

# Tail Risk Hedge Investing

## A Merge of Risk Mitigation and Growth

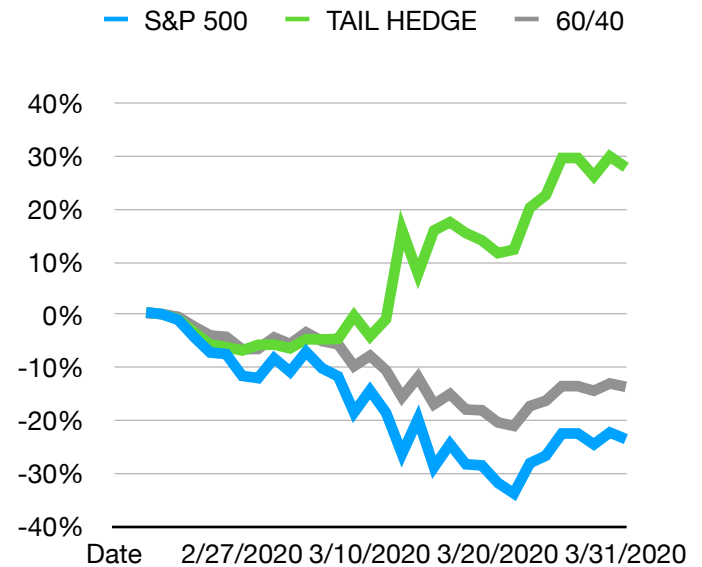
### What is Tail Risk Hedge Investing?

- Buying “insurance” to protect your equity (S&P 500) position against large losses.
- Example portfolio: 97% S&P 500 and 3% of assets are spent annually on risk mitigation.
- No attempt to time/predict market crashes.
- Our “insurance” has a large cash payout when markets crash (>20% drop), the payout is reinvested in the S&P 500.

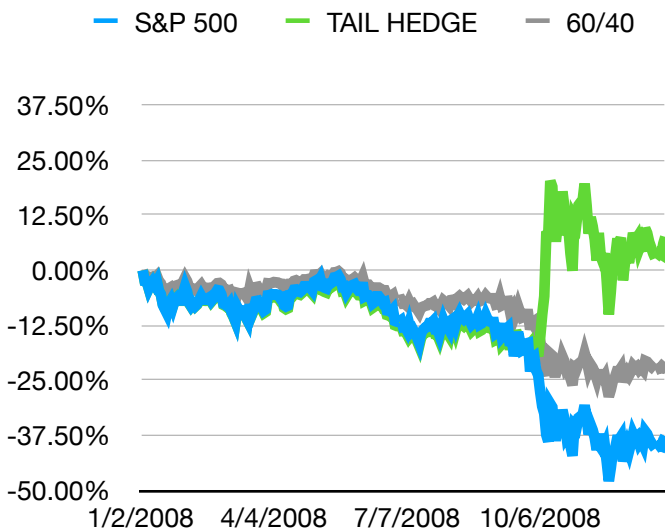
### Downside Protection:

One of the largest benefits of having a tail hedged portfolio is protection from large downside moves. The insurance that we hold protects us against the largest of losses. We have to be willing to take some losses in order to protect against the largest ones, greater than 20%. We will take a look at how our portfolio performed during the most recent large crashes, 2008 and 2020.

### 2/18/2020 - 3/31/2020:



### 1/2/2008 - 12/31/2008:



Portfolio	Max Drawdown
S&P 500	-33.87%
60/40	-21.08%
Tail Hedged	-6.78%

Portfolio	Max Drawdown
S&P 500	-47.94%
60/40	-28.72%
Tail Hedged	-19.58%

No two crashes are the same as we can see in 2008 and 2020. 2008 was a much more drawn out crash when compared to 2020 which is why our tail hedged did not perform as well in that crash. In 2020 our insurance increased greatly in value because of the sharp increase in volatility and sharp decline in the S&P 500. Both scenarios our tail hedge did a great job protecting our assets in the S&P 500 against massive losses. Remember, this is with an allocation of 97% S&P 500 and 3% tail hedge. By allocating just 3% of our portfolio, it was able to protect us from such large crashes. A natural question to ask would be “I get that a tail hedge portfolio protects on large downside moves that’s what it is supposed to do, but how does it do during long term bull markets, the achilles heel of tail hedge investing?”

## Tail Hedge Cost:

Every year roughly 3% of your portfolio is spent on insuring it. Unlike your home, or life insurance which are typically fixed costs, the cost to insure your portfolio changes on a daily basis. The cost to insure your portfolio fluctuates with the volatility of the market. During and after market crashes the cost to insure goes up dramatically. When the market slowly grinds higher over long periods, the cost to insure becomes less expensive. What separates our tail hedge portfolio from other ones is that our cost to insure is fixed. For example, other funds will always hold hedges that prevent the portfolio from dropping 10% or more. On paper this seems like a great idea. The issue with this strategy arises when the cost to insure becomes too high. Let's look at some specific examples of hedging costs. The following are annual percentage costs of hedging your portfolio on the first trading day of the year against a drop of 10% or lower for the entire year:

2008: 4.83%  
2009: 9.95%  
2010: 5.90%  
2011: 5.36%  
2012: 6.58%  
2013: 4.20%  
2014: 3.21%  
2015: 4.17%  
2016: 4.45%  
2017: 3.48%  
2018: 2.50%  
2019: 4.11%  
2020: 3.11%

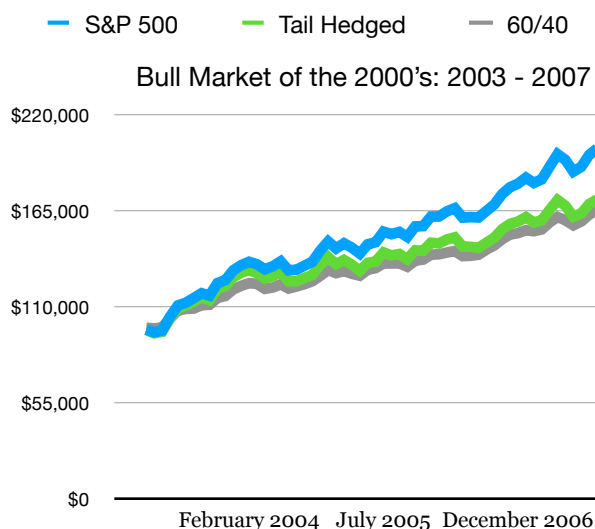
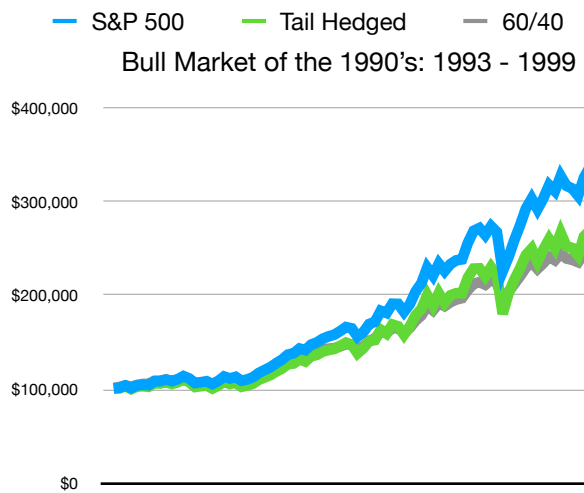
By limiting our cost to 3% annually it allows us to compete with traditional diversified portfolios in long bull market runs while still protecting ourselves against large downside moves. Funds that have a variable cost can go through long stretches where they drastically underperform their counterparts. History tells us that bull markets can go on for a very long time with the most recent one lasting over 10 years. Bleeding large amounts of money over a 10 year period just isn't an option. The one downside to having a fixed cost is it does not give us an exact downside threshold. However, our tail hedge still provides us with protection against the largest downside moves, the ones that have the biggest impact on long term growth.

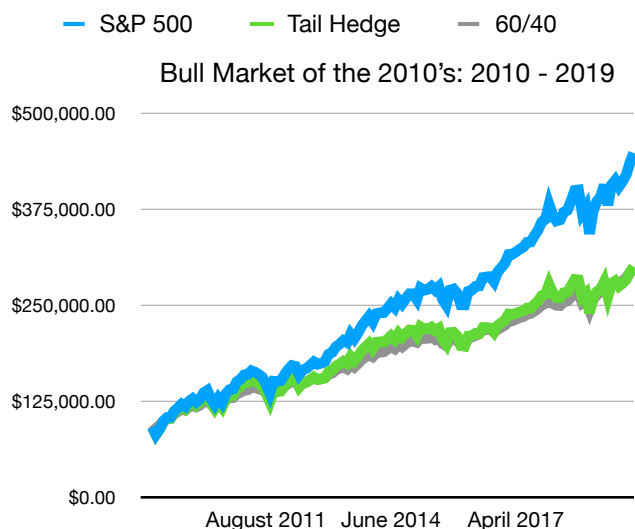
By only focusing on the largest sell-offs, it allows us to limit costs during large no crash time periods. It also allows us to never actually need a market crash to get competitive returns. We will now examine how our tail hedge portfolio competes against comparable portfolios during long term bull markets.

Bull markets will help us determine how it performs during long periods where there is no payout and you lose 100% of your insurance premium.

The following charts show the performance during three different bull markets: 1993-1999, 2003-2007, and 2009-2019. We compare three different portfolios:

- 100% S&P 500
- 60% S&P 500/40% bonds
- Tail hedged portfolio





Graphical representation shows even while spending 3% annually to tail hedge, you still perform better than a standard 60/40 portfolio in the last three bull markets. There is a high cost to long term growth when you allocate 40% of your portfolio to bonds. Most people underestimate the cost of their “diversified” portfolio.

Anyone can show massive profits when the markets crash in a tail hedged portfolio. What is vital is your performance during long bull runs. Below we look at the compound annual growth rate over those bull runs, comparing the S&P 500, 60/40, and a tail hedged portfolio with a starting balance of \$100,000 in each time period.

### Bull Market of the 90's: 1993 - 1999

Portfolio	CAGR	End Balance
S&P 500	20.21%	\$362,640
60/40	14.74%	\$261,893
Tail Hedged	17.21%	\$304,000

### Bull Market of the 2000's: 2003 - 2007

Portfolio	CAGR	End Balance
S&P 500	14.99%	\$201,037
60/40	10.62%	\$165,641
Tail Hedged	11.99%	\$176,150

### Bull Market of the 2010's: 2009 - 2019

Portfolio	CAGR	End Balance
S&P 500	14.62%	\$448,456
60/40	10.43%	\$297,842
Tail Hedged	11.62%	\$335,090

### Alternative Investments:

A common practice amongst many investors is adding alternative investments (diversification) to protect their portfolio. It is important to determine if these alternative investments actually provide risk mitigation. We will take a look at some of the most common alternative investments and see how they perform during market crashes when risk mitigation is needed most. We will look at bonds, gold, REIT's, commodities, and trend following/managed futures.

We have shown in the previous section how one of the most popular diversified portfolios (60/40) has underperformed the S&P 500, and our tail hedged portfolio during bull markets. The next section investigates how these alternative investments perform during market crashes. If these investments drag our portfolio down considerably during good times, we would expect them to do a great job lifting it up during bad times.

Our time period will be March 2020. This is the most recent market crash, and should show the best performance for these alternative investments.

Bonds: VBMFX  
 Gold: GLD  
 REIT: VGSIX  
 Commodities: GSG  
 Managed Futures: AQMIX

Portfolio	Return
S&P 500	-16.59%
VBMFX	-0.61%
GLD	-0.77%
VGSIX	-23.22%
GSG	-32.31%
AQMIX	5.02%

These are catastrophic results for alternative investments. Only the managed futures produced a positive return. To confirm this was not an outlier, we will review another time period for comparison.

In this time period, we will examine Oct 1, 2008 - Feb 27, 2009, this was a much longer drawn out market crash. Let's see how the alternative investments performed during this crash.

Product	Return
S&P 500	-36.68%
VBMFX	1.11%
GLD	8.25%
VGSIX	-58.05%
GSG	-53.69%

Managed Futures, AQMIX, inception date was in 2010, so we don't have data for the 2008 crash.

The data shows us, bonds provided a small return of 1.11% over this time period. Gold performed the best of all our options at 8.25%, over the same time period.

So what does this data teach us? It shows us no alternative investment provides us with a large upside move during a market crash. The best we could do for any of these was a small gain, and some even had bigger losses than the S&P 500.

We need to determine if there is a better form of risk mitigation available to us. We need something that will not drag our portfolio down significantly during bull markets while simultaneously providing us with large returns during market crashes.

The upcoming section, will show the argument that tail risk hedging is the answer to our risk mitigation problem. It not only drags less than most alternative investments during bull markets, but it vastly outperforms during market crashes. This combination, and depending on the frequency of crashes, could actually provide our portfolio with long term alpha, S&P 500 outperformance.

We examined how our tail risk portfolio performed during market bull runs, underperformed the S&P 500 by roughly 3% annually, but outperformed the 60/40 during the same period. Let's look at three different portfolios during the last two big markets crashes.

- 100% S&P 500
- 60% S&P 500 / 40% Bonds
- Tail Hedged: 97% S&P 500 / 3% Tail Hedge

**Oct 1, 2008 - Feb27, 2009:**

Product	Return
S&P 500	-36.68%
60/40	-21.57%
Tail Hedged	9.4%

**March 2020:**

Portfolio	Return
S&P 500	-16.59%
60/40	-10.20%
Tail Hedged	35.6%

Our tail hedge portfolio allocated at 97% S&P 500 and 3% tail hedge, vastly outperformed a 100% S&P 500 and a 60/40 portfolio. This means we had a massive payout on our tail hedge. Convexity is a necessity in the tail hedge that we own. Gold was our best performer at 8.25% in 2008, our tail hedge insurance returned over 50x. This is how we can get away only spending 3% on it. This also shows the power of a large payout when markets crash. In a market crash, a large portion of market participants are seeking liquidity. Our tail hedge portfolio creates liquidity in a crisis, and this allows us to take our payout from our tail hedge and purchase more shares of S&P 500. This brings us to the core idea of what tail risk hedging is. Spend small amounts of money annually, when things are going well, so you can avoid catastrophic losses to your investment in the event of a major market crash.

**Annual Performance Backtest:**

We will now merge both bull markets and market crashes to see how our portfolios perform for the long term investor. Using the SPY for our S&P 500 position, as it is a commonly held ETF for those wanting S&P 500 exposure.

This table shows the cumulative annual percent yield. This will help us see how large losses (2008) have a long lasting affect on our portfolio. Starting balance of \$100,000.

Year	SPY	60/40	Tail Hedged
2007	5.14%	5.85%	2.16%
2008	-33.44%	-15.39%	6.62%
2009	-15.92%	0.00%	34.08%
2010	-3.27%	11.61%	51%
2011	-1.44%	16.25%	51.29%
2012	14.32%	29.28%	70.83%
2013	51.26%	53.17%	118.99%
2014	71.63%	69.08%	142.89%
2015	73.77%	70.55%	140.76%
2016	94.60%	84.53%	163.09%
2017	135.71%	111.13%	211.34%
2018	125.10%	105.23%	193.35%
2019	195.17%	150.75%	273.13%
2020	211.05%	166.08%	409.54%
\$	\$311,050	\$266,080	\$509,540

SPY takes 4 years to get back to a positive return after taking steep losses in 2008. By avoiding the loss of 2008 in our tail hedge portfolio, it has given us a massive head start compared to the other two portfolios. The time period of 2007-2020 is advantageous to a tail hedged portfolio. However, it is vital to see how our tail hedge pays out when the inevitable market crash happens. In this time period we had two payouts, 2008 and 2020. We already knew our tail hedged portfolio performed just as good, if not better than a 60/40 portfolio under normal market conditions. Now we see our tail hedged portfolio has the chance to outperform the S&P 500 in the long term. This is a bold claim, we are saying our risk mitigation can actually provide us with better long term returns than the S&P 500. In the S&P 500, there has been eight 20% or greater intra-year declines in the last 34 years. These declines are opportunities for a tail hedged portfolio to create profit. More importantly, tail hedged investors are much less likely to be shaken out of their S&P 500 position.

## What do the Skeptics miss?

### Active Management:

One of the most common products used to tail hedge is put options. If you are holding options as your tail risk hedge, it is vital that you take profit on them if they increase to a certain point. A lot of backtesting claims tail hedge investing is a poor idea never take profit. They will either hold their options until expiration, or they will blindly roll them on a monthly or quarterly basis.

March 2020 was a great example of why monetization is a must. The market fell so fast and recovered so quickly that if you didn't take profit on your options, you could have gone from a gain of 50x on your options to them expiring at \$0.

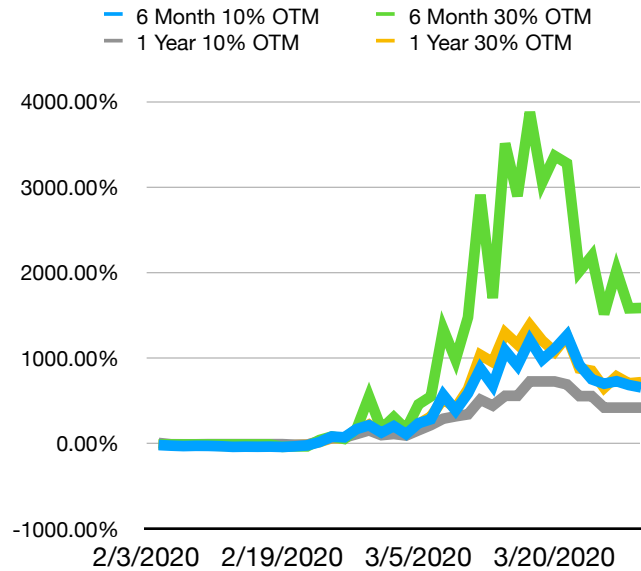
Let's look at a real world example. On February 3, 2020 if you would have bought a 6 month put option 20% out of the money, it would have cost you \$2.09 per option. On March 17, 2020 those same puts were trading at \$36.22 per option. That is an increase of 1633%. If you held the option until expiration in July, you would have seen the options value go to \$0 since the S&P 500 rallied so hard from the March lows.

Monetization is vitally important when it comes to managing a tail hedge portfolio. You will find drastically different results from a portfolio that does not monetize.

### No Convexity:

We want a convex relationship between the price of the options we hold and the S&P 500. By having a convex relationship, once the S&P 500 starts selling off sharply the value of our options increase exponentially. We only want to hedge against the largest crashes, when markets drop 20% or more. By hedging these extremely rare events, we know the large majority of the time our options will expire worthless. However, when our options do pay off we know that it will be a large enough payout to cover large losses to our portfolio. Understanding which options provide this convexity is vital when constructed a tail hedge portfolio.

We will now look at how different options performed during the March 2020 sell off to see how some provide convexity and other do not.



This chart shows us the difference in performance of put options. At the height of the March 2020 sell off if you held 1 year 10% out of the money puts they would have returned just over 7x. If you held 6 month 30% OTM puts they would have returned almost 40x. Our tail hedge portfolio holds options that give us this large upside in large crashes.

### Long Term Consequences of Large Losses:

As we showed earlier, it took us 4 years to recover from the crash of 2008, with subsequent years all showing gains in the S&P 500. Large losses do much more damage to your long term compound annual growth rate than large gains. If you lose 50% you need to gain 100% to get back to even. If you lose 30% you need to gain 42.85% to get back to even.

### Inherent Cost to a Diversified Portfolio:

Most alternative investments have a great drag on your portfolio in bull runs. We showed how most provide little upside in a market crash. Bond yields have been on the rise for decades. There is virtually no upside to the prices of bonds unless yields go negative. Bonds have essentially turned into return free risk. If yields rise considerably, using bonds as risk mitigation in the upcoming decade could prove catastrophic.

## **Conclusion:**

### **Tail hedge investing is long term bullish on the American economy:**

Skeptics tend to think that those who preach the benefits of tail hedging are fear mongers. In reality, this could not be further from the truth. The main goal of our tail hedged portfolio is for investors to be able to allocate more heavily into equities.

### **Outperformance of most diversified portfolios:**

It is expected a tail hedged portfolio will perform quite well in a market crash. However, even without any crash payouts, we have established a tail hedged portfolio still has outperformed a 60/40 portfolio for long durations during bull markets. Diversified portfolios create their allocations based on historical correlations, such as bonds are inversely correlated to equities. Large market crashes can force people to do large liquidations of all their holdings. These large liquidations can cause correlations that usually exist in calm markets to completely unwind. This can be disastrous for a market participant who thinks their portfolio is properly hedged. Holding a put option on the S&P 500 gives us the right to see the S&P 500 at a given price. This is a direct hedge that can't be broken.

### **Gives the risk averse investor a great option:**

There are a large number of investors who shy away from investing in equities from fear of large losses. This is especially common for those in or near retirement. This can have a serious damage on an investor's wealth creation. These types of investors will typically be sold annuities, c.d.'s, municipal bonds, U.S. treasuries. These investments provide very little yield and can barely keep up with inflation. By allocating a large percentage of their portfolio to these investments, it can have a severe impact on one's long term wealth creation. A tail hedge portfolio is the perfect marriage between risk mitigation and long term growth potential.

### **Allows investor to be more aggressively allocated in equities:**

Arguably the two most important things for long term investing are:

1. Risk Mitigation
2. Compound Annual Growth Rate

Risk mitigation is the implementation of investments that decrease the likelihood of suffering massive losses to your portfolio. CAGR is the annual measurement of your portfolio's growth over a specified time.

You can focus entirely on risk mitigation by buying an annuity. This will completely protect you against losses, however once you start receiving payouts your CAGR goes to zero. This will put a massive dent in long term wealth creation.

You can focus entirely on your compound annual growth rate by owning a basket of 10 popular stocks and ignore any risk mitigation. You might have great outperformance for a few years, maybe even a decade, but you will always be leaving yourself open to suffering catastrophic losses to your portfolio.

Tail hedge investing is a great blend of proper risk mitigation and seeking a high CAGR. Tail hedging protects your S&P 500 position against large losses which gives your portfolio great risk mitigation. Tail hedging allows you to maintain a large position in the S&P 500 which gives you the ability to grow your investment at a high CAGR.

### **Potential to increase long term CAGR:**

The tail hedge portfolio underperformed in bull markets and were able to avoid the largest market crashes. One of the biggest advantages of tail hedging is cash payouts in market crashes. The cash payouts are used to buy the S&P 500 when the market is considerably off its highs. By doing this, we were able to obtain a higher long term CAGR than the S&P 500. A long term outperformance of the S&P 500 is entirely dependent on the frequency of large crashes which is impossible to predict. The main thing to remember is we put ourselves in a position to perform very well in long term bull markets while still giving ourselves protection from catastrophic losses. This makes tail hedging a viable strategy for decades to come.

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