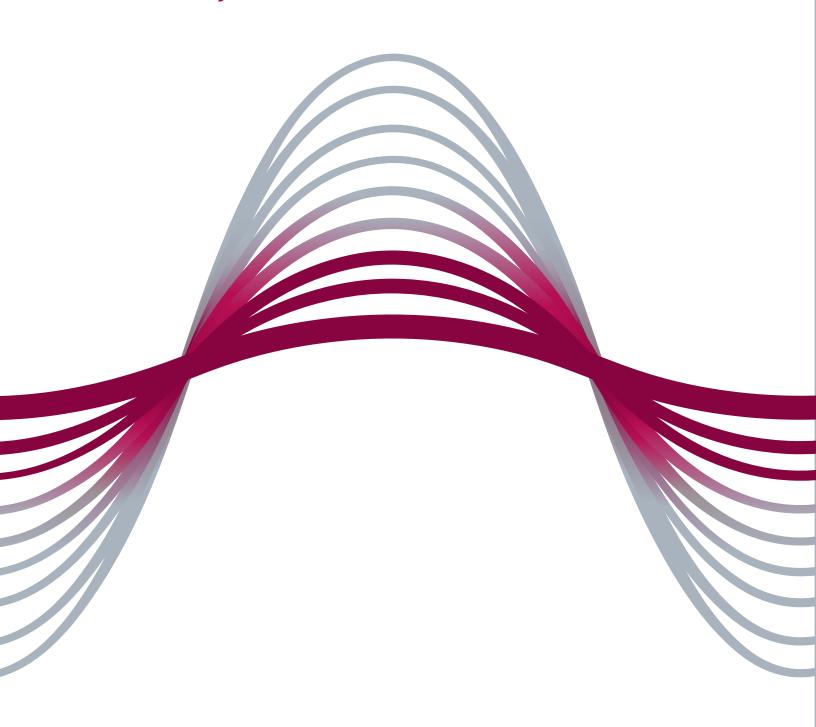


# An Overview of Parametric's Volatility Risk Premium Solutions



# Parametric's Volatility Risk Premium solutions

Parametric has been making complex instruments simpler for investors to access for over 30 years and strives to be an innovative force in providing systematic and cost-effective option-based solutions. We currently manage more than \$13.2 billion in Volatility Risk Premium (VRP) solutions. Our VRP strategies aim to provide a significant and persistent source of return without the use of leverage or market forecasts by harvesting the VRP—a well-researched phenomenon based on the discrepancy between the implied and realized volatility of equity-index options.

Total Firm AUM

\$204.5B

Total Assets Under Management\*

85

Investment Professionals

12 YEARS

Portfolio Managers Average Industry Experience **VRP Solutions AUM** 

\$13.2B+

AUM in Option Selling Strategies\*

32

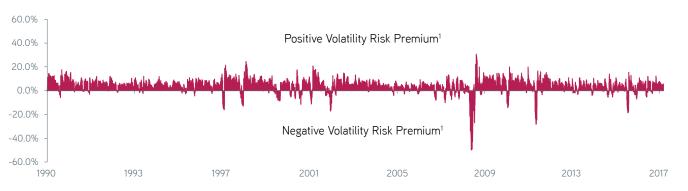
Investment professionals focused on Derivatives Strategies

30+ YEARS

Many investors believe that U.S. equity returns will be lackluster over the next several years. Accordingly, they are looking for ways to increase returns and reduce risk in their existing equity portfolios. However, there can be significant road blocks to this approach including cost, liquidity concerns, complexity, and potential tax consequences. One relatively underused solution investors are exploring is the use of option-based strategies that seek to harvest the volatility risk premium.

## What is the VRP?

The VRP is a risk premium that option buyers pay to option sellers to induce them to enter the market, similar to the cost (or premium) associated with buying insurance. Historically, based on simulated data, equity index options have persistently exhibited a positive VRP. A persistent and well-documented disparity exists between fair-market value and VRP, and the VRP has been positive more than 85% of the time since 1990.



Source: Parametric, Bloomberg; Date: 04/04/17.

1990 to the present represents the longest period from which reliable data is available for the S&P 500 Index implied volatility. S&P 500® Index options relative

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valuation measured by taking daily observations of Implied Volatility (as measured by VIX Index) and subtracting the subsequent Realized Volatility of the S&P 500® over the following 30 days. Options have historically traded about 4.3 volatility points above subsequent realized volatility. Said another way, the option market tends to overestimate future volatility, which translates directly into higher prices for both puts and calls. VIX is the Chicago Board Options Exchange Volatility Index. VIX is calculated constantly throughout each trading day by observing the implied volatility derived from actual market prices of a wide array of put and call options with an average maturity of 30 days to expiration. For informational purposes only.

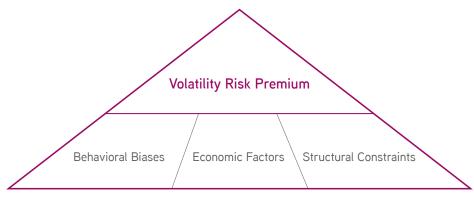
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<sup>\*</sup> As of May 31, 2017. Includes AUM of Parametric Investment & Overlay Strategies and Parametric Custom Tax-Managed & Centralized Portfolio Management.

<sup>&</sup>lt;sup>1</sup> 30 years reflects history of the Clifton Group that was acquired by Parametric Portfolio Associates LLC on December 31, 2012.

# What drives the VRP?

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



### Behavioral biases

In terms of behavioral biases, risk aversion and loss aversion are the most impactful biases.

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

Loss aversion: People feel much more pain from losses than they feel joy from gains, so they behave in ways that minimize potential losses, even at the expense of foregoing large potential gains. Because of this loss aversion, they tend to strongly favor long option positions (limited risk).

#### Economic factors

The VRP can be viewed as compensation, which must be meaningful, for withstanding 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 unfavorable price movements, and the premiums include coverage for either up or down movements.

#### Structural constraints

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

The potential pool for option sellers is small because selling options creates downside exposure for the seller, they may also be perceived by some investors as a complex investment strategy, and their classification as an alternative investment may further limit the number of sellers.

# When can it be beneficial to use VRP strategies?

Volatility selling strategies are dynamic and tend to be more profitable during or immediately after a financial crisis. While the VRP is a complex phenomenon and there are multiple drivers, investment strategies designed to harvest it can be utilized 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, we believe investors should probably consider having a strategic exposure to the VRP.

## Who is the most appropriate type of investor for the VRP?

Investors in the VRP are analogous to providers of insurance: they collect a premium from option buyers seeking volatility protection. Those with long-term investment horizons, including institutional investors and high net worth individuals, who are willing and able to withstand the unique risks involved, may be in a good position to take advantage of the VRP and potentially harvest superior risk-adjusted long-term returns for their portfolios. Based on simulated data, the presence of the VRP has been stable across time and we believe that it is likely to persist in

## How can you capture the VRP?

There are several possible ways to monetize the VRP, including option strategies (selling calls, selling puts, selling straddles or strangles), swap strategies (selling volatility or variance swaps), or futures strategies (trading VIX futures).

Both swaps and futures tend to be too complicated and potentially intimidating for many investors. Our preferred, and perhaps more accessible method, is using equity index option strategies. By systematically selling combinations of calls and puts, we attempt to capture the VRP effectively and consistently.

How options are used in the VRP process at Parametric

Call Selling	Short call option collateralized by long equity     Seller provides insurance against a market rally
Put Selling	<ul> <li>Short put option collateralized by cash</li> <li>Seller provides insurance against a market decline</li> </ul>

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# How can investors use the VRP?

At Parametric, we harness the VRP without the use of leverage by employing liquid, exchange-traded instruments, in order to promote attractive risk-adjusted performance. Depending on investor objectives, utilizing different combinations of collateralized equity index put- and call-option positions can produce unique risk/return profiles across a range of equity market betas. These classifications range from 100% cash-secured put selling to 100% covered-call selling.

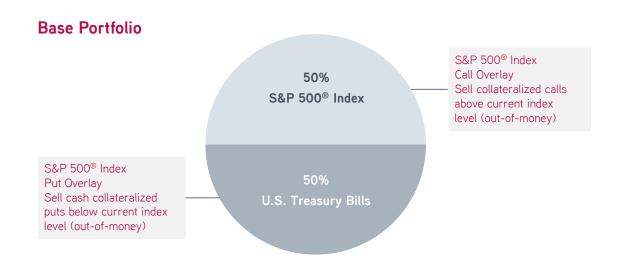
## VRP in Action – Defensive Equity

The following example is 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 is comprised of 50% S&P 500® Index (sampled) exposure, 50% U.S. Treasury bills, and an overlay of S&P 500® Index puts and calls. Both short-position put and call options are fully collateralized by the underlying S&P 500® Index and by U.S. Treasury bills, and they have notional values equal to the respective allocations.

A defensive equity portfolio is created by de-risking the underlying portfolio, which is accomplished by converting half of the portfolio to cash in the form of short-dated U.S. Treasury bills. Additional portfolio income is generated by selling fully collateralized index options to harvest the VRP. In this way, Parametric's defensive equity portfolio replaces exposure to the (less persistent) equity risk premium (ERP) in favor of the more persistent VRP, without adding leverage. The expected return of the portfolio will be: (50% x S&P 500® Index) + (50% x cash equivalents) + (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 a client's overall portfolio. The objective of this strategy is to produce lower return volatility and consistently favorable risk-adjusted returns as compared to a long-only equity portfolio. Over the long term, we expect the portfolio's best relative performance to occur in flat and lower equity markets and, typically, for performance to trail during a strongly rallying equity market.



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# 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 Defensive Equity strategy could appeal to investors wanting to reduce equity risk without sacrificing long-term performance potential. This strategy also exhibits a low correlation with more traditional assets, such as equities or fixed income, and it provides diversification benefits.

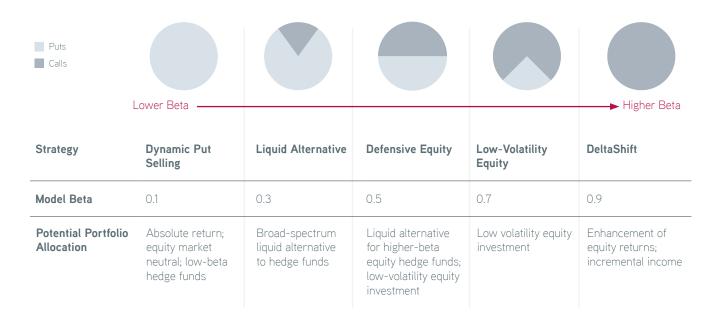
Additionally, for investors concerned about market volatility, Defensive Equity is expected to experience significantly lower drawdowns during major market declines, while recovering more rapidly, due to elevated implied market volatility, following crisis events.

## Where does a VRP strategy fit within a portfolio?

Many investors consider using this Defensive Equity strategy as a complement or replacement for traditional low-volatility equity and hedgedequity 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 transparency, liquidity, lower average costs and increased exposuremanagement flexibility. The persistence of the VRP means strategies do not have to rely on market timing or active market bets to deliver predictable results. Investors who adopt this unique risk premium can reasonably expect to benefit from it across market cycles.

#### Potential Uses of the Five Collateralized Option-Selling Strategies



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Treasury Bills are a short-term debt obligation backed by the U.S. government with a maturity of less than one year. T-bills are sold in denominations of \$1,000 up to a maximum purchase of \$5 million and commonly have maturities of one month (four weeks), three months (13 weeks) or six months (26 weeks).

The Chicago Board Options Exchange Volatility Index ("VIX®") reflects a market estimate of future volatility, based on the weighted average of the implied volatilities for a wide range of strikes. 1st & 2nd month expirations are used until 8 days from expiration, then the 2nd and 3rd are used.

The Bloomberg Barclays US Aggregate Bond Index is a broad-based flagship benchmark that measures the investment grade, US dollar-denominated, fixed-rate taxable bond market. The index includes Treasuries, government-related and corporate securities, MBS (agency fixed-rate and hybrid ARM pass-throughs), ABS and CMBS (agency and non-agency). Provided the necessary inclusion rules are met, US Aggregate eligible securities also contribute to the multi-currency Global Aggregate Index and the US Universal Index, which includes high yield and emerging markets debt. The US Aggregate Index was created in 1986 with history backfilled to January 1, 1976.

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