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Risk Parity, Tail Risk Parity and the Holy Grail Distribution

A New Approach to Wealth Management and Portfolio Tail Risk Management

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Wealth Management and Investors' Pain

The number of Single-Family and Multi-Family Offices increased recently fueled by the 5 year bull market in equities. At the same time the short history of some of these Family Offices implies that they had not lived through the full market cycle and might be less prepared for Tail Risk events.

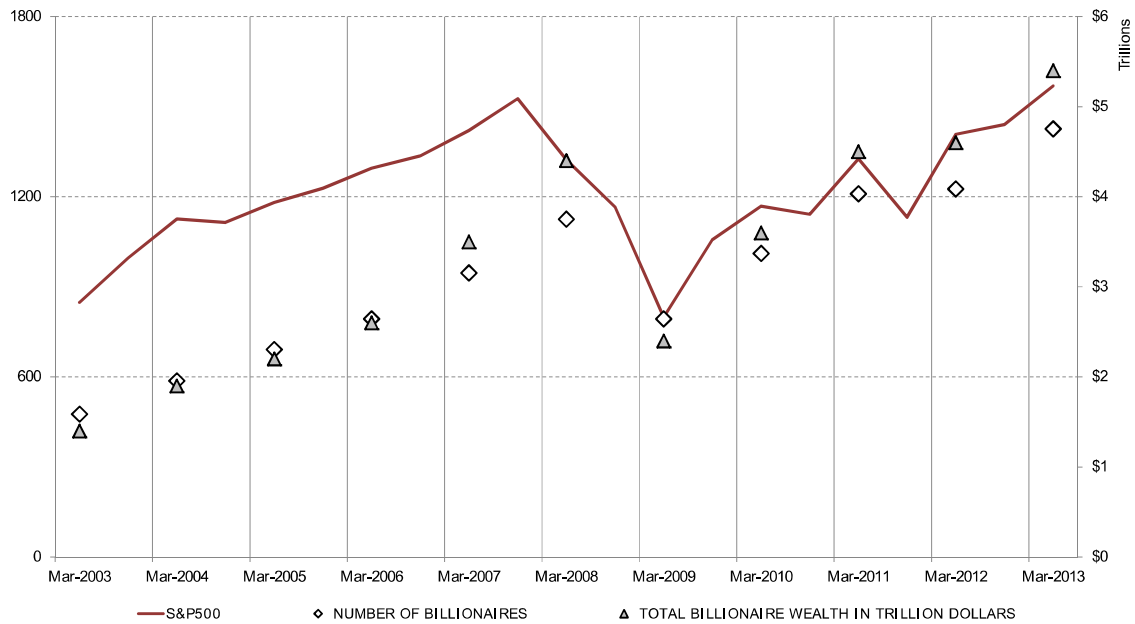
By Tail Risk events we mean those events with a strong negative impact on financial markets that are considered rare, but visit us on a seemingly regular schedule: the widely mentioned ballpark number is once every seven years, but it can vary. Roughly speaking, Tail Risk events are bubbles that burst or bear markets that happen after periods of strong positive market performance.

We couldn't help but notice that in recent months market participants and commentators repeatedly discuss drawdowns, corrections, stock price bubbles. Some curious charts are floating around comparing recent stock market performance with early 1929 Dow Jones index performance. We see that investors are concerned, they finally pay more attention to risk and we very well understand why.

All these discussions remind us of the pain that investors experience during Tail Risk events – the pain of significant financial loss. Every time a Tail Risk event happens, massive chunks of wealth are destroyed.

Global wealth is highly correlated with the stock market performance and with Tail Risk events. According to Forbes, between March of 2008 and March of 2009 the number of billionaires in the world decreased from 1125 to 793 and estimated aggregate holdings of all billionaires in the world dropped from \$4.4 trillion to \$2.4 trillion. During the same period financial markets experienced a Tail Risk event and the S&P 500 index dropped from 1323 to 798.

Forbes Billionaires and the S&P 500 Index



We think that it is fair to say that the majority of High Net Worth individuals experienced the pain of significant loss of wealth as waves of the financial crisis spread across the globe.

We believe that protecting investors from Tail Risk events and from the associated pain of significant loss is one of the primary responsibilities of every Single- or Multi-Family office.

Diversification and Portfolio Tail Risk Management

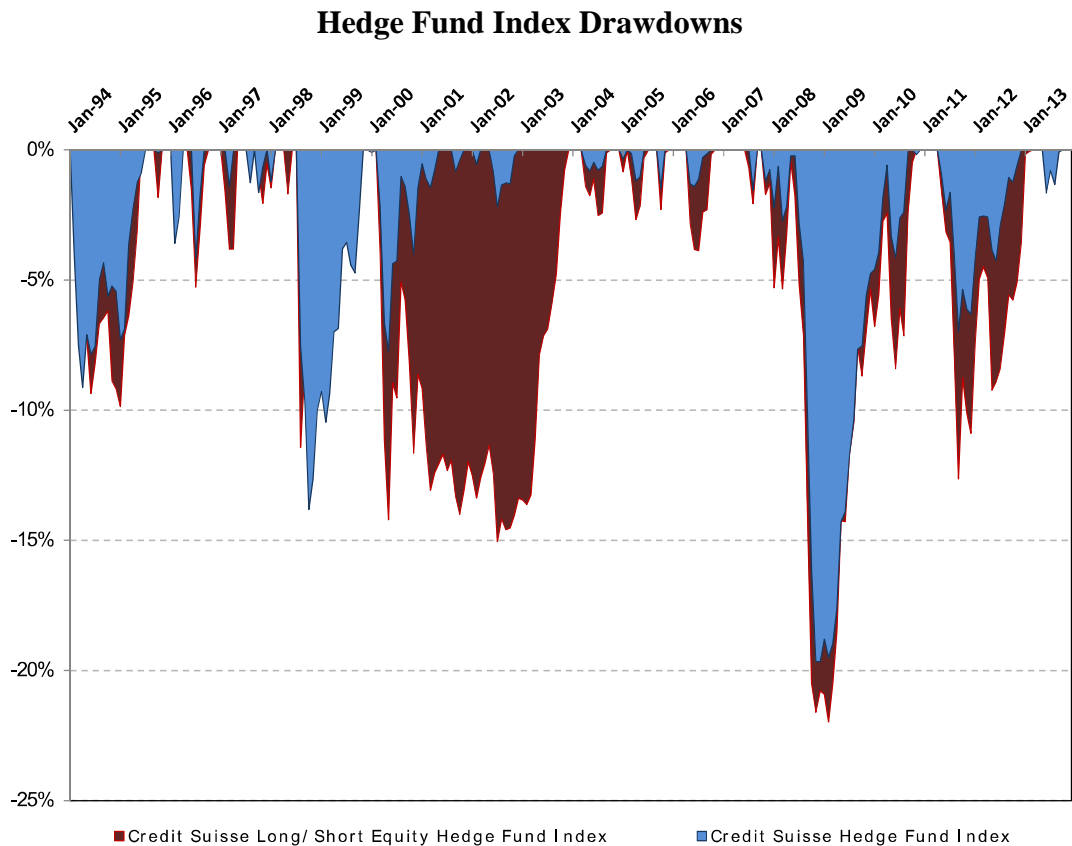
Traditional tools of risk management are diversification and strategic asset allocation.

Equities (public or private) represent a significant portion of assets in a traditional portfolio. Therefore, volatility of equities has a strong impact on the overall portfolio volatility. This is why Tail Risk events in equity markets have a significant impact on most investors' portfolios.

Moreover, in many cases other asset classes (real estate, commodities, etc.) become highly correlated with equities during Tail Risk events as they are driven by the same business cycle.

The credit spread component of a diversified bond portfolio is also correlated with equities and at the beginning of the Great Recession some active bond managers significantly underperformed their benchmarks.

Hedge funds as an asset class allegedly had a goal of generating returns uncorrelated with the stock market and other indices. Hedge funds as a group frequently fail to deliver on this promise right at the time when their diversification benefit is needed the most – during Tail Risk events.



The only investment category that might help during Tail Risk events is long-dated U.S. government bonds, but usually they are considered too volatile to include them in Asset Allocation.

Finally, when the nature of Tail Risk events is systemic, i.e. driven by market shocks rather than ebbs and flows of the business cycle, diversification as a Tail Risk management tool may fail because the underlying markets stop functioning or even disappear.

Let us take you through a thought experiment on how a well-intentioned asset allocation advice given today would look in a curious historical framework.

A very standard allocation could be 60% global equities, 30% global bonds with 10% invested into alternatives. Global equities are split 65-35 between mature and growing economies' markets. Global bonds are apportioned similarly between developed and emerging offerings. A choice of alternatives could be left to the reader.

Arguments could be presented against this allocation but we would probably solicit more approving nods than not. Many wealth managers and trustees would put their funds and clients' assets in a similar portfolio. Our thought experiment takes us exactly 100 years back to the beginning of 1914. What would you advise your then clients to put their dollars, guilders, francs, goldmarks or pounds sterling?

39% of client's assets would be split between stocks of Great Britain, France, German Empire, Austria-Hungary and Italy: truly mature, developed markets. 21% of assets would go into stocks of the two fastest growing economies: Russian Empire and North American United States. One could put a smidge into emerging economies like Argentina, Brazil or Japan. In bonds, allocation would be somewhat similar. Gilts with sub-3% yield would be the benchmark, with the rest of developed and emerging bonds trading at a spread.

One's alternatives investment could be in anything ranging from arable land in central Russia or the Great Plains to shares of new automotive or aeroplane startups in Europe and America to Japanese manufacturing ventures.

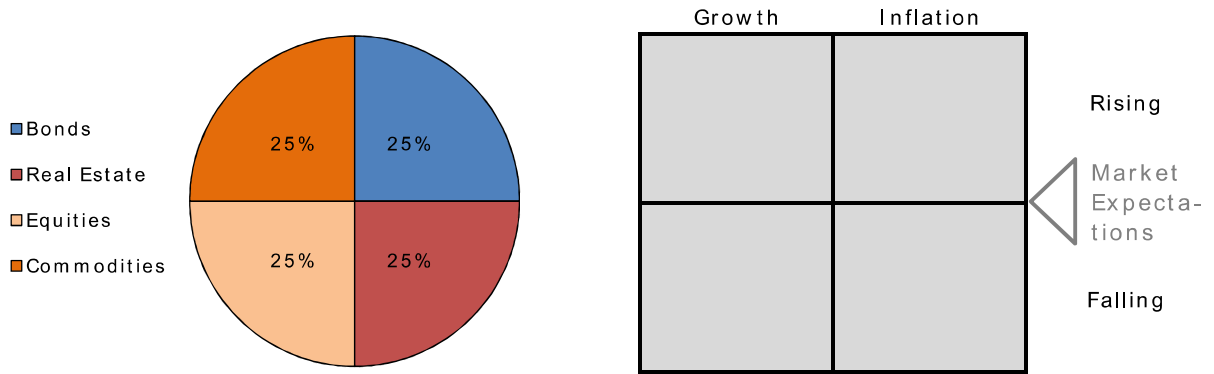
Clearly, this well-intentioned, balanced portfolio would be in for a wildest ride in the next decade. Portfolio drawdowns of 80% couldn't be ruled out. One's only saving grace would have been to invest in Detroit startups or other investments that successfully straddled wars, Russian revolution, crises and the technological boom of the early 20th century.

The history teaches us a few lessons here and there, if we were to listen.

Risk Parity

Risk Premia Parity or, if shortened, Risk Parity is one of the most recent weapons in the arsenal of institutional investors in their eternal fight with unfunded liabilities. This investment category, although not new, became popular in the Pension Fund industry in the last several years not without the help from one of the authors of this article.

Roughly speaking, investors are looking for a risk diversification instead of capital diversification. The naïve approach to constructing a Risk Parity portfolio takes standard deviation measures of asset classes and their covariance matrix and uses this data to spread the contribution of each asset class to the overall portfolio risk in a roughly equal proportion. A more sophisticated approach diversifies portfolios of different risk premia associated with asset classes across fundamental sources of return, such as rising/falling economic growth and rising/falling inflation.



Since the expected return of such a portfolio is low, leverage is required to bump up the portfolio return (and volatility) to the desired level.

One of the advantages of a Risk Parity portfolio is that it helps to achieve relatively high Sharpe ratio (0.6-0.8) using only “beta” returns. These returns can be achieved through investing in low-cost ETFs replicating index performance of a given asset class index. The other advantage is that this portfolio is less dependent on equities to deliver returns, conversely it is less affected by equity market Tail Risk events.

Finally, the Risk Parity approach results in milder bad outcomes when compared to equities during most of the time, which is beneficial for the Tail Risk management.

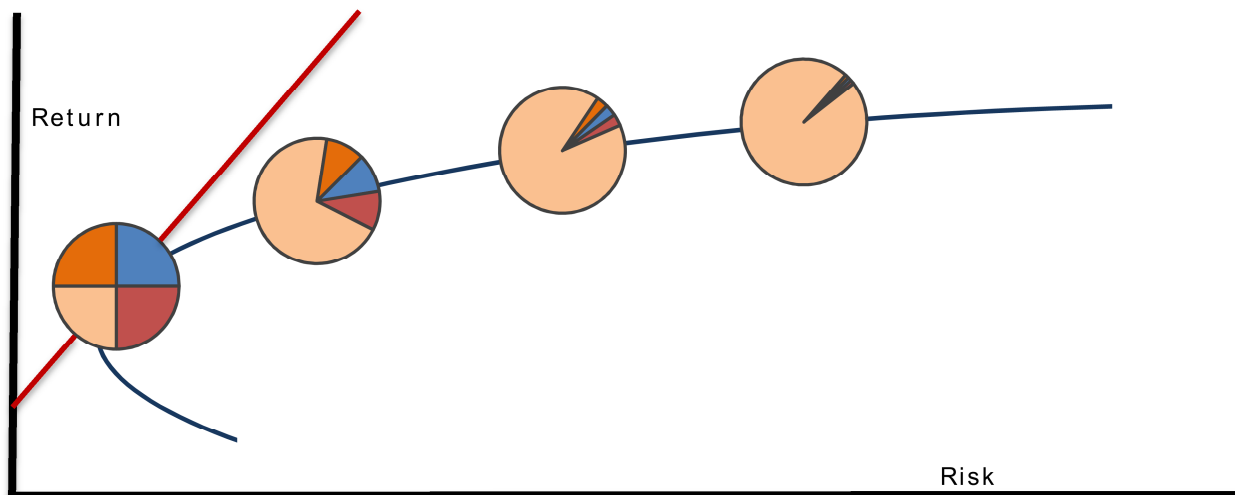
The first “Risk Parity” investment product – Bridgewater’s “All-Weather” – was designed for long-term passive investors with up to 100 year time horizon. 100 years is really a long time and one should expect some serious Tail Risk events happening along the way. So does Risk Parity approach protect investors from Tail Risk events?

While in most scenarios Risk Parity portfolio may deliver returns with drawdowns smaller than drawdowns of a traditional diversified portfolio, once in a while it may hit a period when the market appetite for risk completely evaporates.

Such periods are relatively rare. The first year of the Great Recession in U.S., 2008, was one of them: cash became the most desired asset class. 1929, the first year of the Great Depression, was another one. This is when the leverage inherent in Risk Parity strategies can backfire. Without any additional tweaking, like tactical allocation to cash, using volatility instruments or momentum-driven shifts in asset allocation, Risk Parity portfolio drawdown may reach the drawdown of the equity market itself.

Nowadays there are plenty of Risk Parity investment products and the wealth management industry can follow the lead of institutional investors to utilize the benefit of risk diversification to reduce (to some extent) the impact of Tail Risk events on high net worth portfolios. Still, some exposure to Tail Risk events and the associated pain of significant loss will remain.

Tail Risk Parity



Risk Parity approach gives one additional dimension to the Modern Portfolio Theory – the pie chart of “risk allocation” that changes when you move along the efficient frontier.

The most efficient (tangent) portfolio with the highest Sharpe Ratio is replaced by the “risk-balanced” portfolio that is leveraged to achieve desired level of return and volatility.

The “risk-balanced” term is loosely defined as we observe different versions of Risk Parity approach utilized by investment managers.

It makes sense to re-define the term “risk-balanced” to reflect the perception of risk by the majority of HNW investors and their sensitivity to the impact of Tail Risk events.

While many investors are tolerant to volatility of their portfolios within a reasonable range (let’s say 10%-15%), they “feel the pain” when their portfolios experience draw-downs of more than 20%, and “feel significant pain” when drawdowns reach 30% or more.

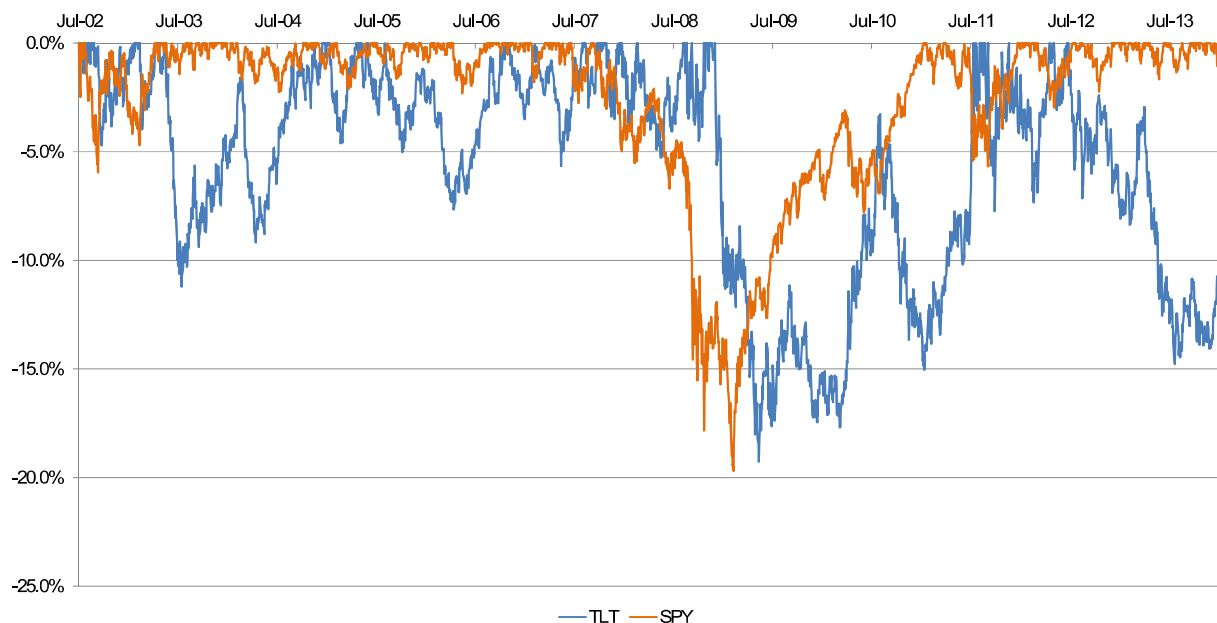
In other words, when equities experience a Tail Risk event and lose 50% with 60% of the portfolio allocated to equities, investors’ pain is significant. If another 10% of the portfolio is in real estate and its prices are in a free fall, Tail Risk events overlap and investors’ pain is devastating.

During Tail Risk events the correlation between many but not all asset classes goes to one. In fact, some asset classes become strongly negatively correlated with the rest during a Tail Risk episode. Pooling asset classes into groups driven by how a given asset behaves in a Tail Risk scenario is the basis for the Tail Risk Parity approach.

Visual representation of this diversification is straightforward. If one plots drawdowns that an asset class experiences during its lifetime, just like we did on page 3, as a sequence of icicles (or stalactites, if you prefer) then location, depth and duration of each drawdown can be easily read from the chart. On a side note, the graph of these drawdowns flipped upside down (plotted as stalagmites) is essentially the graph of the proverbial “pain of significant loss” caused by each asset class.

The key premise Tail Risk Parity is offering: assets from different Tail Risk Parity buckets will have mostly non-overlapping drawdowns. A proper weighting further will ensure that the maximum depth of drawdowns of each component of a Tail Risk Parity portfolio is roughly similar. Let's examine a simple example of how this approach works:

Contribution to Portfolio Drawdowns (70% TLT + 30% SPY)



A portfolio with 70% TLT (Long Government Bond ETF) + 30% SPY (S&P 500 Index ETF) would have a similar contribution to portfolio drawdowns from both TLT and SPY with a low overlap of draw-downs. Since July of 2002 such portfolio would have delivered returns close to 8% with volatility around 9% and drawdowns of 20% or less.

One might come up with the same mix of TLT and SPY using some variation of the “traditional” Risk Parity approach, but we believe that there is a twist here that is worth your attention.

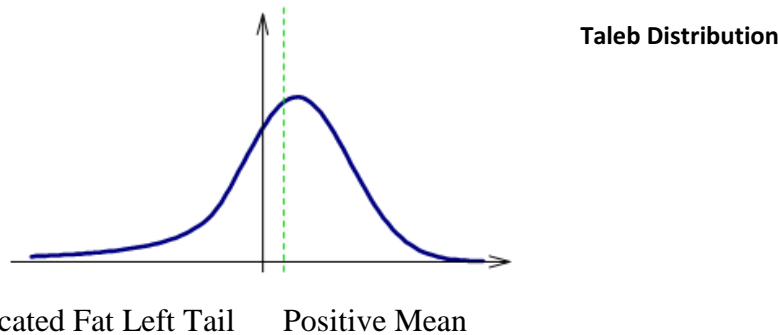
For a Tail Risk Parity portfolio investors would seek asset classes or investment strategies that have positive expected return and distributions of returns where left tail events (drawdowns) happen during different time periods, preferably with the least overlap possible. By changing the way that risk is understood in the portfolio sense one arrives at the idea of Tail Risk Parity.

We think that the benefit of Tail Risk Parity to the HNW (and likely other) investors is obvious – they can reduce the cost of investing as represented by the “pain of significant loss” and avoid sub-optimal investment decisions that are frequently made at the market extremes.

The Holy Grail Distribution

In the presence of Tail Risk events the observed distribution of returns of most asset classes and many investment managers is skewed to the left with a clear fat left tail. The disturbing fact is that these negative fat tails are often observed at the same time – seemingly uncorrelated asset classes suffer simultaneous drawdowns.

The distribution of returns that produces many small gains and few large losses is called the Taleb distribution. There is no specific formula for the distribution but it is characterized by negative skewness and large kurtosis. Here's what this distribution conceptually looks like:



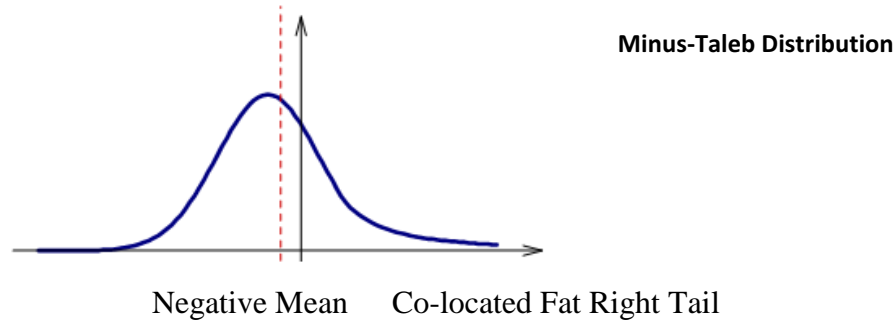
When one invests, he makes a wager and hopes that the worst won't happen. Most investors collect risk premia from various asset classes or investment strategies and then occasionally to pay the price in the form of a significant underperformance.

It would be great to have the ability to predict Tail Risk events, bear markets or significant corrections and move investment portfolios to cash on time. It is impossible for the majority of investors though. Investors are the market and any concerted effort to liquidate holdings brings about a Tail Risk event.

If market timing on a consistent basis is out of question, what can investors do to protect themselves from the adverse effect of Tail Risk events?

One solution emerged less than a decade ago. A new category of hedge funds called "Tail Risk" or "Tail Hedge" funds came into existence. These funds buy volatility or credit-risk based derivative instruments to produce returns with expected right (positive) fat tail that is supposed to protect investors from the negative impact of Tail Risk events. The premier fund manager in this category is Universa Investments.

As a matter of implementation, one cannot invest in the VIX (CBOE Volatility Index) directly. One has to buy some VIX derivatives (options, futures) and pay the price to maintain position in these derivatives. This drag invariably sinks the average return of Tail Risk funds below zero.



The effective distribution of returns for Tail Risk funds is a “minus-Taleb” distribution, a Taleb distribution rotated around the y-axis. This distribution features a negative mean and a fat right tail where observations with strong positive returns tend to happen when traditional instruments suffer unusual losses. In other words, the fat right tail of a minus-Taleb distribution is co-located in time with a fat left tail of traditional distributions.

The popularity of Tail Risk funds is not growing because the negative expectation of returns from funds in this category makes them essentially an insurance product. This unfortunate characteristic pushes these funds out of the framework of the traditional asset allocation. The cost of mitigating investors’ pain in Tail Risk events is prohibitively expensive; using volatility and credit derivatives is not a sustainable way to permanently hedge a portfolio from Tail Risks events.

It is clear where this method could be improved.

What if we had an instrument with a returns distribution that features a positive mean and a fat right (positive) tail?

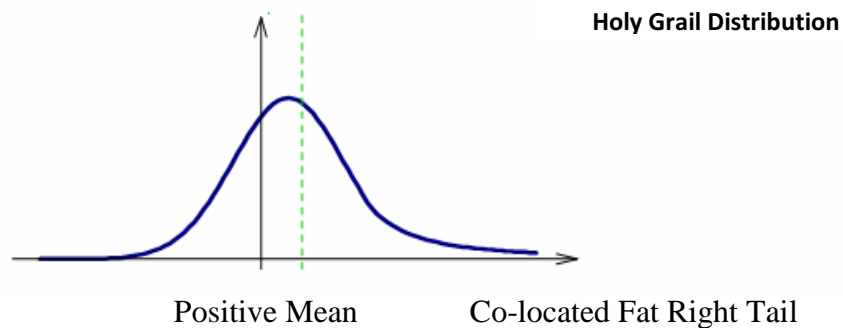
A wealth manager would want to hold such an instrument in her investment portfolio on a regular basis, so she could rest assured that tail event risks are hedged. When Tail Risk events, bear markets or significant market corrections come, portfolio’s negative outcome is compensated by an overlapping positive fat tail outcome from such an instrument occurring at the same moment of time. During quiet markets, on the other hand, the instrument is still earning a positive return contributing to the portfolio's overall return.

This would then be a missing piece in almost every investment portfolio seeking protection from Tail Risk events but without paying a high price demanded by traditional Tail Hedge approaches.

How hard is it to find strategies following this return distribution? It is hard for many reasons. First, any investment strategy that holds a derivative of some kind with an asymmetric positive payout is mathematically guaranteed to lose money over time. Second, market shocks are always characterized by the lack of liquidity in the markets. These reduced liquidity conditions tend to cause unexpected performance shocks in strategies as price behavior of many assets starts being driven by prevailing capital flows and departs from fundamentals. So

strategies that focus on liquidity, volatility or credit risk have the best chance of fulfilling the task.

The name Holy Grail distribution captures both the elusive nature of finding a strategy with these characteristics and the unique value it provides to an asset allocator. The Holy Grail distribution has a positive mean to justify the investment and a positive fat tail to add some protection to investment portfolios during Tail Risk events.



Tail Risk Plus Investment Category

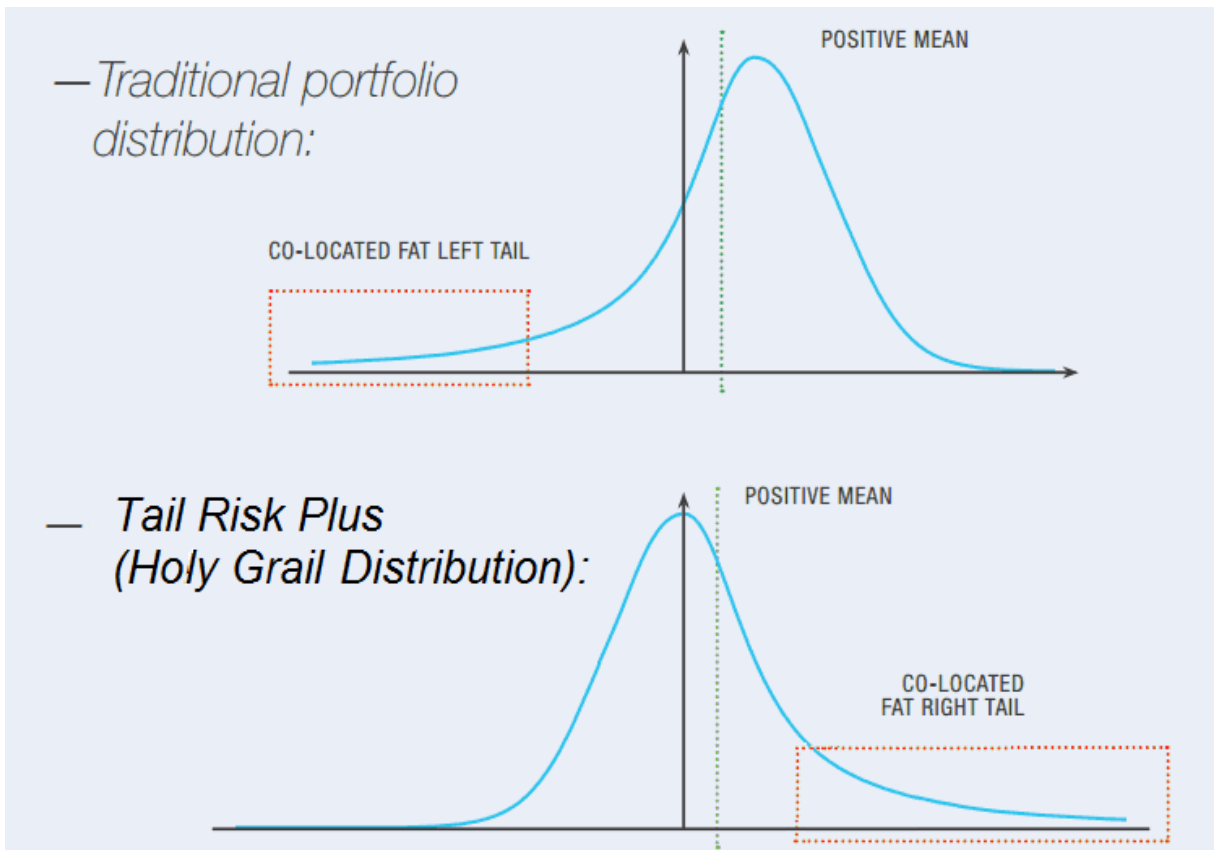
VIX index is not investable; the Holy Grail distribution is similarly an abstract concept. Without an investment product with these characteristics it is not helping investors in any way.

Tail Risk Plus is the name for the category of investments with distributions of returns sharing characteristics with the Holy Grail distribution. Words “Tail Risk” mean that this investment category seeks to deliver significant returns during Tail Risk events, and “Plus” indicates that during normal times returns are also expected to be positive.

In essence, the difference between Tail Risk and Tail Risk Plus is in positive expected returns during quiet markets.

We do not mention any Tail Risk Plus implementations because

- This is an emerging category of funds; many of these products have short track records,
- More importantly, there is a room for Tail Risk Plus products in the majority of investment portfolios – subject to capacity limits, investment policy constraints, etc.



It is hard to deliver Tail Risk Plus returns using only replication and generally available asset classes. Tail Risk Plus returns have to be engineered, so investors will probably have to hire a hedge fund manager if they want to add some Tail Risk Plus exposure to their portfolios.

Finally, we think that investors should not be fooled by naming. If a traditional Tail Risk fund that invests in VIX derivatives and some source of alpha to compensate for the drag, renames itself to Tail Risk Plus to attract more investors, it doesn't mean that its nature has changed overnight. Investors should trust numbers, not names.

References:

- 1) "The All Weather Story", by Bridgewater
- 2) "An Introduction to Tail Risk Parity", by Ashwin Alankar, Michael DePalma, Myron Scholes

Note to Readers:

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