

## Should You “Sell” Volatility?

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by Larry Swedroe

Academic theory predicts that the volatility implied by the VIX index will be greater than the realized volatility. That difference can be thought of as an insurance premium investors are willing to pay because volatility tends to spike when stocks crash, as in the last bear market. New research confirms that investors can profit from this and that such a strategy is uncorrelated with other traditional sources of return.

The volatility of asset returns is regime dependent, changing over time as the economy goes through periods of tranquility and periods of turbulence. Changes in the volatility of asset returns are priced into options markets. Theory suggests that the price of volatility risk should be negative because increases in volatility are viewed by investors as a deterioration in the investment environment. Thus, assets that purchase volatility insurance (such as variance swaps and options) that pay off positively when the markets unexpectedly become more turbulent should have negative expected returns. Conversely, selling volatility insurance should have positive expected returns.

The variance risk premium (VRP) refers to the fact that, just as theory suggests, over time the option-implied volatility has tended to exceed the realized volatility of the same underlying asset. This has created a profit opportunity for volatility sellers – those willing to write the volatility insurance options, collect the premiums and bear the risk that volatility will increase by more than the implied volatility. Investors are willing to pay a premium because risky assets, such as stocks, tend to perform poorly when volatility increases. Thus, the VRP isn't an anomaly that should be expected to be arbitrated away. And since the risks of the VRP tend to show up in bad times (when risky assets are performing poorly), we should expect a significant premium. Thus, the VRP should be considered a unique risk premium that investors with long horizons and stable finances (allowing them to take on cyclical risks that show up in bad times) can harvest.

Geert Bekaert, Robert Hodrick and Andrea Kiguel contribute to the literature on the variance risk premium with their August 2019 study “Variance Risk in Global Markets.” They sought to explain the excess returns on a variety of assets with a simple three-factor model that includes the return on a benchmark equity portfolio and two additional sources of risk, the excess return on a long-term U.S. dollar bond, and the return on a variance swap that captures a traded measure of unanticipated increases in volatility. As a proxy for global equity market volatility, they used the return on a one-month variance swap on the U.S. equity market. They examined the exposure of returns to variance risk at the regional level in developed and emerging equity markets, bond markets and foreign currency markets. Their data sample covers the period January 1995 to November 2018 and consists of 22 developed markets and 25 emerging markets.

Bekaert, Hodrick and Kiguel began by noting that the correlation between the return on equity and the return to the variance swap is highly negative at -58%, though it is far from perfect. The following is a summary of their findings:

- While the equity and bond exposures strongly vary with the different asset classes considered, there is a nearly uniform and mainly negative exposure to the variance risk factor.
- Because the average return on buying volatility is negative, such negative exposures should be compensated by positive risk premiums. In fact, the VRP is highly statistically significant, often exceeding 50% of the total risk premium.
- The global factor model explains a substantive fraction of the co-movements between international assets, with the best fit being for international equity correlations.
- The annualized mean returns of the risk factors are 5.20% for equities, 2.61% for long term bonds and -1.14% for the variance swap.
- Across all regions, average excess equity returns are very high, approaching 40% per annum (p.a.), when volatility innovations are low; and average excess returns are negative, also approaching -40% p.a., when volatility innovations are high.
- When volatility is high, emerging market bonds perform poorly, and emerging market currencies depreciate versus the dollar. Conversely, in low volatility states, emerging market bonds do well, and their currencies appreciate relative to the dollar.

- Excess returns on equities and bonds are negatively correlated at -0.22, while the excess equity return and the variance swap return are strongly negatively correlated at -0.53. Bond returns and the variance swap return are positively correlated at 0.15.

The authors concluded: “We find almost uniformly negative exposures of returns to variance risk across all asset classes and all regions, including emerging markets.” They added: “Economically, the variance risk factor contributes significantly to global risk premiums, with its contribution hovering in the 40-60% range of the total premium for most portfolios we consider.”

Their findings are consistent with prior research on the VRP.

## Historical evidence

In his November 2011 paper “The Variance Risk Premium Around the World” (Board of Governors of the Federal Reserve System International Finance Discussion Papers), Juan Londono not only found that the VRP predicts U.S. stock returns but also that variance premiums are highly correlated across countries; and the cross-country variance premium correlation is mainly driven by the volatility of volatility (VoV) generated in the leader (the U.S.) country, which further implies that the leader country variance premium plays the key role in predicting equity return correlations across countries. In addition, he found that the U.S. variance premium outperforms all other countries’ variance premiums in predicting local and foreign equity returns. And he provided evidence that international equity returns tend to co-move more intensely following episodes of increasing U.S. variance premium.

William Fallon, James Park and Danny Yu, authors of the study *Asset Allocation Implications of the Global Volatility Premium*, published in the September/October 2015 issue of the *Financial Analysts Journal*, examined the performance of volatility premiums over the 20-year period beginning in 1995. They began by defining and calculating standardized returns to volatility exposure for a variety of global asset markets. They scaled each of the 34 volatility return series to target an annualized volatility of 1% each month at trade inception. They found that shorting volatility offers a very high and statistically significant Sharpe ratio: 0.6 equities, 0.5 fixed income, 0.5 currency, 1.5 commodities, and 1.0 for a global VRP composite strategy (which is dramatically higher than the 0.4 Sharpe ratio for the market beta premium). They also noted: “Selling volatility is profitable in virtually all markets nearly all the time, including the five-year period surrounding September 2008.” However, they also cautioned that shorting volatility strategies is not a free lunch in that they come with occasional, but substantial, tail risks. The tail risk in the diversified portfolio was similar to the average tail risk of the individual strategies, indicating that correlations tend to rise in bad times. However, they added that the diversified strategy when added to a multi-asset class portfolio did not increase the tail risk, though it greatly improved (by 31%) the Sharpe ratio.

## Summary

There is now a large body of evidence demonstrating that the VRP is persistent and pervasive as well as robust to various maturities across asset classes (stocks, bonds, commodities and currencies) and around the globe. The VRP also has a simple, intuitive, risk-based explanation for why it should persist post-publication of the research: It results from the desire of investors to protect themselves against economically unfavorable states of the world – they are willing to pay an insurance premium.

Diversification has been called the only free lunch in investing. And diversification is investors’ only relief from systemic and unforecastable market risks. Effective diversification requires uncorrelated investments as well as a look beyond traditional stock and bond indexes to other areas of risk and return, such as reinsurance, alternative lending, carry and the VRP. Thus, the key to successful investing is pursuing a combination of strategies across low-correlating assets to produce a broadly diversified portfolio.

While the VRP is best known in U.S. equities (so most volatility products focus on them), diversification across many asset classes has the potential to improve VRP returns through reducing portfolio volatility. This is both intuitive and empirically observable in historical data, which shows low correlation of the VRP across asset classes, including commodities, currencies and credit.

Before investing in the VRP, or any strategy that exhibits negative skewness, you should be aware that while such strategies can consistently accrue small and consistent gains over many years, rare large losses disproportionately occur in bad times. It’s this poor timing of losses that helps explain the large required risk premiums. For example, a simple strategy that involves capturing the S&P 500 volatility premium lost more than 48% in October 2008. However, volatility premium strategies tend to recover more so than other asset classes, because it is precisely in the immediate aftermath of a crisis event when the implied volatility is highest (caution: a high implied volatility doesn’t guarantee a high return, as realized volatility can continue to increase). This is similar to how insurance companies, which raise premiums after

incurring large losses from catastrophic events, operate.

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