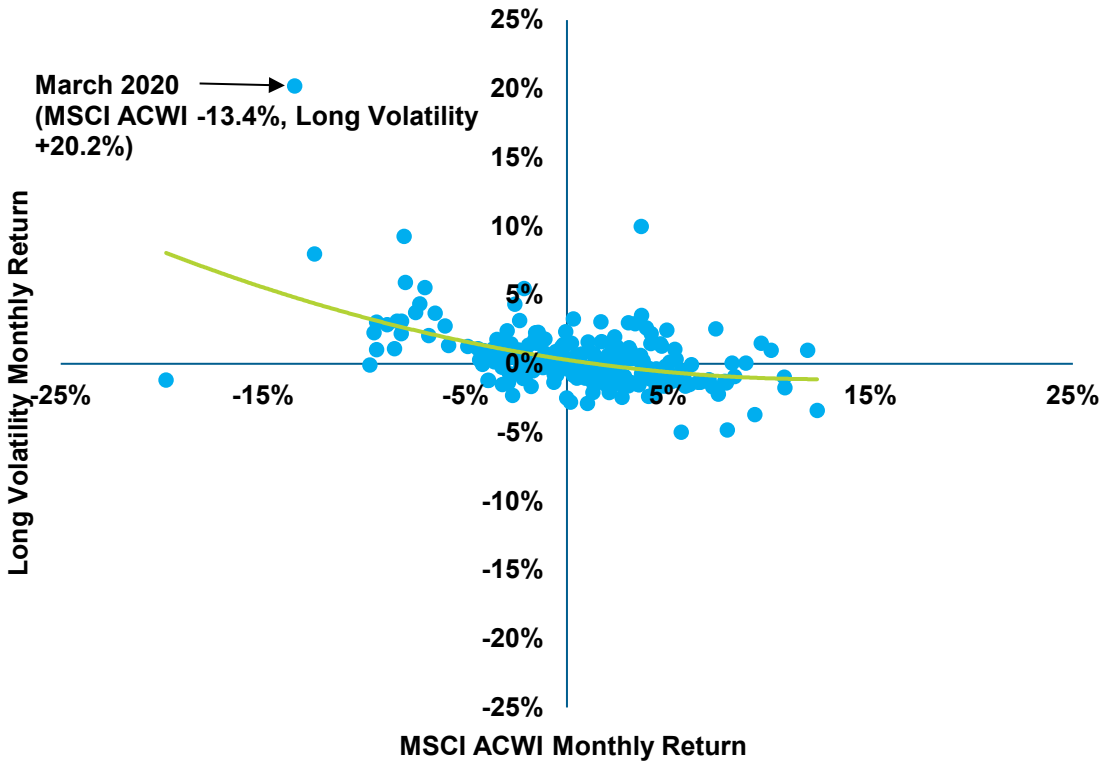

FIGURE 9
Monthly Convexity of Long Volatility Relative to Global Equities

Source: Investment Metrics. Reflects the period January 2005 through September 2024. Indexes: MSCI ACWI, Eurekahedge Long Volatility Hedge Fund.

Convexity compared to "safe haven" assets

In investing, safe haven assets refer to investments that are expected to retain value or possibly even produce gains when equities perform poorly. Common safe haven assets include government bonds, gold, and cash. Figure 10 shows how long volatility has the most positively convex slope when compared to the other safe haven assets, meaning it has historically offered the most consistent protection during severe stock market downturns. Because long volatility strategies are structurally built to increase in value when volatility rises, this positive convexity profile should remain in the future.

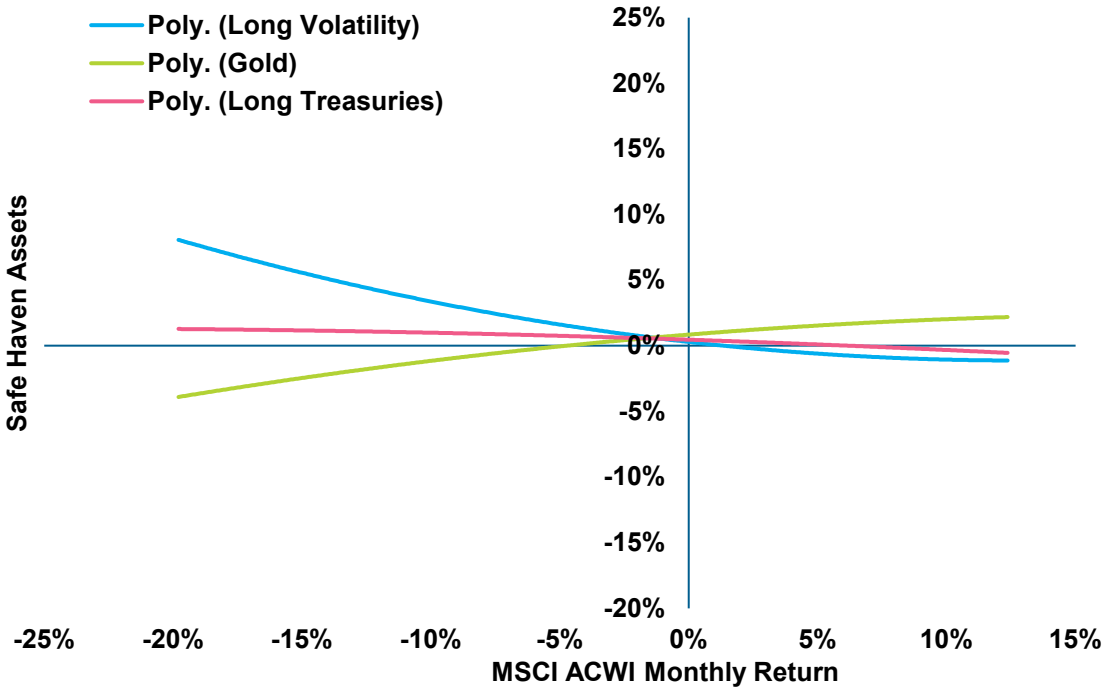

FIGURE 10
Monthly Convexity of Common Safe Haven Assets Relative to Global Equities

Source: Investment Metrics and Bloomberg. Reflects the period January 2005 through September 2024. Indexes: MSCI ACWI, Eurekahedge Long Volatility Hedge Fund, LBMA Gold Price PM USD index, Bloomberg US Long Treasury index.

Protection during market downturns

Historically, long volatility strategies have exhibited the strongest defensive profile during significant negative months for global equities.

Figure 11 illustrates how long volatility, global equities, long-term Treasuries, and gold have performed during different stressed market scenarios. The two scenarios shown are when global equities declined by more than one standard deviation from the mean (i.e., the equity market declined by more than a "normal" amount) and when overall equity market volatility increased by more than one standard deviation from the mean (i.e., the equity market had more than a "normal" amount of volatility).[10] The chart shows that long volatility has, on average, defended better during these stressed environments compared to other defensive assets.

[10] Assuming a normal distribution of outcomes, an event of greater than one standard deviation has approximately a one in six chance of occurring.

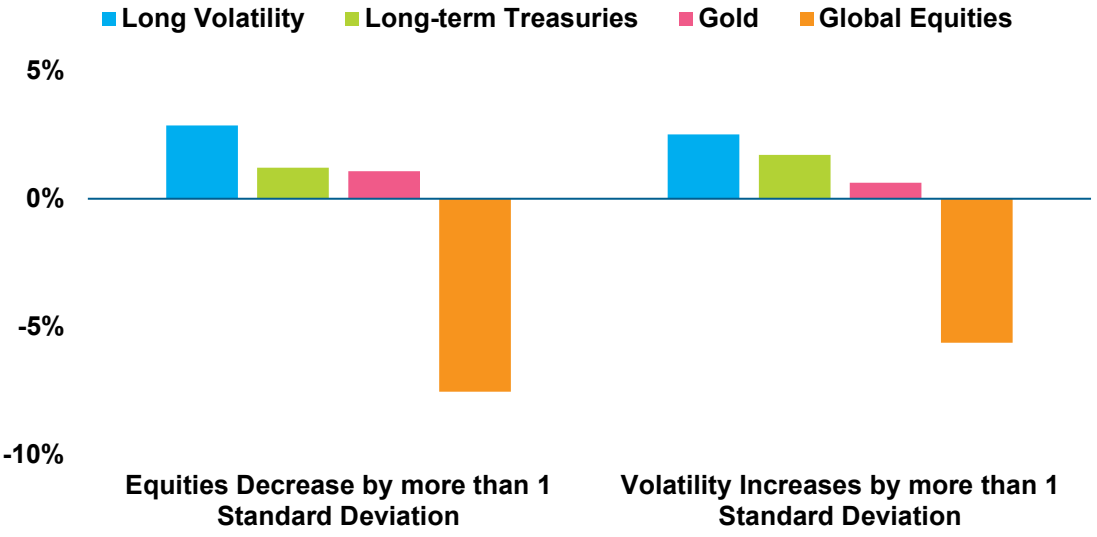

FIGURE 11
Scenario Analysis: Monthly Average Return During Different Scenarios

Source: Analysis by Meketa Investment Group using Investment Metrics data for the period January 2005 through September 2024. Indexes: MSCI ACWI, Eurekahedge Long Volatility Hedge Fund, LBMA Gold Price PM USD index, Bloomberg US Long Treasury index. "Equities Decrease" is based on analysis of the MSCI ACWI index and "Volatility Increases" is based on analysis of the CBOE VIX Continuous index.

Another way to evaluate the benefit of long volatility's potential protection is to see how it performed during historical equity market downturns compared to "safe haven" assets. The three downturn scenarios shown in Figure 12 span a wide range of market environments, from the credit/banking crisis of the GFC to the Covid-19 shock and most recently to the inflationary high-interest rate environment that began in early 2022. In this period, long-term government bonds did not defend against equities selling off. Instead, both equity and long-term government bond prices experienced deep declines simultaneously, implying that the flight to safety relationship usually associated with government bonds may not always hold true.

Long volatility was the only asset shown in Figure 12 to generate positive returns in each of these very different downturn environments. Thus, long volatility can be viewed as the most consistent hedge during each of these different negative scenarios. This is expected to continue to be the case in the future, as it has shown the ability to weather a multitude of equity downturn periods.

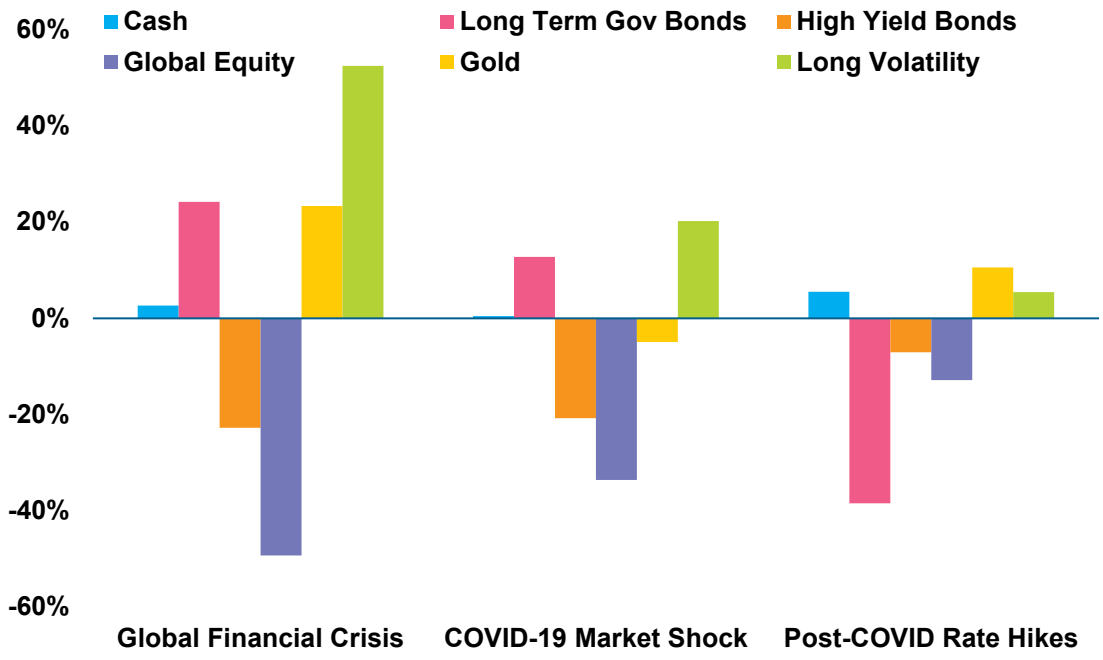

FIGURE 12
Historical Downturn Scenarios

Source: Meketa's Asset Allocation Tool. Returns are cumulative for the period over which the scenario occurred. Dates for the downturn events in order are: Oct 2007 – Mar 2009, Feb 2020 - Mar 2020, Jan 2022 - Oct 2023. Long Volatility is represented by the Eurekahedge Long Volatility Hedge Fund Index, Long Term Government Bonds are represented by Bloomberg US Long Treasury index, gold is represented by the LBMA Gold Price PM USD index, global equities are represented by the MSCI ACWI Net TR index, cash is represented by the Bloomberg US Treasury Bill Index, and high yield bonds are represented by the Bloomberg US Corporate High Yield index.

During historical equity market recoveries, long volatility has served as a drag on performance. During upturns, there is still a level of volatility in the market; however, it is not to the same degree as during downturns. This results in long volatility generally underperforming during upturns, compared to traditional assets that thrive during these periods and even some safe haven assets.

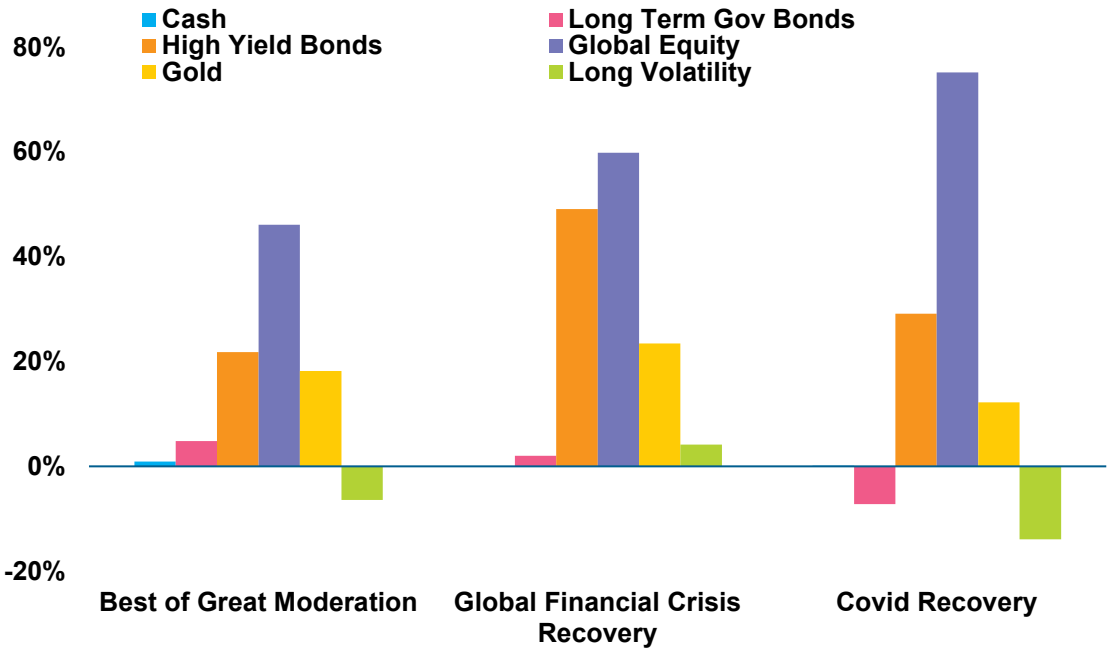

FIGURE 13
Historical Upturn Scenarios

Source: Meketa's Asset Allocation Tool. Returns are cumulative for the period over which the scenario occurred. Dates for the upturn events in order are: Apr 2003 - Feb 2004, Mar 2009 - Nov 2009, Apr 2020-Dec 2021. Long Volatility is represented by the Eurekahedge Long Volatility Hedge Fund Index, Long Term Government Bonds are represented by Bloomberg US Long Treasury index, gold is represented by the LBMA Gold Price PM USD index, global equities are represented by the MSCI ACWI Net TR index, cash is represented by the Bloomberg US Treasury Bill Index, and high yield bonds are represented by the Bloomberg US Corporate High Yield index.Yield index.

Why consider including long volatility in a portfolio?

Generally, rising volatility is bad for financial markets, inherently making most investment portfolios short volatility (i.e., when volatility rises, the overall value of a portfolio declines). Adding long volatility strategies may help an investor protect their portfolio from irreparable loss or severe impairment. Long volatility strategies generally trade instruments that have high liquidity, thus making the funds themselves very liquid. This liquidity may allow an investor to use long volatility as a funding source during crisis periods to meet critical spending obligations when most other assets in their portfolio are declining in value, or to rebalance into other parts of their portfolio.

Role in an RMS framework

Meketa uses the name risk mitigating strategies as a framework for investment strategies expected to provide exposures complementary to equity risk, which is the predominant risk in many investors' portfolios. An RMS framework seeks to produce gains during turbulent markets, such as equity drawdowns, while also producing positive returns over the long term.

The RMS framework is typically composed of three components:

First responders: These strategies are intended to be the first line of protection during a significant equity drawdown. They often utilize long-term US Treasuries, long volatility, and tail risk strategies.

Second responders: These strategies are designed to capitalize on protracted bear markets. This group commonly includes trend-following strategies such as Commodity Trading Advisors (CTAs) and managed futures, which can also produce gains in extended bull markets.

Diversifiers: This group includes a wide range of strategies that aim to provide diversification benefits. These strategies are not as narrowly defined as the first and second responders and can include various types of investments.

Long volatility strategies fall within the "first responders" component of RMS. There are three main strategies within Meketa's First Responder methodology: correlation hedges (US Long-term Treasuries), structural hedges (long volatility), and explicit hedges (tail risk).

Correlation hedge: a bet that one asset will produce good returns when another produces poor returns.

Structural hedge: an investment in a security that has a close inverse relationship with another security(ies).

Explicit hedge: analogous to an insurance contract (e.g., an ongoing payment in exchange for a payoff if an event occurs).

Each of these options carries its own benefits and drawbacks. Meketa views these potential options on a spectrum of reliability, cost, expected return, and expected payoff.

FIGURE 14
RMS: First Responders

Source: Meketa, 2024.

Conclusion

Long volatility strategies serve as a crucial component in an investor's toolkit, providing a robust defense against sudden market downturns. These strategies are designed to offer protection during the initial stages of market shocks, making them an essential part of a broader risk mitigation approach. By incorporating long volatility strategies, investors can better manage uncertainty and enhance the resilience of their portfolios.

Furthermore, the implementation of these strategies requires careful consideration of various factors, including portfolio use-cases, investment manager selection, and overall investor objectives. It is important for investors to understand how these strategies work and to evaluate their potential benefits and limitations within the context of their specific investment goals. As the market environment continues to evolve, long volatility strategies will remain a valuable tool for navigating periods of heightened volatility and trying to ensure long-term portfolio stability.

Ultimately, the successful integration of long volatility strategies into an investment portfolio hinges on a thorough understanding of their mechanics and a strategic approach to their application. By leveraging these strategies effectively, investors can achieve a more balanced and resilient portfolio, capable of withstanding the challenges posed by volatile market conditions.

Appendix | What should investors consider in an allocation to long volatility?

When discussing considerations in the long volatility space, there are typically three major questions that investors should ask themselves: Will it work? Will it contribute enough? Can I afford to hold this until an event happens? Each of these are critical considerations that investors should contemplate before allocating to long volatility. Reviewing these questions can help investors to better align their expectations with realistic outcomes and avoid making short-term oriented decisions when their long volatility strategy produces low or even negative returns in a low volatility environment.

- **Will it work / produce positive returns in an equity drawdown?** Will it contribute enough during the equity drawdown? Is the strategy structurally built to appreciate as volatility increases by a large amount? Is the composition of the strategy's exposure to volatility (asset class, geography, etc.) important to my portfolio? Am I more concerned about selloffs in equity markets, credit markets, currencies, commodities, all of them, or am I agnostic?
- **Will the expected positive return be large enough to make a difference to the total portfolio?** How large should the allocation be? Given the negative impact of a sell-off to the rest of my portfolio, will the positive impact of long volatility make a meaningful impact in mitigating the sell-off? If the allocation is too small, do I risk having too little impact? If it is too large, will the cost in low volatility periods be too onerous to hold?
- **Can the allocation be maintained until a meaningful drawdown occurs?** Can the protection be held until an event occurs? As seen in many of the volatility charts earlier in this paper, levels of volatility can be low for years at a time. Because of this, an investor allocating to a long volatility strategy should consider their runway for holding an asset that could provide a negative return for several years on end. One may expect that during the low volatility period where long volatility is underperforming, many other assets in the investor's portfolio would be performing well.

Fees

Most long volatility managers are structured as hedge funds with varying fee arrangements that often include a management fee and/or an incentive fee. The management fee is a flat percentage of assets managed, while the incentive fee provides the manager extra compensation for positive performance. The incentive fee may be structured to be paid for any positive performance, performance over a high water mark,[11] or performance over a hurdle[12]. While the quality and capabilities of the strategy and investment manager are higher priorities, all else being equal, investors may prefer flat fee arrangements without an incentive fee. This is because in the periods where a long volatility strategy experiences high positive return, the rest of an investor's portfolio is likely declining, hence the investor may not want to have fees consume a large percentage of that gain.

[11] A high water mark refers to when the fund reaches a "peak" in the value of assets and a performance fee is paid to a manager, if the fund subsequently loses value, the manager does not receive fees on the gain in assets it takes to reach the previous peak. In other words, the manager cannot receive fees on the same assets/value twice.

[12] A hurdle is a percentage return specified in advance, that the fund must earn higher than, to earn the incentive fee. For example, if a hurdle is 5%, then the fund must earn higher than 5% to be paid an incentive fee.

Benchmarking

The CFA Institute highlights key qualities of benchmarks through the acronym "SAMURAI"[13]. SAMURAI stands for Specified, Appropriate, Measurable, Unambiguous, Reflective (of manager's current views), Accepted, Investable.

[13] Source: CFA Institute, 2021.

Benchmarking long volatility is inherently difficult because most options lack multiple of these qualities, and the options are very limited. The **Eurekahedge Long Volatility Index** incorporates multiple asset classes and geographies, making it a more appropriate index for benchmarking multi-asset volatility funds. Volatility strategies that focus on an individual asset class or geography will likely experience a higher tracking error when using this as a benchmark.

The **CBOE Volatility Index "VIX"** is designed to track expected volatility in the US Equity markets. The index is not investable and is most appropriately used as a tool for measuring implied future volatility of the S&P 500. The VIX is not an accurate representation of global equity volatility or strategies that trade volatility across rates, commodities, or currencies. By itself, the CBOE VIX is not representative of an investment strategy, nor should it be used as a primary benchmark.

Benchmarking in this space will carry **tracking error**, or the difference in return between an investor's strategy and the benchmark. This is an actively managed space with no currently investable passive option. Investors should expect periods of deviation from the benchmark with the strategy(ies) they are invested in.

A more practical way to think about benchmarking long volatility strategies may be to consider their function in a portfolio and evaluate performance in the scenarios an investor is expecting long volatility to perform well. For example, in a 15% sharp drawdown in equity markets, what are the investor's expectations of the strategy they are invested in? Considering the performance of the strategy for its function within the investor's portfolio may be a more functional benchmarking exercise than simply comparing it to a range of peer strategies with different asset class and geographic exposures.

Asset class exposure

Long volatility strategies may trade instruments in multiple types of asset classes or just focus on a single asset class like equities. There are trade-offs to consider in this variety of approaches. Equity volatility markets are the most liquid to trade as most investors are primarily interested in protecting their equity portfolios. However, equity volatility may not help protect against shocks in non-equity markets that an investor may have exposure to. Strategies that trade additional asset classes (e.g., rates, commodities, currencies) may help an investor protect against a variety of sell-off events in different asset classes. Volatility instruments in more esoteric markets may be less liquid and could be harder to monetize in periods of stress. An investor should think about the primary risk(s) in their portfolio and consider which of those are worth hedging via long volatility strategies.

Basis risk

Any hedging activity involves basis risk, or the risk that a hedge does not completely offset losses incurred in the asset being hedged against. This is no different for long volatility strategies, as they are not a "perfect" hedge against an investor's entire portfolio. An investor's portfolio will carry exposures that may not be perfectly hedged against in a long volatility strategy.

Expectations, convexity and cost

In earlier sections, we referenced both convexity and cost of carry. An investor should understand the tradeoffs of these two properties in a long volatility allocation. This includes considering their tolerance level for holding a long volatility strategy in the portfolio, particularly when it is lagging the rest of the portfolio. For example, can the investor tolerate a five-year period without a volatility event in markets where a long volatility strategy may produce flat or even negative returns? An investor should also understand how their tolerance to hold a long volatility strategy matches up with the strategy they are reviewing. A mismatch of investor expectations with realistic outcomes of that investment may cause issues and confusion for the stakeholders involved with the investment. Figure 15 highlights some of the tradeoffs between seeking positive convexity and positive carry.

Positive Convexity	Positive Carry
Owns mostly assets tied to rising volatility	Owns both assets tied to rising volatility and assets that are uncorrelated to volatility and other markets
Higher expected return in highly negative equity/credit environments	Lower expected return in highly negative equity/credit environments
Negative expected return in low volatility environments	Flat/positive return expected in low volatility environments

FIGURE 15
Positive Convexity and Positive Carry

Source: Meketa, 2024

Liquidity

It is important for investors to pay close attention to the liquidity offered by investment managers. This is usually a direct result of the liquidity in the underlying instruments being traded in the strategy. Being able to reap the benefits of a long volatility strategy during a crisis is critical to the strategy's goal. Without this option, the usefulness of a long volatility strategy is severely constrained. Typically, the liquidity provisions in long volatility strategies can range from daily to monthly. Investing in liquid futures within G10[14] markets may allow for better liquidity than investing in esoteric commodity markets with more complex settlements and market structure.

[14] The G10 refers to a group of eleven countries that consult on economic and financial markets: Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Switzerland, Sweden, the UK, and the US. These are ten of the most traded currencies in the world hence their high liquidity.

What are the Greeks?

Long volatility managers may often refer to the "Greeks" when discussing positions or option markets in general. The Greeks refers to a set of metrics that provide measurements of sensitivity of an option's price to different factors. The metrics that are most often mentioned are delta, gamma, vega, and theta (see Figure 16 for a description of each).

Delta	Delta measures the sensitivity of an option's price to a move in the underlying asset price. This metric ranges from 0 to 1 for call options and from 0 to -1 for put options. Positive delta indicates that the option's price rises when the underlying asset price increases and a negative delta indicates the opposite. Investment managers use delta to understand the directional exposure they have to the underlying asset.
Gamma	Gamma measures the rate of change of an option's delta. Investment managers may use gamma to forecast price movements in the underlying asset. The larger the gamma is, the more sensitivity the option has to price changes in the underlying asset. Gamma is generally higher for at the money and lower for in or out of the money options. It also tends to be lower for longer dated options and as expirations dates near.
Vega	Vega measures an option's sensitivity to changes in the implied volatility of the underlying asset. Implied volatility is a measure of the market's expectations of the change in value of an asset over time.
Thetha	Theta measures an option's sensitivity to the passage of time. The value measures the amount of daily decline in the option's value if long or increase if short.

FIGURE 16
Descriptions of "The Greeks"

Source: Meketa, 2024.

Volatility skew and smile

Volatility skew is another measure that investors will analyze when determining the relative attractiveness of a set of options. This measure refers to the difference in implied volatility among options on the same asset with the same expiration date, but with different strike prices. In this application, skew highlights the asymmetry of option values. Skew is mainly generated by the demand for options by investors.

For example, investors in a stock index ETF may buy put options to protect their downside. At lower strike prices, a higher level of volatility is implied as demand for those options would theoretically increase during a sell off. This is highlighted in Figure 17.

When the perception of an asset's price movement in either direction is volatile, a smile shape occurs. This could exist for an option on a specific currency where the impact in either direction could negatively or positively impact investors. Analyzing skew can help market participants analyze expectations of future price movements and compare those expectations to their own, and thus inform trading decisions.

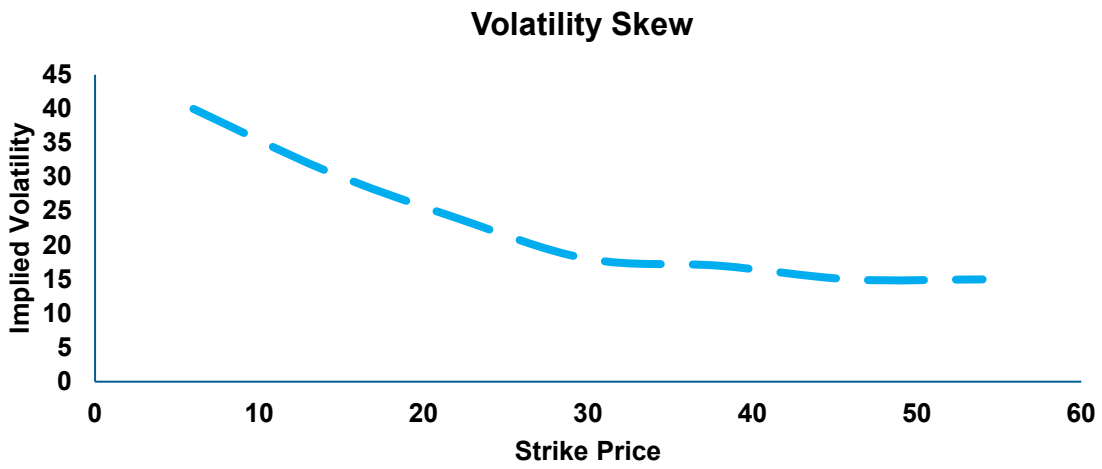

FIGURE 17
Volatility Skew

Source: Meketa, 2024.

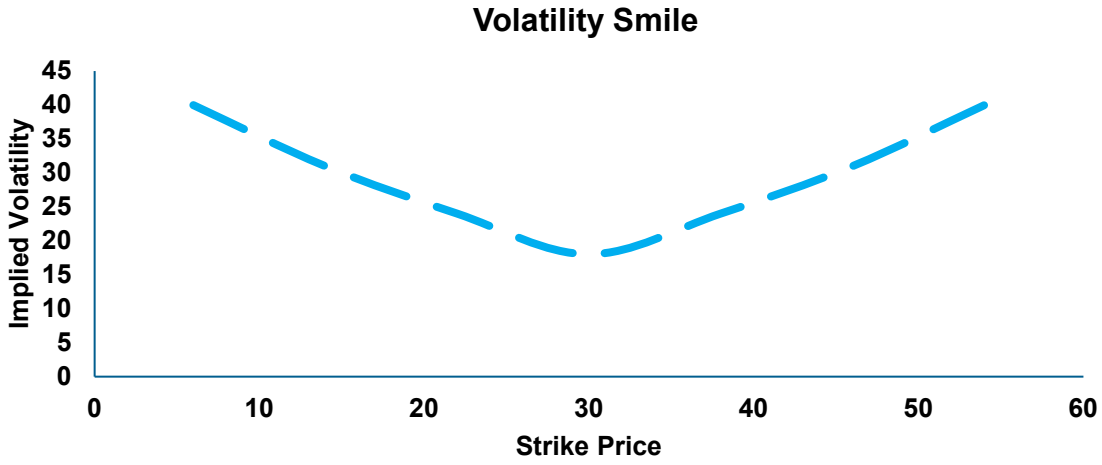

FIGURE 18
Volatility Smile

Source: Meketa, 2024.

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