CASE STUDY

High Income in a Yield-Starved World: Efficiently Harvesting the Equity Volatility Premium

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Introduction

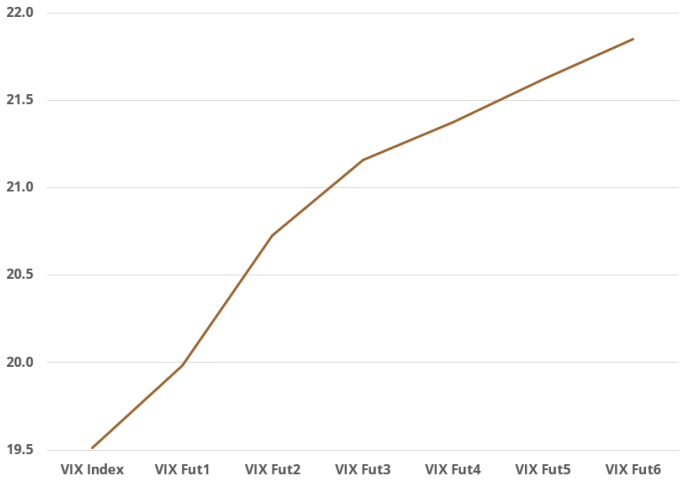
In the US and around the world, populations are aging and people are living longer, heightening demand for income generating investment strategies. Yet as need continues to increase, key sources of income remain inadequate. The 10-year treasury yield was under 1% for the majority of 2020, while hovering between 1.3% and 1.6% the majority of 2021. And at approximately 1.3%, the S&P 500 dividend yield is currently a full 3 percentage points or some 70 percent below its historical mean.

To state the obvious, income is hard to come by, and reaching for yield can quickly (sometimes unknowingly) add risk to one's portfolio. But there may be a solution: the equity volatility premium. In this case study we will show you what the equity volatility premium is, the most efficient ways to harvest it, and how it can be used as a compelling risk-adjusted source of high income.

Equity Volatility Premium 101

Let's begin by reviewing what the volatility premium is and how it is harvested. Figure 1 shows the average term structure for VIX spot and the first 6 futures contracts over the fifteen years ending 2020. On average, the curve is in contango. This means the longer-dated futures are higher in price than the shorter-dated futures, a consistent structural anomaly that stems from VIX futures being used as a hedge for equities. To harvest this premium, one simply needs to short the futures contract, typically the front month due to high steepness and liquidity, and continuously do so by rolling the front-month short to the next month, on a monthly basis, ad infinitum. Since long positions in VIX are used to hedge equity positions, the VIX curve typically spikes during equity selloffs, which is the primary risk to harvesting the volatility premium in this manner.

Figure 1 – Average VIX Term Structure from 2016 to 2020



Source: Bloomberg, Simplify Calculations

The monthly yield from this continuous roll can be calculated as (VIX 2nd Month – VIX 1st Month)/((VIX 2nd Month + VIX 1st Month)/2), for an annualized yield of approximately 56% for the average VIX term structure presented in Figure 1 (we just multiply the monthly yield by 12, assuming income is distributed monthly). This yield is not static, as both levels and spread between contracts are continuously changing.

From 30,000 feet, the volatility premium is essentially compensation received for taking on the risk of losses during sudden market downturns, since VIX will spike during these periods. Harvesting the premium has proven to be a viable strategy because over the longer-term, implied volatility used for pricing market insurance, a la VIX, has been consistently higher than realized (or actual) volatility.

Optimal Exposure for Volatility Harvesting

Short volatility investments can indeed have massive drawdowns, as was the case in the high-profile implosion of XIV in February of 2018. This blowup was first and foremost due to the fund's total short VIX exposure — a 1:1 ratio of VIX short exposure to fund assets — which created a -100% exposure to VIX. To avoid a blowup of this magnitude, one should first reduce the exposure down from -100%.

Post "Volmageddon 2018", the market norm has been to sell volatility with a -50% exposure. But as Figure 2 illustrates, the sweet spot, where the annualized return from the trade is optimal, is around 25%. One might expect the 50% exposure to have the highest return. This is true for yield, but not true in terms of compounded annual return. The reason is simple: a 50% drawdown requires a 100% return to get back to even. So even though the yield at 50% exposure is two times the yield for the 25% exposure product, the extra yield is more than offset by the larger drawdowns. Investors looking to capture the volatility premium over extended periods should therefore focus on the "compound optimal" exposure near 25%, rather than the "yield maximizing" exposure near 50%.

Figure 2 – Inverse VIX Strategy Performance as a Function of Exposure (2016 to 2020)

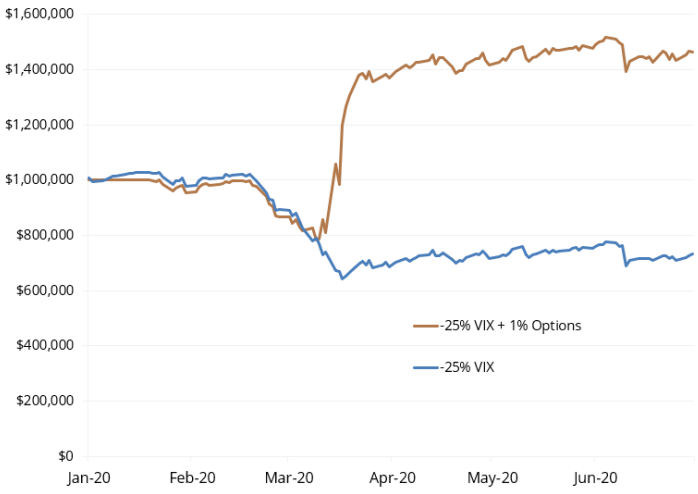
	50% Inverse VIX	25% Inverse VIX	12.5% Inverse VIX
Cumulative Return	19.83%	29.64%	20.93%
Annualized Return	3.68%	5.33%	3.87%

Source: Bloomberg, Simplify Calculations

Further Mitigating Downside With Options

In the previous section, we saw that targeting exposure near -25% is critical to optimal harvesting of the volatility risk premium. Beyond this tuning exposure, we can also use options to further limit the downside and improve cumulative returns. Figure 3 shows the performance during the first six months of 2020 of a simple strategy that is -25% short VIX and rolls a monthly call option on VXX that is 200% out-of-the-money, spending 1% annually on option premium (1/12th of 1% each month). By comparison, we also see the performance of the -25% VIX strategy without options. The COVID-related drawdown during this period gets cut by nearly half from the VXX option position, and even at the relatively small 1% annual option budget, we see the options can add significant value to the strategy beyond just drawdown protection.

Figure 3 – Downside Mitigation of 25% Inverse VIX Strategy via Options



Source: Bloomberg, Simplify Calculations

Maximizing Risk-Adjusted Portfolio Income

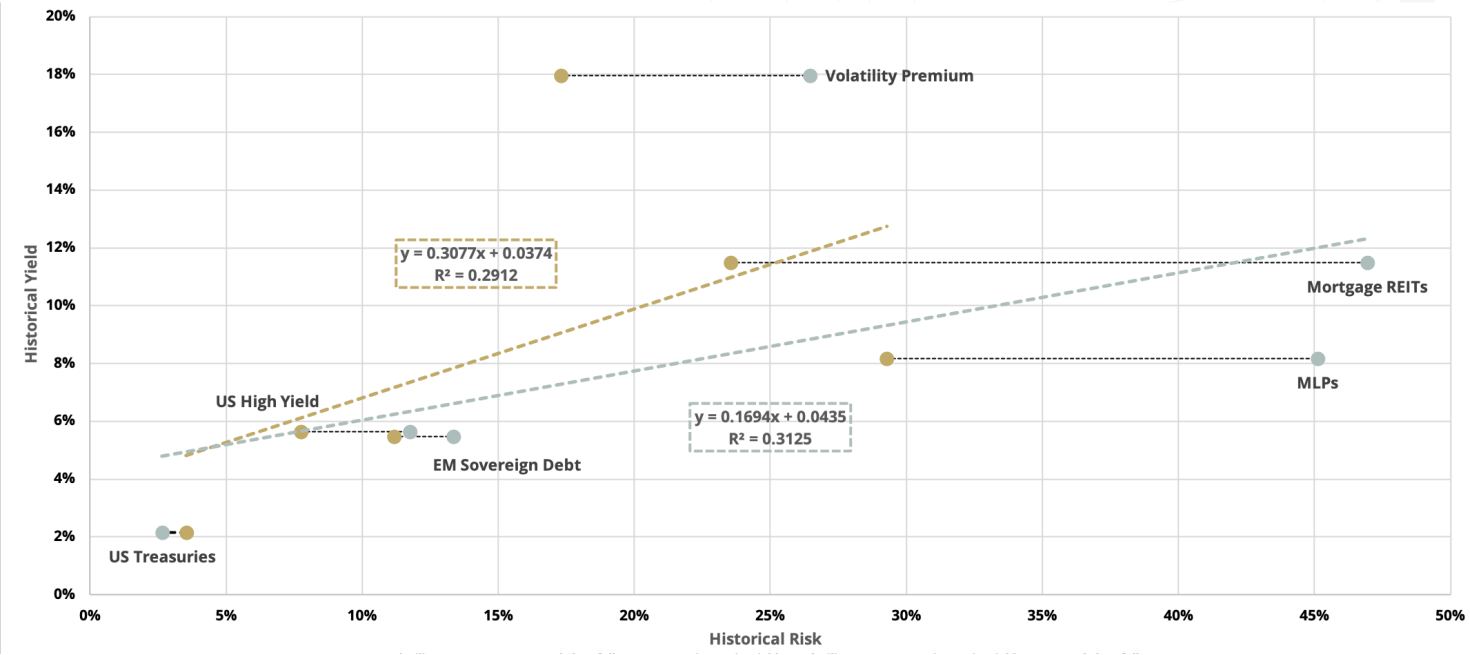
At this stage, we've established the potential for attractive yield levels from harvesting the equity volatility premium, and how to minimize downside risks. That said, on a risk-adjusted basis, how does it stack up to other income strategies? Let's consider the classic risk-reward tradeoff for the most popular income-focused strategies, such as[1]: US Treasuries, US High Yield Bonds, Mortgage REITs, MLPs, EM Sovereign Debt, and the Volatility Premium (from here on we assume a 25% exposure to the standard front month VIX and no option protection).

Figure 4 shows the historical yield[2] vs volatility (gold dots) for our full universe of income strategies, over the decade ending Sept. 15, 2021. The strategies generally follow the relationship between risk and return one would expect from the Capital Asset Pricing Model (CAPM), with one notably positive outlier: the equity volatility premium. From a CAPM perspective, the equity volatility premium is a dominant strategic position for income. It is such a strong outlier that the r-squared for the linear fit between yield and volatility across the strategies is only 0.29, whereas without this strategy the r-squared increases to 0.70. Now volatility is not the only risk one can be compensated for. One could also be accepting increased left-tail risk, so let's account for that now.

There are many metrics for measuring the left tail risk of an investment. In this case study, we utilize the 1-month expected shortfall (ES) at the 99% confidence level. This is found by creating a return distribution of 20-day historical rolling returns and finding the average of returns in the worst 1% of cases. Returning to Figure 4 we show historical yield vs expected shortfall (gray dots). The higher income strategies are clearly taking on some excess left-tail risk. But interestingly, the equity volatility premium strategy is now an even more attractive outlier to the expected shortfall "security market line", given significantly larger shifts to the right in ES for high income peers. So even when higher-moment CAPM is accounted for, the attractiveness of the risk-adjusted income remains intact for the short volatility strategy. And once again, the relatively muted r-squared of 0.31 would be a whopping 0.85 if not for the extremely positive outlying yield of the equity volatility premium strategy.

It's worth noting that one can also be taking on equity

Figure 4 – Average Yield vs Average Risk (Volatility and Expected Shortfall), 9/15/2011-9/15/2021



Source: Bloomberg, Simplify Calculations

correlation risk, whereby you accept increasing correlations to equities as those markets correct. This is indeed a feature of the short volatility strategy, where we see correlations slowly grow from 0.22 to 0.75 as equity markets move from strongly upward regimes to strongly downward regimes (also measured over the decade ending Sept. 15, 2021). To neutralize this during the strategic asset allocation process, simply include the income source within one's equity bucket.

Tactical Asset Allocation of the Volatility Premium

The short volatility strategy also presents allocators a unique opportunity for more effective tactical positioning within the income space. Short volatility strategies deliver positive returns from two easily identified drivers: 1. mean reversion of volatility from elevated levels to average levels and 2. roll yield as second month VIX futures roll down to the front month position.

Figure 5 presents the 20-day realized forward return (annualized) for the short volatility strategy as a function of starting VIX level and starting expected roll yield[3], binned into terciles (middle VIX bucket is 13.7 to 17.6; middle expected roll yield bucket is 13.2% to 26.5%). The strategy generally performs best when the curve is elevated and has room to mean revert down (driver 1) and when the curve is steep and roll yield is high (driver 2). One can thus use Figure 5 as a guide to help tactically improve the risk-adjusted income beyond the already favorable expectations highlighted in Figure 4.

Parting Words

Given current US demographics, income is an increasingly critical component of investment portfolios, but yield is incredibly hard to come by these days. One compelling solution is the equity volatility premium, a structural opportunity born out of supply-demand imbalances

Figure 5 – 20-Day Realized Forward Returns (Annualized) for Volatility Premium Strategy as a Function of Starting VIX Level and Starting Expected Roll Yield, 9/15/2011-9/15/2021

		Starting Expected Roll Yield		
		Lower Third	Middle Third	Upper Third
STARTING VIX LEVEL	Lower Third	-22.5%	-7.9%	8.5%
	Middle Third	1.1%	6.9%	20.6%
	Upper Third	21.7%	39.0%	41.0%

Source: Bloomberg, Simplify Calculations

within portfolio hedging markets. After adjusting for both volatility and tail risks, we see that the equity volatility premium presents a compelling risk-adjusted income stream for strategic asset allocators. We have also shown that volatility premium harvesting can be further enhanced by tactically managing the exposure based on starting VIX levels and starting expected roll yields.

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[1] US Treasuries are represented by LUATTRUU Index, US High Yield Bonds by HYG, Mortgage REITs by REM, MLPs by AMLP, EM Sovereign Debt by EMLC, and Equity Volatility Premium by 50% exposure to SVXY.

[2] For the short volatility strategy we assume the historical yield is equal to the average roll yield.

*[3] Starting expected roll yield is calculated as (UX2-UX1)/Average(UX1,UX2)*12*0.25, where UX1 and UX2 are the front-month and second-month VIX futures contracts, respectively*

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