CHICAGO BOARD OPTIONS EXCHANGE

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Using VIX in a Diversified Portfolio

Diversification is vital to reducing risk in an investor's portfolio. At its simplest, it is intended to cushion against market fluctuations: acquire two uncorrelated assets, and if you incur a loss in one, a gain in the other should offset it.

In 2008, the U.S. stock market lost more than a third of its value, marking the largest annual decline since the Great Depression era. International and emerging market equities fared even worse. Even alternative investments such as real estate, commodities and hedge funds suffered similar declines and provided little, if any, diversification benefit.

2008 Performance by Asset Class	
Emerging Markets	-54%
International Developed	-43%
Real Estate	-43%
U.S. Large Caps	-37%
Commodities	-37%
U.S. Small Caps	-34%
Hedge Funds	-23%
Fixed Income	5%

Source: Credit Suissse: Portfolio Strategy

Fixed income (5% gain) did little to offset losses in equities and other investments. Volatility, on the other hand, with its historical tendency to be negatively correlated to stock market returns, gained 81%[1] in 2008! CBOE Volatility Index (VIX) futures and options provide the tools to buy and sell volatility like other asset classes. Ironically, investors could have reduced their market risk due to volatility by including volatility (VIX) in a diversified portfolio.

A Diversified Portfolio without VIX

Consider a hypothetical diversified portfolio created by passively allocating to the following ETF asset groups[2]:

- **35% Large Cap – *S&P 500 SPDR* (Ticker: *SPY*)**
- **20% Small Cap –*iShares Russell 2000 Index Fund* (Ticker: *IWM*)**
- **30% Bonds**
  - **15% - *iShares Barclays 7-10 Year Treasury Bond Fund* (Ticker: *IEF*)**
  - **15% - *iShares Barclays 20+ Year Treasury Bond Fund* (Ticker: *TLT*)**
- **15% Foreign**
  - **10% - *iShares MSCI EAFE Index Fund* (Ticker: *EFA*)**
  - **5% - *iShares MSCI Emerging Markets Index Fund* (Ticker: *EEM*)**

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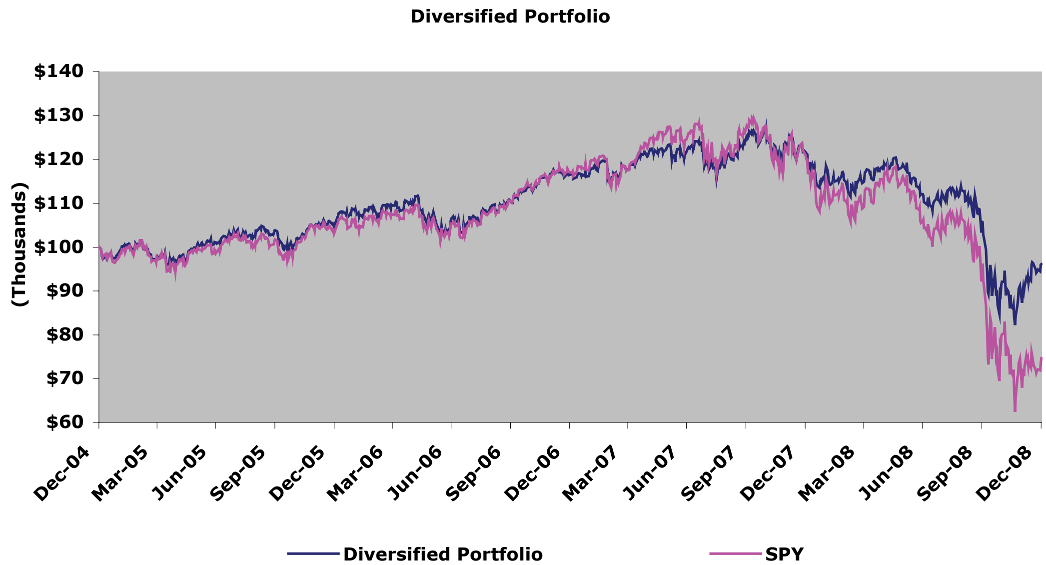
[1] Assumes a continuous long position in VIX futures re-balanced daily to reflect a constant maturity of 5 months. Returns do not include transaction costs, cost of capital or taxes.

[2] The construction of the hypothetical portfolio was performed from December 31, 2004 through December 31, 2008, assuming an initial investment of $100,000. The portfolio allocations were re-balanced annually to initial weights.

The chart and tables below display the performance of the diversified portfolio relative to the S&P 500 (SPY) from 2005 through the end of 2008.



Return		
Year	**Diversified Portfolio**	**SPY**
2005	4.73%	3.01%
2006	11.16%	13.74%
2007	4.51%	3.24%
2008	-20.99%	-38.28%
4-Year	**-3.87%**	**-25.34%**

Volatility		
Year	**Diversified Portfolio**	**SPY**
2005	8.41%	10.33%
2006	9.90%	10.99%
2007	12.10%	15.86%
2008	23.90%	41.25%
4-Year	**14.90%**	**23.29%**

The direct benefit of diversification is clearly shown. The diversified portfolio outperformed SPY in 2005, 2007, and 2008. The 4-year return for the diversified portfolio was more than 20% higher than SPY's 4-year return. The portfolio's volatility was also reduced each year in comparison to SPY, and the overall volatility for the 4-year period was lower. As shown below, adding long volatility (VIX) exposure to the diversified portfolio could have reduced the 21% loss in 2008, and improved the overall 4-year return as well.

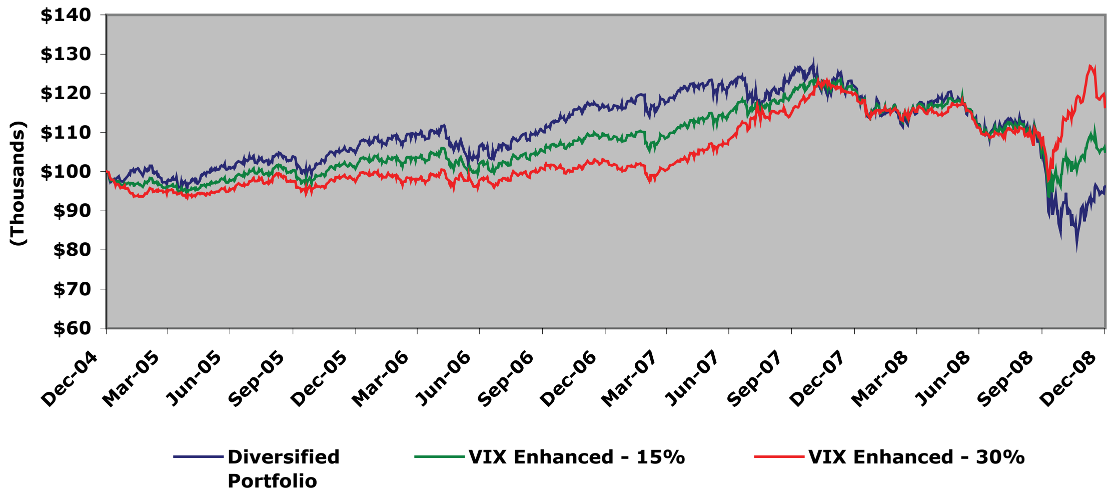
Adding VIX to a Diversified Portfolio

The following table highlights two "VIX Enhanced" portfolio strategies with a 15% and 30% allocation of VIX Futures. In each portfolio, a percentage of the bond allocation from the original diversified portfolio was replaced with VIX Futures.

	Diversified Portfolio	VIX Enhanced Portfolio - 15%	VIX Enhanced Portfolio - 30%
Large Cap	35% SPY	35% SPY	35% SPY
Small Cap	20% IWM	20% IWM	20% IWM
Bonds	15% IEF 15% TLT	15% IEF 0% TLT	0% IEF 0% TLT
Foreign	10% EFA 5% EEM	10% EFA 5%EEM	10% EFA 5%EEM
Volatility	0% VIX Futures	15% VIX Futures	30% VIX Futures

While the 4-year returns for the VIX Enhanced portfolios were higher than the overall return for the diversified portfolio, the VIX Enhanced portfolios underperformed in 2005 and 2006 when market volatility was at historically low levels. However, when volatility increased in 2007 and 2008, the VIX Enhanced portfolios posted significantly higher returns than the diversified portfolio. Moreover, the benefits of a long VIX exposure increased with a larger allotment to VIX futures.

Benefits of Including VIX in a Diversified Portfolio



	Diversified Portfolio	VIX Enhanced Portfolio - 15%	VIX Enhanced Portfolio - 30%
2005 Return	4.73%	0.70%	-2.57%
2006 Return	11.16%	8.44%	5.42%
2007 Return	4.51%	10.70%	16.84%
2008 Return	-20.99%	-13.08%	-2.92%
4-Year Return	-3.87%	5.07%	16.50%
Avg. Annual Compounded Return	-0.98%	1.24%	3.89%
Std. Deviation	3.03%	1.93%	2.14%
Sharpe Ratio	-0.41	-0.31	0.07

Also, the risk-adjusted performance (Sharpe Ratio) of the VIX Enhanced portfolios compared favorably to the diversified portfolio. In both cases, the standard deviation of daily VIX Enhanced portfolio returns was roughly two-thirds that of the diversified portfolio.

The return characteristics of the VIX Enhanced portfolios suggest a diversification benefit to including volatility in a balanced investment mix. However, the high cost of holding a long volatility position in a low volatility market environment can create a drag on portfolio returns. With this in mind, consideration might be taken for a rule-based allocation of VIX Futures, assigning different exposures depending on the volatility "regime." If incorporated properly, VIX can enhance a diversified portfolio's return and help reduce the risks of owning stocks in a turbulent market.

More information on the VIX futures and options may be found at the CBOE website:

www.cboe.com/VIX