Syntax

Smoothing the Ride on the Investment Highway

Paul Kenney December 3, 2024

Managing to a Target Volatility Level with Syntax's Defined Volatility Indices

Key Takeaway

- The level of risk realized by most investors is tied to ever-changing market conditions in which investors effectively take on the risk given to them by the markets.
- History has shown that investors often earn higher returns when markets are stable, whereas returns often decrease as market volatility rises.[1]
- Defined volatility indices target a desired level of risk and manage to it by increasing market exposure when volatility is low using total return swaps, and decreasing exposure when volatility is high by allocating to cash.
- This paper compares the modeled performance of the Syntax Defined Volatility US Large Cap 500 Index to the S&P 500, and the Syntax Defined Volatility Triple Qs Index to the Nasdaq 100 Index. The paper highlights the dynamic, rules-based asset allocation process and backtested performance of each index from December 31, 2004, through September 30, 2024.

Investing for the long term is similar to a road trip across the country. Both can be described as a journey, and you are sure to come across varied conditions along the way. The road trip can be easy driving through the scenic cornfields in the Midwest, or you could be riding the brake as you navigate the more difficult terrain of the Rocky Mountains. Similarly, capital markets have "smooth road" periods of low volatility and strong returns where everything is fine, and periods where investors want to pull off to the side of the road as the markets feel as if they are in free fall.

One of the challenges investors face is balancing the desire to be aggressive when the road is smooth (returns are good) and conservative when the road becomes bumpy (you are losing money). A common approach to weathering the storms along the way is to:

- Target a rate of return that is consistent with your ability to take risk, expressed as a target volatility percentage;
- Rebalance the portfolio when it veers outside of target asset allocation ranges; and
- Focus on the long term with the expectation that time will smooth out the realized volatility.

Exhibit 1: S&P 500 Stock Price Returns and Standard Deviations by Decade

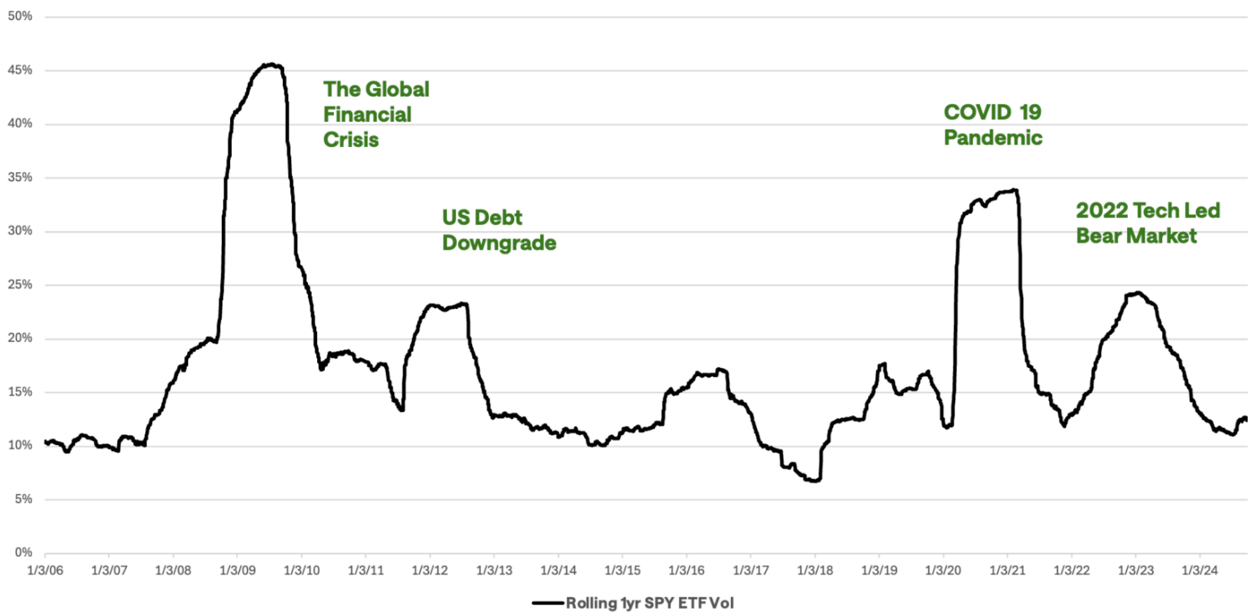
Decade	Annualized Return	Annualized Std. Deviation
1930's	-5.3%	33.0%
1940's	3.0%	16.0%
1950's	13.6%	18.7%
1960's	4.4%	14.1%
1970's	1.6%	18.5%
1980's	12.6%	12.2%
1990's	15.3%	14.3%
2000's	-2.7%	20.6%
2010's	11.2%	12.0%

Price return and annualized standard deviation of price return by decade, 1930-2019. Data prior to S&P 500 inception in March 1957 is modeled. Source: Syntax Data

The data above is based on stock price returns, which excludes dividends, to understand the long-term dynamics in play, as historical data on total return is limited. More recently, the S&P 500 produced an annualized total return of -1% for the first decade this century, or about -10% cumulatively, while the annualized standard deviation was roughly 20%. This decade was a wild ride that included two severe market drawdowns represented by the collapse of the tech bubble and the Global Financial Crisis. Conversely, the S&P returned 13.4% annually in the 2010s, and its approximate volatility of 12% was just 58% of what was experienced in the prior decade. The results in these two decades point out that higher realized risk is often associated with low returns, and higher returns are often achieved in periods of low volatility.

The annualized standard deviations by decade in Exhibit 1 range from 12% to 33%; when you shorten the time horizon, it is easier to identify spikes in volatility. This is shown in Exhibit 2, which captures the rolling one-year volatility of the SPDR S&P 500 ETF (SPY) from 2005 through September 30, 2024.

Exhibit 2: Rolling One-Year Volatility of SPY ETF

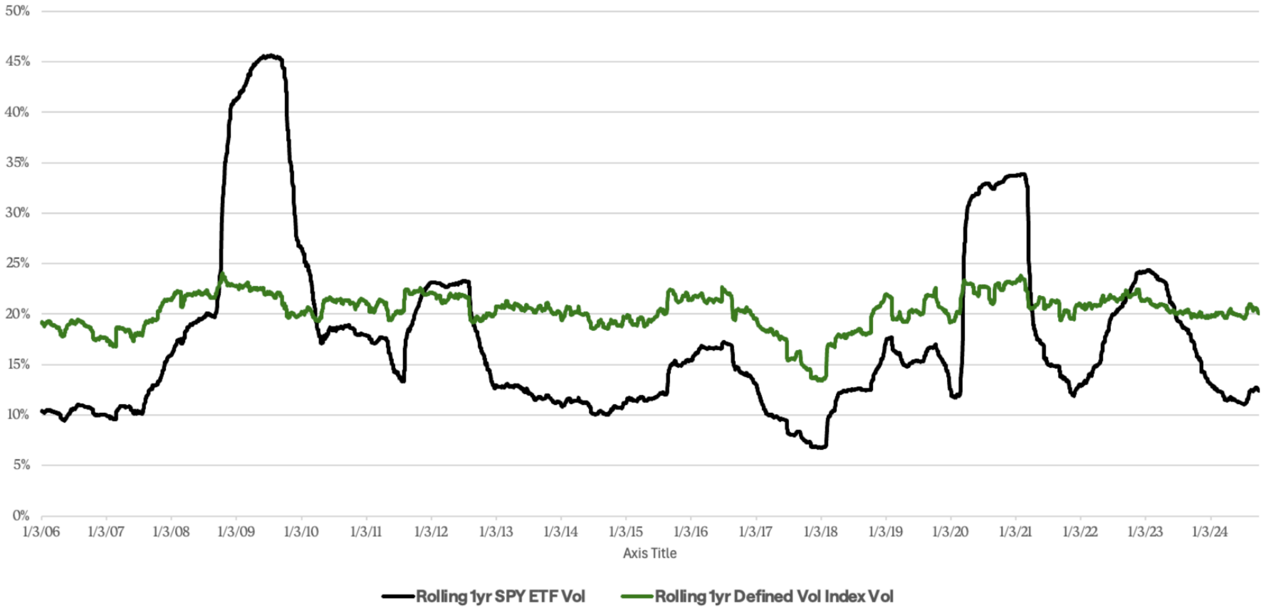


Source: Syntax Data.

Volatility from 2005 into 2007 was about 10% before spiking to 40% as the Global Financial Crisis took hold in 2007 and 2008. This type of volatility can create challenges for investors. As Matt Levine noted in a recent Bloomberg article, "the volatility of the stuff goes up, the natural volatility of your portfolio goes up, but your volatility target does not".[2] Certain institutional investors like banks and hedge funds that employ long/short, managed futures or systematic trend funds do not want to be beholden to riding the waves of market volatility. They have a bias towards maintaining a more consistent level of risk to improve their chances of earning their target return. To do this, they dynamically manage their asset allocation. For example, if they have a 10% risk target, they can own a portfolio of bonds with a 5% expected risk and leverage it two times to hit the 10% risk budget. If the volatility of the bonds increase, they reduce their leverage to bring down risk; and if the volatility falls, they increase their leverage because they assess that they can afford to take more risk.

The Syntax Defined Volatility US Large Cap 500 Index takes a similar approach to provide exposure to the S&P 500, with the goal of managing to a target annualized volatility of 20%[3], which aligns with realized volatility of the S&P 500 over time. Exhibit 3 takes the rolling one-year volatility of SPY from Exhibit 2 and adds the Defined Volatility US Large Cap 500 Index rolling one-year volatility.

Exhibit 3: Rolling One-Year Volatility of SPY ETF vs. Syntax Defined Volatility US Large Cap 500 Index

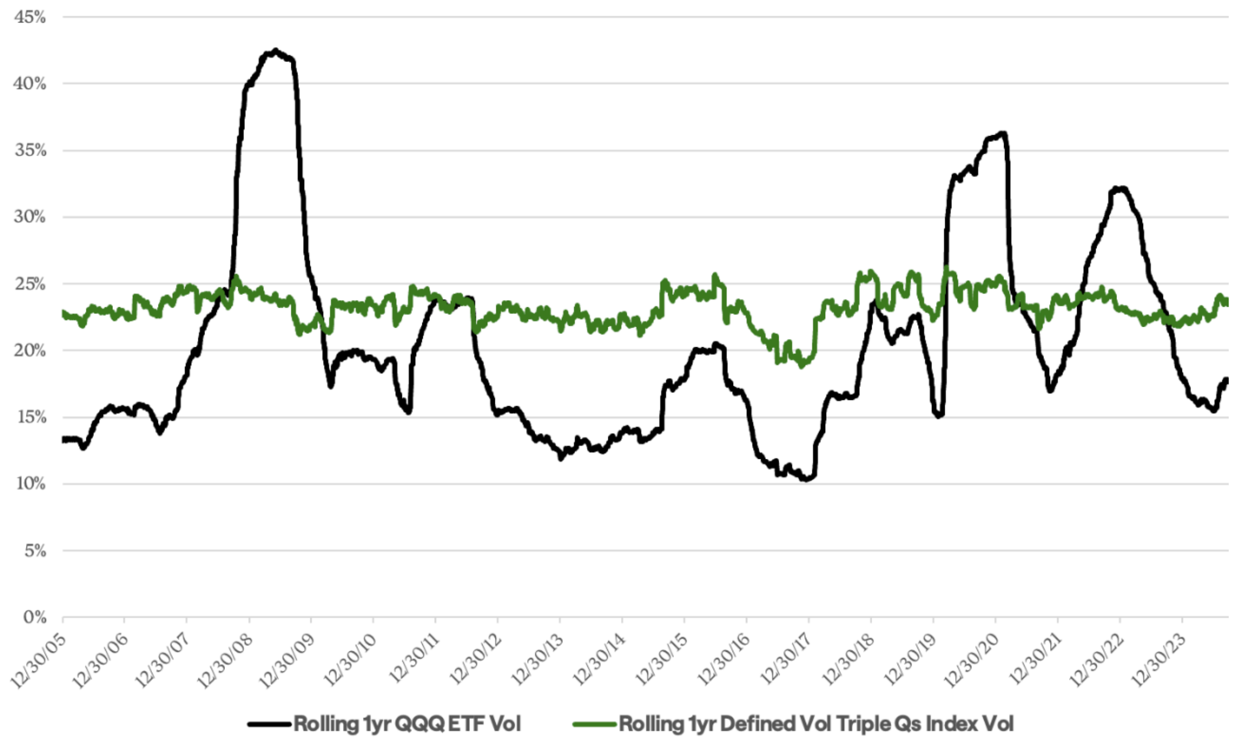


Source: Syntax Data. Data on Syntax Defined Volatility US Large Cap 500 Index is backtested. Please see important disclaimers on backtested and modeled data.

The SPY-based Defined Volatility Index generally seeks to stay in a range of +/-5% of the 20% target over time by either adding risk when volatility is falling (increasing exposure via total return swaps) or reducing risk when market volatility is rising (decreasing exposure by shifting to cash). Note that the Index, on a backtested basis, experienced volatility below the 20% target for much of 2017 and 2018. During this period, leverage would have needed to have exceeded the SEC 2x leverage limit in order to raise the Defined Volatility Index's volatility to 20%.[4] As a result of this regulatory limit, realized volatility was closer to 15% than the target 20% threshold during this period.

In addition to this defined volatility index that invests in the SPY ETF, Syntax also produces the Syntax Defined Volatility Triple Qs Index, which applies the same methodology to target a 22% volatility on the QQQ ETF. Its volatility is shown relative to the Nasdaq 100 in Exhibit 4.

Exhibit 4: Rolling One-Year Volatility of QQQ ETF vs. Syntax Defined Volatility Triple Qs Index

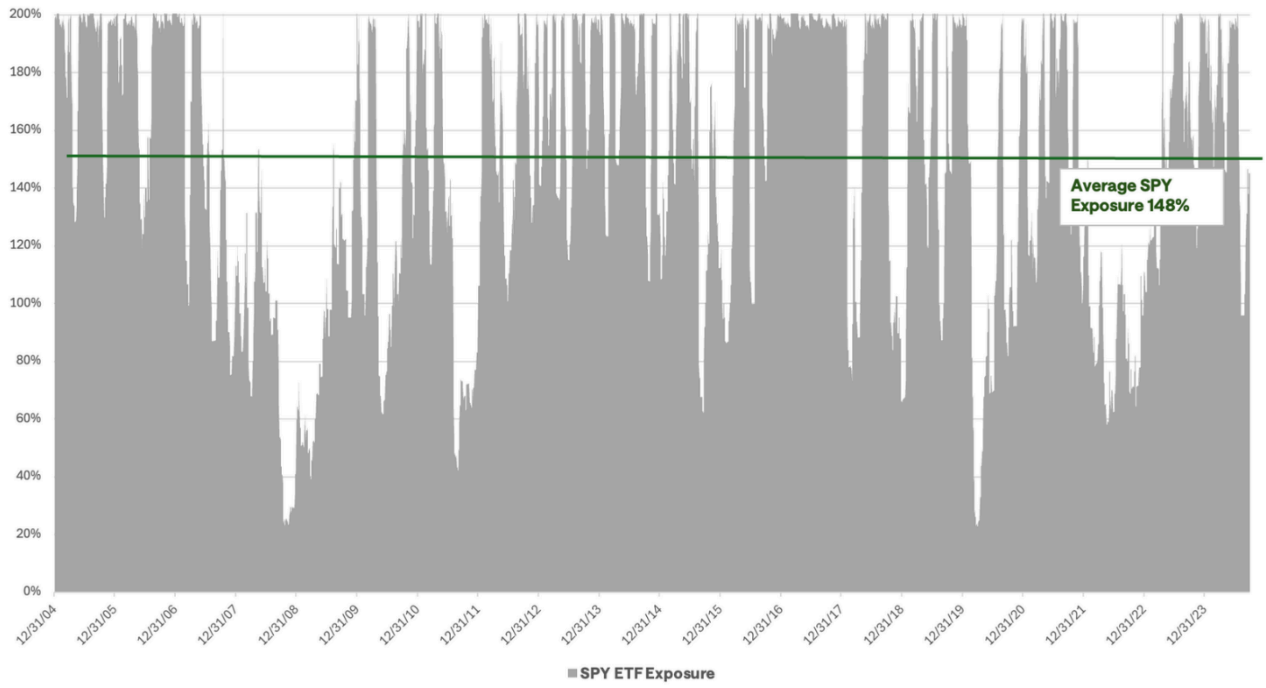


Source: Syntax Data. Data on the Syntax Defined Volatility Triple Q's Index is backtested. Please see important disclaimers on backtested and modeled data.

The annualized volatility of the QQQ ETF (22.2%) is slightly higher than that of the SPY ETF (19.6%). The Defined Volatility Triple Qs Index stays in the same 20% to 25% range as the Defined Volatility US Large Cap 500 Index most of the time in the period modeled.

Exhibit 5 highlights the long position in the Defined Volatility US Large Cap 500 Index over time, both via the holdings in SPY and the exposure provided through the swaps. Depending on the level of risk in the market, the weight to SPY could range from 0% to 200%, its leverage cap.

Exhibit 5: Long Position in SPY for Defined Volatility US Large Cap 500 Index

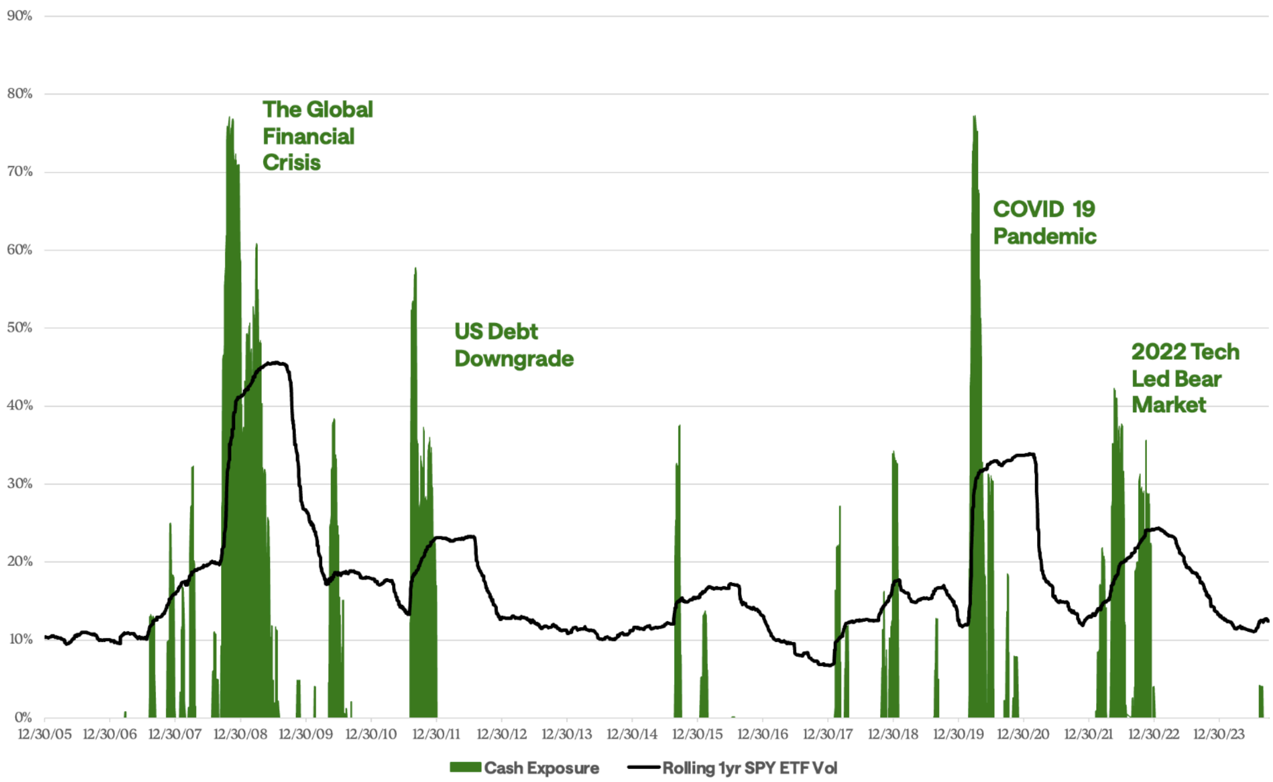


Source: Syntax Data.

Through the backtest period, the average long position was 148%, or roughly 1.5x the weight to the S&P 500. The highest long position was 211%, and the lowest weight in SPY was 23%. If the long exposure exceeds 200%, it is reduced for the open of the following day.

Exhibit 5 focused on the holdings and leverage applied to the SPY ETF, while Exhibit 6 shows the Index's cash position over time.

Exhibit 6: Cash Position in Defined Volatility US Large Cap 500 Index & SPY Volatility

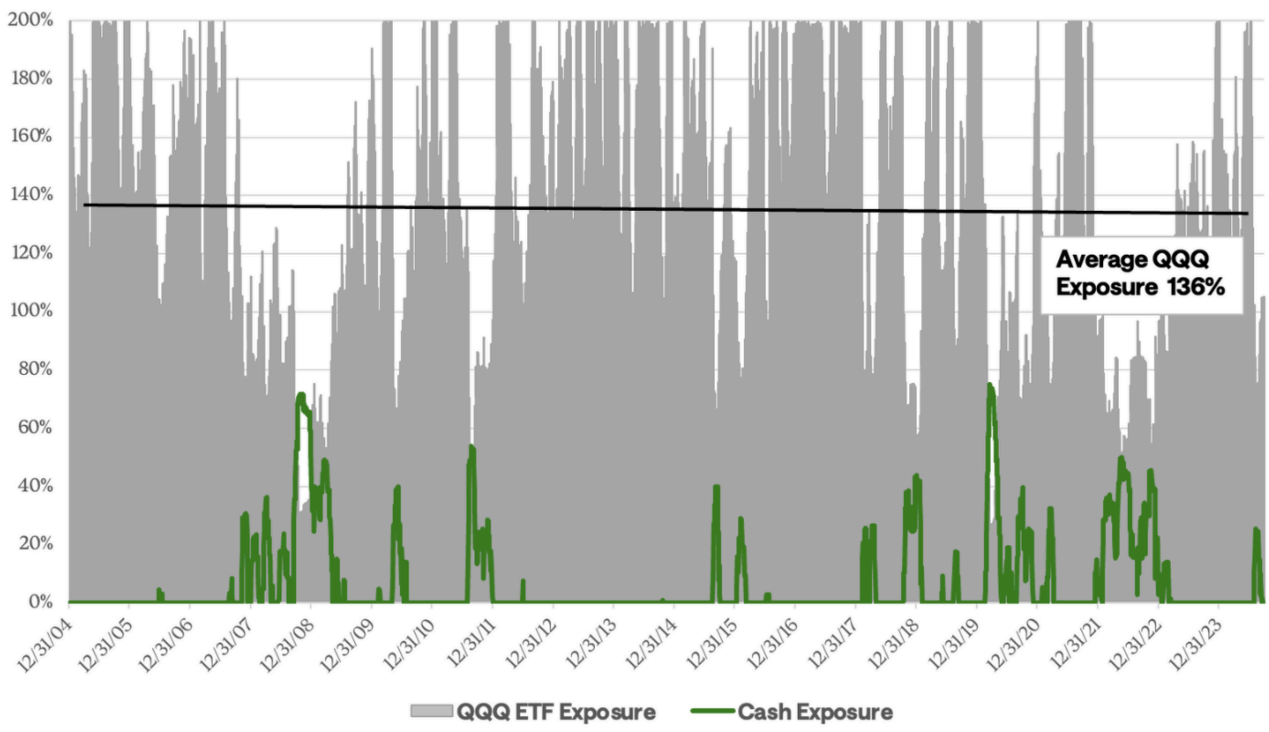


Modeled cash allocation of the Defined Volatility Index (green) and rolling 1-year volatility of SPY (black). Note that the Defined Volatility Index rebalances its risk level based on the trailing 21-day trade dates, while the volatility depicted here is the rolling 1-year standard deviation of SPY. Data on the Syntax Defined Volatility US Large Cap 500 Index is backtested. Please see important disclaimers on backtested and modeled data. Source: Syntax Data.

The exhibit shows that the rebalancing into cash aligns with the increase in broad market volatility as shown in Exhibit 2 above. The Index's cash position (the green bars) elevates as the volatility of SPY increases (the black line). Cash positions were raised from 2007 to 2011, a period of high volatility, and became less frequent from 2012 to 2019, a period of relative calm.

In Exhibit 7, we combine the long position in QQQ and the long position in cash to show how the backtested asset allocation of the Defined Volatility Triple Qs Index would have moved over time.

Exhibit 7: Long QQQ and Cash Positions in Defined Volatility Triple Qs Index

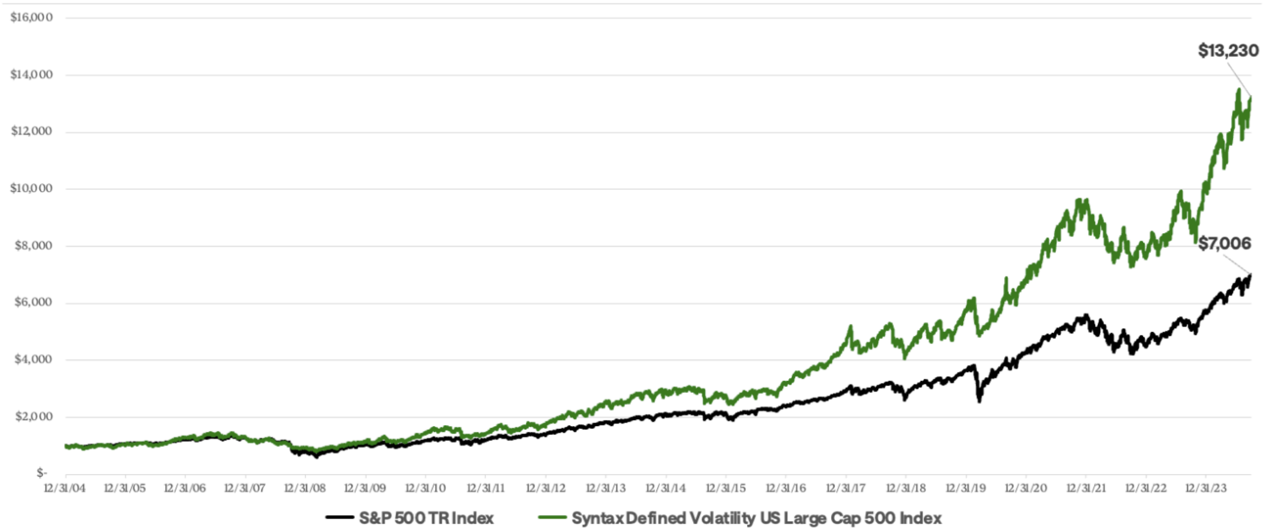


Source: Syntax Data

The average long exposure to QQQ was 136%, which is lower than the 148% for the Defined Volatility US Large Cap 500 Index. The highest long position was 209%, while the lowest was 25%. If the long exposure exceeds 200%, it is reduced for the open of the following day. The cash position peaked at 75% and averaged 7% over the course of the backtest.

From a performance perspective, the backtest of the SPY-based Defined Volatility Index was strong relative to the S&P 500 from its December 31, 2004, inception through September 30, 2024. Exhibit 8 shows the hypothetical growth of a $1,000 investment relative to the S&P 500 benchmark

Exhibit 8: Growth of $1,000 – Modeled Performance of Defined Volatility US Large Cap 500 Index vs. S&P 500

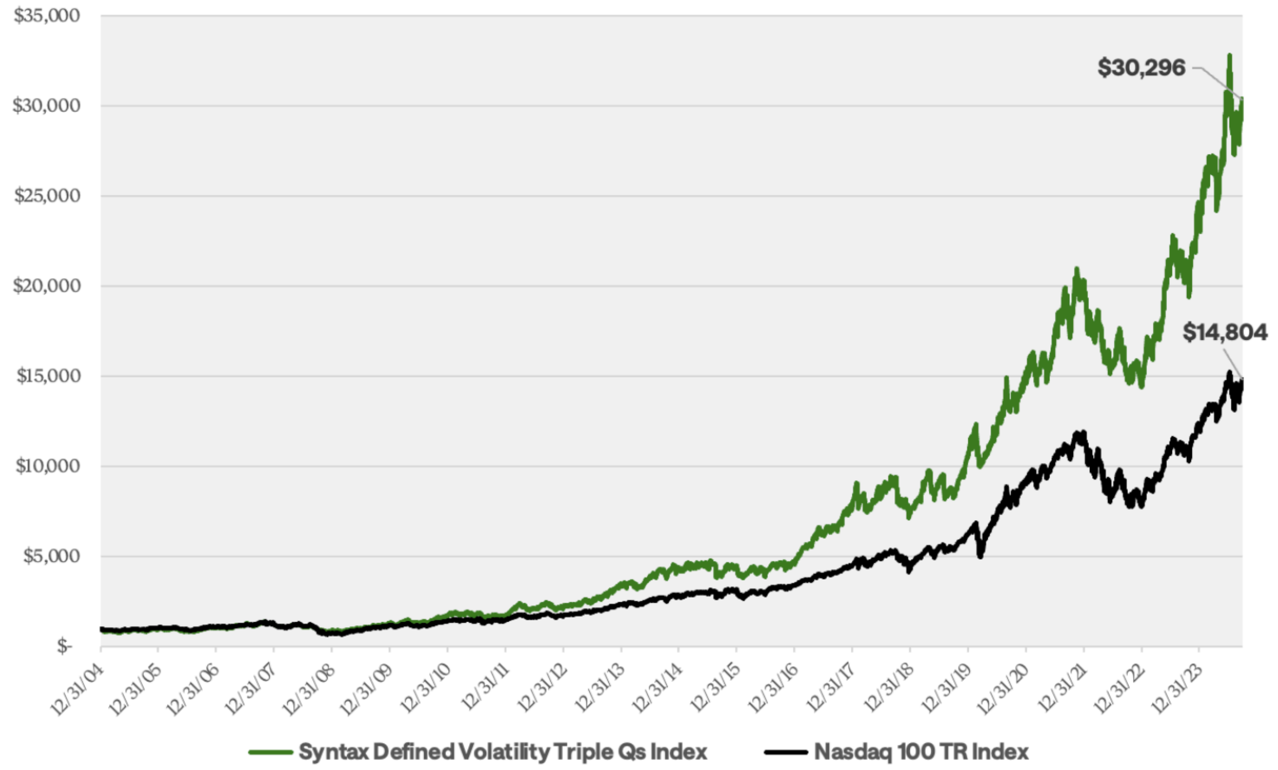


Total Return: 12/31/2004-9/30/2024. Performance reflects the assumed 65 basis point fee for the SPY ETF swap and the overnight lending rate for the Syntax Defined Volatility US Large Cap 500 Index but does not reflect fees or implementation costs beyond the assumed 65bp swap fee and overnight lending rate, as an investor cannot directly invest in an index. Please see important disclaimers regarding back-tested data. Source: Syntax Data

The modeled performance for the Defined Volatility US Large Cap 500 Index was very similar to the S&P 500 from 2005 through 2011; however, its modeled performance diverged favorably beginning in 2011. A hypothetical $1,000 would have grown to $13,230 before fees and implementation costs (other than the assumed 65bp swap fee and the overnight lending rate) for an annualized total return of 14.0%. This compares to $7,006 for the S&P 500 which realized a 10.4% annualized total return over this roughly 20-year period.

Exhibit 9 displays the backtested performance of the Defined Volatility Triple Qs Index compared to the Nasdaq 100.

Exhibit 9: Growth of $1,000: Modeled Performance of Defined Volatility Triple Qs Index vs. Nasdaq 100



Total Return: 12/31/2004-9/30/2024. Performance reflects the assumed 65 basis point fee for the QQQ ETF swap and the overnight lending rate for the Syntax Defined Volatility Triple Qs Index but does not reflect fees or implementation costs beyond the assumed 65bp swap fee and overnight lending rate, as an investor cannot directly invest in an index. Please see important disclaimers regarding back-tested data. Source: Syntax Data

A hypothetical $1,000 investment in the Defined Volatility Triple Qs Index would have grown to $30,296 before fees and implementation costs (other than the assumed 65bp swap fee and the overnight lending rate) for an annualized total return of 18.9%. This compares to $14,804 for the Nasdaq 100, which equates to an annualized total return of 14.6%.

To better understand the performance of both indices, we compared their annual results to their respective benchmarks. The Defined Volatility US Large Cap 500 Index results relative to the S&P 500 are shown in Exhibit 10. The results were sorted by the annual return on the S&P 500, and our findings were grouped into three categories.

Exhibit 10: Annual Modeled Total Return Performance of Defined Volatility US Large Cap 500 Index vs. S&P 500

Year	Defined Vol Index Return	S&P 500 Return	Return Difference	SPY Avg. Weight	Cash Avg. Weight
S&P 500 Negative Return					
2008	-27.7%	-37.0%	9.3%	83%	23%
2022	-19.6%	-18.1%	-1.5%	88%	16%
2018	-5.8%	-4.4%	-1.4%	150%	4%
S&P 500 Moderate Return (0% to 10%)					
2015	-5.8%	1.4%	-7.2%	150%	3%
2011	-1.8%	2.1%	-3.9%	123%	14%
2005	1.2%	4.9%	-3.7%	186%	0%
2007	1.2%	5.5%	-4.3%	144%	3%
S&P 500 Strong Return (>10%)					
2016	14.7%	12.0%	2.7%	159%	1%
2014	13.2%	13.7%	-0.5%	177%	0%
2010	26.6%	15.1%	11.6%	133%	5%
2006	26.6%	15.8%	10.8%	184%	0%
2012	21.1%	16.0%	5.1%	161%	0%
2020	20.7%	18.4%	2.3%	109%	17%
2024	28.5%	21.0%	7.4%	168%	0%
2017	44.8%	21.8%	23.0%	199%	0%
2023	32.5%	26.3%	6.2%	157%	0%
2009	20.9%	26.5%	-5.6%	92%	19%
2021	38.2%	28.7%	9.5%	164%	0%
2019	34.1%	31.5%	2.6%	161%	3%
2013	50.0%	32.4%	17.6%	176%	0%

Total Return:12/31/2004-9/30/2024. Modeled performance reflects the assumed 65 basis point fee for the SPY ETF swap and the overnight lending rate for the Syntax Defined Volatility US Large Cap 500 Index but does not reflect fees or implementation costs beyond the assumed 65bp swap fee and overnight lending rate, as an investor cannot directly invest in an index. Please see important disclaimers regarding back-tested data. Source: Syntax Data

- S&P 500 negative return: Over the past 20 years, the S&P 500 produced a negative calendar year return three times. The SPY-based Defined Volatility Index had modeled outperformance over S&P 500 by 930 basis points in 2008 as the Index was down -27.7% vs. -37.0% for the S&P 500. The Index benefited in the model from an average weight to the SPY ETF of 83% and an average cash position of 23%. In 2022 the Index returned -19.6% in the backtest, underperforming the S&P 500 by 150 basis points. The underperformance was similar in the more modest 2018 drawdown when the Index returned -5.8% in the model, which was 140 basis points behind the S&P 500.

- S&P 500 moderate return (0% to 10%): The Index underperformed in the model during the four calendar years when the S&P 500 returned between 0% and 10%. The average return was -1.3% compared to 3.5% for the S&P 500, creating an average modeled underperformance of 480 basis points per year. The average SPY weight was 151% and cash averaged 5%.
- S&P 500 strong return (>10%): The Index exceeded the S&P 500 in the model in 11 of the 13 years when the S&P 500 returned more than 10%. The Index averaged 710 basis points of outperformance in the backtest during these 13 years, benefiting from an average position in SPY of 159%. Given that volatility was low during these market up years, the modeled average cash balance was just 3.5%. The largest modeled underperformance in a single year was -5.6 percentage points, whereas the largest modeled outperformance was 23.0 percentage points.

As noted above, when markets are trending up, volatility is often low. Managing to a constant volatility target during these favorable, calm periods drove the modeled returns for the Defined Volatility US Large Cap 500 Index shown in Exhibit 8.

The same analysis was performed on the Defined Volatility Triple Qs Index, the results of which are shown in Exhibit 11.

Exhibit 11: Annual Modeled Total Return Performance of Defined Volatility Triple Qs Index vs. Nasdaq 100

Year	Def. Vol Triple Qs Index Return	Nasdaq 100 TR Index	Return Difference	QQQ Avg. Weight	Cash Avg. Weight
S&P 500 Negative Return					
2008	-30.1%	-41.6%	11.4%	77%	25%
2022	-26.9%	-32.4%	5.5%	72%	28%
S&P 500 Moderate Return (0% to 10%)					
2018	-0.9%	0.0%	-0.9%	131%	10%
2005	-6.5%	1.9%	-8.3%	173%	0%
2011	0.6%	3.7%	-3.1%	119%	11%
2016	3.9%	7.3%	-3.4%	148%	2%
2006	11.3%	7.3%	4.0%	148%	0%
2015	2.0%	9.8%	-7.8%	142%	3%
S&P 500 Strong Return (>10%)					
2012	28.3%	18.4%	10.0%	152%	0%
2007	23.6%	19.2%	4.4%	142%	3%
2014	23.2%	19.4%	3.7%	168%	0%
2024	23.7%	20.0%	3.7%	135%	3%
2010	30.8%	20.1%	10.7%	134%	5%
2021	32.2%	27.5%	4.6%	144%	3%
2017	66.0%	33.0%	33.0%	187%	0%
2013	60.4%	36.9%	23.5%	174%	0%
2019	39.4%	39.5%	0.0%	147%	4%
2020	45.2%	48.9%	-3.6%	97%	20%
2009	43.9%	54.6%	-10.7%	101%	14%
2023	66.5%	55.1%	11.4%	126%	2%

Total Return: 12/31/2004-9/30/2024. Modeled performance reflects the assumed 65 basis point fee for the QQQ ETF swap and the overnight lending rate for the Syntax Defined Volatility Triple Qs Index but does not reflect fees or implementation costs beyond the assumed 65bp swap fee and overnight lending rate, as an investor cannot directly invest in an index. Please see important disclaimers regarding back-tested data. Source: Syntax Data

The return patterns were similar for the Defined Volatility Triple Qs Index as the Defined Volatility US Large Cap 500 Index:

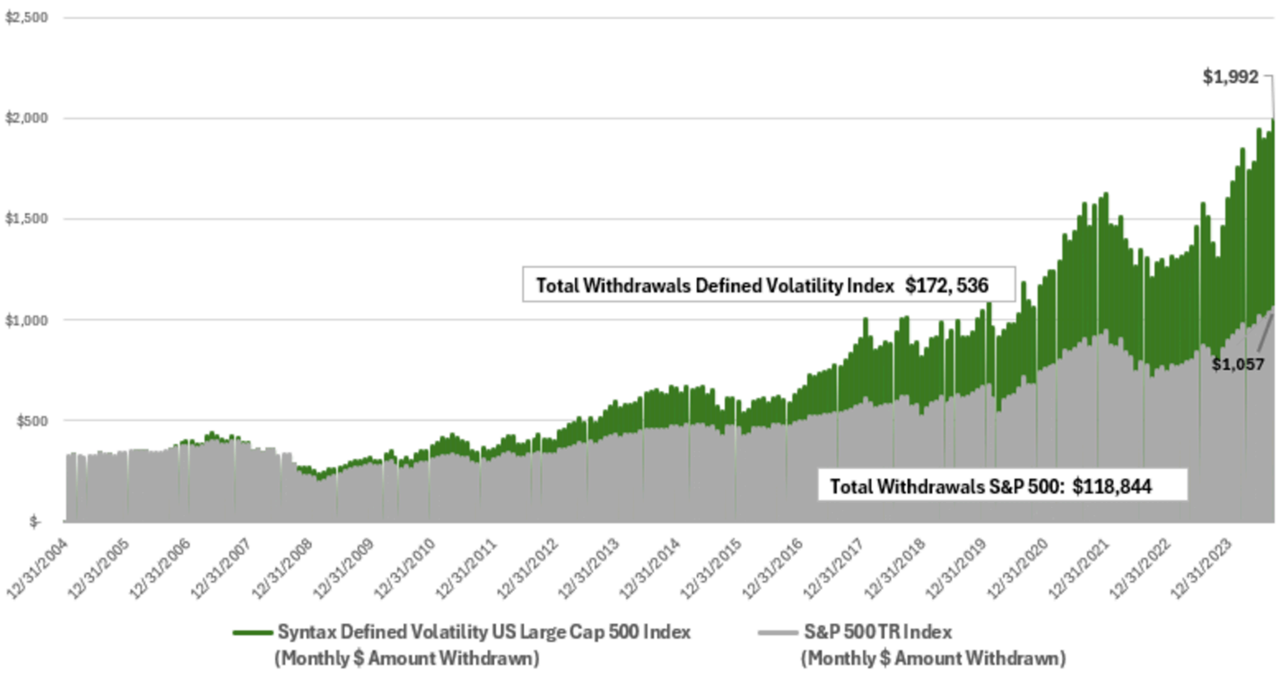
- Nasdaq 100 negative return: The Defined Volatility Triple Qs Index outperformed in 2008 in the model by +11.4 percentage points when the Nasdaq 100 Index was down 41.6%. The Index also outperformed in the model in 2022 by +5.5 percentage points when the Nasdaq 100 was down 32.4%.
- Nasdaq 100 moderate return (0% to 10%): The Defined Volatility Triple Qs

Index underperformed in five of the six years in the model; the average backtested underperformance was 3.3 percentage points over the six-year period.

- Nasdaq 100 strong return (>10%): The Defined Volatility Triple Qs Index exceeded the Nasdaq 100 in nine years in the model, matched the benchmark in one year, and underperformed it in two years. The average annual modeled outperformance was 7.60 percentage points. The largest modeled outperformance was 33.0 percentage points (2017), the largest backtested underperformance was 10.7 percentage points (2009). The Index benefited from a modeled average position in QQQ of 142%; the average cash balance was 4.4%.

The final piece of our analysis in Exhibit 12 focuses on analyzing the backtested results shown above in Exhibit 8 for the Defined Volatility US Large Cap 500 Index and incorporating a 4% annual spending rate. Portfolios exist to fund liabilities and spending needs, and a 4% annual withdrawal rate is a common assumption used by financial advisors for retiree distribution strategies. For this analysis, we assumed a $100,000 initial investment and we display the modeled cash withdrawals from both the Defined Volatility US Large Cap 500 Index and the S&P 500.

Exhibit 12: $100,000 Modeled Investment with Monthly Withdrawals at 4% Annual Rate – Defined Volatility US Large Cap 500 Index and S&P 500



The growth in withdrawals for the Defined Volatility US Large Cap 500 Index shows the benefits of compounding at high rates of return over time. Modeled monthly withdrawals for both indices started at $333 per month in 2005, or $4,000 per year. At the end of the time horizon, the modeled monthly withdrawals for the Defined Volatility US Large Cap 500 Index increased to $1,992, compared to just $1,057 for the S&P 500. The cumulative modeled cash flow generated by the Defined Volatility US Large Cap Index totaled $172,536, compared to $118,844 for the S&P 500. Additionally, since the modeled return on the Index and the return benchmark both exceed the 4% withdrawal rate, the ending balance for both indices exceed the hypothetical $100,000 starting investment. The Defined Volatility US Large Cap Index's modeled ending value is $599,000 compared to $317,000 for the S&P 500 (not shown). The Defined Volatility Triple Qs Index as well produced favorable results in the backtest under the withdrawal analysis given its strong modeled absolute and relative return performance.

Conclusion

Individual investors typically address market volatility by taking a long-term approach, with the expectation that time will smooth out the bumps in the road. There are institutional investors, however, that take a different approach and seek to maintain a consistent risk level by leaning into the market and adding risk when conditions are favorable, and reducing exposure when volatility increases above the target threshold. The Syntax Defined Volatility US Large Cap 500 Index targets a 20% annual volatility—and through a rules-based approach—rebalances based on market volatility. The modeled portfolio can hold three different assets: 1) a long position in the S&P 500 SPY ETF; 2) a total return swap on SPY that allows exposure to the S&P 500 to be added when historical volatility is low; and 3) cash, which is used to seek to de-risk the index when recent historical volatility exceeds the target.

The backtested analysis from December 31, 2004, through September 30, 2024, showed the Index had a hypothetical total return of 14.0%, compared to 10.4% for the S&P 500. The modeled results were driven by the Index's levered exposure to SPY during periods where the S&P produced strong returns. The Defined Volatility Triple Qs Index likewise featured similar return patterns and favorable results relative to the benchmark.

In a recent paper, Howard Marks noted, "In my opinion, one decision matters more than – and should set the basis for – all other decisions in the portfolio management process. It's the selection of a targeted "risk posture," or the desired balance between aggressiveness and defensiveness."[5]

The Syntax Defined Volatility indices seek to maintain a targeted risk posture to which Howard Marks refers. Rather than accepting what the market gives you, investors can use this approach in conjunction with other strategies to target a portfolio with a more consistent risk level. The rules-based approach of adding and decreasing risk also may provide some comfort to investors knowing that, when the road looks clear, the portfolio will pick up speed (add risk) in pursuit of returns while reducing speed when driving conditions deteriorate (reduce risk).

The road ahead is unpredictable and there are no guarantees that a defined volatility index will outperform a more traditional index. What we can say is that this is a different approach, often employed by banks and hedge funds, that can help investors reduce their reliance on investments where the risk level is driven by ever-changing market conditions. To learn more, please visit syntaxdata.com.

1. Moriera, Alan, and Tyler Muir. "Volatility-Managed Portfolios." The Journal of Finance 72, no. 4 (2017): 1611–43.

2. Matt Levine's Money Stuff: Leverage Goes Down When Markets Do.

3. As of the market close on each trade date, the target leverage of the Index is determined as the lesser of 1) the maximum leverage of 200%, and 2) the ratio of the target annual volatility of 20% to the current annualized volatility of the SPY total returns (based on log returns) over the trailing 21 trade dates (including the current trade date).

4. The SEC's derivatives rule 18f-4 may apply to investment vehicles that track Syntax's Defined Volatility Indices, and so was considered in index construction. Syntax does not provide legal advice; please consult legal counsel regarding leverage limits and regulatory constraints in tracking this index.

5. https://www.oaktreecapital.com/insights/memo/ruminating-on-asset-allocation

Important Disclaimers

Past performance is no guarantee of future results. All performance, holdings, and allocation information provided on the Syntax Defined Volatility Indices is backtested. Backtested performance is not actual performance but is hypothetical and is suitable only for institutional audiences. Backtested performance may not be predictive of actual or future performance. Backtested data may reflect the application of the index methodology with the benefit of hindsight, and the historic calculations of an index may change from month to month based on revisions to the underlying economic and/or financial data used in the calculation of the index. Charts and graphs are provided for illustrative purposes only. S&P® is a registered trademark of S&P Global and/or its affiliates. QQQ® and NASDAQ- 100® are a registered trademark of Nasdaq, Inc. and/or its affiliates. Syntax® is a registered trademark of Syntax, LLC and/or its affiliates.

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