NEUBERGER BERMAN

DEREK DEVENS, CFA
Senior Portfolio Manager
Option Group

RORY EWING
Associate Portfolio Manager
Option Group

ERIC ZHOU
Associate Portfolio Manager
Option Group

BERYL LOU
Research Analyst
Option Group

Simply Put(Writing)

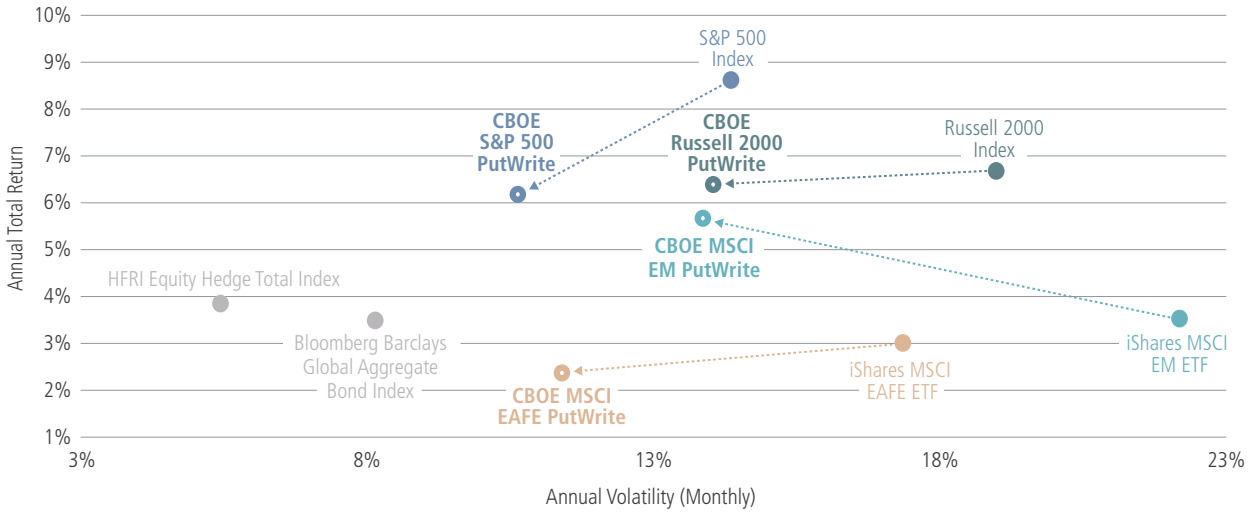
Evolutionary, Not Revolutionary

When we contemplate the evolution of the investment management industry in aggregate, it appears to us that an increased desire to control risk and isolate and/or define investment outcomes is a persistent, likely permanent, feature of the financial market landscape. Waning investor preference for stock pickers is being partially reborn in hopes of identifying and capturing market factors and risk premiums. In response, investment strategy innovation is becoming less about honing active stock selection and more about engineering and delivering a unique, identifiable return distribution. That said, innovation does not necessarily require increased complexity. Invariably, risks must be managed, and if risks are not managed by a "stock picker", then precautions must be taken at the portfolio level. We view the increasing adoption of risk-based allocations and the success of products such as risk-premia, smart-beta, low-volatility, factor-based and multi-asset class strategies as first-hand confirmation of this tectonic shift.

The perennial investor challenge is to source investment strategies that can offer both total returns consistent with long-term portfolio targets and manageable levels of risk (volatility and drawdown). Naturally, investors seek to maximize their return earned per unit of risk assumed, i.e. risk-adjusted returns. However, such risk-efficiency can't be "spent" to meet future obligations without the application of meaningful leverage, usually a less desirable risk element.

In this vein, we present collateralized equity index put writing as a strategy well suited to improve the risk-return efficiency, liquidity, flexibility and cost-effectiveness of investor portfolios, be they passive or active. Figure 1 illustrates the potential enhanced risk-efficiency index option writing strategies offer versus a variety of traditional asset class indexes. What follows is an anthology of sorts on collateralized index put writing that is guided by our investment philosophy, years of research and implementation, and investor conversations.

FIGURE 1. POTENTIAL TO ENHANCE PORTFOLIO RISK EFFICIENCY
Index Annual Return vs. Risk (Mar 2006 – Sep 2019)



Source: Bloomberg LP, CBOE. The CBOE Index performance set forth above represents a combination of live and backtested performance. Please see additional disclosures at the end of this piece for specific details. Indexes are unmanaged and are not available for direct investment.

Option Markets Are Capital Markets

At a macro level, we believe index option markets serve as a necessary capital market for risk transfer not too dissimilar to other risk underwriting markets such as debt or equity capital markets or even traditional insurance markets. Equity index option premiums efficiently price the transfer of equity index risk between buyers and sellers, much like bond market yields price interest rate and credit risks. Figure 2 plots the CBOE S&P Volatility Index (the "VIX") level against the option-adjusted spread of the Barclays U.S. High Yield Index to illustrate our idea that index option implied volatility is a risk-pricing mechanism that is similar to high yield bond yields.

FIGURE 2. IMPLIED VOLATILITY VS. HIGH YIELD CREDIT SPREADS
CBOE S&P 500 Volatility Index (VIX) vs. Barclays U.S. High Yield OAS (Jan 1994 – Sep 2019)

Source: Bloomberg LP, CBOE.

While bonds and stocks are exclusively underwritten by investment banks, almost any sophisticated investor is free to write an option contract on an exchange. This allows longer-term, well-capitalized investors to take advantage of the market structure built by the larger players, including the information flow and established options pricing. Imagine an accessible insurance marketplace where the clearing price was set by insurers with high operating costs and high costs of capital. Underwriters with lower fixed costs or access to lower cost long-term capital could underwrite similar risks and generate similar revenue, but with higher profit margins.

FIGURE 3. PUTWRITE PAY-OFF DIAGRAM

For illustrative purposes only.

A collateralized put writing strategy consists of a short position in an equity index put option and an investment in short-term U.S. Treasuries with a value equal to the strike price of the put option. Selling (Writing) an equity index put option accepts a future, contingent liability equal to no more than the option's strike price, i.e. fully collateralized or unlevered, in exchange for an up-front cash premium. Much like an insurance business, cash put option premiums can be used to partially offset losses that may result from the underlying index's price falling below the option's strike price. When introducing put writing as an investment strategy, we like to dispel the inconsistent view that while investors buy put options for negative beta exposure, i.e. hedging, sellers of put options tend to be viewed solely as "selling volatility" rather than gaining efficient positive beta exposure, i.e. long equity, with a volatility premium.

In 2007 the Chicago Board of Exchange (the "CBOE") introduced the S&P 500 PutWrite Index (the "PUT Index") with a history available from 1986, which is designed to track the performance of a collateralized put writing strategy on the S&P 500 Index. More recently, the CBOE introduced PutWrite strategy indexes based on the Russell 2000 Index, MSCI EAFE Index and MSCI EM Index. Specifically, the CBOE published histories for the CBOE Russell 2000 PutWrite Strategy Index (2001), the CBOE MSCI EAFE PutWrite Strategy Index (2006) and the CBOE MSCI EM PutWrite Strategy Index (2006). These CBOE indexes represent a portfolio that maintains a short position in a 30-day, at-the-money put option on the respective underlying index, rolled monthly, and a long position in U.S. T-bills equal to the potential obligation of the put options (fully collateralized). As illustrated in the tables below, the CBOE indexes have achieved a return similar to that of the underlying equity index while experiencing a notably lower level of volatility, resulting in a more risk-efficient equity index exposure over the period.[1] The CBOE indexes' betas and up-market and down-market statistics versus their underlying equity indexes illustrate that the strategy results are driven by structural differences in strategy payoffs. However, the CBOE PutWrite strategy indexes' complementary relative results are not achieved without unique risks. Accepting these differentiated return profiles comes with long-term annualized tracking errors relative to the underlying equity index. Of course, higher tracking error levels allow smaller allocations to have an impact at the portfolio level. For those interested, our research paper on option benchmark indexes offers more information on the broader suite of CBOE option writing indexes.

[1] CBOE PutWrite Indexes perform well across additional statistics that address non-normal return distributions (such as option writing) and include, but are not limited to, Sortino ratio, Stutzer index, Treynor ratio and Leland's annual alpha. This is further described specifically for the CBOE S&P 500 PutWrite Index in the paper http://www.cboe.com/rmc/2015/Day-1-Session-2-Black-Szado-projector.pdf.

Jun 1986 to Sep 2019 (monthly data)	CBOE S&P 500 PutWrite (PUT)	S&P 500 Index
Annual Return (%)	9.6	10.2
Volatility (%)	9.9	14.9
Risk-Adj. Ret.	0.97	0.68
Beta (S&P 500)	0.56	1.00
Max DrawDown (%)	-32.7	-50.9
Up-Mkt. Cap. (%)	62	100
Down-Mkt. Cap (%)	41	100
Tracking Error (%)	8.51	–

Jan 2001 to Sep 2019 (monthly data)	CBOE Russell 2000 PutWrite (PUTR)	Russell 2000 Index
Annual Return (%)	7.4	7.5
Volatility (%)	13.5	19.0
Risk-Adj. Ret.	0.55	0.39
Beta (S&P 500)	0.58	1.00
Max DrawDown (%)	-38.1	-52.9
Up-Mkt. Cap. (%)	59	100
Down-Mkt. Cap (%)	47	100
Tracking Error (%)	11.12	–

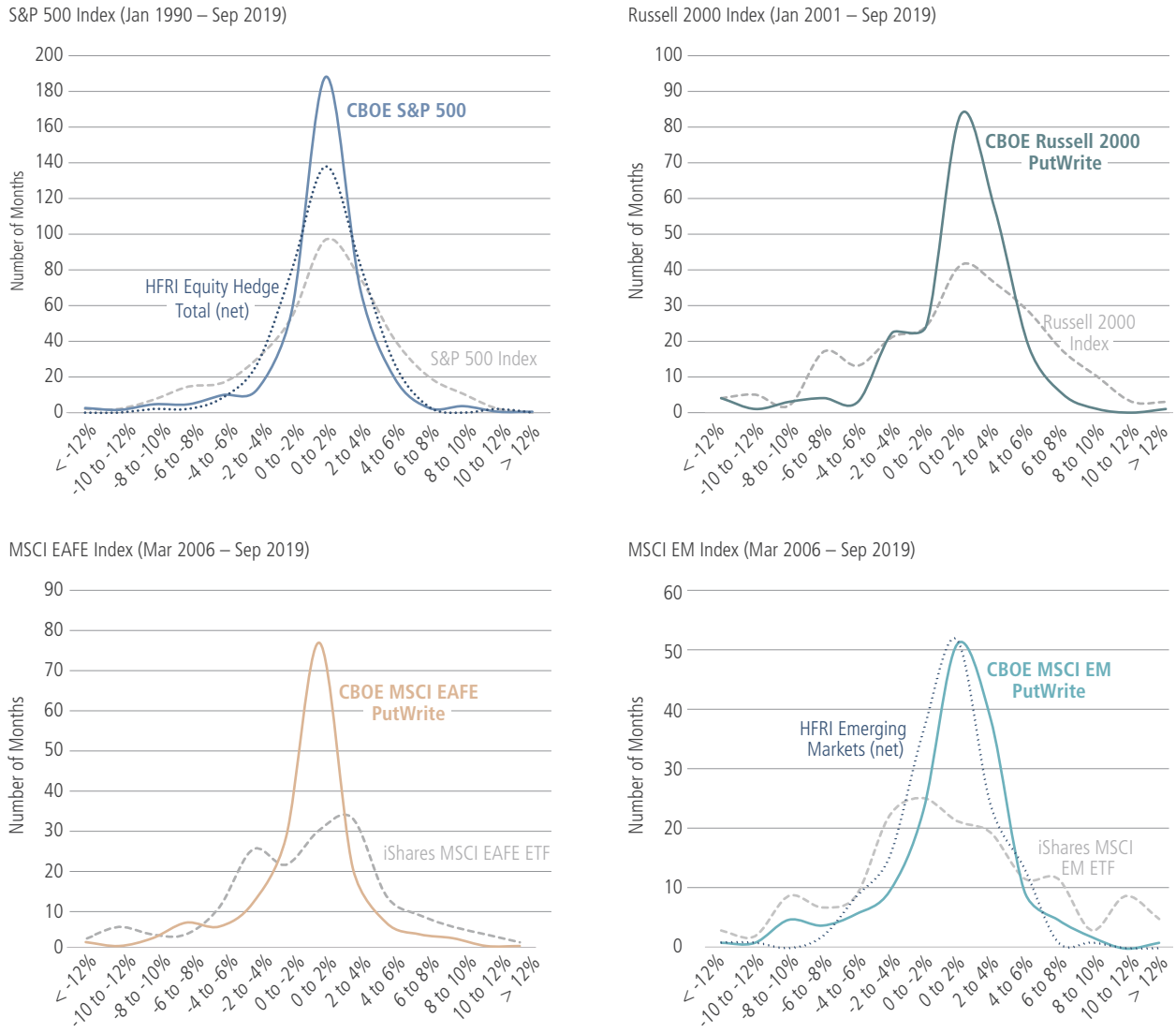
Mar 2006 to Sep 2019 (monthly data)	CBOE MSCI EAFE PutWrite (PXEA)	iShares MSCI EAFE ETF (EFA)	CBOE MSCI EM PutWrite (PXEF)	iShares MSCI EM ETF (EEM)
Annual Return (%)	2.4	3.0	5.7	3.5
Volatility (%)	11.4	17.3	13.9	22.2
Risk-Adj. Ret.	0.21	0.17	0.41	0.16
Beta (S&P 500)	0.57	1.00	0.52	1.00
Max DrawDown (%)	-38.4	-57.4	-37.0	-60.4
Up-Mkt. Cap. (%)	54	100	51	100
Down-Mkt. Cap (%)	51	100	38	100
Tracking Error (%)	9.48	-	13.24	-

Source: Bloomberg LP, CBOE. The CBOE Index performance represented here represents a combination of live and backtested performance.

Please see additional disclosures at the end of this piece for specific details. Indexes are unmanaged and are not available for direct investment.

Figure 4 provides the monthly return distributions for the CBOE PutWrite strategy indexes presented above alongside return distributions of their underlying equity indexes, as well as hedge fund or low volatility indexes where available. In converting traditional equity investment return potential, i.e., capital appreciation and dividends, into tangible up-front cash flows via the consistent collection of option premiums and interest income, equity index put writing strategies reshape the return distribution of the underlying equity index. These augmented return distributions can play a meaningful role in investor portfolios by diversifying traditional equity index allocations, complementing higher-cost alternative investments and supplementing the cash generation of yield-oriented investment allocations.

FIGURE 4. RESHAPING THE INDEX MONTHLY RETURN DISTRIBUTION



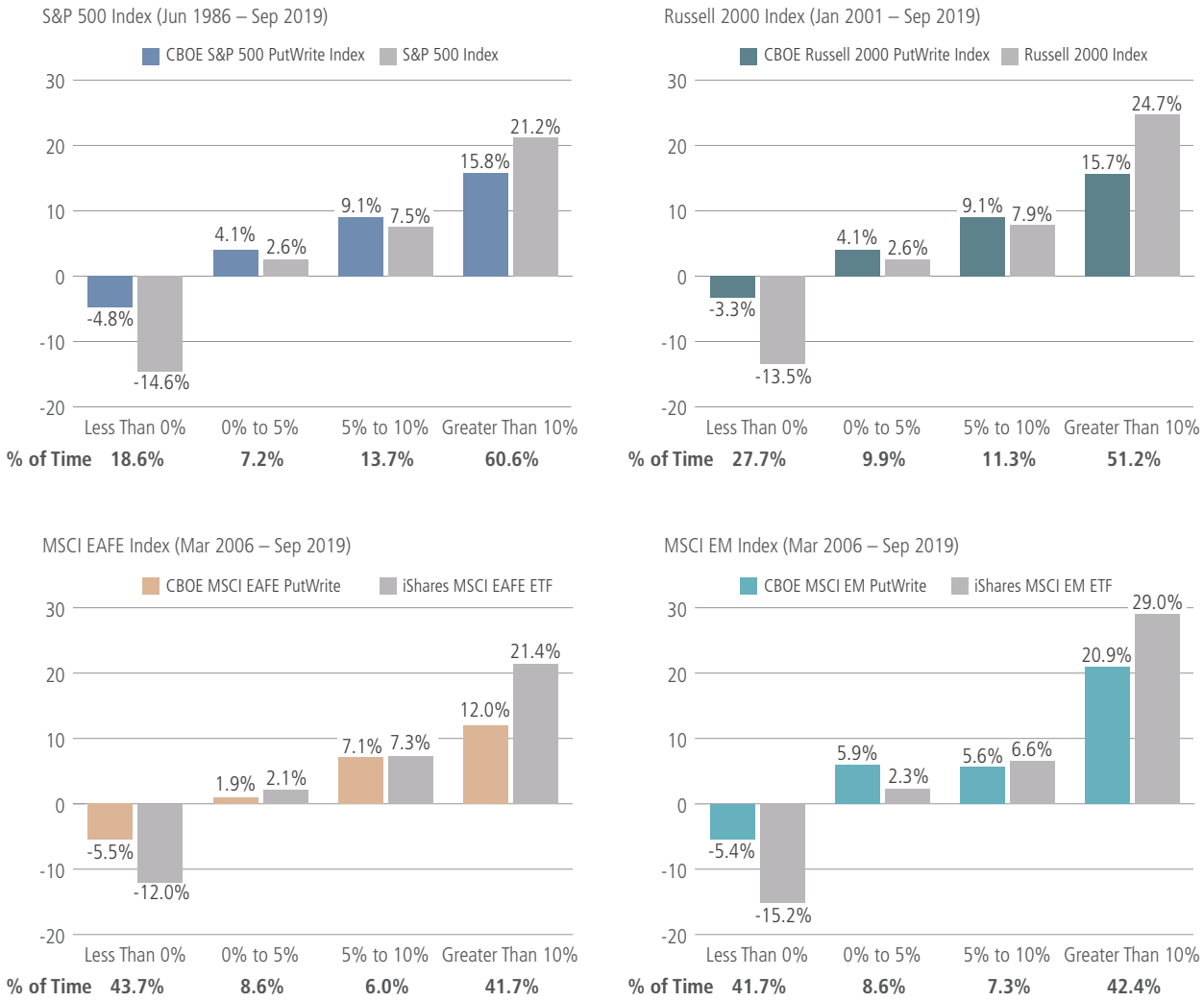
Source: Bloomberg LP, CBOE. The CBOE Index performance set forth above represents a combination of live and backtested performance. Please see additional disclosures at the end of this piece for specific details. Indexes are unmanaged and are not available for direct investment.

Structural Return Diversification

The monthly up-market and down-market capture ratios presented previously in the performance summary tables help quantify the structural return diversification illustrated in Figure 4, but neither offers a clear return profile across various return environments. In Figure 5 we compare the average one-year return of the CBOE PutWrite indexes relative to their underlying equity indexes across selected one-year return scenarios. By tending to outperform the underlying equity indexes during negative, flat and modest return environments, the CBOE PutWrite strategies achieve their relative success in three out of four scenarios with the periods of relative underperformance coinciding with periods where putwrite strategies generated an attractive absolute total rate of return. Of note, relative to the other equity indexes, the S&P 500 has spent a significant portion of rolling one-year periods compounding at an annual rate greater than 10%. We suspect many investors would agree that the success of the S&P 500 is likely unsustainable relative to the other equity indexes presented below. With this in mind, we believe the relative performance profiles can be materially additive to broader asset allocations that seek to improve overall risk efficiency in their global equity portfolios.

FIGURE 5. PUTWRITE RETURNS BY INDEX RETURN REGIME

Average Rolling 1-Year Returns Index Return Scenario

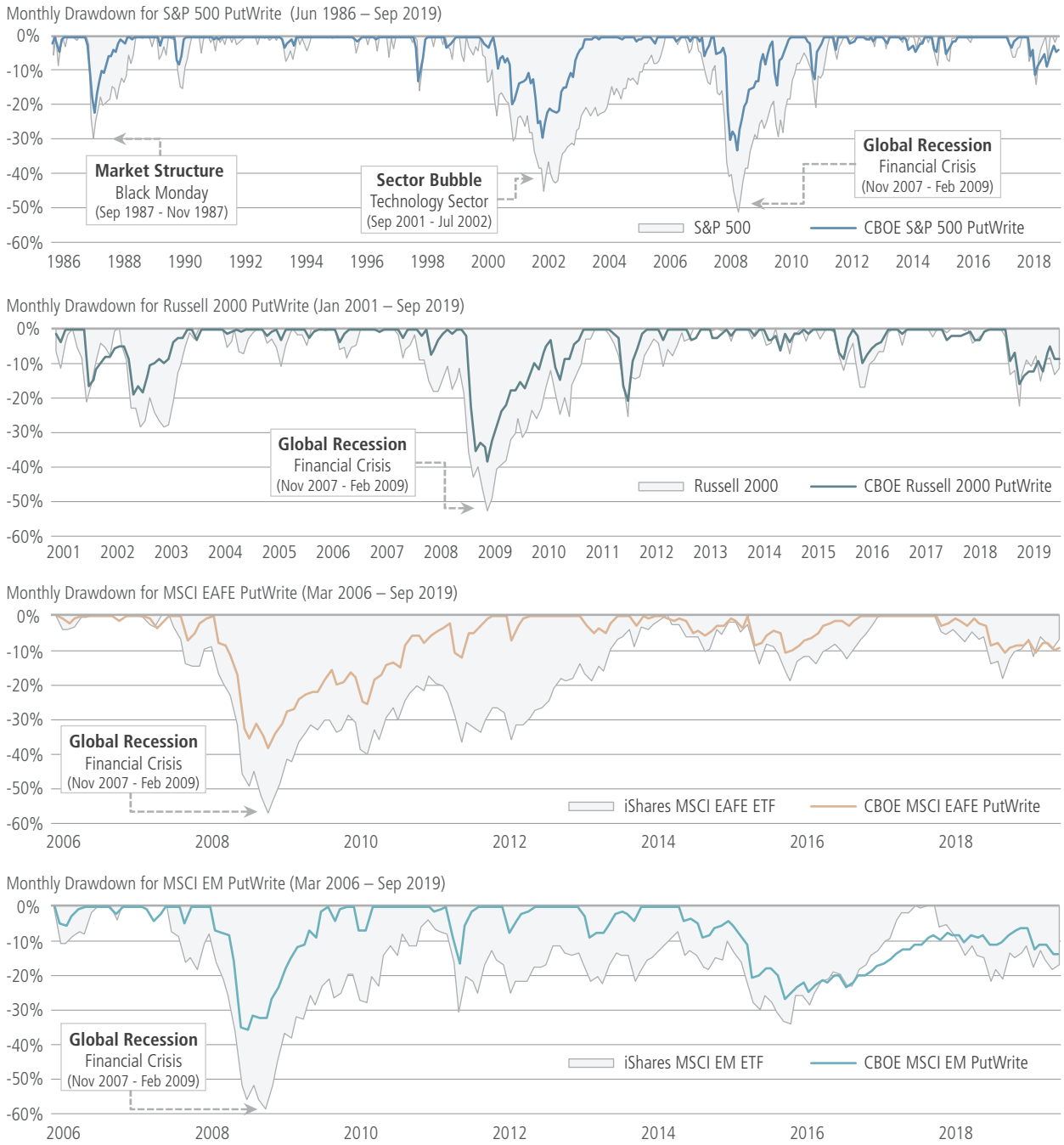


Source: Bloomberg LP, CBOE. The CBOE Index performance set forth above represents a combination of live and backtested performance. Please see additional disclosures at the end of this piece for specific details. Indexes are unmanaged and are not available for direct investment.

Drawdowns: Perception Does Not Make for Reality

Figure 6 provides annotated drawdown charts for the four CBOE PutWrite strategy indexes versus their respective underlying equity indexes. In almost all cases presented, the CBOE PutWrite indexes declined less and had more expedient recoveries than the underlying equity index. No matter the nature of the crisis depicted in Figure 6, the strategy of collecting put option premiums tends to be a lower volatility/lower downside strategy.

FIGURE 6. CUMULATIVE DRAWDOWN COMPARISON



Source: Bloomberg LP, CBOE. The CBOE Index performance set forth above represents a combination of live and backtested performance. Please see additional disclosures at the end of this piece for specific details. Indexes are unmanaged and are not available for direct investment.

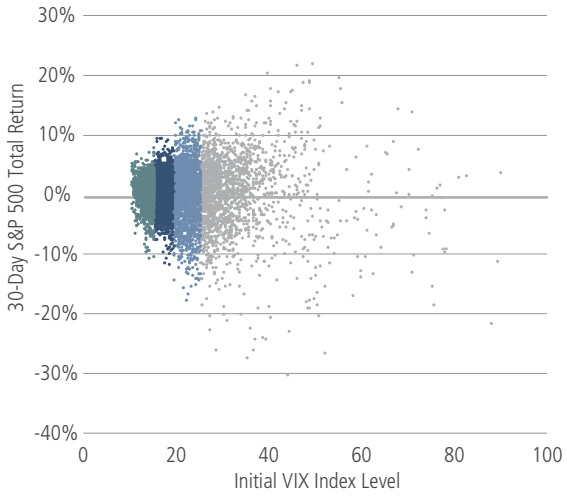
Time Is Money: What Are Investors Waiting For?

We find the reactive nature of implied volatility often promotes the perception that it has a predictive nature. So much so, it tempts many investors into forecasting implied volatility levels with elaborate models that produce compelling results most of the time. Unfortunately, it only takes a rare event that happens every few years to render a model ineffective.

In our minds, consistently trying to add value by successfully forecasting a market-derived "forecast"—option implied volatility is an explicit forecast of an index's underlying return distribution over an explicit timeframe—is not a viable long-term business model. Figure 7 illustrates the relationship between spot VIX Index levels versus the subsequent 30-day return of the S&P 500 Index. As we would expect, VIX appears to be a reasonable forecast of 30-day return dispersion, but it is a poor predictor of the direction of the S&P 500. In the context of collateralized put writing strategies, in which the sensitivity to implied volatility (vega) is relatively limited due to unlevered positioning, timing implied volatility has only a marginal, likely negligible, impact on long-term performance. When it comes to option investing, time literally is money and it is generally better to be compounding it continuously.

FIGURE 7. OPTION IMPLIED VOLATILITY 'PRICES' RISK

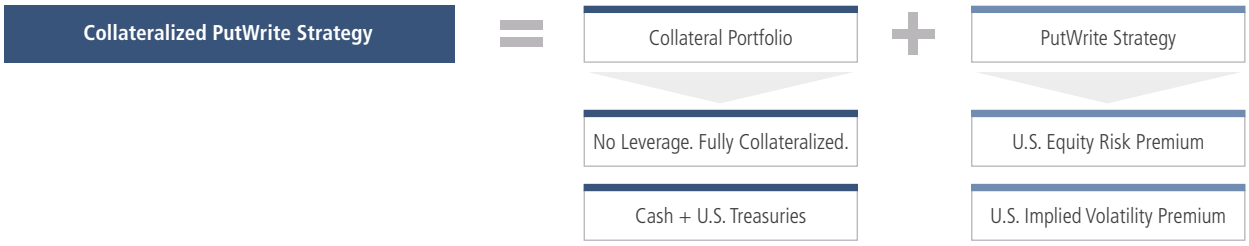
30-Day S&P 500 by Starting CBOE S&P 500 Volatility Index ("VIX") Index Level (Jan 1990 – Sep 2019)



Source: Bloomberg LP. The CBOE Index performance set forth above represents a combination of live and backtested performance. Please see additional disclosures at the end of this piece for specific details. Indexes are unmanaged and are not available for direct investment.

Definable and Potentially Sustainable Returns

FIGURE 8. EQUITY INDEX PUTWRITE RETURN SOURCES

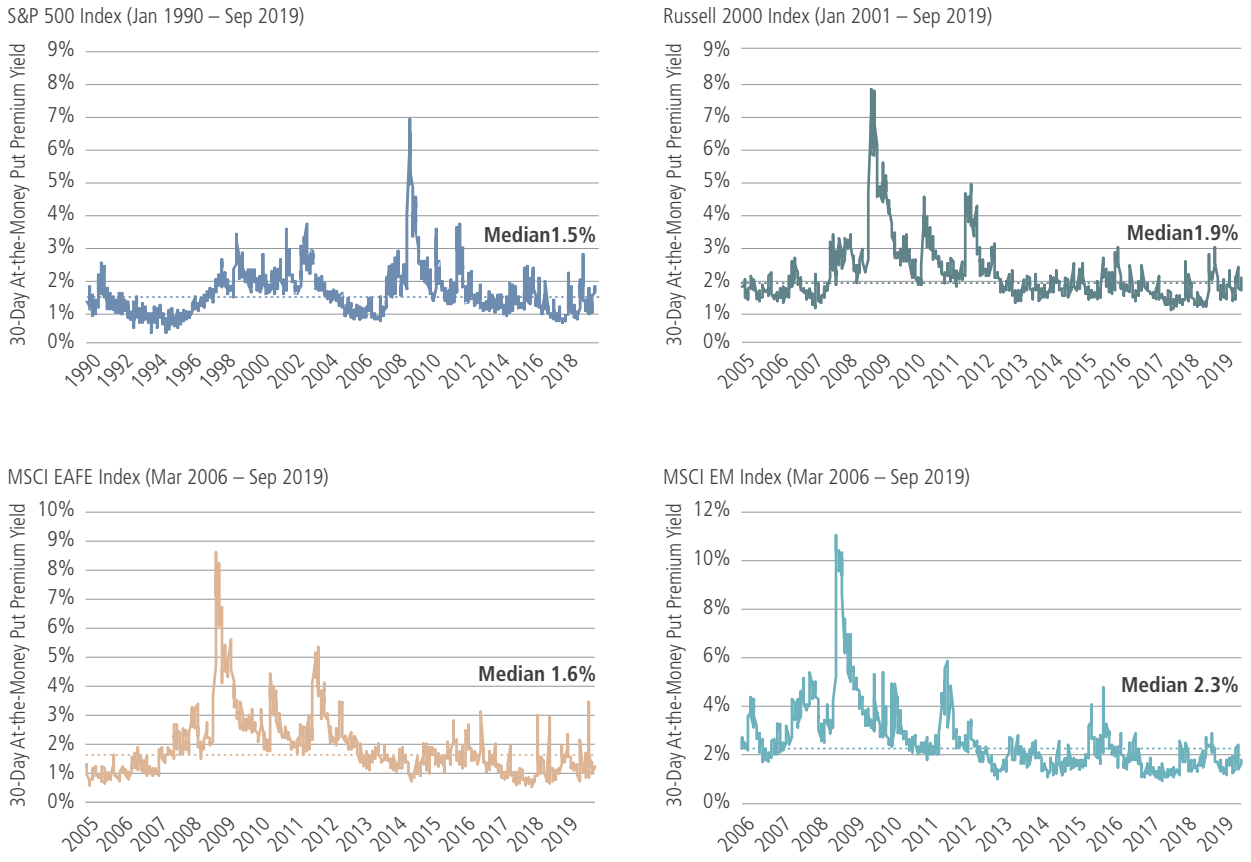


For illustrative purposes only.

Collateralized put writing returns are sourced from the collection of put option premiums and collateral income (Figure 8). We view a put option premium as accounting for two principal risk components. The larger of the two is an expectation of the underlying equity index's prospective distribution (equity risk premium). The second reflects the inherent uncertainty involved in underwriting the equity risk premium for a finite period of time (volatility risk premium), i.e. additional compensation for accepting the risk others wish to avoid. When translated into option implied volatility, we relate the former to the anticipated realized volatility of an equity index and the latter to the well-known implied volatility premium. Figure 9 provides the historical premium yields—defined as option premium as a percent of option strike price—of various CBOE indexes. Since 1986, the median put option premium yield collected by the PUT Index has been over 1.5% per month, which implies an annual cost of over 18% for consistent S&P 500 put option buyers. Similarly, the median put option premium yield collected by global CBOE Indexes has been 1.9%, 1.6% and 2.3% per month (or approximately 23%, 19% and 28% per year) for consistent Russell 2000, MSCI EAFE and MSCI EM put option buyers, respectively. Option markets are constantly reappraising equity market risk to adjust for both perceived and realized risks.

FIGURE 9. OPTION PREMIUMS ADJUST TO REFLECT EQUITY MARKET RISK LEVELS

30-Day At-the-Money Put Option Premium Yield



Source: Bloomberg LP, CBOE.

Equity Risk Premium: Market Efficiency Applies Here, Too

The persistent substantiation of equity market efficiency has driven most equity allocations toward some degree of passive investment strategies. In accepting that stock prices reflect "all" or "most" information, we believe that an investor must acknowledge a natural corollary related to options on diversified stock portfolios, i.e. indexes. For equity markets to be efficient, investors who assume the downside risk of an equity index should expect to earn the long-term equity risk premium consistent with owning the index. Essentially, the underwriters of equity risk should earn a long-term equity risk premium as a component of their returns regardless of how the risk is assumed. Were this not the case, then we believe equity markets would fail to meet an important condition of market efficiency.

Hence, a portion of put option premiums must compensate for the anticipated sensitivity of the option price to the underlying index—the delta risk of the option.[2] Were markets omniscient, an index put option premium would simply be priced based on the realized volatility of the index over the life of the option—implied volatility would equal realized volatility. This portion of an option premium is compensation for assuming index beta/delta risk, i.e. an equity risk premium. However, markets are obviously not "all-knowing" and the realized volatility of an equity index is difficult to predict, so surely they must demand further compensation for the added uncertainty.

Volatility Risk Premium: The Making of a Profit Margin

Option market makers, broker dealers, large trading firms and trading desks of large banks are the primary participants in the options market and are typically focused on trading volatility rather than underwriting equity index risk in a collateralized format. Specifically, listed index option markets ("option markets") are comprised of profit-seeking investors (speculators, hedgers and arbitrageurs) that set exchange traded option prices (premiums), intending for the majority of the options they sell to expire worthless, generating a profit in return for assuming equity risk, as well as time and capital committed. Investors don't assume risk with the intention of losing money over time, and option markets are not an exception. So, understanding how option market participants seek to earn profits is important to understanding the implied volatility premium.

As a broad generalization, option market makers buy/sell options and seek to hedge resulting exposures to the underlying index and implied volatility, aka "the greeks". Profits are earned when aggregate premiums collected exceed the costs of hedging and any additional fixed expenses associated with their operations, including corporate taxes. However, unlike a typical business model, the cost of goods sold, which is realized volatility of the underlying index, isn't known until the expiration of the options.[3] Of course, option market makers still seek to maximize their profits in the face of this additional uncertainty. Therefore, option premiums (implied volatility levels) of exchange traded index options are constantly adjusting to reflect a clearing price of risk (implied volatility premium) that accounts for world events, supply and demand dynamics, and investor utility.

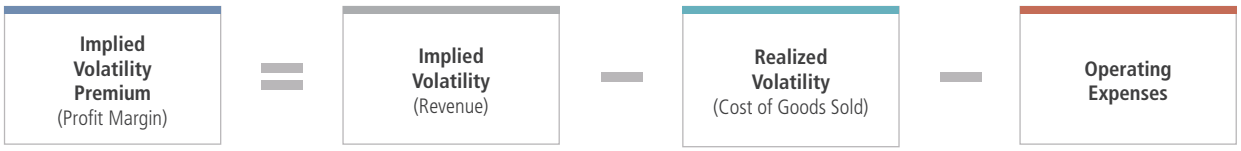


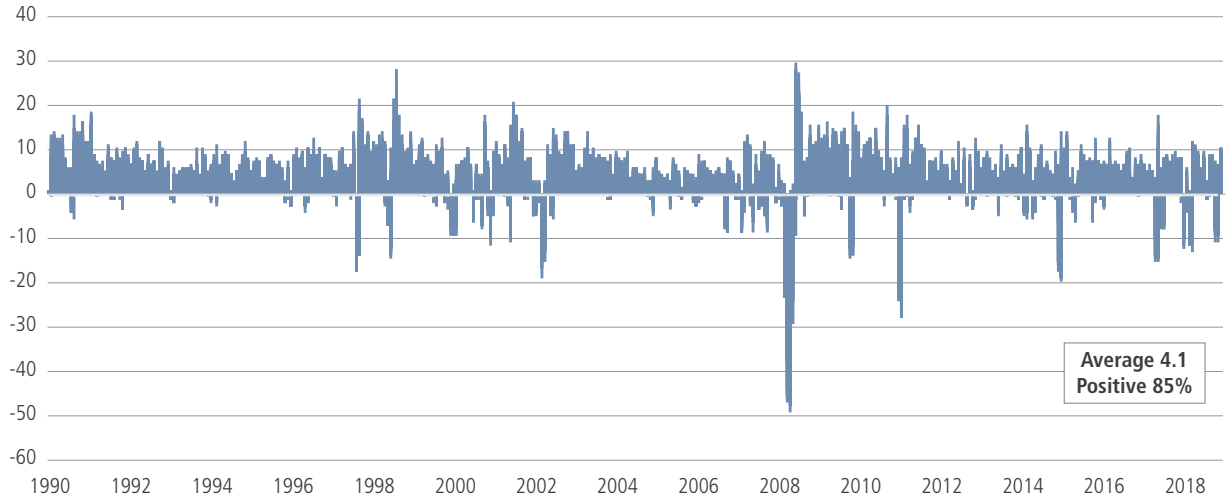
Figure 10 charts an estimate of the implied volatility premium for the S&P 500 Index using the VIX as a proxy for 30-day implied volatility levels of the S&P 500. The implied volatility premium as estimated using VIX has averaged 4.2% and been positive in approximately 86% of the daily observations since 1990.

[2] Realized volatility translates directly into an expense for option market makers (an expense of hedging) that motivates them to price in expectations for index price volatility in their market-making activities.

[3] As an aside, investment banks that sell index volatility swaps have the benefit of structuring their hedges at the time they underwrite an over-the-counter swap for a known cost. Further, terms of the contracts typically include "stops" or "limits" that coincide with limitations of their ability to hedge in the option markets. Hence, they are able to earn fees and transaction costs on relatively riskless exposures. Needless to say, this can be a very profitable business given the notional sizes involved.

FIGURE 10. OPTION MARKETS DEMAND A PREMIUM TO UNDERWRITE RISK

CBOE Volatility Index (VIX) minus S&P 500 Realized Volatility (Jan 1990 – Sep 2019)



Source: Bloomberg LP, CBOE.

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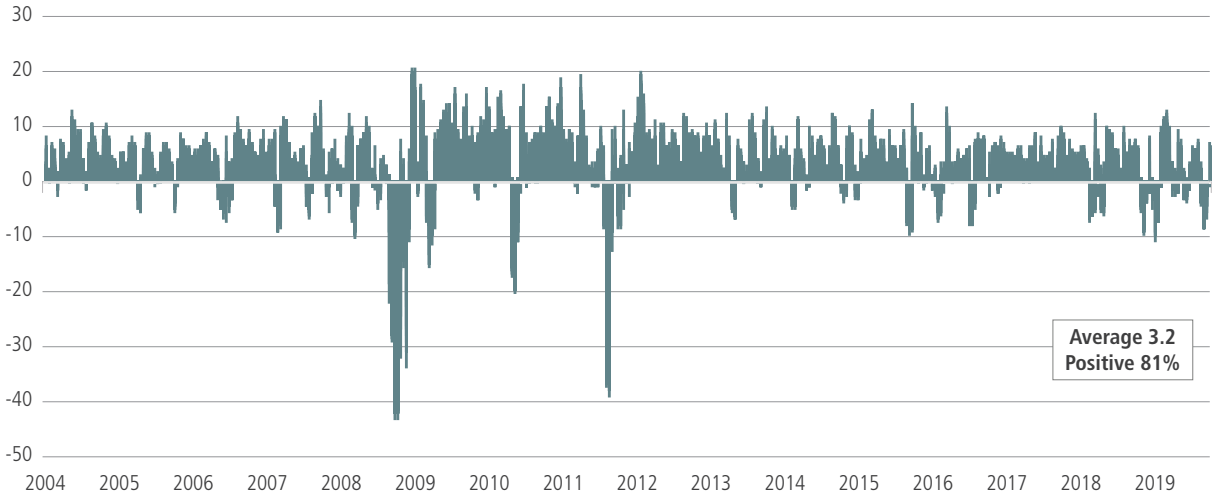
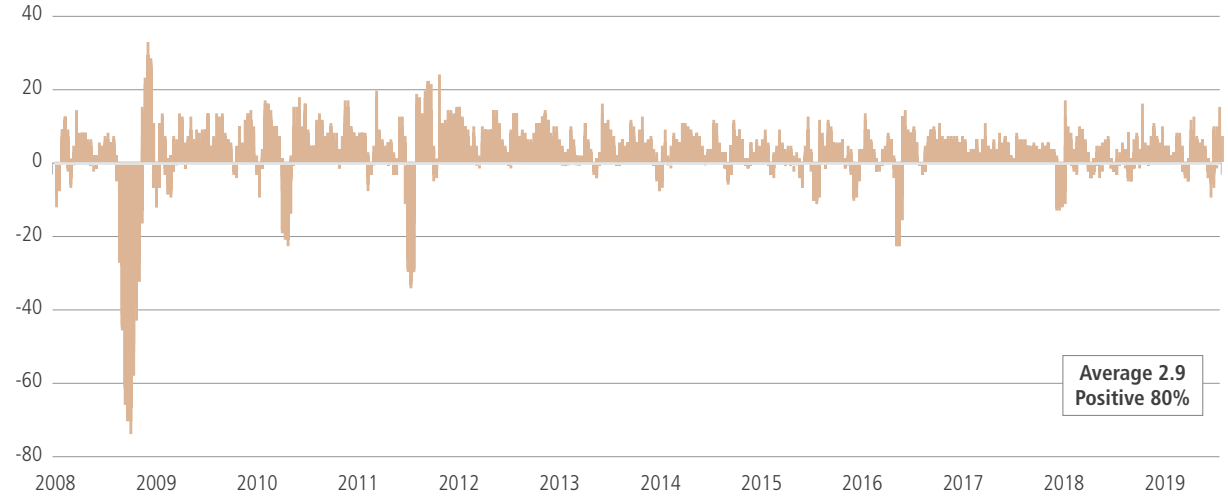
The implied volatility premium is pervasive across most large equity index option markets. Figure 11 below provides our estimates of the 30-day implied volatility premium for the Russell 2000, MSCI EAFE and MSCI EM index options based on their respective CBOE implied volatility index.

FIGURE 11. GLOBAL OPTION MARKETS DEMAND A PREMIUM TO UNDERWRITE RISK

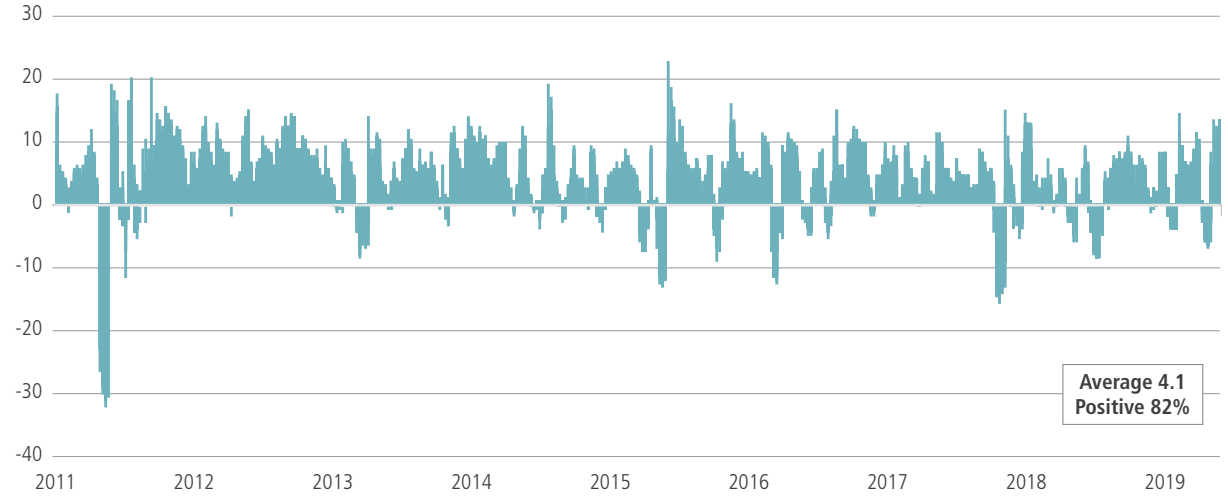
CBOE Russell 2000 Volatility Index (RVX) minus Russell 2000 Realized Volatility (Jan 2004 – Sep 2019)



CBOE EFA ETF Volatility Index (VXEFA) minus MSCI EAFE Realized Volatility (Jan 2008 – Sep 2019)



CBOE EM ETF Volatility Index (VXEEM) minus MSCI EM Realized Volatility (Mar 2011 – Sep 2019)



Source: Bloomberg LP, CBOE.
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Collateral Interest Income: Not to be Underestimated

Several notable benefits are derived from the collateral portfolio within a putwrite strategy. First, when short-term U.S. Treasuries are held as collateral, the value of the collateral portfolio tends to increase (yields decline) during periods of significant market stress. This can directly serve to offset both realized and unrealized (mark-to-market) losses stemming from short index option positions. Second, regular income into the collateral portfolio increases the potential rate of compounding and lowers the overall volatility of the strategy. Over the life of the PUT Index (commencing in 1986[4]), short-term U.S. T-bills had an average yield of around 2.7%, which is obviously well above the current rates. Should rates revert toward their longer-term averages by even a modest amount, the return potential and efficiency of a PutWrite strategy may increase materially. These positive collateral interactions can be even more robust when investors utilize existing bond allocations as collateral for index put writing strategies, i.e., overlay implementations.

[4] Though the PUT Index was introduced in 2007, the CBOE provides historical backtested data on the PUT Index starting from June 30, 1986.

Thoughts on Competing Ideas

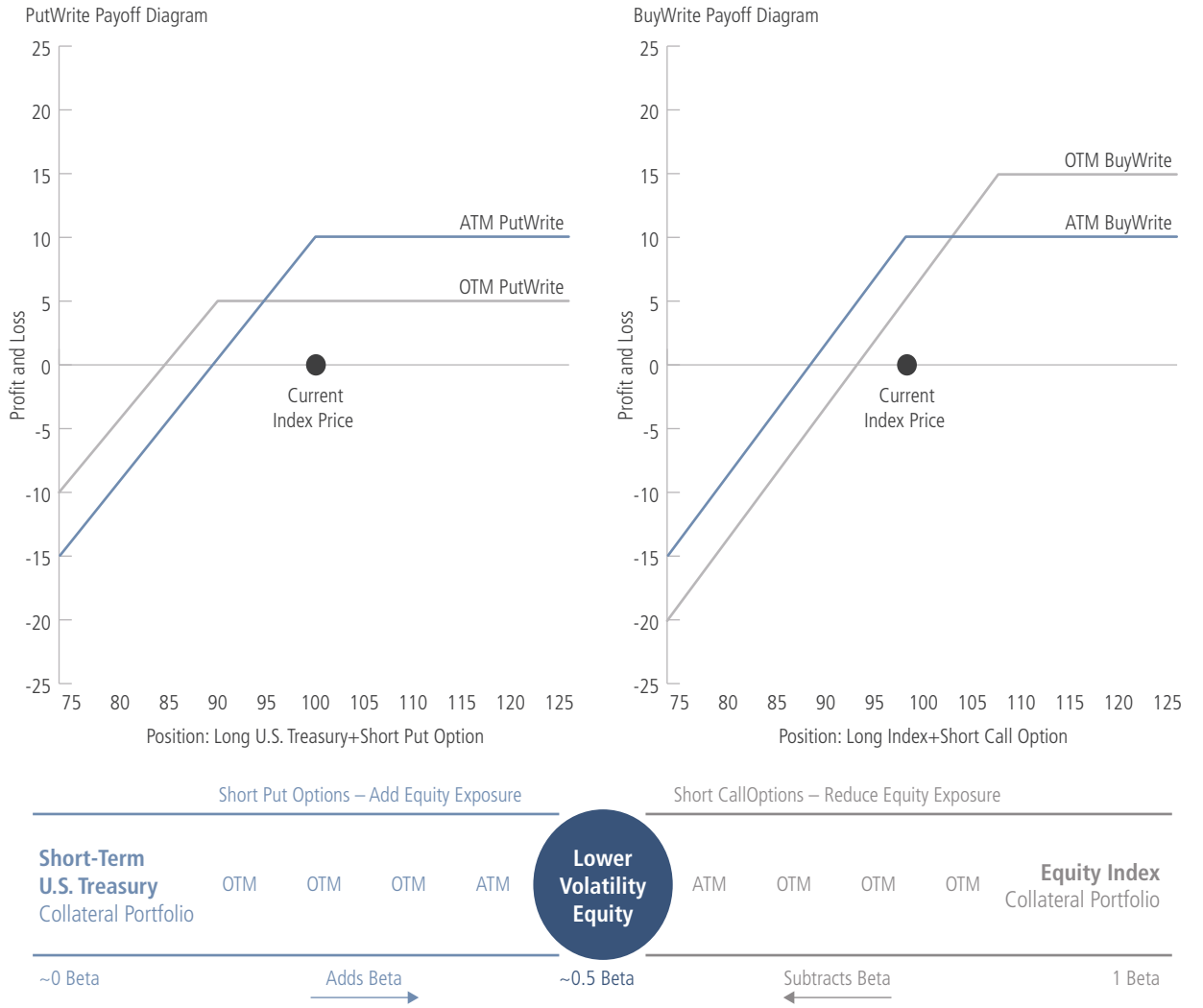
The volatility (option) investment landscape can be difficult to navigate given its relatively limited history, complexity, opacity and broad diversity of implementations. Below we elaborate on why we feel that putwrite strategies continue to stand out among what we see as the most common competing ideas.

The Equity Index BuyWrite; Simply Less Efficient

When we initially researched option writing strategies and began developing our put writing methodologies, we had the luxury of starting with a blank sheet of paper and without an existing option writing doctrine to preserve. In other words, we weren't on record selling buywrite strategies, so we could be objective and pursue whichever strategies we felt offered clients the most direct, risk-efficient and complementary exposure to their existing portfolios.

With the exception of at-the-money putwrite and buywrite (covered call) strategies, putwrite and buywrite strategies offer markedly different exposures over time. The diagram in figure 12 illustrates their structural differences and highlights what we believe to be key advantages of the putwrite strategy.

FIGURE 12. PUTWRITE VS. BUYWRITE



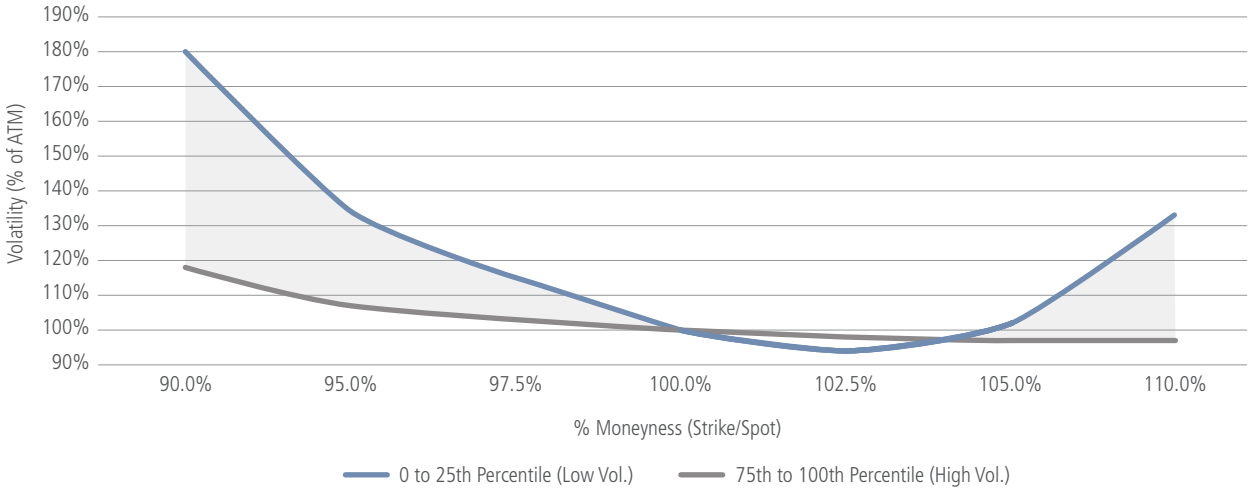
For illustrative purposes only.

Advantages of PutWrite Strategy vs. BuyWrite

- **Greater demand:** Market participants are naturally long equity indexes at little to no expense, which promotes a market in which there is greater demand for downside mitigation than upside participation
- **Investor utility:** Investors find financial losses more painful and are thus generally willing to pay to avoid them
- **Liquidity premium:** Obligation to provide liquidity during periods of market losses
- **Equity index exposure from options:** Since a putwrite strategy does not own the underlying index, it has more freedom in managing downside risk
- **Collateral portfolio:** Flexibility to hold collateral that may exceed the risk-free rate of return and provide additional diversification

One of the most direct contributors to a putwrite strategy's ability to generate greater risk efficiency relative to buy writing is its ability to capture higher levels of option implied volatilities, i.e. implied volatility skew. Figure 13 illustrates the implied volatility "smiles" for high volatility and low volatility environments. In practice, option markets do not price down-market protection commensurate with up-market participation—that is not to say option markets are not generally arbitrage-free. Rather, they simply recognize that risk and investor utility do not tend to be truly symmetric and price options accordingly. In many cases, the dollar premiums of out-of-the-money put options are multiples greater than call options that are out-of-the-money by the same degree.

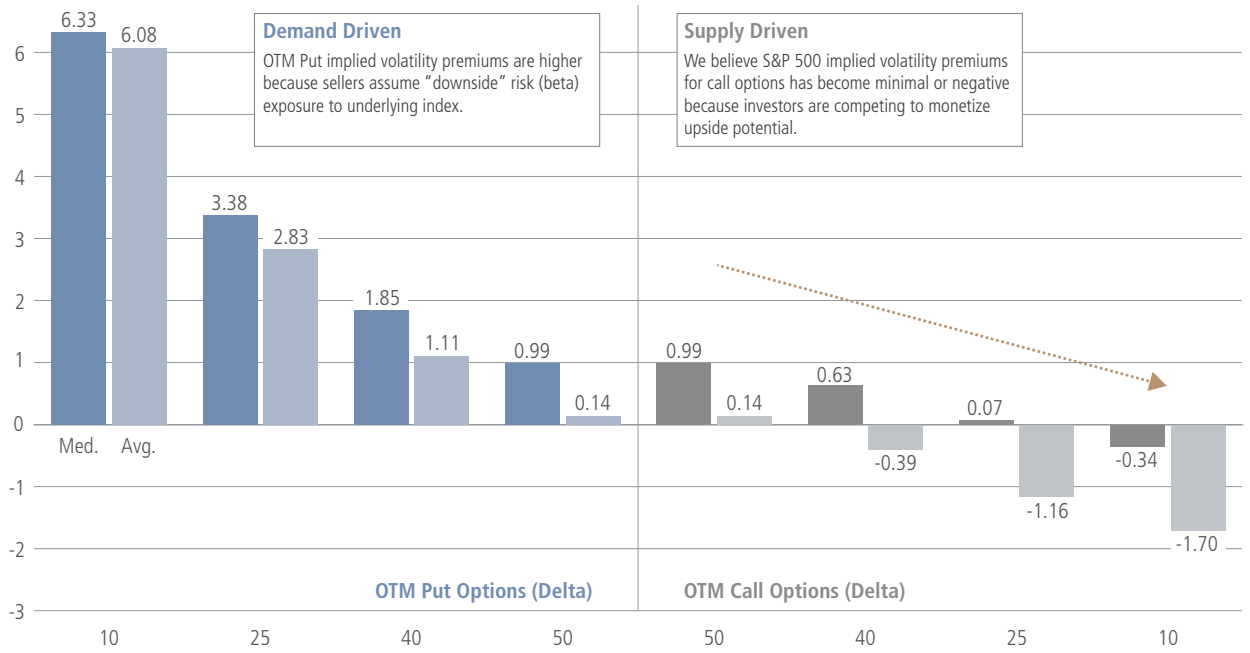
FIGURE 13. OPTION IMPLIED VOLATILITY 'PRICES' RISK
S&P 500 30-Day Option Implied Volatility (IV) as a % of ATM Implied Volatility (Jan 1990 – Sep 2019)



Source: Bloomberg LP, CBOE.

Further, we offer Figure 14 to help illustrate the current challenges of selling call options during a period of historically low interest rates and high demand to generate additional portfolio income. With many investors willing to "sell" away the upside of their existing equity holdings, an excess supply of call selling has largely eroded the implied volatility premium offered by selling call options on the S&P 500. Given that selling a covered call option results in a reduction of risk—the short call option has a negative delta exposure—we wonder whether full call sellers should earn a long-term implied volatility premium in exchange for reducing their portfolio risk levels (long equity plus short call option equals lower volatility). Of course selling a call option will always capture a dollar premium, but the question is whether you are being compensated for selling the call option. The same cannot be said about put options. Figure 14 shows the persistence of implied volatility premiums for put options versus call options across various option delta levels. When an investor sells a put option, they assume equity risk that can increase their portfolio exposures. Hence, the seller generally earns a premium to "underwrite" the risk of selling an investor protection against market declines. We see the growing disparity between put and call implied volatility premiums as a classic example of a demand-driven market (put buyers) vs. a supply-driven market (call sellers).

FIGURE 14. S&P 500 INDEX 30-DAY IMPLIED VOLATILITY PREMIUM LEVELS
Jan 2005 – Sep 2019



Source: Bloomberg LP.

Philosophically, we believe investors own equity index exposure for the upside participation, i.e. right-tail, and therefore should not sell a portion of it away in exchange for a modest call option premium. Investors appear to partially agree with our view as out-of-the-money buywrite strategies are typically preferred to at-the-money buywrite implementations as the former maintain degrees of upside participation in an underlying index's price appreciation. However, since an out-of-the-money buywrite strategy is simply a mix of an option premium and index beta exposure, a blend of a putwrite strategy and the underlying passive index exposure can be used to approximate risk-equivalent out-of-the-money buywrite strategies.

More specifically, a blend of the Put index with passive S&P 500 Index exposure can replicate a similar risk profile as popular out-of-the-money buywrite indexes, including the CBOE S&P 500 30-Delta BuyWrite Index and the CBOE S&P 500 2% OTM BuyWrite Index. Blending PUT with beta one exposure can produce a potentially superior long-term return due to the "unencumbered" upside that is preserved by owning the S&P 500. The better up-market capture of the blend has potential to add value over time as periods of sharp reversals can erode the efficiency of selling call options (upside). Again, the efficiency of blending short put option premiums, collateral income and S&P 500 exposure tends to produce a more efficient equity exposure than the combinations of S&P 500 and short call option premiums.

Based on our discussions with investors, we believe making smaller allocations to an index putwrite strategy and combining it with a passive equity index exposure—in some cases "delta" completion to target a specific beta to an equity index— is preferable to committing a larger allocation to an equity index buywrite strategy. Maximizing the lower cost passive index exposure helps to maintain a lower aggregate fee structure, to preserve a greater degree of "full" right-tail exposure to an equity index and to limit the overall allocation to option strategies at the portfolio level, which reduces a portfolio's dependence on option premiums—all of which should resonate with allocators.

[5] Concerns about the potential for return erosion due to actively trading index options tend to be overblown. Rolling index options does not increase trading costs materially for unlevered index option writing strategies as option contracts must be rolled regularly in both active and passive implementations. In practice, the benefits derived from a systematic management process can far outweigh the incremental costs.

The Hedge Fund Handshake

Put writing isn't a strategy built on a philosophy of explicit risk avoidance; rather, it is rooted in seeking compensation to underwrite risks that investors often overpay to mitigate. It doesn't swing for home runs; it seeks to consistently hit singles and doubles and limit strikeouts. Sound familiar? We like to refer to investors' willingness to accept limited upside returns in exchange for less frequent, smaller return drawdowns as the "hedge fund handshake." The structured payoffs provided by strategies like the PUT Index can offer a similar trade-off without the onerous terms and additional limitations many equity hedge funds demand.

Truly riskless return strategies don't exist; even the ones that appear to be so require additional risk factors, e.g., leverage and/or illiquidity, to achieve desirable net of fee returns. Knowing the risks taken and capturing adequate compensation for those risks leads to more reliable results and higher utility. The tables below draw comparisons of CBOE PutWrite indexes to various hedge fund indexes.

Mar 2006 to Sep 2019	CBOE S&P 500 PutWrite (PUT)	CBOE S&P 500 2% OTM PutWrite Index	HFRI Equity Hedge Index	HFRI Fund of Funds	CBOE MSCI EM PutWrite Index	HFRI Emerging Markets Index
Annual Return (%)	6.2	4.7	3.5	2.0	5.7	3.5
Volatility (%)	10.6	9.1	8.1	5.0	13.9	10.9
Risk-Adj. Ret.	0.58	0.52	0.43	0.39	0.41	0.32
Beta (to underlier)	0.64	0.50	0.50	0.26	0.54	0.44
Max DrawDown (%)	-32.7	-28.9	-30.6	-22.2	-37.0	-39.8
Up-Mkt. Cap. (%)	7	9	8	11	51	45
Down-Mkt. Cap (%)	62	46	48	27	38	40
Tracking Error (%)	56.14	40.65	53.29	29.18	13.24	13.23

Source: Bloomberg LP, CBOE. The CBOE Index performance set forth above represents a combination of live and backtested performance. All indexes are gross of fees.

Putting a Swap to It

To date, most investors we talk to have sought to isolate the implied volatility premium via swaps or structured option trades like delta-hedged straddles. Their results are often eroded by some combination of high implementation fees/expenses (both explicit and implicit), illiquidity, leverage, counterparty risk, strategy complexity and/or tactical missteps. We like to refer to leverage, illiquidity and complexity as the "Bermuda Triangle" of option investing, an area we wish to avoid.

What is important is the recognition that while index putwrite returns capture a volatility risk premium as a portion of the option premiums collected, strategy losses are directly related to the underlying index price upon expiration rather than the relationship between implied volatility and realized volatility. A negative implied volatility premium does not necessarily equate to a loss for an index putwrite strategy. Indexes can and do increase in value during periods when realized volatility exceeds implied volatility. Hence, we are of the opinion that it is better to take a holistic view of monetizing the entirety of option-implied volatility (realized volatility and implied volatility premium) and generating the returns as efficiently as possible rather than pay to isolate and profit from a relatively slim and unstable piece of it.

Similarly, the universe of equity-linked structured products is riddled with complex structures that seek to capture relatively high fees for delivering differentiated or diversifying exposures. We believe various implementations of put writing can offer more efficient exposures and achieve similar results for less with greater liquidity and without counterparty risk.

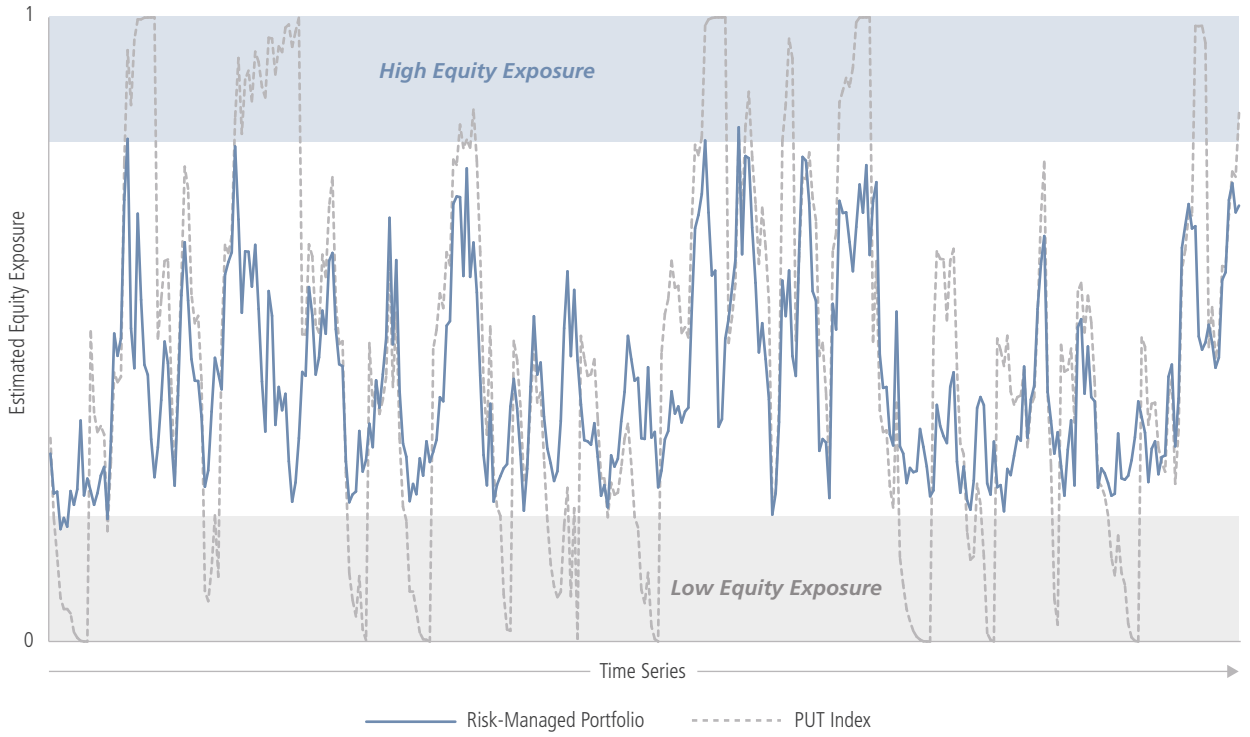
Passive Is not an Option

As option writing and volatility-based strategies continue to grow as a strategic allocation for investors, we believe that the benefits of passive equity investing will not translate into option strategies over the long term. To date, the relatively popular out-of-the-money buywrite strategies have worked well in passive formats because strategy returns are predominantly based on the underlying equity indexes, which have tended to go up over time. Investors essentially accept whatever additional return they can glean from call premiums. However, option markets are transparent and sizable positions in specific option contracts are widely observed by the relatively limited number of exchange participants and option dealers. Consider that hundreds of billions in notional value in index options trade each day on the CBOE.

This leads us to anticipate that as passive option strategies scale, they will not invoke the same positive feedback loop that can occur in passive equity investing. Passively buying stocks in an index can drive the index value higher. Conversely, passively selling options can result in a reduction of the premium yield collected by investors. Option markets are likely to see to it that passive investors collect incrementally lower premium yields—even 5 basis points per month is 60 basis points per year in opportunity cost—which will directly affect the premium used in calculating the index investors are tracking. There are risks in both passive and tactical implementations. We believe a balanced systematic approach to collateralized option writing offers the highest probability of long-term success for us and our clients.[5]

FIGURE 15. RISK-MANAGED PORTFOLIO EXPOSURE

Illustration



Source: Bloomberg LP, CBOE.

Incorporating a PutWrite Strategy into Diversified Portfolios

As with any new investment idea, finding a seat in the portfolio can be challenging, even for the most compelling strategies. Hence, investors generally do not have a direct "bucket" in which to place this strategy. This challenge, of course, is not an entirely new problem. Now-popular investments like REITs, high yield bonds, CTAs and hedge funds faced similar challenges in the past.

The one overarching theme is that we, like many, believe investors should not pay for implicit beta exposure and set out years ago to develop risk-efficient equity index put option writing strategies that would provide attractive risk-adjusted return distributions to complement traditional investments that limited the implicit beta exposures. Our intention is for allocators to harness the risk/return efficiency of equity index put writing with lower-cost beta strategies or in overlay formats to target a specific risk profile or investment outcomes, for example, lower-volatility equity or liquid alternatives.

Allocators and consultants have never had more "options" to consider and finding "boxes" in which to place them is becoming less practical. In response, some have shifted to "buckets" that align investments by objective and allow for public (liquid) investments to co-exist with private (less liquid). Below is a summary of our "high-level" view of the big four buckets. This is by no means a definitive structure. We have seen option strategies allocated to a variety of buckets depending on their implementation details and investment objective. We have found investors are considering index putwrite strategies in a multitude of contexts and formats, which we summarize below.

Allocation	Objective	Strategy	Implementation
Equity	**Lower-Volatility Equity**	Index PutWrite (At-the-Money)	• Fully collateralized equity index put option exposure provides structurally lower delta/beta equity exposure, monetizes implied volatility through short put options and collects collateral coupons. • Seeks to earn superior risk-adjusted returns and beta-adjusted excess returns. • Typical allocation size 5% – 10% of equity allocation.
Alternative	**Equity Long/ Short Exposure**	Index PutWrite (Out-of-the-Money)	• Out-of-the-money options provide delta/beta exposure consistent with equity long/short strategies, but are index-based, liquid, transparent and lower fee. • Typical allocation equivalent to that of one or two hedge fund allocations.
Income	**Yield Enhancement (Overlay)**	Index PutWrite (Out-of-the-Money)	• Supplemental portfolio income from selling out-of-the-money index equity options collateralized by investors' existing portfolio holdings. • For taxable investors; potential for 1256 tax treatment; 60/40 long-term/short-term capital gains rates. • Typical overlay notional exposure represents 5% – 10% of portfolio net asset value.
Asset-Liability	**Target Date Investments**	Index PutWrite (Variable Moneyness)	• Equity index option (delta) and collateral (duration and credit) exposures can be systematically adjusted over time to aid glide path portfolios in achieving increased risk efficiency. • Reduced volatility and drawdowns dampen the funding risk.

While most investors we encounter do not allocate directly to option writing strategies, many of them have familiarity with the matter and acknowledge that many of their alternative exposures (hedge funds) have explicit or implicit exposure to equity volatility strategies, e.g. options, swaps, hedging, overlay. This embedded exposure has been a significant driver of the return distributions that historically made alternative strategies such attractive additions to portfolio allocations. Ironically, the structure and inflexibility of many of them have served to undermine the aggregate results of their peer groups. This has left investors seeking to pivot toward accessing similar return distributions more directly in liquid, transparent and cost-effective formats.

Conclusion

We believe that an index putwrite strategy can offer a cost-effective opportunity for improved risk efficiency, flexibility and liquidity in asset owners' portfolios. Our clients continue to seek methods that will allow them to earn returns more efficiently, thereby freeing up scarce risk budgeting capacity to spend in other asset classes. The index putwrite may offer investors a way to earn an equity-like return with less volatility, providing allocators with valuable flexibility to increase investments in less-efficient and/or less-liquid asset classes where return potential may be higher (e.g. private equity and debt, infrastructure). Implementing an appropriate option writing strategy for an institutional portfolio requires an in-depth analysis of asset owners' investment goals and existing portfolio allocations and an evaluation of how an option writing strategy (funded or overlay) can work toward improving the likelihood of investment success. Asset owners should seek to partner with experienced asset managers and consultants that have long and successful track records in the options space. Managers should emphasize transparency, consistency and cost-effectiveness of strategies while helping institutional investors address a variety of allocation needs and risk/return profiles.

APPENDIX – INDEX DESCRIPTIONS

The BofA Merrill Lynch Option-Adjusted Spreads (OASs) are the calculated spreads between a computed OAS index of all bonds in a given rating category and a spot Treasury curve. An OAS index is constructed using each constituent bond's OAS, weighted by market capitalization. The BofA Merrill Lynch High Yield Master II OAS uses an index of bonds that are below investment grade (those rated BB or below).

The Bloomberg Barclays Global Aggregate Index provides a broad-based measure of the global investment-grade fixed income markets. The three major components of this index are the Bloomberg Barclays U.S. Aggregate, the Bloomberg Barclays Pan-European Aggregate and the Bloomberg Barclays Asian-Pacific Aggregate Indices. The index also includes Eurodollar and Euro-Yen corporate bonds, Canadian government, agency and corporate securities, and USD investment grade 144A securities.

The CBOE EFA ETF Volatility Index (VXEFA) is a key measure of market expectations of near-term volatility conveyed by iShares MCSI EAFE stock index option prices. It measures the market's expectation of 30-day volatility implicit in the prices of near-term iShares MCSI EAFE options. VXEFA is quoted in percentage points, just like the standard deviation of a rate of return. CBOE disseminates the VXEFA index value continuously during trading hours. The VXEFA Index is a leading barometer of investor sentiment and market volatility relating to the iShares MCSI EAFE Index Fund.

The CBOE Emerging Markets ETF Volatility Index (VXEEM) is a key measure of market expectations of near-term volatility conveyed by iShares MCSI Emerging Markets stock index option prices. It measures the market's expectation of 30-day volatility implicit in the prices of near-term iShares MCSI Emerging Markets options. VXEEM is quoted in percentage points, just like the standard deviation of a rate of return. CBOE disseminates the VXEEM index value continuously during trading hours. The VXEEM Index is a leading barometer of investor sentiment and market volatility relating to the iShares MCSI Emerging Markets Index Fund.

The CBOE MSCI EAFE PutWrite Index (PXEASM) is designed to track the performance of a hypothetical passive investment strategy that collects option premiums from writing an At-the-Money (ATM) MXEA Put option on a monthly basis and holds a rolling money market account invested in one-month T-bills to cover the liability from the short MXEA Put option position, generally on the third Friday each month.

The CBOE MSCI Emerging Markets PutWrite Index (PXEFSM) is designed to track the performance of a hypothetical passive investment strategy that collects option premiums from writing an At-the-Money (ATM) MXEF Put option on a monthly basis and holds a rolling money market account invested in one-month T-bills to cover the liability from the short MXEF Put option position, generally on the third Friday each month.

The CBOE Russell 2000 Volatility Index (RVX) is a key measure of market expectations of near-term volatility conveyed by Russell 2000 stock index option prices. It measures the market's expectation of 30-day volatility implicit in the prices of near-term Russell 2000 options. RVX is quoted in percentage points, just like the standard deviation of a rate of return. CBOE disseminates the RVX index value continuously during trading hours. The RVX Index is a leading barometer of investor sentiment and market volatility relating to the Russell 2000 Index.

The CBOE S&P 500 2% OTM PutWrite Index (PUTY) is designed to track the performance of a hypothetical passive investment strategy that collects option premiums from writing a 2% Out-of-the-Money (OTM) SPX Put option on a monthly basis and holds a rolling money market account invested in one-month T-bills to cover the liability from the short SPX Put option position.

The CBOE S&P 500 30-Delta BuyWrite Index is designed to track the performance of a hypothetical covered call strategy that holds a long position indexed to the S&P 500 Index and sells a monthly out-of-the-money (OTM) S&P 500 Index (SPX) call option. The call option written is the strike nearest to the 30 Delta at 10:00 a.m. CT on the Roll Date.

The CBOE S&P 500 PutWrite Index (PUT) is designed to track the performance of an index option put writing strategy that sells a sequence of one-month, at-the-money S&P 500 Index puts and invest cash at one- and three-month Treasury Bill rates. The number of puts sold varies from month to month, but is limited so that the amount held in Treasury Bills can finance the maximum possible loss from final settlement of the SPX puts, i.e., put options are fully collateralized.

The CBOE Volatility Index (VIX) is a key measure of market expectations of near-term volatility conveyed by S&P 500 stock index option prices. Since its introduction in 1993, the VIX Index has been considered by many to be the world's premier barometer of investor sentiment and market volatility. Several investors expressed interest in trading instruments related to the market's expectation of future volatility, and so VIX futures were introduced in 2004, and VIX options were introduced in 2006.

The HFRI Emerging Markets (Total) Index includes Emerging Markets funds that invest, primarily long, in securities of companies or the sovereign debt of developing or 'emerging' countries. Emerging Markets regions include Africa, Asia ex-Japan, Latin America, the Middle East and Russia/Eastern Europe. Emerging Markets - Global funds will shift their weightings among these regions according to market conditions and manager perspectives.

The HFRI Equity Hedge Index Investment Managers who maintain positions both long and short in primarily equity and equity-derivative securities. A wide variety of investment processes can be employed to arrive at an investment decision, including both quantitative and fundamental techniques; strategies can be broadly diversified or narrowly focused on specific sectors and can range broadly in terms of levels of net exposure, leverage employed, holding period, concentrations of market capitalizations and valuation ranges of typical portfolios. EH managers would typically maintain at least 50% exposure to, and may in some cases be entirely invested in, equities, both long and short.

HFRI Fund of Funds Index invests with multiple managers through funds or managed accounts. The strategy designs a diversified portfolio of managers with the objective of significantly lowering the risk (volatility) of investing with an individual manager. The Fund of Funds manager has discretion in choosing which strategies to invest in for the portfolio. A manager may allocate funds to numerous managers within a single strategy, or with numerous managers in multiple strategies. The minimum investment in a Fund of Funds may be lower than an investment in an individual hedge fund or managed account. The investor has the advantage of diversification among managers and styles with significantly less capital than investing with separate managers.

The iShares MSCI EAFE ETF is an exchange-traded fund incorporated in the U.S. The ETF tracks the performance of the MSCI EAFE Index. The ETF holds large and mid-cap stocks. Its investments are focused on developed countries across the world, excluding the U.S. and Canada. The ETF weights the holdings using a market capitalization methodology.

The iShares MSCI Emerging Markets ETF is an exchange-traded fund incorporated in the U.S. The ETF tracks the performance of the MSCI TR Emerging Markets Index. The ETF holds emerging market stocks that can predominantly be classified as large and mid-cap. It weights the holdings using a market capitalization methodology and rebalances quarterly.

MSCI EAFE Index (Europe, Australasia, Far East) is a free float-adjusted market capitalization index that is designed to measure the equity market performance of developed markets, excluding the U.S. and Canada. The MSCI EAFE Index consists of the following 21 developed market country indices: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, and the United Kingdom.

The MSCI Emerging Markets Index is a free float-adjusted market capitalization index that is designed to measure equity market performance of emerging markets. The MSCI Emerging Markets Index consists of the following 23 emerging market country indices: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, Philippines, Poland, Qatar, Russia, South Africa, Taiwan, Thailand, Turkey and United Arab Emirates.

The Russell 2000 Index measures the performance of the small-cap segment of the U.S. equity universe. The Russell 2000 Index is a subset of the Russell 3000® Index representing approximately 8% of the total market capitalization of that index. It includes approximately 2,000 of the smallest securities based on a combination of their market cap and current index membership.

The S&P 500 consists of 500 stocks chosen for market size, liquidity and industry group representation. It is a market value weighted index (stock price times number of shares outstanding), with each stock's weight in the Index proportionate to its market value. The "500" is one of the most widely used benchmarks of U.S. equity performance. As of September 16, 2005, S&P switched to a float-adjusted format, which weights only those shares that are available to investors, not all of a company's outstanding shares. The value of the index now reflects the value available in the public market.

Glossary of Terms

ATM option: An option with a strike price equal to the current price (or in some cases the forward price) of an asset. An ATM option has a delta of 0.5.

OTM option: An option with a strike price lower than the current asset price (for a put option), and higher than the current asset price (for a call option). The delta of an OTM option will be lower than an ATM option.

Delta: The sensitivity of an option's price to small changes in the price of the underlying asset. An ATM option has a delta of 0.5.

Implied volatility: A measure of the expected volatility, or movement, in an asset's price. A key determinant of an option's value; generally backed out from the option's price quoted in the market.

Realized volatility: The actual volatility, or movement, in an asset's price, as measured after the fact.

Skew: The tendency for lower strike options (i.e. OTM puts) to be priced with a higher implied volatility than ATM options. While it may seem counterintuitive, this can be explained by several factors:

- Greater demand for lower strike options by hedgers (and implied volatility is calculated from the option's price)
- Higher possibility of downside shocks in an asset class relative to upside shocks
- For index options, correlations of assets in a decline are generally higher than in a rally. Higher correlation will increase the volatility of an index relative to the average volatility of the components.

The CBOE S&P 500 Index incepted in June 2007 with historical backtested data available since June 30, 1986; the CBOE Russell 2000 PutWrite Index incepted in November 2015 with historical backtested data available since January 1, 2001; the CBOE MSCI EAFE PutWrite Index and CBOE MSCI EM PutWrite Index were introduced in June 2019 with historical backtested data available since March 1, 2006; the CBOE S&P 500 2% OTM PutWrite Index incepted in March 2019 with historical backtested data available since June 30, 1986.

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Options involve investment strategies and risks different from those associated with ordinary portfolio securities transactions. By writing put options, an investor assumes the risk of declines in the value of the underlying instrument and the risk that it must purchase the underlying instrument at an exercise price that may be higher than the market price of the instrument, including the possibility of a loss up to the entire strike price of each option it sells but without the corresponding opportunity to benefit from potential increases in the value of the underlying instrument. The investor will receive a premium from writing options, but the premium received may not be sufficient to offset any losses sustained from exercised put options.

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1290 Avenue of the Americas
New York, NY 10104-0001

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