Managing equity portfolio volatility by harnessing the volatility risk premium

- After eight years of stock market gains, many investors have tempered their return expectations and are focusing attention on how best to best achieve equity-like returns with less risk.

- One relatively new solution investors are exploring is the use of option-based strategies that seek to harness the volatility risk premium (VRP), a well-researched phenomenon.

- The VRP is an attractive, distinct, persistent and diversifying alternative return source that can be harnessed via various derivative-based methods.

- A properly structured VRP-capture strategy has the potential to deliver attractive risk-adjusted returns with low correlations to traditional assets.

- One option for investors is to allocate to a dedicated defensive equity construct that swaps out some of the less persistent equity risk premium in the underlying portfolio for cash equivalents and then generates additional return by selling fully collateralised equity index put and call options.

- Parametric research into dedicated VRP constructs during times of financial distress has found that even in the worst scenarios, VRP constructs perform better than a broad-based equity index such as the MSCI All Country World Total Return Index (MSCI ACWI).
Introduction
After eight years of stock market gains and the rising duration risk across fixed income assets, many institutional investors have tempered their forward-looking return expectations. Increasingly, they are turning their attention towards ways to achieve equity-like returns with less risk. However, in pursuing this goal, there can often be significant road blocks to investment, including cost, liquidity concerns, complexity and potential tax consequences.

Various strategies investors consider include:

- Allocating to low-volatility indices. Interest in these assets has been underpinned by the so-called low-volatility anomaly. Contrary to the proposition that investors realise above-average returns in an efficient market only by taking above-average risks, high-beta and high-volatility stocks have long underperformed low-beta and low-volatility stocks.

Baker, Bradley and Wurgler argue that this anomaly may be partly explained by the fact that the typical institutional investor's mandate to beat a fixed benchmark discourages arbitrage activity in both high-alpha, low-beta stocks and low-alpha, high-beta stocks. Conversely, Wei Ge, Ph.D., a senior researcher at Parametric Portfolio Associates LLC (“Parametric”), and others have questioned the existence of the low volatility premium. They argue that the good recent performance of many smart beta factors, including low volatility, may be due to rising valuations rather than intrinsic long-term risk premia.

Irrespective of which theory is correct, there have been strong fund flows into lower volatility stocks and corresponding indices have delivered very strong returns over the past decade. In Parametric’s view, some of this opportunity set has already been arbitrated away.

- Investing in traditional alternatives. However, hurdles to investment here often include cost, liquidity, complexity and adverse tax consequences.

- Buying equity market protection. Instruments relating to the Chicago Board Options Exchange Market Volatility Index (VIX) to protect portfolios from “tail risk events” have gained considerable popularity since the Global Financial Crisis. However, buying long volatility-related instruments can amount to buying an expensive insurance policy. Investors often experience discomfort at paying a premium while waiting for a market correction and they frequently abandon protection ahead of the envisaged “insurance event”.

- Derivative-based strategies seeking to harvest the volatility risk premium (VRP). The VRP refers to the observation that the implied volatility embedded in derivatives, such as equity options or variance swaps, is usually higher over time than subsequent realised volatility. As noted by Wei Ge, Ph.D., this difference is generally most significant in broad market equity indices, such as the S&P 500 Index. Investors in the VRP are analogous to providers of insurance: they collect a premium from option buyers seeking volatility protection.

The use of option-based strategies that seek to harvest the volatility risk premium (VRP) is a relatively new solution that investors are increasingly exploring. The remainder of this paper will focus on the VRP as an alternative return source and the various strategies, including de-risking, which can be built around it.

What is the volatility risk premium?
The volatility risk premium (VRP) is a risk premium that index option buyers pay index option sellers to induce them to enter the market. The VRP is evidenced by the observed phenomenon that option-implied volatility tends to exceed realised volatility of the same underlying

3 A Survey of Three Derivative-Based Methods to Harvest the Volatility Risk Premium, The Journal of Investing, Fall 2016, Volume 25, Number 3
asset over time, thus creating a profit opportunity for the volatility sellers. More simply, it is the difference between the implied volatility of options and the subsequent realised volatility. A persistent and well-documented disparity exists between the two. S&P 500 Index options, for example, have traded with a positive VRP over 85% of the time since 1990 (see Exhibit A).

The presence of VRP has been stable across time and, according to Parametric research, is likely to continue to be predominantly positive in the future. The reason for the likely persistence of the VRP in the future is best illustrated via an examination of what drives the VRP.

What drives the volatility risk premium?

There are three commonly accepted sources of the premium: behavioural biases of investors, economic factors and structural constraints.

- **Behavioural biases.** In terms of behavioural biases, risk aversion and loss aversion are the most impactful.

  - **Risk aversion:** Given the choice of two investments with equal expected returns, one with no volatility and the other with significant return volatility, most investors will choose the former. In fact, most investors will choose the former even if it means less return. This preference for greater certainty of returns, or risk aversion, is generally the most important source of the volatility risk premium.

  - **Loss aversion:** People feel much more pain from losses than joy from gains, and behave in ways that minimise potential losses, even at the expense of foregoing large potential gains. As a result of this loss aversion, they tend to strongly favour long option positions (limited risk). All market participants are human beings with human emotions, such as hope, greed, fear, excitement, dismay, frustration, etc. The market trends and prices are inevitably affected by such human emotions and the tendency to be risk averse, effectively preserving the continued good health of the volatility risk premium.

- **Economic factors.** The VRP can be viewed as compensation, which must be meaningful, for bearing certain undesirable return/risk profiles. These economic factors include jump risk, tail risk and correlation risk. Option strategies (think of them as financial insurance for equities) can be designed to offer protection against unfavourable price movements and the premiums include coverage for movements up or down. Purchasing equity index put options, especially out-of-the-money options, helps to “insure” buyers from market meltdowns, which is valuable for most investors. The

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**Exhibit A**  The persistence of the volatility risk premium.

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<thead>
<tr>
<th>YEAR</th>
<th>IMPLIED - REALISED VOLATILITY %</th>
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<tbody>
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<td>2015</td>
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<tr>
<td>2016</td>
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The chart shows S&P 500® Index options relative valuation measured by taking daily observations of Implied Volatility (as measured by VIX Index) and subtracting the subsequent Realised Volatility of the S&P 500® over the following 30 days. The chart highlights empirical evidence showing that S&P 500® Index options have historically traded with a positive VRP more than 85% of the time. The embedded risk premium creates an opportunity to enhance returns through option selling.

Sources: Parametric, Bloomberg as of 3 January 2017.
insurer acts as a potential liquidity provider when cash is in urgent need and both parties of the transaction know this clearly.

- **Structural constraints.** Lastly, there are structural constraints. As the economic law of supply and demand generally stipulates, the short positions must carry significant premiums for the market to balance between the two sides of the equation.

Option buyers can be divided into two groups, hedgers and speculators. Hedgers seek downside protection for their portfolios. Speculators are investors betting on market directions and wishing to profit from the movements. After the Global Financial Crisis, the concept of downside protection, especially protection against tail risk, became popular among asset managers, maintaining a huge market for volatility products.

The potential pool for option sellers is much smaller as it creates downside exposure for the seller and most investors already have significant downside risk. Option selling may be perceived as a new investment strategy that is utilised primarily by sophisticated investors, and is classified as an alternative investment, which may further limit the potential number of sellers and the overall asset size for short positions.

### The VRP as a distinct, alternative return source

The fairly high persistence of the VRP makes it an attractive and suitable candidate for long-term investment. Investors in the VRP position themselves on the opposite side of the trade to investors seeking access to protection from “tail risk events”.

VRP investors behave as liquidity providers during a crisis and can reap elevated returns during such situations. When structured properly, a VRP strategy has the potential to deliver attractive returns with low correlations to traditional assets, such as equities and fixed income.

### When can it be beneficial to use VRP strategies?

As mentioned earlier, the Global Financial Crisis showed the magnitude of the potential headwinds. Volatility selling strategies are dynamic and tend to be more profitable during or immediately after a financial crisis. While VRP is a complex phenomenon and there are multiple drivers, investment strategies designed to harvest it can be utilised throughout the market cycle. The expected premium is usually higher when the market is in turmoil. However, as no one can time the market successfully, investors should or may want to consider

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**Exhibit B**  **Sources of the volatility risk premium.**

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<th>VOLATILITY RISK PREMIUM</th>
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</thead>
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<tr>
<td><strong>ECONOMIC FACTORS</strong></td>
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<tr>
<td>1. Tail/jump risk</td>
</tr>
<tr>
<td>2. Unfavourable returns profile</td>
</tr>
<tr>
<td>3. Asymmetric utility</td>
</tr>
<tr>
<td><strong>STRUCTURAL FACTORS</strong></td>
</tr>
<tr>
<td>1. Imbalanced supply/demand</td>
</tr>
<tr>
<td>2. Investor constraints</td>
</tr>
<tr>
<td>3. Manager career risk</td>
</tr>
<tr>
<td><strong>BEHAVIOURAL BIAS</strong></td>
</tr>
<tr>
<td>1. Risk/loss aversion</td>
</tr>
<tr>
<td>2. Availability bias</td>
</tr>
<tr>
<td>3. Incomprehension of small probability</td>
</tr>
</tbody>
</table>

Source: Parametric
having a systematic exposure to a VRP-harnessing strategy.

**Who is the VRP most appropriate for?**

Those with long-term investment horizons, including institutional investors or high net worth individuals, who are willing and able to bear the unique risks involved may be in a good position to take advantage of the volatility risk premium and potentially harvest superior, risk-adjusted, long-term returns for their portfolios.

**How can you capture the VRP?**

There are several possible derivative-based methods to monetise the volatility risk premium, including option strategies (selling calls, selling puts, selling straddles or strangles), swap strategies (selling volatility or variance swaps), or futures strategies (trading VIX futures).

A detailed discussion of their respective strengths and weaknesses lies outside the scope of this paper, but Parametric’s Wei Ge, Ph.D. found that all three approaches, when examined in an overlay context, had the potential to deliver Sharpe ratios higher than one and with significantly smaller maximum drawdowns than the S&P 500 Index.\(^4\)

For most investors, the option-based VRP harvesting strategy was recommended as a default as options have a long trading history, are exchange traded and highly liquid, and can easily be customised for different purposes. VIX futures are highly liquid, efficient to implement and have modest trading costs, but have high short-term volatility and provide returns more correlated with the equity markets. Variance swaps, meanwhile, have a relatively weak performance record in times of market turmoil and are traded over over-the-counter (OTC); so may compare unfavourably to the other two methods in terms of trading costs, liquidity and market depth.

At Parametric, we harness VRP without the use of leverage by employing liquid, exchange-traded instruments, with the ultimate goal of delivering attractive risk-adjusted performance.\(^5\)

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\(^4\) A Survey of Three Derivative-Based Methods to Harvest the Volatility Risk Premium, The Journal of Investing, Fall 2016, Volume 25, Number 3.

\(^5\) Parametric Portfolio Associates LLC (“Parametric”), a majority-owned subsidiary of Eaton Vance Corp., has been managing option-based strategies for over 20 years. Our VRP strategies aim to provide a significant and persistent source of return without the use of leverage or market forecasts by harvesting the “Volatility Risk Premium” - a well-researched phenomenon based on the discrepancy between the implied and Realised volatility of equity index options. Parametric is an innovative force in providing systematic, cost-effective and tax efficient solutions and currently manages (as at 31 December 2016) over US$11 billion of VRP strategies.
Defensive Equity strategy, we aim to de-risk the base portfolio and then sell collateralised equity index put and call option positions to generate additional income. The following section describes this dedicated VRP construct in more detail.

A dedicated VRP construct – Global Defensive Equity

This example is a fully collateralised portfolio specifically designed to deliver equity-approximating returns across most market environments (except when markets are rallying strongly) but with significantly below equity market risk. This portfolio (see Exhibit D) comprises 50% MSCI ACWI (sampled) exposure, 50% Treasury bills, and a short strangle consisting of shorting MSCI ACWI puts and calls layered on top of the base assets. Both short put and call options are explicitly and fully collateralised by the underlying MSCI ACWI and Treasury bills and have notional values equal to the respective MSCI ACWI or Treasury bills allocations.

A defensive equity portfolio is created by de-risking the underlying portfolio by converting half of the equity exposure to cash in the form of short dated U.S. Treasury bills. For Euro and Sterling investors, this cash allocation can be hedged back to their local currency. Additional portfolio income is generated by selling fully collateralised index options in order to harvest the VRP. In this way, the “defensive equity” portfolio replaces exposure to the (less persistent) equity risk premium for the more persistent VRP, without adding leverage. The expected return of the portfolio will be: (50% x MSCI ACWI) + (50% x cash equivalents potentially hedged to either Sterling or the Euro) + (100% x “VRP”). Disciplined rebalancing back to a 50/50 equity/cash blend means there is no market timing or market forecasting involved.

This portfolio is designed as a dedicated (strategic) allocation and can be funded by a reallocation from other parts of the overall portfolio. The objective of this strategy is to produce lower return volatility and consistently favourable risk-adjusted returns compared to a long-only equity portfolio. Over the long term, we expect its best relative performance to occur in flat and lower equity markets and for performance typically to trail a strongly rallying equity index.

Why consider incorporating the VRP?

The VRP is an attractive and untapped source of returns that can provide return enhancement while reducing overall portfolio risk. Parametric’s Global Defensive Equity strategy could appeal to investors wanting to reduce equity risk without sacrificing long-term performance potential. This strategy also exhibits a low

Exhibit D  An example of a dedicated global defensive equity portfolio.

Source: Parametric. Options are fully collateralised (no leverage), “out of the money” at initiation, approximately one-month term and typically cash settled. OTC options may be used for non-US options.
correlation with more traditional assets, such as equites or fixed income, and provides diversification benefits.

Additionally, for investors concerned about market volatility, Global Defensive Equity is expected to experience significantly lower drawdowns during major market declines while recovering more rapidly due to elevated implied market volatility following crisis events.

Where does a VRP-capture strategy fit within a portfolio?

Many investors consider using this Global Defensive Equity strategy as a complement or replacement for traditional low-volatility equity and hedged equity strategies. It can also be considered as an alternative to a traditional hedged equity or balanced portfolio. Lastly, the strategy can be a highly liquid component within an alternative assets allocation.

The benefits of a systematic VRP-capture strategy can include simplicity, transparency, liquidity, lower average costs and increased exposure management flexibility. The persistence of the VRP means strategies do not have to rely on market timing or active market bets in order to deliver predictable results. Investors who take on this unique risk premium can reasonably expect to benefit from it across market cycles.

Exhibit E  Global Defensive Equity construct: simulated\(^1\) cumulative\(^2\) drawdown behaviour, 1/4/06 - 31/12/16.

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-0.2 \\
-0.3 \\
-0.4 \\
-0.5 \\
-0.6 \\
\end{array}\]

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\[\begin{array}{c}
\text{Sim. Global Defensive Equity (Net)} \\
\text{MSCI ACWI™ Total Return} \\
\end{array}\]

\(^1\)Global Defensive Equity simulated returns are net of (45 bps) management fees and net of expected transaction costs.

\(^2\)Cumulative drawdown measures the cumulative percentage decline from the peak investment value to date. The most negative value of the cumulative drawdown statistic represents the maximum month-end drawdown. Simulated returns are for illustrative purposes only, do not represent the actual returns of any investor, and may not be considered for investing purposes.

Source: Parametric as of 4 January 2017. Global Defensive Equity is expected to experience significantly lower drawdowns during major market declines, while also recovering more rapidly due to elevated implied volatility (higher premiums/wider strikes) following crisis events.
Sources of data: Parametric, Eaton Vance and Bloomberg as of 3 January 2017, unless otherwise stated.

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