RESEARCH NOTE

Intraday Volatility Control in Tumultuous Markets

A real-world test of newer volatility control mechanisms in action

Executive Summary

Volatility-controlled indices with intraday features have gained significant traction in the fixed index annuity (FIA) market, particularly during periods of heightened market turbulence. This research evaluates the performance of intraday volatility control strategies relative to traditional daily-only methods, focusing on the first half of 2025 and other historical drawdown-recovery cycles. The findings show that intraday indices consistently outperform on the downside due to their enhanced responsiveness, though they may lag during sharp rebounds when volatility remains elevated. By incorporating intraday data, rebalancing, and advanced volatility forecasting models, these indices offer improved risk management and potentially more stable participation rates. As adoption accelerates, intraday features are poised to become a standard component of next-generation volatility-controlled strategies.

The number of volatility-controlled indices with intraday features offered in annuities have doubled in a little more than a year. Of the **188** distinct volatility-controlled indices currently available as crediting options in fixed index annuities (FIAs), **46** of them (25%) have some kind of intraday feature in the index methodology, up from 23 in November 2023.[1] This number will likely increase in the coming months and years as indices with lower volatility targets and older designs are replaced.

Whether daily or intraday, volatility targeting is a simple concept that works reasonably well. By adjusting the mix of risky assets and cash along with frequent rebalancing, volatility-controlled strategies can get pretty close to their annualized volatility targets. Yesterday's volatility is generally a good predictor of volatility tomorrow (unlike returns) so using recent historical data can be an effective day-to-day forecast.

The use of intraday features in this process helps by increasing the *reactivity* of the index to changes in the market. Although past volatility is generally a good predictor, markets can change very quickly so mechanisms that can detect those shifts faster can help improve targeting. This additional responsiveness should also help the index outperform versus a more traditional index using only daily data. With the rocky start to 2025 in terms of market volatility and a wider variety of intraday indices now available in the market, how have they performed?

[1] "Intraday" is defined as using any or all of the following techniques: using historical intraday data to forecast future volatility, intraday rebalancing, or using an intraday-based overlay such as momentum. For further detail see "Intraday Everywhere: Making Sense of the Latest Trend in Volatility-Controlled Indices"

DATA AND METHODOLOGY

In this research note, we compare a group of US large cap, equity-only, volatility-controlled indices with intraday features to one using only daily data as well as a large cap benchmark. The volatility-controlled indices all have a 15% volatility target, are excess return (mostly Effective Federal Funds Rate), and are adjusted if necessary to reflect zero transaction or holding costs, and a 50-basis point index fee.[2] For a better comparison against the volatility control indices, we create a neutral, large cap benchmark using SPDR S&P 500 ETF (SPY) returns and adjust them to reflect the same excess return with a 50-basis point index fee structure. The objective is to isolate the impact of the volatility control mechanism (or lack thereof) on index performance during some key periods of market turbulence. Here are summary stats for all six indices from January 1, 2010 through May 23, 2025:

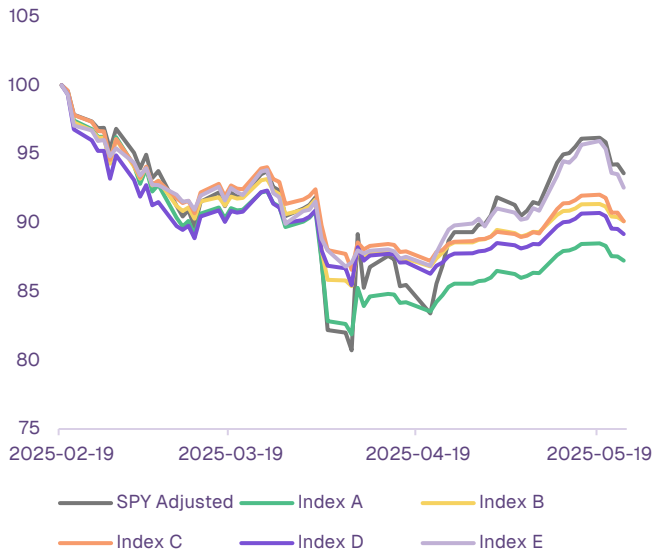
Table 1: Overall Performance

Index	CAGR	Volatility	Sharpe
SPY Adjusted	11.2%	17.4%	0.64
Index A (Daily)	9.6%	14.9%	0.65
Index B	10.4%	14.8%	0.70
Index C	12.5%	14.9%	0.84
Index D	13.5%	15.2%	0.89
Index E	13.4%	15.0%	0.89

2025 PERFORMANCE

After making a new high on February 19, 2025, markets sold off sharply following the April 2nd announcement deemed "Liberation Day" that revealed sweeping new tariffs on a host of US trading partners around the world. Our SPY Adjusted benchmark dropped 19.3% from the peak to the trough on April 8th before rebounding. So how did our volatility-controlled group do?

Figure 1: February 19, 2025 through May 23, 2025



Index	Peak to Trough	Trough to 5/23/25	Peak to 5/23/25
SPY Adjusted	-19.3%	15.9%	-6.4%
Index A (Daily)	-18.1%	6.6%	-12.8%
Index B	-14.6%	5.5%	-9.9%
Index C	-13.4%	4.1%	-9.9%
Index D	-14.5%	4.3%	-10.8%
Index E	-12.9%	6.3%	-7.4%

While all of the volatility-controlled indices outperformed on the downside into the trough, the intraday strategies (Indices B-E) experienced a much shallower dip than the daily-only Index A, which is very clear visually on the chart. As markets recovered, the slower, less reactive Index A (Daily) lagged both the SPY Adjusted and the intraday group considerably over the period.

All the volatility-controlled strategies underperformed SPY Adjusted on the rebound but

[2] We use adjustment techniques similar to the ones used in our monthly Annuity Index Analytics report but we limit the analysis to "native" 15% volatility target indices and only use ones in which transaction and holding costs can be either removed or a non-transaction cost version of the index is published. The underlying equity indices used in all are US large cap benchmarks with near perfect daily correlation.

this is generally expected. As realized volatility rises, exposure is reduced to manage the target. On April 2nd, 22-day trailing historical volatility (HV) was 20.3%. At the close of trading at the trough on April 8th, 22-day HV rose to 31.8%. But then it jumped to well over 50% and stayed elevated for the next three weeks or so *as the SPY itself rallied over 14%.* Any volatility-controlled index was considerably deleveraged for that rally, with exposure well less than 40% (depending on the index).

What made this underperformance for the volatility-controlled group worse in this scenario was one very unusual day: April 9th. On that day, the administration announced a 90-day pause on implementing the tariffs it just announced on April 2nd and markets responded in force, with SPY surging **10.5%** on the day. Putting that in historical perspective, April 9, 2025 was the third largest gain in SPY since its inception in 1993 as well as the fourth largest absolute daily return (positive or negative). Every other date on the top 10 biggest moves were in September-October 2008 (depths of the Global Financial Crisis) or March 2020 (onset of COVID pandemic).

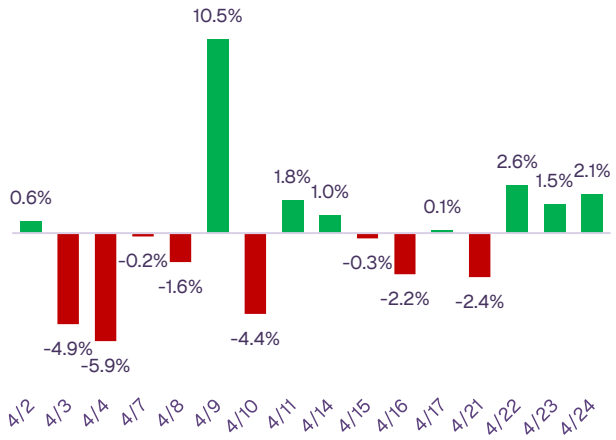
Table 2: Top 10 SPY Largest One Day Gains

Date	Return
October 13, 2008	14.5%
October 28, 2008	11.7%
April 9, 2025	10.5%
March 24, 2020	9.0%
March 13, 2020	8.6%
March 23, 2009	7.2%
November 24, 2008	6.9%
April 6, 2020	6.7%
November 13, 2008	6.2%
October 20, 2008	6.0%

Source: Bloomberg

The problem is that volatility is measured in both directions. In general, price declines are associated with lower prices. But as markets recover, some of the biggest gains occur during crises when volatility is sky-high and just beginning to recede. When targeting volatility, a 10.5% gain one day will cause as much "damage" in terms of realized volatility as a 10.5% loss—that's just how the math works. As a result, a very sharp gain in a short period of time will make it very difficult for a volatility-controlled index to maintain exposure as the benchmark recovers on persistently high volatility.

Figure 2: SPY Daily Returns, April 2, 2025 through April 24, 2025



Source: Bloomberg

- Volatility control with intraday features outperformed traditional daily-only methods during the recent market decline and rebound in the first half of 2025.
- Large gains during short-duration/high volatility periods are harder for volatility-controlled strategies to capture given the constraint of needing to keep volatility on target.
- The 10.5% gain on April 9th was historically large and depressed exposures as markets rebounded, leading volatility-controlled indices to lag the benchmark more than usual.

HISTORICAL PERSPECTIVE

The outsized rebound day following the pause in tariff policy in April caused some headaches for volatility control, but how did some of these

intraday features hold up during other periods of market turbulence? For this we examine periods where markets sold off by at least 5% from a recent peak, found a bottom, and then fully recovered to cross the last recent peak.[3] We use our SPY Adjusted series to measure the drawdown periods and compare performance across the cycle of peak, trough, and recovery and the same adjusted series of Indices A-E. We limit the analysis to January 1, 2010 through May 9, 2025 as some of the intraday indices did not have sufficient history to go back any further.

There have been **21** such drawdown events since 2010. Here are the average returns at each point in the cycle for each index:

Table 3: Average Returns for All 5%+ Drawdown Cycles, 2010-2025

Index	Avg Drop (%)	Avg Rebound (%)	Avg Total Return (%)
SPY Adjusted	-11.6%	13.7%	-0.2%
Index A (Daily)	-11.5%	10.1%	-2.7%
Index B	-10.8%	9.5%	-2.5%
Index C	-10.3%	9.8%	-1.7%
Index D	-10.2%	10.6%	-0.9%
Index E	-9.5%	9.9%	-0.8%

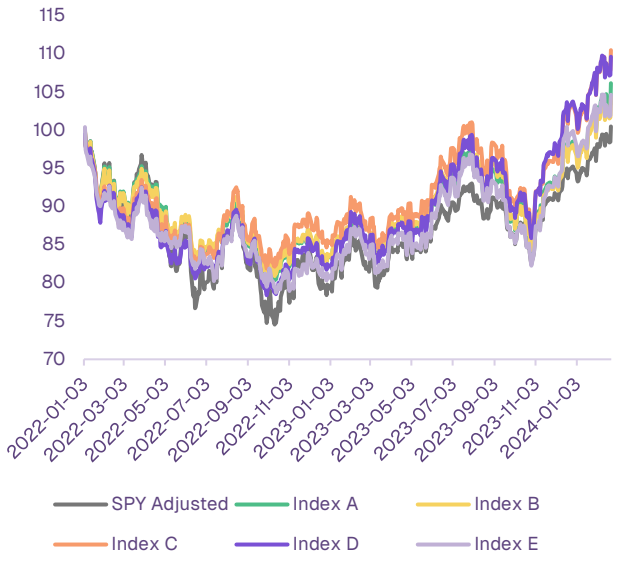
Again, the intraday-powered strategies led to smaller drawdowns and better overall returns for each cycle with about the same magnitude of rebound compared to the traditional daily version. Index A (Daily) fared only marginally better on the downside compared to the uncontrolled SPY Adjusted in addition to lagging the intraday group. With a 15% target that is lower than the ~19% long-term historical volatility for US large cap stocks, it should be expected that the volatility-controlled index would outperform on the downside and underperform on the upside. For this sample, only the intraday indices managed to fit this pattern, on average.

Taking a closer look at some of the individual scenarios reveals some other insights into the historical performance of intraday features.

Inflation and Rate Hikes

The sell-off after the COVID recovery impacted both stocks and bonds as the Fed raised rates sharply in response to inflation not seen since the early 1980s. After seeing the market peak on January 3, 2022, stocks and bonds both sold off throughout the year and SPY Adjusted failed to make a new high until February 22, 2024. For this extended cycle, the volatility-controlled group fared much better, with indices outperforming on the downside and for the period, with some of the intraday strategies notching returns over 9% better than SPY Adjusted.

Figure 3: January 3, 2022 through February 22, 2024



[3] We use a slightly different method to define the drawdown cycle, resetting the "local high" after each recovery to maximize the number of market declines captured. The more traditional method would define the drawdown in terms of prior maximum high but this eliminates some declines during periods when the market takes an extended period to make an all-time high (the period following the Global Financial Crisis is one good example). We also use our SPY Adjusted series that can lead to slightly different dates for the peak/trough/recovery due to the inclusion of dividends in SPY and exclusion of the risk-free rate of interest.

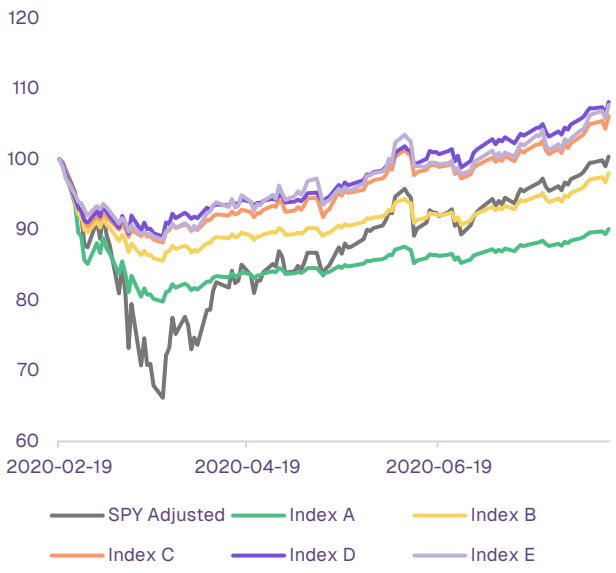
Index	Peak to Trough	Trough to Recovery	Peak to Recovery
SPY Adjusted	-25.4%	34.8%	0.5%
Index A (Daily)	-19.6%	32.1%	6.2%
Index B	-19.1%	28.9%	4.3%
Index C	-17.9%	34.5%	10.5%
Index D	-21.3%	39.3%	9.6%
Index E	-20.6%	31.7%	4.6%

Index	Peak to Trough	Trough to Recovery	Peak to Recovery
SPY Adjusted	-33.8%	51.7%	0.4%
Index A (Daily)	-20.2%	12.9%	-9.9%
Index B	-14.4%	14.5%	-1.9%
Index C	-11.8%	20.4%	6.1%
Index D	-11.0%	21.4%	8.1%
Index E	-11.4%	21.6%	7.7%

COVID

As COVID-19 swept around the world and stocks swooned in early 2020, the intraday strategies mostly outperformed SPY Adjusted, especially on the downside where they avoided over two-thirds of the decline enabling them to pick up gains overall during the period. The slower to react Index A (Daily) absorbed about 60% of the decline in SPY Adjusted and was unable to participate in enough of the rebound, lagging the benchmark by over 10% by the recovery date.

Figure 4: February 19, 2020 through August 12, 2020

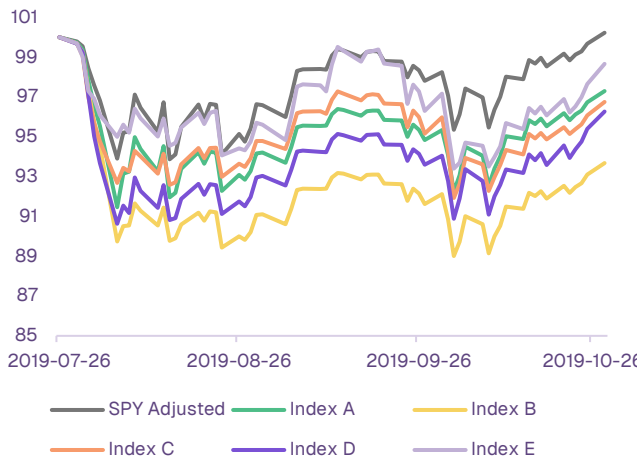


Shallow and Short

In 2019, the yield curve inverted and signaled potential recession, sending SPY Adjusted down 6% from July 26th through August 14th only to see it fully recover by the end of October. The volatility-controlled indices shifted from a leveraged position with 22-day realized volatility in SPY in single-digits (adding exposure to push the volatility up towards the target 15%) to rapidly deleveraging as volatility increased to about 24%. With such a short ride to the bottom and no real follow-through on the downside before recovering in about a calendar quarter, all of the volatility-controlled indices lagged the benchmark, with the traditional daily Index A outperforming most of the intraday strategies during this period.

This is an example where the enhanced reactivity of intraday indices can underperform, "chasing their tail" as markets change directions quickly, shifting from a low volatility, leveraged exposure to a rapidly deleveraged position only to see the market chug higher in matter of weeks. However, in less than five months after this episode, COVID erupted and that same enhanced reactivity turned into a positive with the intraday strategies able to navigate the more severe storm much more successfully.

Figure 5: July 26, 2019 through October 28, 2019



Index	Peak to Trough	Trough to Recovery	Peak to Recovery
SPY Adjusted	-6.1%	6.5%	0.2%
Index A (Daily)	-8.0%	5.6%	-2.7%
Index B	-10.2%	4.2%	-6.3%
Index C	-7.4%	4.4%	-3.3%
Index D	-9.2%	5.9%	-3.7%
Index E	-5.4%	4.2%	-1.3%

INDEX DIVERSITY

In examining these drawdown periods in detail, another key insight is revealed: not all intraday strategies are the same. They may use similar techniques and data, but the differences in design and construction can produce a wider variety of outcomes, especially during times of market stress. The indices in this analysis were purposefully selected as they all rebalance intraday, use historical intraday as inputs, and use trend models to help further adjust exposure in addition to targeting 15% volatility. Despite these similarities, these strategies responded to market shocks in different ways.

The table below shows all of the drawdown cycle dates since 2010 along with the SPY Adjusted benchmark returns, Index A (Daily) Returns and a "winner" overall as determined by the max total return from peak to recovery. A winner among the intraday strategies is also identified with their peak to recovery returns for the period. What stands out is the leadership rotation among the intraday indices as different strategies stand out as the outperformer during a variety of market downturns and recoveries. This suggests a healthy level of diversity amongst intraday indices that can be helpful when used in a portfolio of crediting options in a product such as a fixed index annuity.

Table 4: Best Performing Indices, All Drawdown Cycles Since 2010

Peak	Trough	Recovery	SPY Adjusted	Index A	Overall Winner	Intraday Winner Return	Intraday Winner
1/19/2010	2/8/2010	3/11/2010	0.2%	-0.8%	Index E	Index E	0.7%
4/23/2010	7/2/2010	11/4/2010	1.0%	1.1%	Index D	Index D	7.3%
2/18/2011	3/16/2011	4/26/2011	0.5%	-0.3%	SPY Adjusted	Index B	0.5%
4/29/2011	10/3/2011	2/8/2012	0.3%	-8.4%	Index D	Index D	0.6%
4/2/2012	6/4/2012	8/16/2012	0.4%	-1.1%	SPY Adjusted	Index D	0.4%
9/14/2012	11/15/2012	1/2/2013	0.2%	-0.1%	Index B	Index B	0.3%
5/21/2013	6/24/2013	7/11/2013	0.6%	-0.5%	SPY Adjusted	Index D	0.6%
12/31/2013	2/3/2014	2/24/2014	0.0%	-1.7%	Index E	Index E	0.6%
9/18/2014	10/16/2014	10/31/2014	0.3%	-2.3%	SPY Adjusted	Index B	0.3%

5/21/2015	2/11/2016	6/2/2016	0.1%	-7.2%	SPY Adjusted	Index C	0.1%
6/8/2016	6/27/2016	7/8/2016	0.6%	-1.7%	SPY Adjusted	Index D	0.6%
1/26/2018	2/8/2018	8/27/2018	0.7%	-1.7%	Index D	Index D	1.7%
9/20/2018	12/24/2018	6/20/2019	0.1%	-4.7%	Index E	Index E	6.2%
7/26/2019	8/14/2019	10/28/2019	0.2%	-2.7%	SPY Adjusted	Index E	0.2%
2/19/2020	3/23/2020	8/12/2020	0.4%	-9.9%	Index D	Index D	8.1%
9/2/2020	9/23/2020	11/13/2020	0.4%	-0.2%	SPY Adjusted	Index B	0.4%
9/2/2021	10/4/2021	10/20/2021	0.1%	-1.5%	SPY Adjusted	Index E	0.1%
1/3/2022	10/12/2022	2/22/2024	0.5%	6.2%	Index C	Index C	10.5%
3/27/2024	4/19/2024	5/15/2024	0.5%	-0.1%	Index E	Index E	0.5%
7/16/2024	8/5/2024	9/19/2024	0.0%	-4.1%	Index E	Index E	0.7%
2/19/2025	4/8/2025	5/23/2025	-6.4%	-12.8%	SPY Adjusted	Index E	-7.4%

Source: Bloomberg, Salt Financial

Conclusion

While seeing your volatility-controlled index outperform the benchmark on an absolute basis is a plus, these strategies are not designed for eye-popping returns. Volatility control is designed to smooth out performance and help improve the option pricing, keeping participation rates stable as interest rates and market volatility fluctuate over time. Historically, a volatility-controlled index with a lower volatility target than the market will outperform on the downside and underperform on the upside. But by keeping the pricing stable, more consistent participation has the potential to deliver strong performance over the long run. The use of intraday features in volatility-controlled indices can help improve risk management even further, significantly reducing drawdowns during larger declines and better positioning to participate in rebounds.

There will be periods in which volatility-controlled indices underperform the benchmark, even after factoring in the benefits of higher participation. As shown in this analysis, shorter-lived corrections can sometimes lead volatility-controlled indices to overreact to quick moves with limited follow-through on the downside and then struggle to catch up as the uncontrolled benchmark rebounds. But the ability to avoid larger losses and stay in position to earn credits over more extended downturns offers the potential for long-term outperformance.

For annuity holders, the downside is fully protected but allocating to uncapped strategies with stable participation through volatility control provides more opportunities to earn credits in the outsized return years to make up for the inevitable “zeroes”. Allocating to these strategies alongside traditional benchmark participation or capped options can be a good way to diversify exposure and maximize the chances of earning a bit more than bonds over time, which is what the fixed index annuity is designed to deliver.

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