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Risk Management and the Role of Volatility

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Introduction

Recent market events have highlighted that even when investors believe they have diversification, they may not. For example, equity markets seem to dislike uncertainty and tend to be short volatility. That is to say, when volatility or uncertainty is high, equities may underperform. In addition, during times of market corrections or crises, even alternative strategies such as hedge funds, or assets such as crude oil, which seem uncorrelated may become correlated. This paper describes different top-level approaches to volatility and the ways in which managers can approach risk in their strategies.

What is volatility?

Volatility refers to the amount of uncertainty or risk in a given asset, asset class, or strategy. For the purposes of this paper, risk is defined as the possibility that an outcome will not turn out as you expect it to. Uncertainty, on the other hand, comes from situations where the consequences, extent, or magnitude of circumstances, conditions, or events is unknown. Risk is something we can measure and manage, whereas uncertainty is not easily managed.

In practice, we can measure risk by considering the volatility, or standard deviation of returns, for an individual asset. The challenge with this concept is that risk and volatility vary widely across time. Assets can be low-risk for sustained periods of time and then suddenly shift to a state of high risk. For example, Figure 1 plots the risk of the S&P 500 since 2001. Note that most of the time, the S&P 500 was within a relatively low-risk range but during certain periods of crisis or stress the risk jumped as high as 60%!

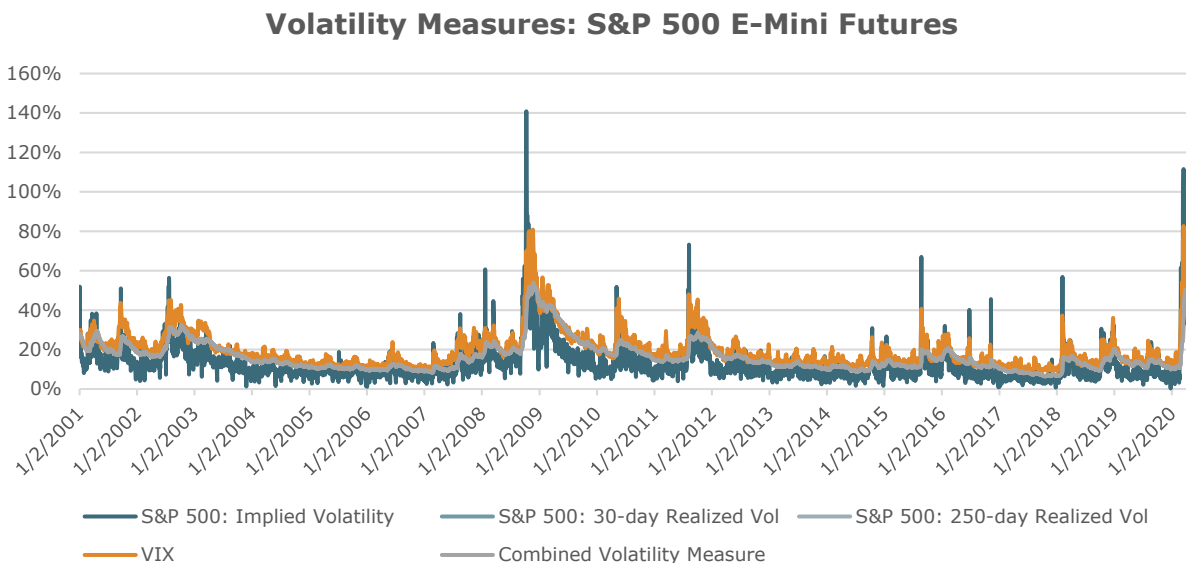


Figure 1: S&P 500 risk as denoted by forward-looking risk estimates implied in options prices via the VIX and the realized risk for the S&P 500 using the standard deviation of returns. Data is from 1/1/2001 to 4/30/2020.

The dark blue line plots implied volatility using hourly data and the orange line plots the VIX index. The gray and light blue lines plot volatility of the S&P 500 using a short-window and a

long-window (respectively), and the dark gray is an aggregate measure of these two. From any angle, forward-looking or backward-looking and short-windows or long-windows, volatility has spikes and can happen unexpectedly.

Managing risk

Although many investors and portfolio managers are aware of risk, their portfolios are often not risk-aware, i.e., they do not use volatility to size portfolio allocations actively. In a portfolio that is risk-aware, the size of the portfolio positions would incorporate the overall level of risk to adjust portfolio allocations over time. For example, as an asset's risk increases, the allocation to that asset should get smaller. In practice, there are many different methods and approaches to incorporate volatility into portfolio construction. Common examples include Managed Futures strategies, risk parity strategies, and many others. For risk-aware portfolios the goal is to manage to changing volatility environments to achieve a more stable risk profile over time.

To demonstrate an example of this type of approach, Figure 2 plots the realized volatility of managed futures strategies (represented by the SG Trend Index) from 2001 to present versus the realized risk of a simple long-equity portfolio holding the S&P 500.

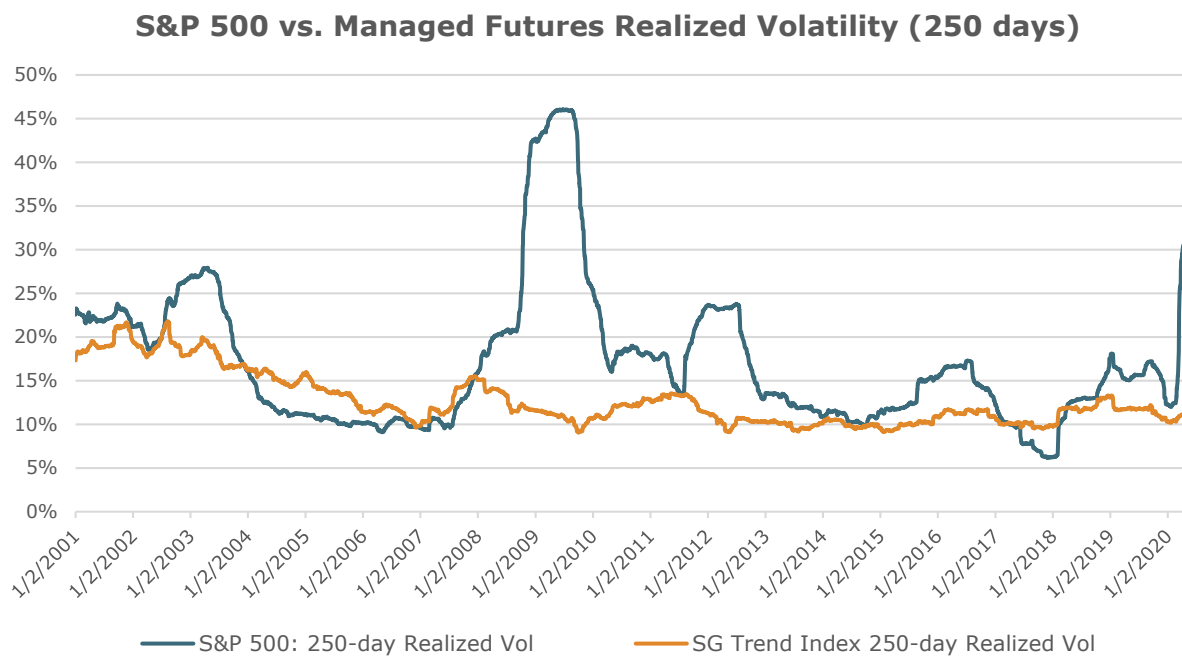


Figure 2: Realized volatility of the S&P 500 and the SG Trend Index from 1/1/2001 to 4/30/2020.

The realized risk of a risk-managed strategy tends to be relatively stable over time. If we consider the recent high-volatility environment, the realized risk for Managed Futures has stayed stable as these strategies adaptively adjust to changes in risk over time. Risk-managed or risk-aware strategies, like managed futures, provide a different approach for dealing with risk: instead of letting risk run, they adjust in reaction to it. However, neither a risk-managed

strategy nor a non-risk managed strategy will always perform well. Instead, it seems that combining both non-risk managed and risk-managed strategies could potentially be more robust over time. To demonstrate this, consider a 50/50 allocation between a risk-managed managed futures strategy and a long-equity strategy. Figure 3 plots the combination since 2001.

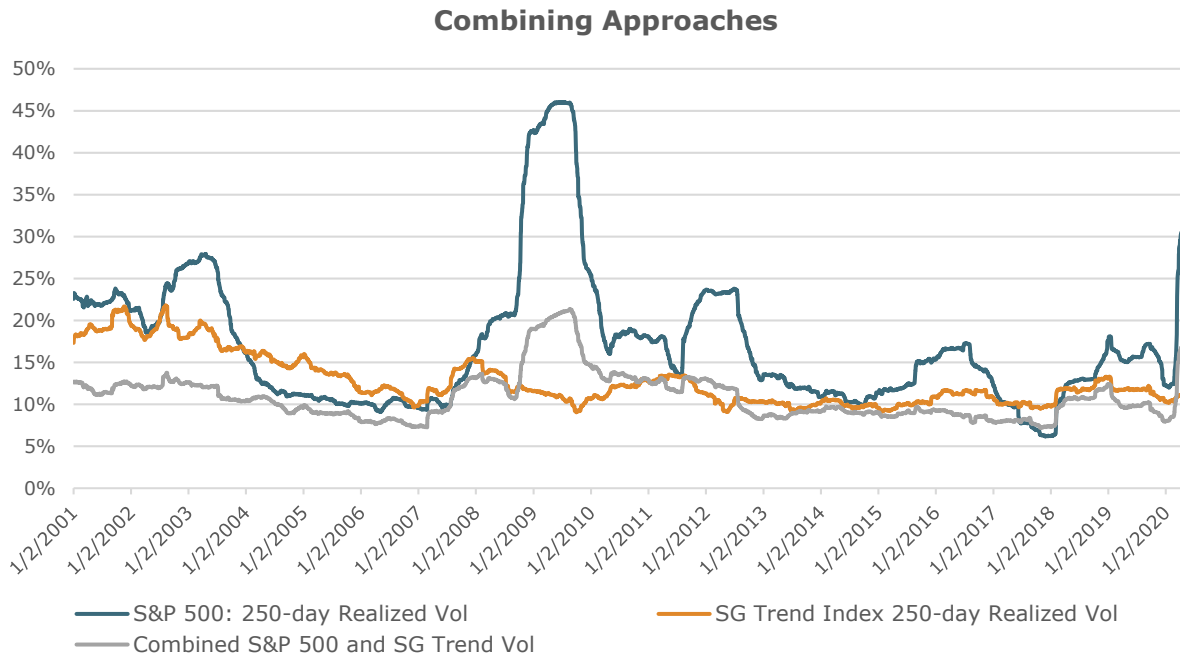


Figure 3: Realized volatility of the S&P 500, SG Trend Index, and a 50/50 combination of the two from 1/1/2000 to 4/30/2020.

Regardless of returns, the combination of a risk-managed and a traditional (not risk-aware) long-equity exposure creates a more balanced risk profile over time. In the case of the SG Trend Index, the risk of the combined portfolio is often lower than the risk of each of the individual indices due to the time varying benefit of low correlation between the two strategies. The correlation between the two strategies is -0.06 from 1/1/2000 to 4/30/2020. Combining approaches may be one way in which managers can approach the overall risk in their portfolios.

Related References

- Kaminski, Kathryn M. 2020. "Risk Variation in Trend-Following Systems." *AlphaSimplex Insights*. <https://www.alphasimplex.com/insight/risk-variation-in-trend-following-systems/>

About the Author

Kathryn M. Kaminski, Ph.D., CAIA® is the Chief Research Strategist at AlphaSimplex Group. As Chief Research Strategist, Dr. Kaminski conducts applied research, leads strategic research initiatives, focuses on portfolio construction and risk management, and engages in product development. She also serves as a co-portfolio manager for the AlphaSimplex Managed Futures Strategy. Dr. Kaminski's research and industry commentary have been published in a wide range of industry publications as well as academic journals. She is the co-author of the book *Trend Following with Managed Futures: The Search for Crisis Alpha* (2014). Dr. Kaminski holds a B.S. in Electrical Engineering and Ph.D. in Operations Research from MIT.

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