Global Option-Writing Strategies to Reduce Risk and Enhance Income

July | 2020

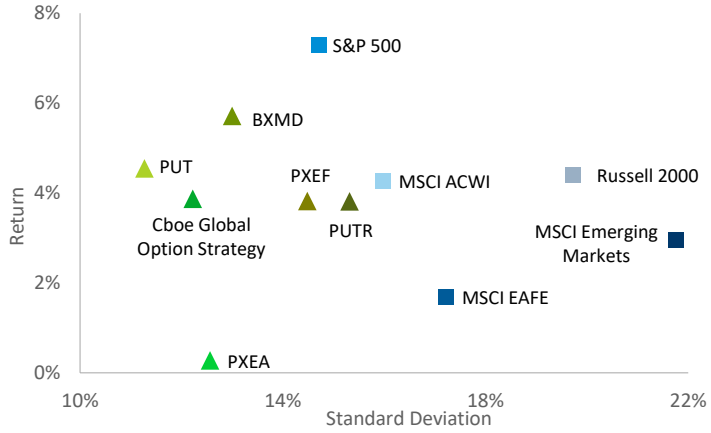
Cboe S&P 500 30-Delta BuyWrite Index (BXMD℠)
Cboe S&P 500 PutWrite Index (PUT℠)
Cboe Russell 2000 PutWrite Index (PUTR℠)
Cboe MSCI EAFE PutWrite Index (PXEA℠)
Cboe MSCI Emerging Markets PutWrite Index (PXEF℠)
Global Option-Writing Strategy
(30% BXMD, 30% PUT, 10% PUTR, 15% PXEA, and 15% PXEF)

This study analyzes the effectiveness of global option-writing strategies by exploring fourteen years (March 31, 2006 to March 31, 2020) of performance of five Cboe indices that sell one-month options on one of these stock indices: S&P 500®, Russell 2000®, MSCI EAFE® or MSCI Emerging Markets Index®. The study also analyzes the performance of a theoretical strategy that combines a mix of the Cboe indices to represent a new Global Option-Writing Strategy.

Option-Selling Index Strategies

Option-selling index strategies provide investors with compensation, or income premiums, that can help provide downside cushion during a market turn, while limiting upside potential. These strategies are expected to demonstrate better diversification, managed tail risk and consistent receipt of the implied volatility risk premium, or compensation for protection against unexpected market volatility.

Exhibit 1 – Annualized Risk Return Analysis
(March 31, 2006 – March 31, 2020)



Source: Wilshire Associates, Cboe, Bloomberg

Exhibit 1: The five option-selling indices all had less volatility than their related stock indices. The Global Option-Writing Strategy showed a significant reduction in risk versus the global MSCI All Country World Index (ACWI), 12.2% versus 16% respectively, while experiencing a small reduction in returns, from 4.3% for MSCI ACWI to 3.9% for the Global Option-Writing Strategy.

Executive Summary: Key Findings

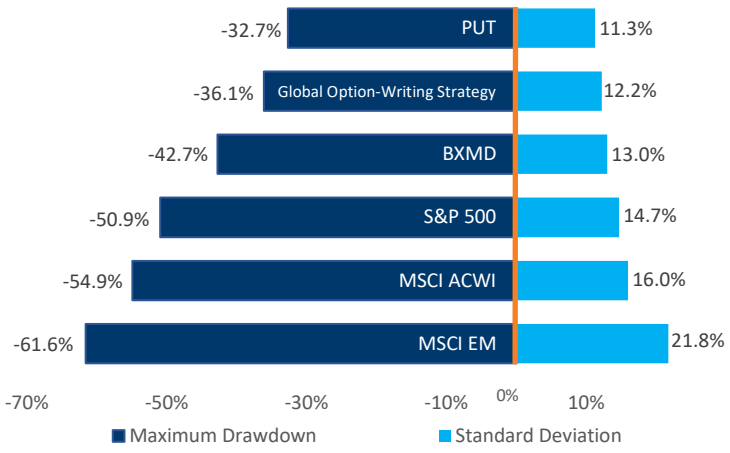
Improved Tail Risk and Lower Volatility. All five Cboe Indices had lower volatility and less severe drawdowns than their underlying market indices. The Global Option-Writing Strategy had a 24% lower standard deviation and 34% less severe drawdown than the MSCI ACWI *(Exhibit 2).*

Comparable Risk-Adjusted Returns. A global diversified option strategy had similar Sharpe and Sortino ratios to the broad global market, confirming downside cushioning with some upside cost. Sharpe Ratio for the Global Option-Writing Strategy was similar to MSCI ACWI (Exhibit 8).

Richly Priced Options Premiums Harvested. The Cboe Indices sold index options and collected monthly premiums. Average gross monthly premiums were higher for indices that sold at-the-money options (e.g., 2.25% and 2.17% for the BXEF and BXR Indices, respectively) versus indices that sold out-of-the-money options (e.g., 0.8% for the BXY Index). Options on all four stock indices were richly priced, as the average implied volatility was greater than the average subsequent realized volatility by 2.8 to 8.4 volatility points (*Exhibits 13 & 14).*

Lowers Efficient Frontier Risk. 15% additional allocation of a Global Option-Writing Strategy to global stock and bond portfolios reduced standard deviation by at least 53 and as much as 72 basis points, giving back just 6 basis points in return *(Exhibits 1 & 11).*

Exhibit 2 – Maximum Drawdown and Standard Deviation
(March 31, 2006 - March 31, 2020)



Source: Wilshire Associates, Cboe, Bloomberg

Exhibit 2: Stock indices demonstrated steepest drawdowns and highest standard deviations. The Cboe S&P 500 PutWrite Index (PUT) had the least severe maximum drawdown of 32.7% and lowest standard deviation of 11.3%, followed closely by the Global Option-Writing Strategy. In combination, all option strategy indices performed as designed - they consistently provided a cushion during challenging markets versus individual and global stock markets.

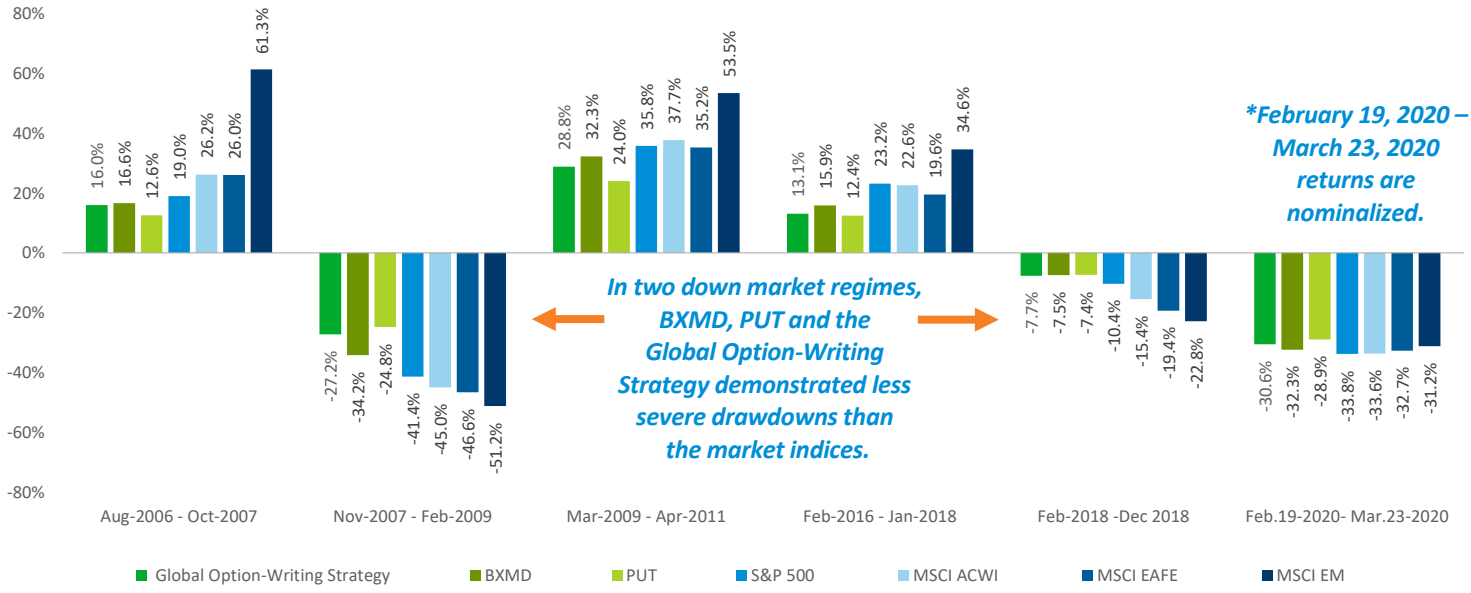
All indices in this paper's exhibits (except the VIX, RVX, VXEEM and VXEFA Indices) are total return indices (pre-tax indices that include reinvested dividends). Past performance is not predictive of future returns. Please read full disclosures on the last page of this paper. Cboe Exchange, Inc. provided funding for this study.

Exhibit 3 – Index Descriptions

TICKER	INDEX	POSITIONS HELD
BXMD[SM]	Cboe S&P 500 30-Delta BuyWrite Index	Sell 1-mo. out-of-the-money (OTM) SPX call options & hold SPX stocks
PUT[SM]	Cboe S&P 500 PutWrite Index	Sell 1-mo. at-the-money (ATM) SPX put options + hold US Treasury bills
PUTR[SM]	Cboe Russell 2000 PutWrite Index	Hold U.S. Treasury Bills + Sell 1-mo. at-the-money RUT put options
PXEA[SM]	Cboe MSCI EAFE PutWrite Index	Sell 1-mo. ATM MSCI EAFE put options + hold U.S. Treasury Bills
PXEF[SM]	Cboe MSCI Emerging Markets PutWrite Index	Sell 1-mo. ATM MSCI EM put options + hold U.S. Treasury Bills
	Global Option-Writing Strategy	25% BXMD, 25% PUT, 10% PUTR, 20% PXEA, and 20% PXEF

Exhibit 4 – Market Regime Analysis (Annualized Returns*)

(March 31, 2006 – March 31, 2020)



Source: Wilshire Associates, Cboe, Bloomberg

Exhibit 4: Select bull and bear market regime concentrations confirmed that all Cboe option-selling indices performed as expected, demonstrating less severe drawdowns in down markets and lower returns in up markets than did the market indices during the same periods analyzed. Drawdowns for Global Option-Writing Strategy were 16.8 percentage points less severe than for MSCI ACWI during the first bear market regime and 6.7 percentage points less severe during the second bear market. The Cboe BXMD Index had the strongest returns of all three options strategies during each bull market period, as the BXMD writes out-of-the-money options and can participate in some upside stock market moves.

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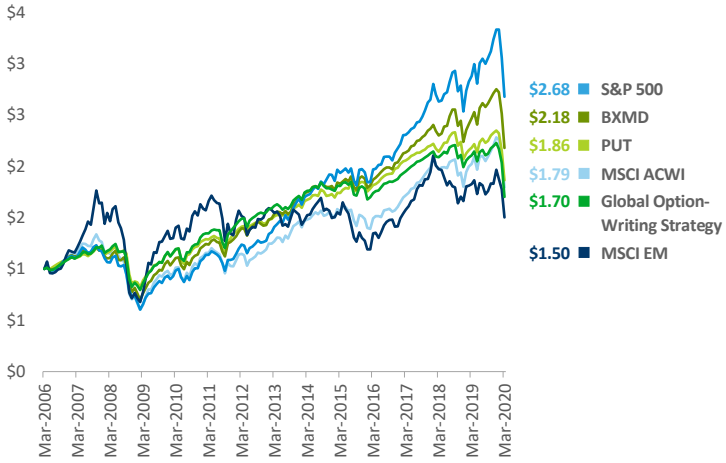
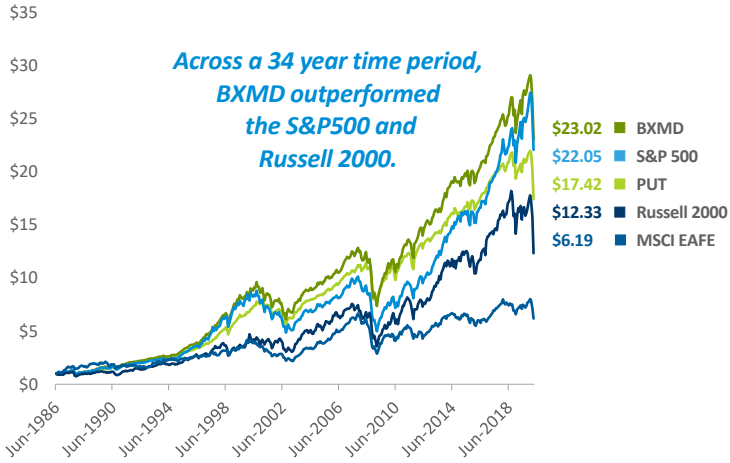
Exhibit 5 – Growth in the Value of $1 Over 14 Years
(March 31, 2006 – March 31, 2020)



Source: Wilshire Associates, Cboe

Exhibit 5: During an unprecedented U.S. equity bull market and 2020 COVID-19 drop, the S&P 500 Index and two S&P 500 related options indices outperformed select global strategies. The Cboe S&P 500 30-Delta BuyWrite Index, with less downside cushion and more upside protection than other options strategies in the chart above, had an annualized return of 5.7%, higher than other options strategies and non-US indices in the chart above.

Exhibit 6 – Growth in the Value of $1 Over 34 Years
(June 30, 1986 – March 31, 2020)



Source: Wilshire Associates, Cboe, Bloomberg

Exhibit 6: During the 34 year time period, the Cboe S&P 500 30-Delta BuyWrite Index (BXMD) with annualized returns of 10%, generated more growth than all other indices in the chart above, including the underlying S&P Index. The BXMD Index collected lesser amounts of monthly premiums and had larger equity upside participation than did Cboe indices that wrote at-the-money options.

Exhibit 7 – Relative Annual Performance Analysis for Option-Writing and Market Indices
(January 1, 2007 – March 31, 2020)

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Q1 2020
Cboe S&P 500 30-Delta BuyWrite Index (BXMD)	6.2%	-31.3%	32.1%	11.2%	7.3%	11.0%	19.1%	6.2%	4.0%	8.4%	16.1%	-5.4%	23.0%	-20.8%
Cboe S&P 500 PutWrite Index (PUT)	9.5%	-26.8%	31.5%	9.0%	6.2%	8.1%	12.3%	6.4%	6.4%	7.8%	10.8%	-5.9%	13.5%	-20.7%
Cboe Russell 2000 PutWrite Index (PUTR)	16.1%	-28.5%	34.3%	13.8%	6.1%	10.4%	12.0%	3.9%	4.9%	8.6%	7.7%	-10.0%	14.5%	-30.2%
Cboe MSCI EAFE PutWrite Index (PXEA)	8.0%	-31.3%	22.8%	8.4%	6.5%	11.6%	7.6%	-3.2%	0.8%	3.9%	11.3%	-10.7%	5.5%	-27.1%
Cboe MSCI Emerging Markets PutWrite Index (PXEF)	24.2%	-29.5%	54.0%	19.6%	8.6%	13.6%	-1.5%	4.0%	-13.1%	-2.4%	17.6%	-1.6%	1.7%	-24.1%
S&P 500® Index	5.5%	-37.0%	26.5%	15.1%	2.1%	16.0%	32.4%	13.7%	1.4%	12.0%	21.8%	-4.4%	31.5%	-19.6%
Russell 2000® Index	-1.6%	-33.8%	27.2%	26.9%	-4.2%	16.3%	38.8%	4.9%	-4.4%	21.3%	14.6%	-11.0%	25.5%	-30.6%
MSCI EAFE® Index (US$)	11.2%	-43.4%	31.8%	7.8%	-12.1%	17.3%	22.8%	-4.9%	-0.8%	1.0%	25.0%	-13.8%	22.0%	-22.8%
MSCI Emerging Markets Index (US$)	39.4%	-53.3%	78.5%	18.9%	-18.4%	18.2%	-2.6%	-2.2%	-14.9%	11.2%	37.3%	-14.6%	18.4%	-23.6%
MSCI ACWI Index (US$)	11.7%	-42.2%	34.6%	12.7%	-7.3%	16.1%	22.8%	4.2%	-2.4%	7.9%	24.0%	-9.4%	26.6%	-21.4%
	Lowest		1	2	3	4	5	6	7	8	9	10		Highest

Source: Wilshire Associates, Cboe, Bloomberg

Exhibit 7: The above heat map compares annual returns across 5 option-writing indices (a mix of equity and global underlying) and 5 market indices (a mix of equity and global) from 2007 – 2019, as well as performance for the first quarter of 2020. Index returns for each year are ranked highest to lowest (green to red) to help visualize relative annual performance across all 10 indices. In both 2008 and 2011, all five option-writing indices outperformed all five market indices.

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Exhibit 8 – Summary Statistics: 14 Indices Analyzed
(March 31, 2006 - March 31, 2020)

INDEX	ANNUALIZED RETURN	STANDARD DEVIATION	BETA	ALPHA	MAXIMUM DRAWDOWN	SORTINO RATIO (MAR = 0.00%, ANNUALIZED)	SHARPE RATIO (ANNUALIZED)	SKEWNESS
Global Option-Writing Strategy	3.9%	12.2%	0.69	0.80%	-36.1%	0.48	0.16	-1.81
Cboe S&P 500 30-Delta BuyWrite Index (BXMD)	5.7%	13.0%	0.75	2.32%	-42.7%	0.67	0.29	-1.13
Cboe S&P 500 PutWrite Index (PUT)	4.5%	11.3%	0.60	1.80%	**-32.7%**	0.57	0.22	-1.91
Cboe S&P 500 BuyWrite Index (BXM)	3.4%	11.3%	0.61	0.65%	-35.8%	0.43	0.12	-1.65
Cboe S&P 500 2% OTM BuyWrite Index (BXY)	5.7%	12.9%	0.74	2.34%	-40.3%	0.78	0.29	-1.21
Cboe S&P 500 5% Put Protection Index (PPUT)	6.3%	**11.1%**	**0.56**	**3.68%**	-38.9%	0.35	0.37	-0.56
Cboe Russell 2000 PutWrite Index (PUTR)	3.8%	15.3%	0.75	0.91%	-38.1%	0.40	0.15	-2.15
Cboe MSCI EAFE PutWrite Index (PXEA)	0.3%	12.6%	0.67	-2.55%	-38.4%	0.11	-0.12	-2.07
Cboe MSCI Emerging Markets PutWrite Index (PXEF)	3.8%	14.5%	0.72	0.92%	-37.0%	0.43	0.15	-1.74
S&P 500® Index	**7.3%**	14.7%	0.88	3.30%	-50.9%	0.78	**0.38**	-0.86
Russell 2000® Index	4.4%	19.7%	1.07	0.43%	-52.9%	0.47	0.19	-0.75
MSCI ACWI Index (US$)	4.3%	16.0%	1.00	0.00%	-54.9%	0.47	0.18	-0.85
MSCI EAFE® Index (US$)	1.7%	17.2%	1.05	-2.57%	-56.7%	**1.12**	0.03	-0.72
MSCI Emerging Markets Index (US$)	2.9%	21.8%	1.22	-1.38%	-61.6%	0.35	0.12	**-0.50**

Source: Wilshire Associates, Cboe, Bloomberg

* Rf =0.22% monthly

Exhibit 8: Summary statistics contrast eight options indices with the underlying S&P 500, Russell 2000, MSCI EAFE and MSCI Emerging Markets Indices, global stock and bond benchmarks, as well as an option-selling strategy. Unlike other measures of risk, Alpha and Beta incorporate market measures versus the broad, global MSCI ACWI. All Cboe options index strategies have better maximum drawdowns and lower standard deviations than their underlying indices, with larger negative skewness (with the single exception of PPUT), as expected. PPUT demonstrated the highest risk-adjusted returns and generated the most Alpha, at 3.68% versus MSCI ACWI.

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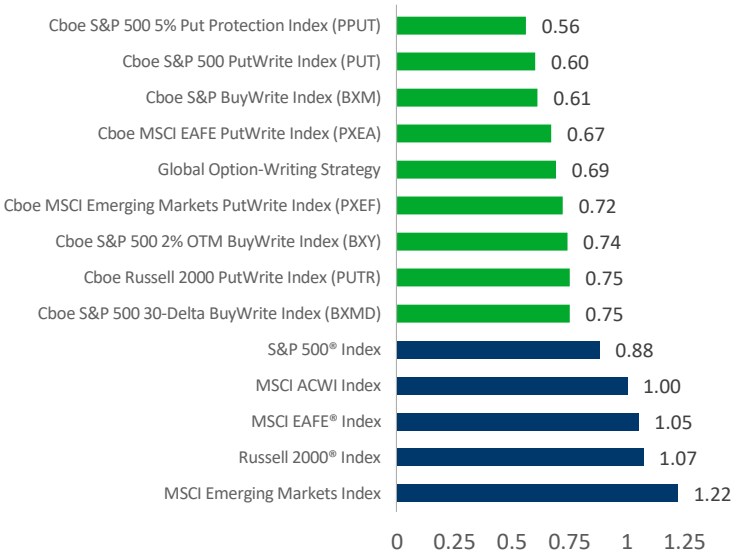
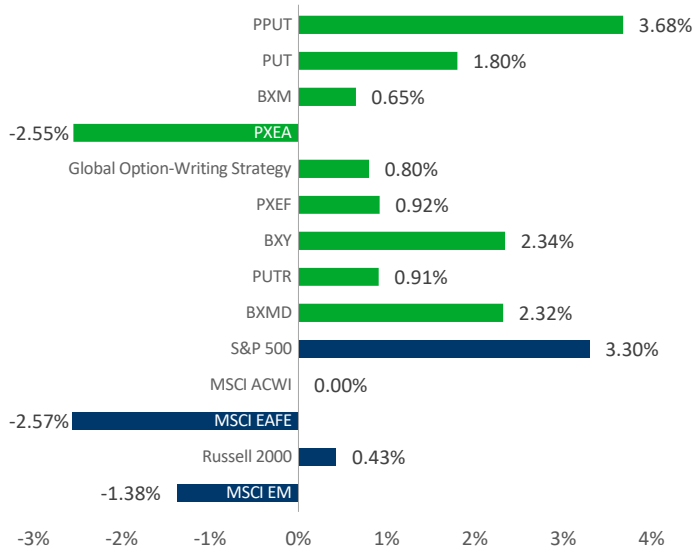
Exhibit 9 – Beta Analysis
(March 31, 2006 - March 31, 2020)



Source: Wilshire Associates, Cboe, Bloomberg
* Rf =0.22% monthly

Exhibit 9: Lower positive Betas across all option-writing strategies, consistent with lower measures of risk, versus the broad market indices. Lower Betas for option-selling strategies may provide the potential to achieve some diversification benefits for certain portfolios. Option-writing strategy Betas ranged from .56 to .75, with the Global Option-Writing Strategy at .69.

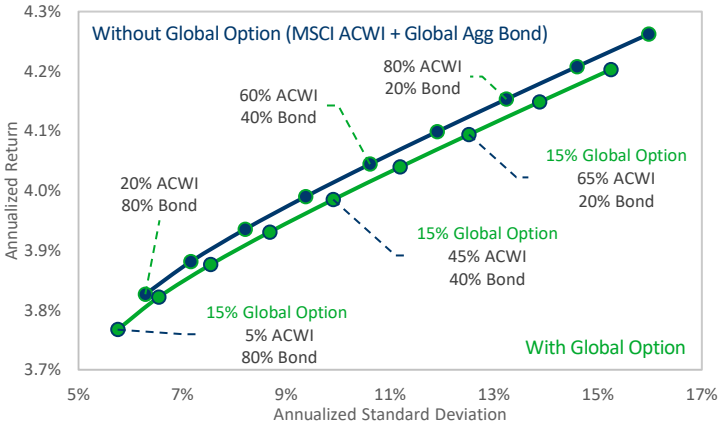
Exhibit 10 – Alpha Analysis
(March 31, 2006 - March 31, 2020)



Source: Wilshire Associates, Cboe, Bloomberg.
* Rf =0.22% monthly

Exhibit 10: Alpha reflects the excess return on an investment, relative to the return on the MSCI ACWI Index. Factors that helped increase Alphas for the option-writing strategies included the harvesting of richly priced option premiums and mitigation of downside risk. Alpha for the Global Option-Writing Strategy was 0.80%.

Exhibit 11 – Reducing Risk Mean Variance Efficient Frontier: 15% Global Options Allocation Added to 60/40 Global Portfolio
(March 31, 2006 – March 31, 2020)



Source: Wilshire Associates, Cboe, Bloomberg

Exhibit 11: A 15% allocation to a Global Option-Writing Strategy within a diversified global portfolio shows a reduced risk efficient frontier. Funding the 15% global options allocation from global stocks lowers risk across all global stock/bond combinations. While returns are reduced by 6 basis points, risk reduction ranges from 53 to 72 basis points across global stock/bond allocations, from 80/20 to 20/80.

Across a wide spectrum of robust risk and return metrics, this fourteen-year study demonstrates that global option-writing strategies, analyzed through multiple, different lenses consistently:

- **Reduced risk and lower Betas in exchange for similar, comparable returns**
- **Provided downside cushion during underperforming markets**
- **Contributed positive Alpha, driven by the combined benefit of reduced risk and consistently harvesting premiums**

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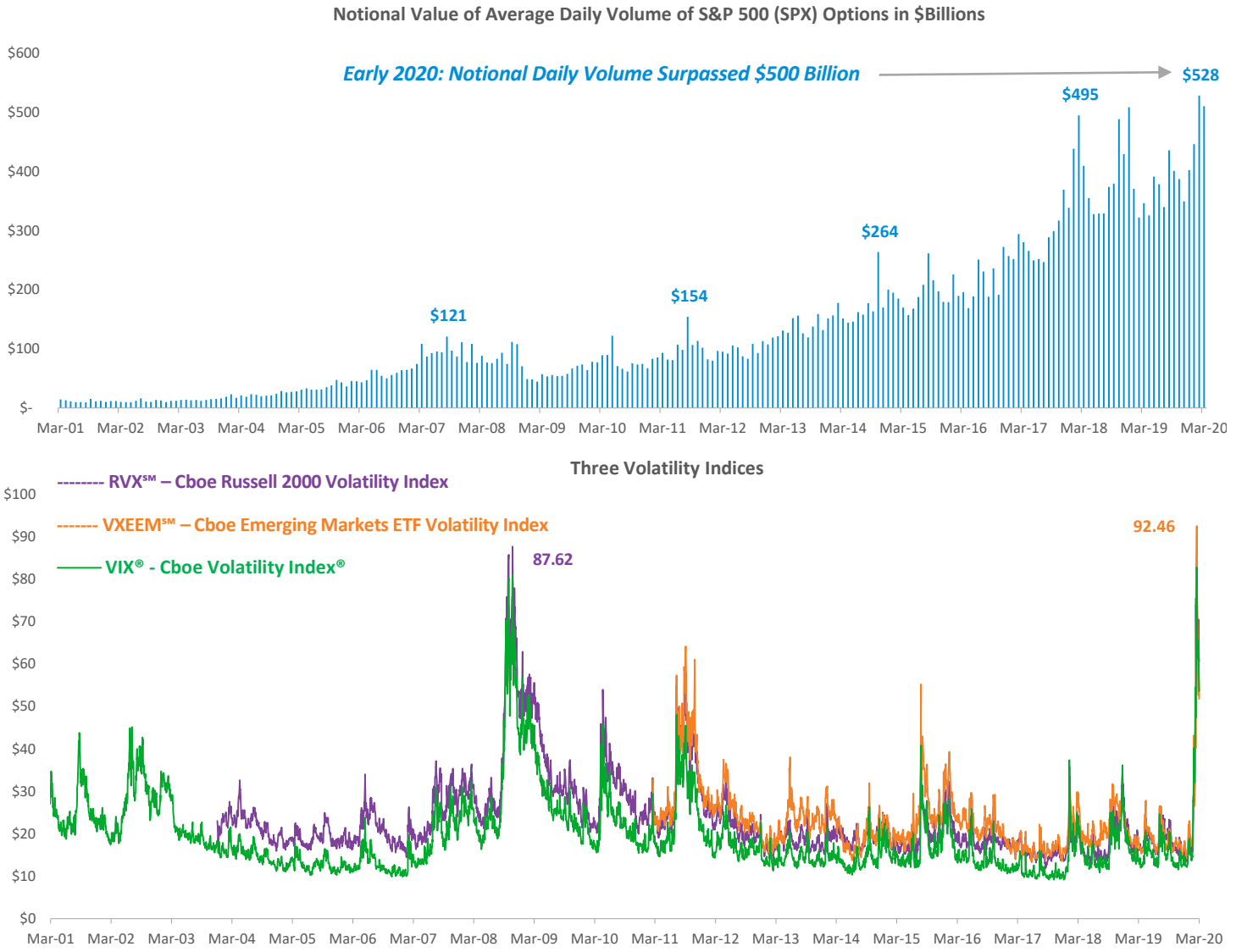
Investor Acceptance

Use of index options and other alternative investments has increased over the past two decades as investors seek to incorporate income generating and diversification strategies. Key factors that institutional investors may consider when assessing new investment opportunities include market capacity, the potential impact of market stress, and higher volatility on both capacity and liquidity. The charts in Exhibit 12 help provide some answers to questions investors may consider when evaluating index options, with 19-year charts demonstrating the notional daily value of SPX options, as well as three volatility indexes that quantify expectations of 30-day future volatility for insights into investor sentiment.

Exhibit 12 – Market Capacity, Trading Volume and Volatility
(March 1, 2001 – March 31, 2020)



*Daily closing values

Source: Cboe, Bloomberg

Exhibit 12: Over the past two decades, notional value of daily SPX index option volume has steadily increased, more than doubling every five years. Institutional investors often prefer to see instruments' market capacity in the tens of billions of dollars. Volatility more than tripled in early 2020 during the Covid-19 pandemic, and during the 2008 Financial Crisis. In the two charts above, we observe that in many periods when the volatility indices rose, notional value of SPX options volume also jumped.

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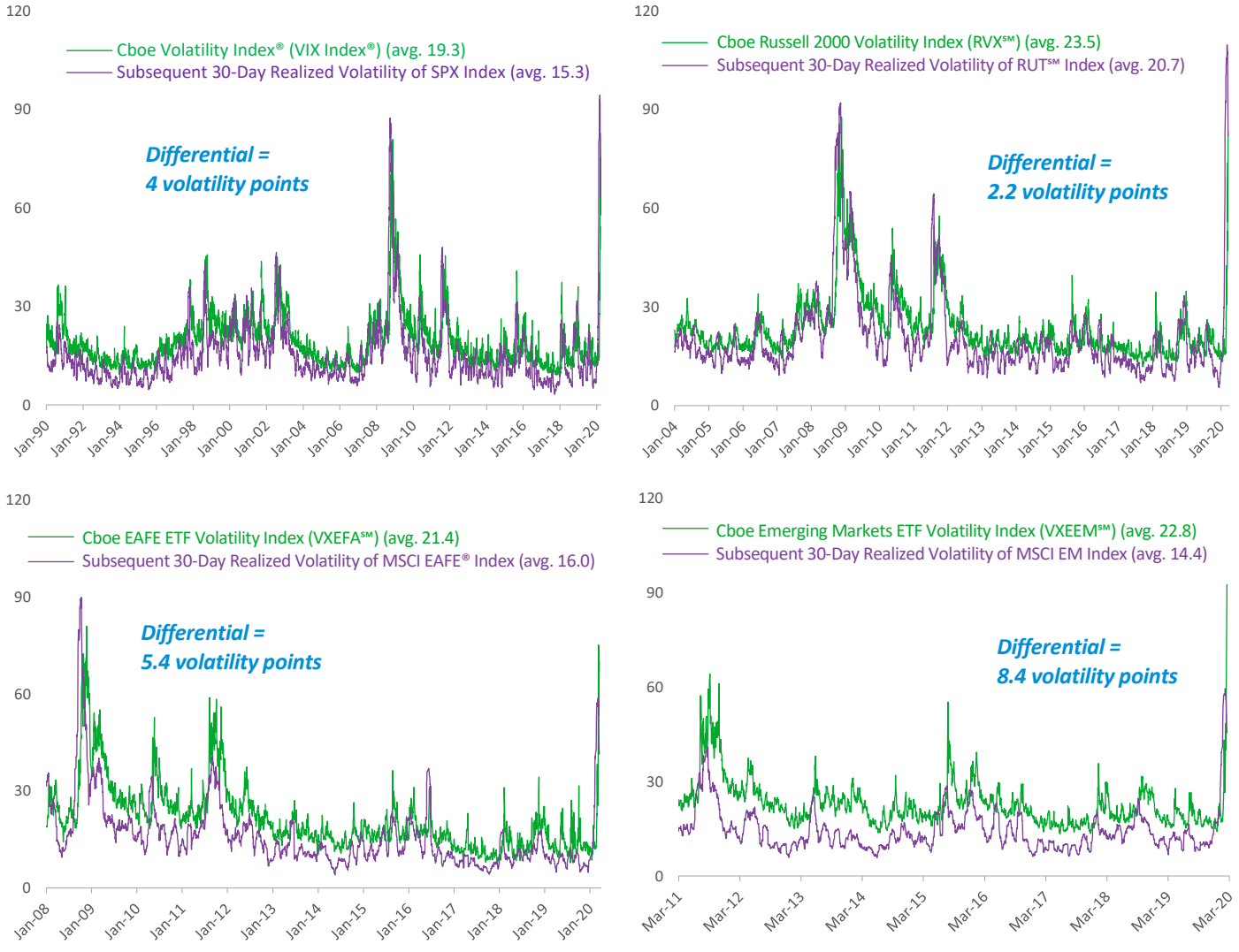
Mining Premiums & Lowering Risk

Option selling strategies focus on harvesting premiums, in exchange for the likelihood of truncated potential in certain market regimes. At-the-money (ATM) strategies, such as PUT, PUTR, PXEA and PXEF focus on maximizing harvested premiums versus out-of-the-money (OTM) strategies, such as BXMD. The premium size is a function of future expected volatility. Markets where expected volatility exceeds realized volatility create premium pricing that is above average, or rich, and can fuel higher risk-adjusted returns. Exhibit 13 (below) shows rich premiums protracting due to lower market volatility. Some asset classes are inherently more volatile, such as small-cap and emerging markets, versus large-cap and developed markets. The tradeoff is between consistently higher premiums during a low-correlated, volatile market and lower premiums during a market that is highly correlated with lower volatility. As shown in Exhibit 14 (further below), premiums between ATM and OTM strategies are highly correlated and as expected, the ATM strategy delivered higher premiums.

Exhibit 13 – Implied Volatility Risk Premium

Data series for the four charts below begin in different years, end in March 2020, and demonstrate that implied volatility was usually higher than subsequent realized volatility.



Source: Wilshire Associates, Cboe

Exhibit 13: The averages of the daily closing values of the Cboe Volatility Index (VIX), Cboe Russell 2000 Volatility Index (RVX), Cboe EAFE ETF Volatility Index (VXEFA) and Cboe Emerging Markets ETF Volatility Index (VXEEM) were above subsequent realized volatility of the S&P 500, Russell 2000, MSCI EAFE and Emerging Markets by a nominal 4.0, 2.8, 5.4 and 8.4 volatility points, respectively.

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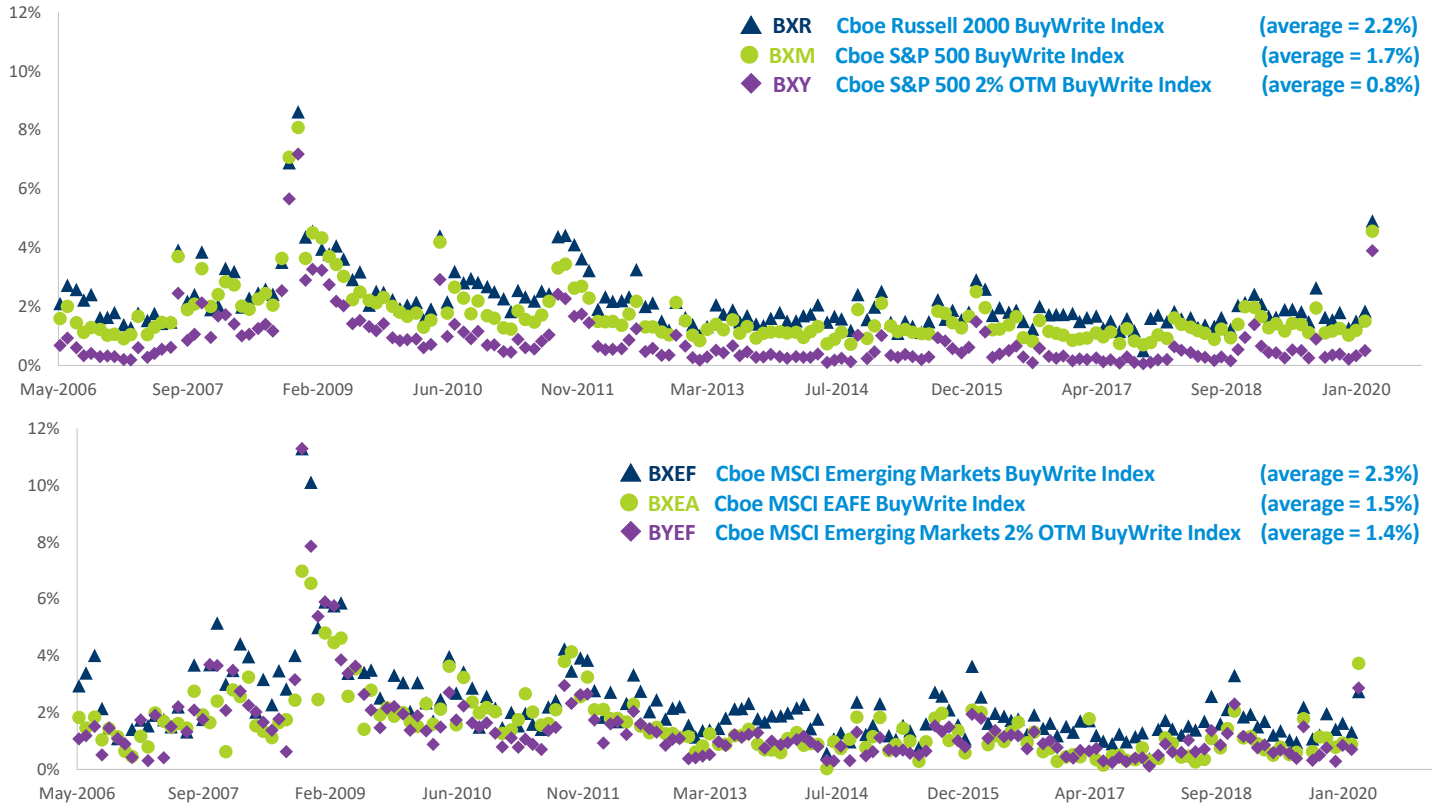
Exhibit 14 – U.S. and International Monthly Gross Premiums for BXR, BXM, BXY and BXEF, BXEA, BYEF
(May 2006 – March 2020)



Source: Wilshire Associates, Cboe

Exhibit 14: The two charts above show four indices that write at-the-money options (BXR, BXM, BXEF and BXEA) and two indices that write out-of-the-money options (BXY and BYEF). The two indices that collected the most premiums were the BXR and BXEF indices, because they wrote ATM monthly options on indices (the Russell 2000 and MSCI EM) that were more volatile than the S&P 500 and MSCI EAFE indices. The two indices that collected the lowest amount of gross premiums were BXY and BXEF indices that wrote OTM options. An advantage of OTM versus ATM option-writing is the fact that an OTM option writer has the potential to participate in some upside moves in the stock market. Exhibit 8 shows that the BXY and BXMD indices (OTM writing) had higher returns than the BXM and PUT indices (ATM writing) over a 14-year period.

Conclusion

Empirical data across 14 years confirmed that Cboe option-writing indices and a theoretically designed Global Option-Writing Strategy delivered reduced risk and consistently captured the volatility risk premium. The Global Option-Writing Strategy offered similar risk adjusted returns to the MSCI ACWI, fueled by richly priced individual index options and expected volatility landing higher than subsequent realized volatility. The combination of these factors delivered realized drawdown cushion as designed. The richest average monthly call premiums for BXR and BXEF, at 2.17% and 2.25% of the underlying value, respectively, contributed at a rate of 29.4% and 30.6% respectively, on an annualized basis from May 2006 to March 2020. Overall, the combination of lower risk, drawdown cushion, demonstrated diversification benefits, and increased investor acceptance indicate that global option-writing strategies are worth further consideration as part of a long-term investment plan.

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