The Costs and Benefits of Tail Risk Hedging Strategies

Bachelor Thesis in Banking and Finance

Swiss Banking Institute

University of Zurich

Professor Dr. Alexandre Ziegler

Author: Olga Motovilova

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Executive Summary

Problem definition

Tail risk hedging has become a very popular topic in the recent years, especially after such events such as the global financial crisis of 2007-2009 and the sovereign debt crisis of 2011. During extreme events in the financial markets, a mere diversification of the investment portfolio is no longer sufficient to mitigate investment risk because the correlation between investments increases. On the other hand, extreme events, also called "black swans", represent the so called "fat tails" that do not fit into the typical normal return distribution concept used in the traditional risk management. One of the possible solutions to this problem is a systematic tail risk hedging.

Objective of this paper

This paper aims to provide an overview of the impact of extreme events on a long term performance and risk profile of investment portfolios and to analyse various tail risk hedging strategies and techniques used in practice. By means of several model portfolios using different tail risk hedging instruments, the impact on the portfolio's risk and return is analysed, in order to find out whether fat tail hedging strategies effectively achieve their investment objective. In addition, inherent risks and cost implications of these strategies are addressed.

Approach and results

This methodological approach is derived from published market studies on tail risk hedging and the problem evaluation and investigation were conducted by the author of this paper by means of an empirical analysis of the relevant market data. Bloomberg, AlternativeSoft and Yahoo Finance were used as data sources and analytical tools. The main areas of the analysis and their results are summarised below.

"Black swans", tail risk and their impact

In this part of the paper, an analysis of the nature and origin of extreme market events, also known as "black swans", and of the tail risk, incl. several examples, is provided. "Black swans" are defined as very improbable and unpredictable events that lie beyond the regular expectations

and typical historical observations and result in an extreme impact on the financial markets performance. For the purpose of this analysis, the tail risk is defined as higher than expected risk of an investment moving more than three standard deviations away from the mean and causing high losses. An analysis of 13 international markets was carried out to illustrate the impact of outlier events on the stock market performance over the period since inception of the respective market index. The results demonstrated that on average a significantly higher long term performance could have been achieved if excluding the worst 10 daily returns (considered as "black swans") from the performance of the market indices. This indicates that outliers and extreme events significantly impact the market performance. The analysis also showed that the markets do not follow a normal distribution pattern. Given that traditional risk management is still predominantly based on the assumption that value movements of marketable investments are normally distributed, this causes underestimation of the severity of tail risk events.

Diversification and prediction problem

Analysis conducted on the basis of several market research studies shows that traditional portfolio investment diversification usually fails during extreme events due to simultaneous increase in correlation among asset classes, and doesn't provide effective protection against losses. Furthermore, it is very difficult to predict the timing and magnitude of "black swans" events but it is necessary to be prepared for them.

Tail risk hedging strategies

In this part of the paper, various tail risk hedging strategies are discussed such as direct hedges, indirect hedges, actively managed investment funds specialised in tail risk hedging, Commodity Trading Advisers (CTA) hedge fund strategies, investments in gold and investments in cash. The analysis focuses primarily on tail risk hedging funds, CTA strategies and gold which are analysed in detail in terms of their effectiveness and impact on the portfolio investment risk.

Empirical analysis of the actively managed tail risk hedging funds, CTA strategies and gold

Analysis of the hedging impact of the above three strategies on a traditional long only model portfolio of stocks and bonds was carried out. Thirty model portfolio scenarios varying by degree of allocation of the hedging instrument were constructed for each of the three hedging strategies

and analysed using a specialised software AlternativeSoft which is used in the investment management industry for portfolio analysis and construction. In particular, performance analysis, as well as an analysis of return volatility, downside risk, risk-adjusted returns and cost-benefit were carried out. The analysis showed that all investigated hedging strategies reduced portfolio losses during extreme market periods.

The tail risk hedging funds (two representative real funds were analysed) provided a good hedging effect but were also found to be expensive during bull and flat markets. Allocation of these funds to the model long only portfolio effectively lowered the portfolio downside risk expressed in terms of Value at Risk (VaR) and Conditional Value at Risk (CVaR), increased risk-adjusted returns expressed by the Sharpe ratio. On the other hand, the performance of the model portfolio being hedged was negatively impacted by costs of holding these funds, whereas the magnitude of that impact varied significantly between the two analysed funds from which it can be concluded that it is not only the strategy that is important but also its cost-efficient implementation by the fund manager.

Allocation of the CTA strategy fund to the model portfolio resulted in reduction of the downside risk, whereby, even a relatively small allocation of the CTA strategy to the model portfolio reduced expected losses without substantially sacrificing the expected return. The CTA strategy performed well both during bear markets and bull markets providing low but steady returns.

Allocation of gold as a hedging instrument to the model portfolio resulted in an improved performance during bear markets but didn't significantly reduce the downside risk expressed by VaR. Gold turns out to be a relatively efficient risk hedging instrument that has had a good run over the last 10 years, but on the other hand is subject to further risks associated with its status as a "safe harbour" with the demand often being driven by emotional rather than economic factors. Within this analysis, cash was also briefly reviewed as a possible hedging instrument and was found least favourable due to high opportunity costs.

Other risks of tail risk hedging

Counterparty and liquidity risk associated with hedging instruments were addressed as an important aspect to consider when choosing a tail risk hedging strategy. Obviously, in practice investment portfolios are more complex than the model portfolio scenarios that were analysed.

The optimal tail risk hedging allocation typically depends on investors risk tolerance, maximum spending limit on hedging and portfolio's risk factor exposure.

Conclusion

Due to high impact of "black swan" events on the long term performance of traditional long only portfolios, ignoring such events is no longer an option. Use of tail risk hedging strategies helps reduce market risk and manage the return distribution of the portfolio. All hedging strategies analysed were found to reduce portfolio losses during extreme events and even generate absolute positive returns. However, costs of such strategies should be considered while choosing the optimal hedging approach. The analysis has shown that use of dedicated actively managed investment funds specialised in tail risk hedging appears to be the best tail risk hedging strategy thanks to its ability to not only reduce the downside risk and generate outperformance during the crisis periods but also to produce better net returns after deduction of hedging costs.