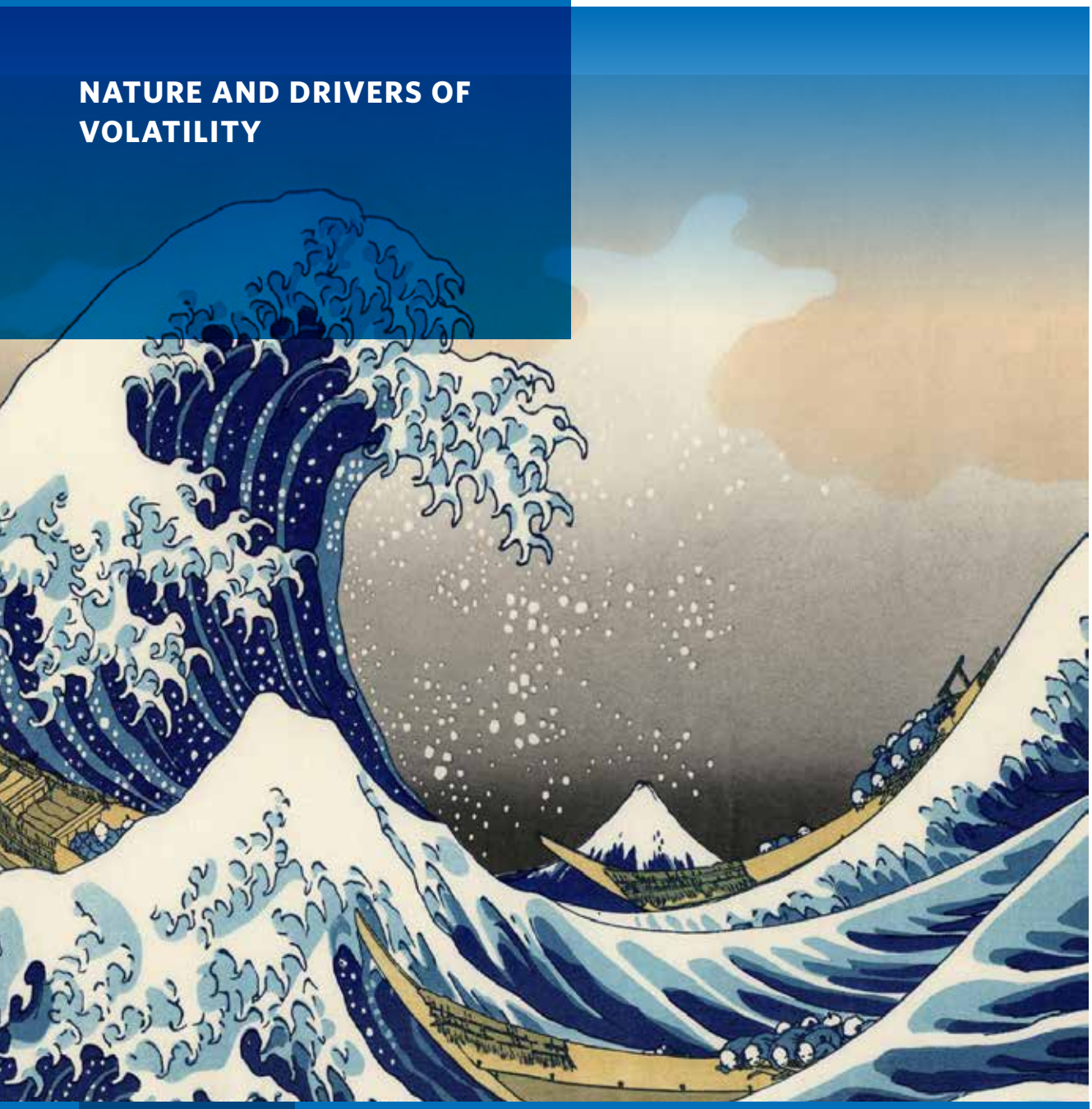
NATURE AND DRIVERS OF VOLATILITY



Strategic Investment Group®

30th ANNIVERSARY 1987 2017

Fiduciary Insights

THIS EDITION OF OUR FIDUCIARY INSIGHTS SERIES CONSIDERS THE NATURE AND DRIVERS OF VOLATILITY, AS WELL AS THE FACTORS BEHIND THE LULL IN VOLATILITY IN 2015-2017 AND ITS SUDDEN RESURGENCE IN EARLY 2018. We conclude by considering the efficacy of two diametrically opposed volatility strategies and highlighting the pitfalls of portfolio insurance.

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Introduction

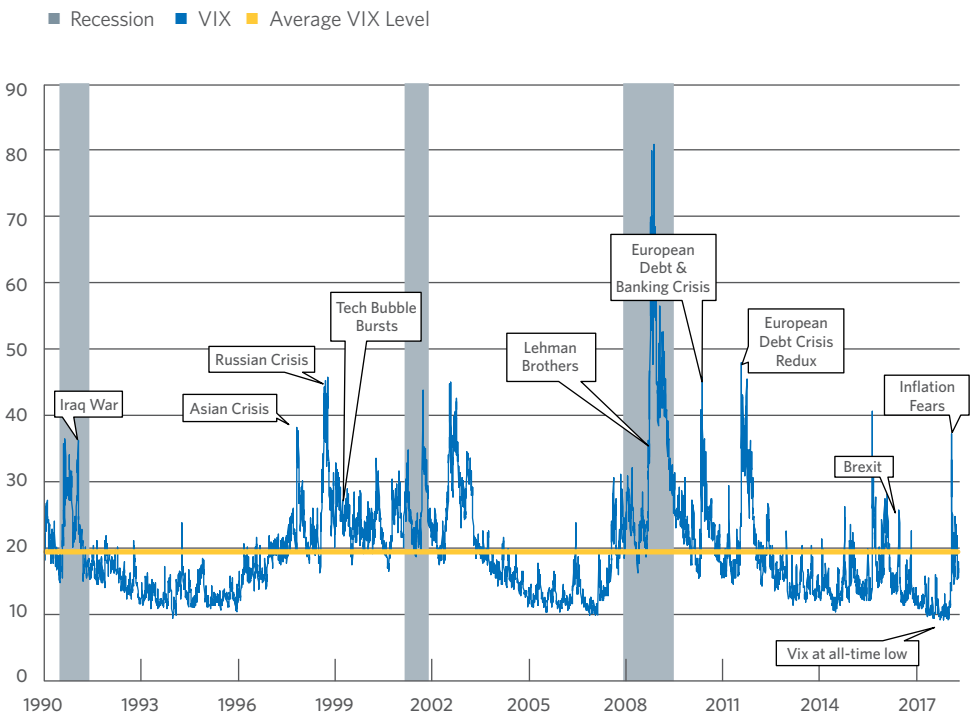
Volatility in global financial markets experienced a lull during 2015-2017 and touched all-time lows in 2017. The prolonged market calm, combined with low yields on safe assets, encouraged investors to take on more risk, stretching asset valuations and increasing market vulnerability. The revival of volatility in February 2018 (Exhibit 1, below) revealed elements of the market fragility created by the period of low volatility, and renewed investor interest in risk management.

In this edition of our Fiduciary Insights series, we address the question of risk, as measured by realized volatility, defined as the standard deviation of returns. Option prices represent a distillation of market expectations for volatility and are thus a very useful tool in assessing and hedging risk. Given the importance of implied volatility in the pricing of options, we will refer to the signals regarding volatility provided by changes in option prices, including the VIX index (see Exhibit 1). Referred to colloquially as the fear index, the VIX Index measures the market's expectations of the future volatility of the S&P 500 Index and, by proxy, serves as a barometer of expectations for market risk more broadly across global markets.

In the analysis that follows, we aim to highlight the main factors that contributed to the varying market conditions experienced over the past three years, thereby shedding light on the nature and drivers of volatility. We also consider the effects of the recent prolonged period of low volatility on investor behavior and the efficacy of two diametrically opposed volatility strategies.

The revival of volatility in February 2018 revealed elements of the market fragility created by a prolonged period of low volatility and renewed investor interest in risk management.

EXHIBIT 1:
VIX Index & Crisis Events
Source: Bloomberg.



Volatility Dynamics – Stylized Facts

Low realized volatility became incorporated into risk models and investor expectations as investors became lulled into a false sense of security.

Combined with low interest rates, the prolonged market calm induced risk taking and boosted asset valuations.

Analysts have identified a number of stylized facts that capture the dynamics of market volatility and inform the parameters of value-at-risk and volatility forecasting models. Five of these stylized facts are particularly interesting as they put recent developments in context.

- First, volatility tends to cluster and demonstrate a degree of serial autocorrelation. If volatility is high today, it is likely to be high tomorrow.
- Second, volatility reverts to the mean, but the speed of reversion varies. When volatility is unusually low, the pace of mean reversion tends to be slower than in times of unusually high volatility.
- Third, markets do not respond symmetrically to news. Negative shocks hit harder than positive developments. As a corollary, declining markets tend to be more volatile than rising markets, and markets are more volatile in recessions than in recoveries (see Exhibit 1).
- Fourth, the correlation of the volatility of returns across assets is much higher than the correlation of their returns. The volatility of stocks, bonds, currencies, and commodities all carry sensitivity to common macro shocks.
- Finally, the implied volatility embedded in an option's price reflects realized volatility, but is typically higher than realized volatility.

Volatility's Ups and Downs

Volatility across equity, bond, and currency markets was exceptionally low in 2017, deepening a trend of the previous few years. In the case of the U.S. equity market, realized volatility in 2017 visited lows seen only three times before in the past 90 years, during bull markets in the 1960s and 1990s, and in the run up to the great financial crisis. Implied equity market volatility, as measured by the VIX, hit an all-time low.

The stylized facts just considered suggest a number of likely contributors to the market calm. In 2017, the U.S. economy was in one of the longest recoveries on record, during which fundamentals were unusually stable, the global economy was enjoying synchronized growth, and equity markets around the world were experiencing a massive rally. The relative stability of broad macro forces, including growth and inflation, as well as steady and strong corporate earnings associated with a sustained economic recovery, contributed to low realized and implied market volatility. Moreover, besides providing abundant liquidity to support and stabilize the economy, the Fed placed great emphasis on its communications strategy to shape expectations and minimize the potential for uncertainty over policy decisions. Investors came to expect that the Fed and other central banks would do what was necessary to support the continued recovery and preserve stability. The implicit put provided by central banks further fueled risk appetite.

Low realized volatility became incorporated into risk models and investor expectations as investors became lulled into a false sense of security. Combined with low interest rates, the prolonged market calm induced risk taking and boosted asset valuations. Low realized volatility also contributed to an easing of collateral and margin requirements and creditor protections, encouraging leverage. Short volatility strategies (see opposite page) predicated on the persistence of low volatility gained in popularity.

In February of this year, U.S. equity markets fell precipitously, the VIX spiked, and markets experienced intra-day swings that dwarfed the modest moves of 2017. The apparent proximate cause for the sell-off was an acceleration in wage growth captured in the January U.S. employment report. Whatever the trigger, the scene was already set for a correction with equity market valuations

stretched following stellar gains in 2017 and January 2018. These developments are emblematic of the Volatility Paradox – the oft-observed phenomenon that periods of low market volatility sow the seeds of their own destruction by inducing risk taking that make markets fragile and more susceptible to reversal. The February episode also closely resembles a mini "Minsky Moment," as it was a sharp, if short-lived, correction following a period of rising asset valuations fueled in part by speculative forces and abundant liquidity.

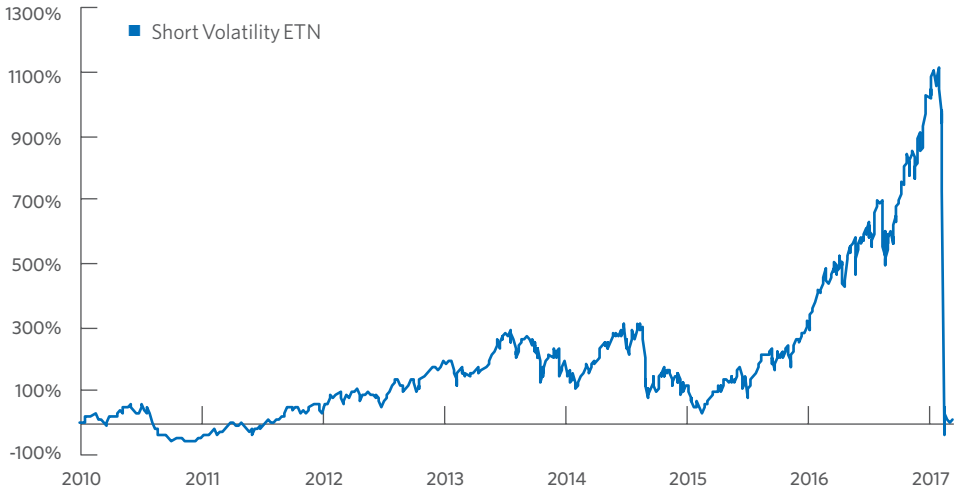
The Long and Short of Volatility Strategies

The prolonged period of low volatility during 2015-2017 made short volatility strategies predicated on continued low and stable levels of market volatility look increasingly attractive. These strategies took a number of forms, all of which appear on the surface to be distinct and independent of each other but, in fact, all share a common fundamental trading strategy.

- Many risk-parity strategies target an overall level of total portfolio volatility by combining, for example, equity and levered bond positions to achieve the desired level of portfolio volatility. As realized and expected market volatility falls, the portfolio's riskiness must be increased by raising the weight of equities in the portfolio or increasing the leverage of the bond portfolio. When volatility spikes, the opposite trades must be executed, potentially contributing to a self-reinforcing spiral of selling assets into a falling and volatile market.
- A number of volatility trading strategies also attracted investors. These include strategies that involve the explicit selling of options or option combinations, as well as strategies whose trades effectively mimic the payoff pattern of a short options position. Retail investors were attracted to several ETNs that shorted volatility to mimic an inverse payoff pattern to the VIX. Institutional investors increasingly pursued "smart beta" and "alternative risk premia" strategies that explicitly shorted volatility, as well as "CTA" and other trend following strategies employing a similar trading pattern. All of these strategies can generate a trading dynamic that is inherently pro-cyclical and destabilizing.

The prolonged period of low volatility during 2015-2017 made short volatility strategies predicated on continued low and stable levels of market volatility look increasingly attractive.

EXHIBIT 2:
Cumulative Return to Short Volatility Products
Source: Bloomberg.



The experience of February 2018 highlights the perils of selling volatility, the equivalent of picking up pennies in front of a steamroller. The strategy works until it does not and the endgame is crushing.

These short volatility strategies were highly profitable as long as volatility remained low or declined further, attracting significant investor flows, and increasing the market's vulnerability to a self-reinforcing downward spiral. Investors in short volatility strategies were hard hit by February's spike in volatility. Trading was suspended in several ETNs that had a payoff that was the inverse of the VIX. After strong gains during the years of market calm, many of these strategies lost virtually all of their value in a day (Exhibit 2, on Page 3). This experience highlights the perils of selling volatility, the equivalent of picking up pennies in front of a steamroller. The strategy works until it does not and the endgame is crushing.

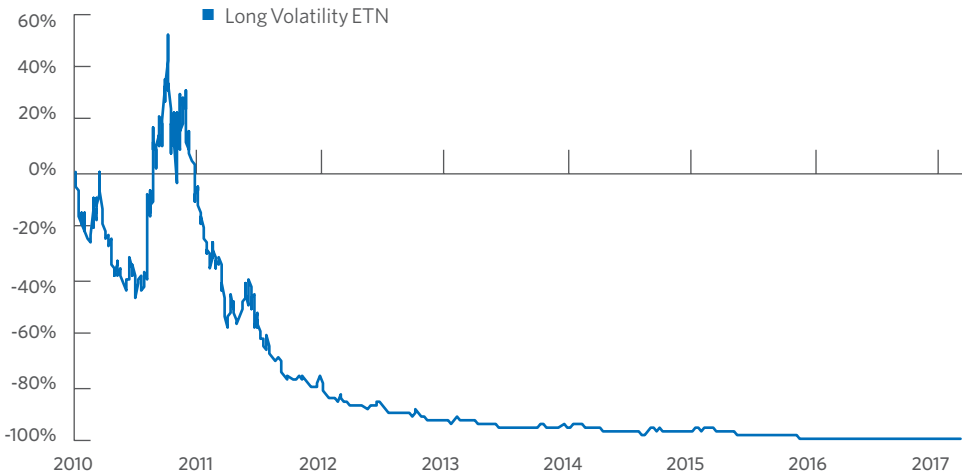
Going long volatility also tends to be a losing strategy. Unlike the short volatility strategies that generate small incremental gains until they crash and burn, long volatility strategies tend to generate steady losses. This reflects the tendency of implied volatility to be higher than actual volatility, the financial market variant of overpaying for insurance. Long volatility strategies yield gains if actual volatility spikes above the implied volatility priced in the option. Over time, however, if volatility remains relatively stable or declines, long option positions are losing strategies. The cumulative expense of buying options as existing holdings expire ultimately erodes any temporary gains from volatility spikes (Exhibit 3, below).

Pitfalls of Portfolio Protection

During times of heightened market volatility and unattractive valuations on major assets, investors naturally become increasingly interested in hedging strategies. They look to these strategies to preserve the gains made in the good times. Unfortunately, such strategies suffer from two fundamental flaws. First, it is notoriously difficult to time significant market downturns. As a result, the period during which investors seek portfolio protection can be prolonged as valuations rise even higher from already lofty levels. Second, hedging in effect reduces exposure to the equity risk premium while also introducing the steady value erosion of a long volatility position. Given these flaws, portfolio protection strategies tend to lag the market through time. As a result, investors effectively overpay for insurance.

To highlight this result, we have illustrated the performance of three common portfolio protection strategies designed to hedge the risk of the S&P 500 (Exhibit 4, on opposite page). The three protection strategies combine a passive position in the S&P 500

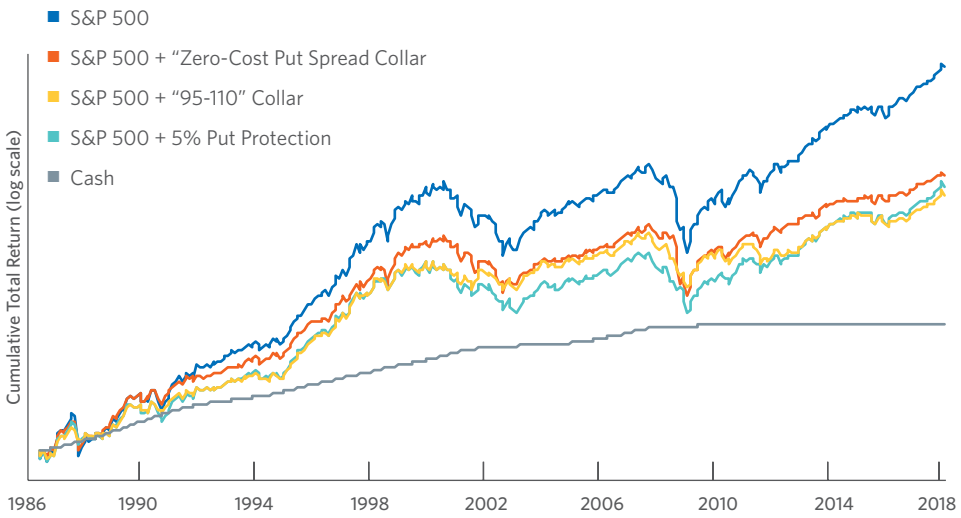
EXHIBIT 3:
Cumulative Return to Long Volatility
Source: Bloomberg.



index with different types of option-based hedges. The S&P 500 +5% Put Protection strategy tracks the performance of a strategy designed to hedge about 95% of the portfolio value. The Zero Cost Put Spread Collar strategy attempts to mitigate the cost of the downside protection by selling other options that effectively cap the upside of the portfolio. This strategy aims to mitigate the cost of hedging while retaining some potential for gain, effectively creating a corridor for portfolio returns. The 95-110 collar is a related approach that aims to protect about 95% of the portfolio value while leaving open the possibility of gaining up to 10% of the portfolio's value if the S&P 500 index rises further. As illustrated in Exhibit 4, these three portfolio protection strategies have one thing in common: they all underperform the S&P 500 index.

Portfolio protection strategies tend to lag the market through time. As a result, investors effectively overpay for insurance. Unfortunately, the protection purchased in this way does not achieve a commensurate reduction in risk.

FIGURE 4:
Performance of Equity Protection Strategies
Source: Strategic.



The reduced return of these strategies reflects the cost of portfolio protection. Unfortunately, the protection purchased in this way does not achieve a commensurate reduction in risk. Consequently, the resultant portfolios do not represent an optimal tradeoff between risk and return. As illustrated in Exhibit 5 below, the various option-based strategies all fall below the frontier representing an efficient trade-off between risk and return. In the case of each hedging strategy, it is possible to increase the return for the same level of risk by constructing a portfolio combining cash and equities. The inefficient risk/return tradeoff of these strategies suggest that portfolio insurance is only desirable to hedge a threshold event for a limited amount of time.

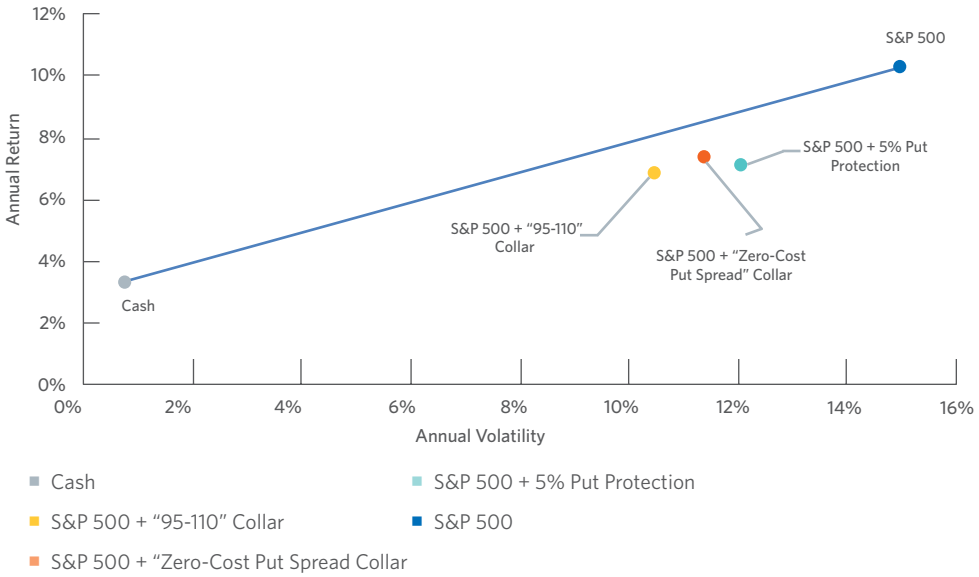
Conclusion

The prolonged market calm experienced during 2015-2017 encouraged risk taking, contributing to stretched valuations, compressed risk premiums, increased recourse to leverage, and reduced creditor protections. These dynamics are typical of the Volatility Paradox, the tendency of long lulls in volatility to increase market fragility and the risk of reversal. The volatility revival in February represented a mini "Minsky Moment," and was amplified by short volatility strategies pursuing similar pro-cyclical trading strategies. Following its spike in February, investors are naturally increasingly concerned about the risk of heightened volatility, and looking for ways to protect their gains. Unfortunately, unless perfectly timed, option-based portfolio protection strategies tend to detract from value as the hedge reduces exposure to the equity risk premium and entails the recurrent payment of an overpriced insurance premium. For this reason, we typically avoid option-based hedging strategies, preferring instead to make tactical portfolio shifts when assets appear significantly misvalued.

Disclosures

It is important to note that the expected returns should not be interpreted to represent a promise of future performance under any of the scenarios described herein. Because the expected return data were constructed with Strategic's judgment and knowledge of history in mind, they may not adequately capture the influence of future market conditions on investment returns. As a result, actual returns may differ substantially from the returns shown in this analysis. In addition, the expected returns do not represent actual trading and, therefore, do not account for the impact of financial risk on actual trading, such as the ability to adhere to a particular strategy in spite of significant trading losses.

EXHIBITION 5:
Return and Risk of Equity Protection Strategies
Source: Strategic.



Strategic Investment Group

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We strive to build enduring partnerships with our clients by strengthening their investment programs through a dynamic, value-enhancing investment process, sound governance framework, and world class client service. Our mission is to empower investors through experience, innovation, and excellence.

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