

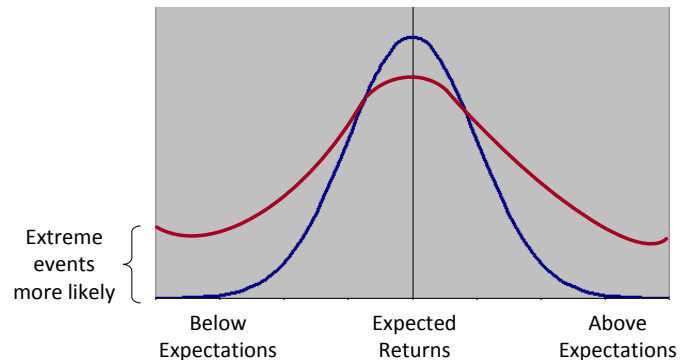
## Implementing Tail Risk Strategies

### Introduction

The bear market of 2008 that continued into early 2009 has caused many investors to question their understanding of risk. Popular books such as Nassim Taleb's "The Black Swan" have reinforced the idea that most market participants do not understand the potential distribution of market returns. Think carefully about the number of times over the last decade you have been told the market is experiencing a 100 year flood, and you might agree.

For many investors, the standard bell curve best describes their understanding of expected market returns over significant periods of time. In this Gaussian or normally distributed model the significant drop in the likelihood of an event occurring between 2 and 3 standard deviations away from the mean results in relatively 'narrow' tails. However, is the bell curve the best representation of the market's expected distribution of outcomes or is another distribution, possibly one that is more skewed and with fatter tails, more representative (for example, see Graph #1)? Naturally, most investors are concerned about negative or left tail outcomes. However, some investors also seek opportunities within the right tail of the distribution. Regardless of the strategy, investors seeking to profit from these "unlikely" outcomes are focused on an active tail-risk management strategy.

**Graph #1:**



Given the magnitude and severity of market events in the third and fourth quarter of 2008, "tail risk management" has become a timely topic for institutional investors. The purpose of this article is two-fold: first, define what constitutes a tail risk hedge; second, provide a framework for implementing these transactions in a manner that provides the greatest likelihood of achieving an investor's objectives.

### Defining a Tail Risk Hedge

Tail risk hedges are those that produce material gains in extreme market environments that most traditional risk models would consider highly unlikely to occur. These extreme environments can be either positive (right tail) or negative (left tail) in nature. As previously noted, most investors fear the events on the left side of the distribution as those outcomes have the potential to devastate a portfolio. Negative tail risk events can be associated with a rise in systemic risk and a decline in liquidity. In this environment investors are forced to generate

liquidity through sale of their most liquid assets. This process causes correlations to rise between asset classes that previously had shown little or no statistical relationship. The rise in correlations provides investors with a broad choice of instruments to use when seeking to implement a tail risk hedge.

What follows is an example of an inflation tail risk hedge. An investor today may be concerned that the expansionary fiscal and monetary policies of the Federal Reserve and other government institutions are sowing the seeds for hyper inflation. To protect a portfolio against this risk the investor may choose to reduce interest rate risk on a contingent basis by purchasing an option on a swap that increases in value if interest rates rise. This option could be struck far out of the money to reduce its up-front cost and the maturity could be adjusted to reflect the investor's view on timing of an inflation event.

An important factor to consider when selecting the type of instrument utilized in a tail risk hedge is the instrument's payout structure. Financial instruments generate either linear (unlimited upside and downside potential) or non-linear (defined upside or downside) returns as a result of the risks to which they are correlated. Investor conviction is critical when deciding which instrument to use. From the previous example, the swap option provides non-linear exposure with a clearly defined downside (the option's premium). Alternatively, the investor could have also sold Treasury Futures to reduce interest rate exposure in a linear fashion. Presumably a higher level of conviction would be required before a linear based hedge is implemented.

In analyzing a tail risk hedge, investors should be cognizant that correlations between asset classes are dynamic in nature. That is, correlations tend to strengthen during periods of increased systemic risk (left tail environment). In these extreme market environments, particularly those exhibited during the second half of 2008, asset class correlations seemingly converge. This can work to the investor's advantage. The following is a practical example of how this might work.

Many investors identify equity risk as one of the principal risk factors present in their portfolio. Historically, many have attempted to mitigate equity risk through the use of long put option positions. At times, however, this strategy can be cost prohibitive. Therefore, an investor may consider an alternative, indirect strategy for removing equity risk. Under the assumption that the correlation between equity and credit tends to rise with an increase in systemic risk, an investor could instead remove credit exposure. In this regard, an active tail risk management strategy entails a constant and vigilant review of both direct and indirect hedge instruments with respect to relative price, availability, liquidity, and payoff characteristics.

Defining a tail risk hedge in this broad manner implies that a number of instruments are available as hedge instruments, many of which are derivative structures such as options, futures, forwards, and swaps. Derivatives allow the investor to gain (or remove) exposure to the market with minimal funding. This ability may be of benefit if sufficient liquidity is unavailable within the portfolio to support an otherwise fully-funded position or if levered exposure is required to achieve the necessary payout profile. Instruments may also be available in a fully funded structure. For example, late in the

summer of 2008, an investor who purchased U.S. Treasury bills would have benefited as significantly diminished liquidity in the commercial paper market occurred due to credit concerns. The subsequent “flight to quality” of capital into Treasury bills resulted in the value of these securities increasing dramatically over a short period of time (at one point bills were trading above par or at negative yields).

Regardless of the tail risk hedge’s funding requirements the investor must be assured of the position’s liquidity and price integrity during periods of sharp rises in systemic risk. In this environment, certain instruments may prove difficult to liquidate at what are deemed fair value prices. Consider again an example from the fall of 2008. An investor party to a plain vanilla interest rate swap, as the receiver of the fixed payment (i.e. long duration position), would have gained significantly when rates declined sharply due to deflationary concerns. Because of financial distress, banks acting as counterparties to these swaps were forced to pay a significant premium to access the capital markets. The banks were unwilling or unable to absorb this increased cost so they passed it through. As a result, the investor seeking to realize gains by unwinding the swap position early would have seen the value of this position adversely impacted. Despite this example, it is important to note that one would expect most tail risk hedges to be unwound at favorable levels, as it is often the case that these trades provide liquidity to an otherwise illiquid market.

### A Framework for Tail Risk Implementation

Understanding what defines a tail risk hedge is important but it is also critical to carefully address implementation factors. What should

an investor consider when determining if it may be appropriate to implement a tail risk hedge? Implementation is a critical variable that can heavily influence the economic outcome experienced by the investor. The primary factor to consider in implementing tail risk hedges is cost.

It is often the case that investors seek to hedge a risk once it becomes clearly identifiable. Unfortunately, this is precisely the time that the cost associated with hedging the specific risk is at its peak. Therefore, a successful tail risk strategy must be forward looking in nature. For example, the time to consider utilizing options to hedge equity risk is when expected volatility, generally the most significant contributor to option premium as measured by the Volatility Index (or VIX), is at 20 and not 60 (indicating high level of perceived risk). Similarly, the time to consider purchasing credit protection is when credit spreads are near historic lows. A successful tail risk strategy is inherently contrarian in nature in that it seeks to hedge risks that are currently perceived by market participants as low. Stated another way, one may choose to implement such a strategy when an investor’s concerns regarding an actual market risk factor exceeds the market’s perception of that risk. The need to be ahead of the crowd may present a roadblock for investors who need broad committee approval for their actions.

Another implementation consideration relates to the security selected to implement the tail risk hedge. As noted earlier, during periods of rising systemic risk, correlations tend to strengthen. For this reason, the investor focused on left tail outcomes will often be faced with making a choice across a broad spectrum of securities, either in funded or unfunded form, to

address a particular risk. Central to this process is a keen understanding of relative price for each instrument; one can then choose the security with the most attractive cost/benefit profile. Making an informed decision requires the ability to monitor broad market variables such as credit spreads, implied volatility and embedded financing costs in real time. For many investors, the need to execute and maintain positions in an efficient manner will require professional management for various tail risk strategies.

Lastly, but of critical importance with respect to tail risk strategies, the ultimate financial integrity of the transaction must be carefully assessed. More specifically, during a period of extreme stress when your meticulously-crafted tail risk hedge is increasing in value while most assets are trading at distressed levels, will the party on the other side of the transaction be able to perform? How many of us could have anticipated, even two years ago, that we'd soon witness the rapid demise of some of the most venerable financial institutions, including Bear Stearns, Lehman Brothers, Fannie Mae, Freddie Mac and others? Tail risk hedging strategies may be structured using more standardized exchange traded instruments, or they might utilize over-the-counter (OTC) instruments. The centralized clearing corporation concept associated with exchange traded instruments provides a higher level of financial security than the individual balance sheet of a single counterparty in an OTC transaction, particularly during high stress events. If a tail risk hedge utilizes OTC instruments, additional precautions may be necessary to minimize the chance of experiencing a counterparty default. These precautions may include credit driven counterparty selection, utilizing low thresholds and minimum transfer amounts in ISDA

documentation, and allowing for early termination or repricing of transactions.

### Conclusion

Recent market volatility has caused the vast majority of market participants to rethink their fundamental assumptions regarding risk. As part of this process, the notion of tail risk management has gained renewed focus. Many market participants have come to the conclusion that extreme market environments occur more frequently than most models predict. With careful analysis, efficient implementation, and diligent ongoing monitoring, a tail risk management strategy can add value, reduce overall portfolio volatility, and improve risk adjusted returns.

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