

Endowment Risk Management and Return Enhancement with Listed Index and ETF Options

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April 24, 2019

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This study provides an important extension of existing research on the performance of options-based strategies by considering the impact of the inclusion of option-based equity strategies in diversified institutional portfolios. Specifically, the analysis assesses the historical impact of the application of rules-based passive buy-write or put spread collar overlays to hypothetical endowment portfolios. In addition, the study considers the choice of physically settled QQQ ETF options versus cash settled NDX index options from the perspective of risk-adjusted performance and various option characteristics such as settlement type, volume, open interest and tracking error.

The buy-write (or covered call) strategy involves the writing of a call option against a long position in the underlying. The buy-write essentially exchanges some or all of the participation in the underlying's upside for a fixed (at the time of option roll in) premium collection. The buy-write is generally considered a return enhancement strategy since the written call can provide extra income in flat market environments. While the buy-write does not limit the portfolio downside, the collected call premium does provide some mitigation of losses. On average, the buy-write strategy is expected to outperform the underlying if the implied volatility of the short calls tends to exceed the realized volatility of the underlying over the life of the calls. This study considered 1-month 2% and 5% OTM buy-writes on the QQQ ETF and NDX index.

The put spread collar (or covered combo) strategy involves the writing of a call and purchase of a bear put spread against a long position in the underlying. The particular characteristics of a put spread collar implementation will depend on the choice of initial moneyness and tenor of each option. The put spread collar may be implemented as a net premium collection or net premium payment strategy. The implementations in this study were net premium collection strategies where the premium collected from the written call and written put exceeded the premium paid for the purchased put. In a put spread collar, the written call limits upside participation while the written put limits the protection provided by the long put. The put spread collar is generally considered a risk management strategy since the bear put spread can provide buffered downside exposure. In contrast to a protective put or collar strategy, the put spread collar does not provide a floor for downside protection since the written put counteracts the protection provided by the long put for losses approaching and beyond the written put's strike price. In general, one would expect that a put spread collar would reduce volatility by limiting upside participation and mitigating downside participation. The put spread collars considered in this study utilized 1-month calls and 6-month puts held to expiration. The first implementation used 2% OTM written calls, 5% OTM long puts and 10% OTM written puts, while the second implementation utilized 5% OTM written calls, 10% OTM long puts and 15% OTM written puts.

In order to implement the analysis, the historical returns for three hypothetical endowment portfolios were generated based on the historical time series of average asset allocations of small (<\$25 million), mid-sized (\$100-500 million) and very large (>\$1 billion) endowments reported in the NACUBO-Commonfund Study of Endowments (2002 - 2018). In order to assess the theoretical impact of the Nasdaq options-based

strategies, the equity allocations of the hypothetical endowments were replaced with Nasdaq-100 QQQ or NDX buy-write or put spread collar strategies.

Over the full 18+ years of the study (April 1999 to December 2018), the buy-writes on the QQQ and NDX provided meaningful increases in returns relative to the corresponding underlying. The improvements in raw annualized returns averaged 2.4%, while standard deviations were reduced by an average of 5.8%. Risk-adjusted returns were also improved. The information ratios (return per unit of risk) of the buy-writes were almost double those of their underlying and the alphas of the buy-writes averaged 3.3% (compared to zero for the underlying). The put spread collar implementations provided slightly less return improvements than the buy-writes, along with larger reductions in standard deviations. From a risk-adjusted return perspective, the put spread collars performed similarly to the buy-writes with generally similar information ratios and alphas. There was no clear dominance in performance between the QQQ and NDX implementations. The differences due to choice of moneyness were greater than those due to choice of QQQ versus NDX.

Since the option strategy overlay was only applied to the equity portion of the endowments, the impact of adding the options was somewhat mitigated in the endowment implementations, but still meaningful. This was particularly the case for the larger endowments due to their smaller equity allocations. For the small endowment portfolio (<\$25 million in assets), the addition of the buy-write overlay increased raw returns by an average of 0.8%, while reducing standard deviations by 2.2%, on average. Alpha improvements averaged 1.5%, while information ratios increased by 0.17, on average. The put spread collar overlays provided smaller return and standard deviation improvements to small endowment performance than the buy-write overlays. In fact, one of the put spread collar overlays slightly reduced returns. However, the risk-adjusted returns were improved by all of the put spread collar overlays with alphas increasing by an average of 1.3% and information ratios increasing by an average of 0.17. Thus all of the option overlays provided meaningful improvements for the small endowment portfolio.

Results for the mid-sized endowment (\$100-\$500 million in assets) were generally similar to those of the small endowment. The buy-write overlays increased returns an average of 0.7% while reducing standard deviations by 1.6%, on average. Information ratios and alphas were also meaningfully improved by the buy-write overlays. The put spread collar overlays also improved the mid-size endowment performance with returns increasing by an average of 0.4% while standard deviations dropped by 2.2%, on average. Information ratios were also improved while alphas increased by an average of 1.1%.

The buy-write and put spread collar overlays also improved raw returns and risk-adjusted performance of the very large endowment portfolio (>\$1 billion in assets), although the improvements were somewhat smaller than those for the small and mid-sized endowments. The buy-write overlays increased returns by an average of 0.6% while reducing standard deviations by an average of 1.0%. Information ratios and alphas were

also improved by the buy-write overlays. The put spread collar overlays improved the very large endowment performance, increasing returns by an average of 0.4% while reducing standard deviations by 1.4%, on average. Information ratios and alphas were improved, with alphas increasing by an average of 0.9%.

In summary, the QQQ and NDX buy-write and put spread collar overlays improved risk-adjusted performance for small, mid-sized and very large endowments, with the largest benefits occurring for the small endowment portfolio. While the return improvements were relatively small from an annualized return perspective, these improvements were averaged over a period of 18+ years so the cumulative impact is meaningful.

Furthermore, the reductions in standard deviations and maximum drawdowns were also economically significant. While the choice between NDX and QQQ options had little impact on performance, other option characteristics such as cash versus physical settlement, contract size and American versus European exercise may result in different preferences across investors.

Important Disclosures

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In order to simplify the calculations used in the examples in these materials, commissions, fees, margin, interest and taxes have not been included. These costs will impact the outcome of any stock and options transactions and must be considered prior to entering into any transactions. Investors should consult their tax advisor about any potential tax consequences.

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The passive put spread collar strategy and the passive buy-write strategy do not take into account significant factors such as transaction costs and taxes and it should be understood that past performance does not guarantee future results.

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