Global Indexes

New Series of Cboe S&P 500 Target Outcome Indexes

Creating Structured Exposures to the S&P 500®

- Defined protection levels
- Defined upside exposures
- Rolling point-to-point outcome period: one-year

Abstract

In 2018 Milliman Financial Risk Management LLC, Cboe Global Markets℠ and S&P Dow Jones Indexes collaborated to build four new series of Target Outcome Indexes, designed to afford investors defined exposures to the S&P 500 Price Index, where the downside protection levels, upside growth potential, enhancement level, and outcome period are all pre-determined.

In this paper, we examine the four new series of Cboe S&P 500 Target Outcome Indexes (Target Outcome Indexes). Each Series consists of four quarterly issued indexes (January, April, July, and October—16 indexes total) that reset annually.

Cboe S&P 500 3X UP, 1X DOWN
ENHANCED GROWTH INDEX SERIES

- SPEG-01 (January)
- SPEG-04 (April)
- SPEG-07 (July)
- SPEG-10 (October)

Cboe S&P 500 2X UP, 1X DOWN, 10%
BUFFER PROTECT INDEX SERIES

- SPEB-01 (January)
- SPEB-04 (April)
- SPEB-07 (July)
- SPEB-10 (October)

Cboe S&P 500 15%
BUFFER PROTECT INDEX SERIES

- SPRF-01 (January)
- SPRF-04 (April)
- SPRF-07 (July)
- SPRF-10 (October)

Cboe S&P 500 30% (-5% TO -35%)
BUFFER PROTECT INDEX SERIES

- SPRF-01 (January)
- SPRF-04 (April)
- SPRF-07 (July)
- SPRF-10 (October)

The approach taken by the Target Outcome Indexes is analogous to certain equity-linked strategies used in structured products—a space with nearly $1 trillion in assets in the U.S. alone. As large as the structured product space has become, it has historically been accessed by institutional and high net worth investors, and has been largely ignored by retail investors, the financial press, and product developers.

To outline our examination of the Target Outcome Indexes, we discuss the framework behind each Series, review historical performance, conduct brief portfolio analysis, and look at how the Indexes are being implemented today.

Additionally, we outline several potential applications for investors, discuss several communication points that may be of use to financial advisors as they communicate the target outcome concept to clients, and disclose several risk considerations.

It is important to note that indexes are not investable, past performance is not a guarantee of future results. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch date is back-filled, for informational purposes only, and is gross of fees and expenses. Any hypothetical data used has inherent limitations and does not represent actual trading.

Section 1: Introduction

Outcome Based Investing

Most investments today target speculative returns, with uncertain levels of risk, over an uncertain period of time. While opportunistic, this approach to investing brings a high degree of uncertainty. Outcome based investing encourages targeting a specific defined payoff profile, with an allowance for a specific defined level of risk, at a specific point in time in the future.

Outcome based investing has been available for decades, largely through bank or insurance products (e.g., structured notes and structured note annuities). With this in mind, a general understanding of the structured product marketplace is helpful. The CFA Society defines structured products well, stating, "Structured products are financial instruments designed and created to afford investors exposure (to something) through a derivative contract. The 'something' [an underlying asset] can be an equity price, an index, an interest rate, an exchange rate, a credit spread, a commodity price—anything, in fact, for which there is an existing financial market."

The structured product marketplace is broken down by underlying asset type in Figure 1.

The structured product market has historically been accessed by institutional and high net worth investors, and is largely ignored by the retail investment market, the press, and product developers.

Figure 1: U.S. Structured Products Market

	2016	**2017**	**2018 Q1**	**Expansion/ Contraction**
Equity Linked (USD)	$732,664,667,306	681,879,717,235	643,649,614,477	-38,230,102,758*
Interest Rate Linked (USD)	118,176,850,494	190,029,497,801	265,371,894,638	75,342,396,836
Credit Linked Notes (USD)	3,791,215,495	2,028,399,526	3,617,460,822	1,589,061,297
Foreign Exchange Linked (USD)	2,282,965,258	2,040,846,059	1,622,952,588	-417,893,471
Commodity Linked (USD)	66,594,134	11,837,340	204,926	-11,632,415
Total Structured Product Market (USD)	856,982,292,686	875,990,297,961	914,262,127,451	38,271,829,489

Source: Capital Market Daily Ltd, as of 3/31/18.

*Equity-linked structured notes experienced a contraction of approximately US $38 million during the first quarter of 2018, likely due to equity market volatility and rising interest rates.

Cboe Target Outcome Indexes were built to replicate features of the largest structured product category, which are tied to the return of an underlying equity asset, like the S&P 500 Index.

Solving a Key Challenge: Providing Simple Access to Structured Outcomes

The structured product market has historically been accessed by institutional and high net worth investors, and is largely ignored by retail investors and product developers. We surmise one key reason for this is that the structured product space has never truly addressed one of its biggest challenges regarding the investing public, which is to devise a simple and transparent approach that investors could easily access and follow.

In our view, solving this challenge through an index based approach can provide unprecedented access to structured outcomes for institutional investors and financial advisors, and establishes liquidity and transparency within an otherwise complex and opaque space.

Creating Defined Exposures to the S&P 500

Each Cboe S&P 500 Target Outcome Index seeks to afford investors defined exposure to the S&P 500 Price Index (S&P 500) through four parameters:

Defined Parameters of Target Outcome Indexes

1. **Equity Market Exposure:** S&P 500 Index. Target Outcome Indexes provide exposure to broad equity markets on which there are liquid underlying derivatives markets; in this case the S&P 500—a broad measure of U.S. large cap equities.
2. **Defined Downside Protection Levels:** 0%, 10%, 15%, 30%. Target Outcome Indexes seek to provide defined levels of downside protection (e.g., 0%, 10%, 15%, and 30%) over each Index's outcome period. For example, if at the end of the outcome period the S&P 500 is down 20%, it is expected that a target outcome strategy with a 15% protection level would be down 5%. Note: the Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index seeks to provide a 30% buffer from -5% to -35%, exposing investors to the first 5% of losses relative to the S&P 500.
3. **Defined Upside Growth Potential:** 1x, 2x, 3x to a cap. Cboe Target Outcome Indexes seek to provide upside growth relative to the S&P 500, to a cap. Each Index also exhibits an upside participation rate, which is an enhancement factor that represents the amount of upside exposure the index return is multiplied by, over the outcome period and subject to a cap. The upside growth is either 1x (no enhancement), 2x, or 3x. The enhancement factor is only applied to the upside growth of the Index. Downside exposure is on a one-to-one basis, over the outcome period (not accounting for any protection levels).
4. **Defined Outcome Period:** One Year. Cboe Target Outcome Indexes seek to offer target outcomes over a one-year outcome period, at which point each Index resets (i.e., "rolls"). Investors may be familiar with certain investment products that seek to deliver both upside and downside exposure (often leveraged) to an asset over a daily or weekly point-to-point period. The Cboe Target Outcome Indexes seek upside enhancement and/downside protection levels on an annual point-to-point period.

The equity market exposure, downside protection level, upside enhancement level, and outcome period are all set for the life of each Index. The upside cap is established at the beginning of each outcome period.

Cboe S&P 500 Target Outcome Indexes seek to afford investors defined exposures to the S&P 500, where the downside protection levels, upside growth potential, and outcome period are all known, prior to investing.

Section 2: About the New Series of Cboe S&P 500 Target Outcome Indexes

Cboe S&P 500 3x Up, 1x Down Enhanced Growth Index Series
Designed to produce 3x the upside relative to the S&P 500 (up to a predetermined cap) and 1:1 downside, over the one year outcome period, at which point the Indexes will reset.

Cboe S&P 500 2x Up, 1x Down, 10% Buffer Protect Index Series
Designed to produce 2x the upside relative to the S&P 500 (up to a predetermined cap) and 1:1 downside exposure, with a defined buffer protection level against the first 10% of losses due to a decline in the S&P 500, over the one year outcome period, at which point the Indexes will reset.

Cboe S&P 500 15% Buffer Protect Index Series
Designed to track the return of the S&P 500 (up to a predetermined cap), with a defined buffer protection level against the first 15% of losses due to a decline in the S&P 500, over the one year outcome period, at which point the Indexes will reset.

Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index Series
Designed to track the return of the S&P 500 (up to a predetermined cap), with a defined buffer protection level against a decline in the S&P 500 from -5% to -35%, over the one year outcome period, at which point the Indexes will reset.

Two Categories of Cboe Target Outcome Indexes

Each of these parameters are used to create one of two distinct strategies within the Cboe S&P 500 Target Outcome Index family:

1. **Enhanced Growth Target Outcome Strategies:** Enhanced growth target outcome strategies are generally used throughout most market environments as long-term growth tools, or tactically, throughout modest bull or range-bound market environments, with the exception of when the stock market is both rallying rapidly and exhibiting low levels of volatility.
2. **Buffer Protect Target Outcome Strategies:** Buffer protect target outcome strategies are generally used as risk management tools throughout most markets environments, or tactically throughout bear or range-bound market environments, with the exception of when the stock market is both rallying rapidly and exhibiting low levels of volatility.

The defined outcome parameters of each Index Series are simplified in table form in Figure 2.

Figure 2: Cboe S&P 500 Target Outcome Indexes

	Index Tickers	Upside Participation	Downside Participation	Buffer Level
Cboe S&P 500 3x Up, 1x Down, Enhanced Growth Index Series	SPEG-01 (Jan) SPEG-04 (Apr) SPEG-07 (Jul) SPEG-10 (Oct)	3x (to a cap)	1x	0%

Cboe S&P 500 2x Up, 1x Down, 10% Buffer Protect Index Series	SPEB-01 SPEB-04 SPEB-07 SPEB-10	2x (to a cap)	1x	10%
Cboe S&P 500 15% Buffer Protect Index Series	SPRF-01 SPRF-04 SPRF-07 SPRF-10	1x (to a cap)	1x	15%
Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index Series	SPRS-01 SPRS-04 SPRS-07 SPRS-10	1x (to a cap)	1x	30% (-5% to -35%)

Figure 3 depicts each Target Outcome Index Series by risk appetite.

Figure 3: Cboe Target Outcome Indexes By Risk Appetite

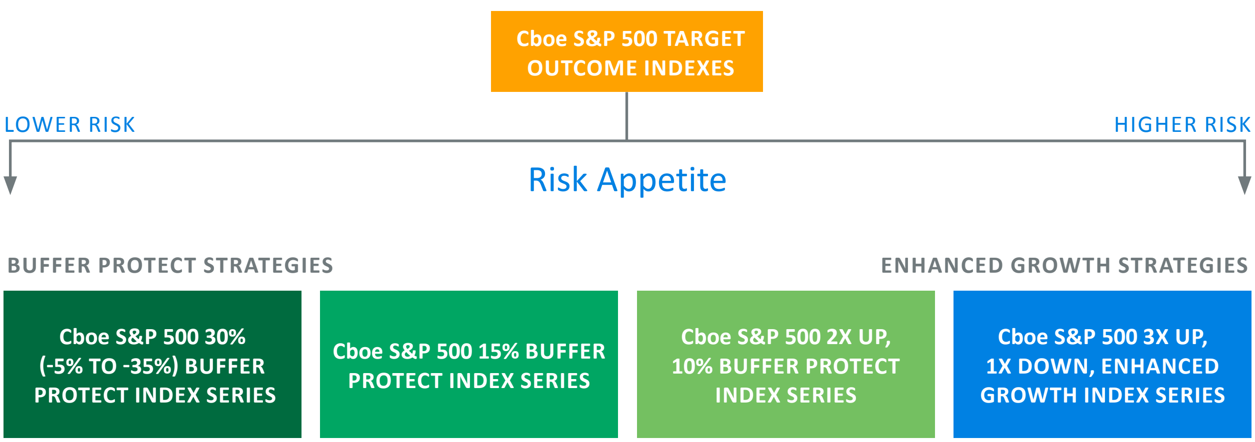
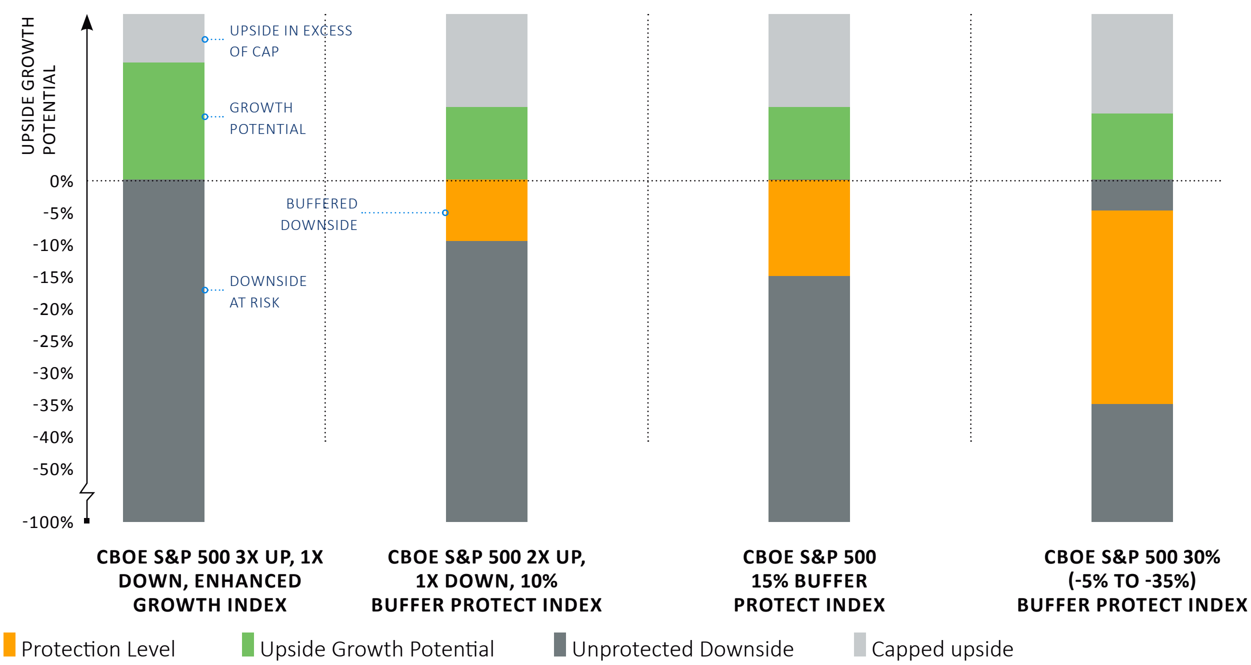


Figure 4 illustrates the Target Outcome Index Series' payoff profiles in bar chart form. For example, over the outcome period, Cboe S&P 500 2x Up, 1x Down, 10% Buffer Protect Index is designed to provide enhanced upside participation subject to a cap (green bar), and a downside protection level of 10% (orange bar) over the outcome period. The light grey bar illustrates the upside growth potential in excess of the cap. The dark grey bar represents the unprotected downside risk.

Each Target Outcome Index is typically made up of three main layers of options that work together to build the Index's defined outcome parameters.

Figure 4: Payoff Profiles – Cboe Target Outcome Indexes



Source: Cboe Exchange, Inc. For illustrative purposes only and is is not representative of any fund or investment. These results do not represent actual trading.

Section 3: How are Target Outcome Indexes Used?

In May 2018, the Cboe S&P 500 Target Outcome Indexes were licensed by an ETF provider in an effort to bring to market the first family of ETFs to offer defined outcomes on the S&P 500 Index.

Exchange-Traded Funds

While target outcome strategies have existed for decades in the structured product and annuity spaces, their uptake in the 1940 Investment Act product world has been low. In May 2018, the Cboe S&P 500 Target Outcome Indexes were licensed by an exchange-traded fund (ETF) provider in an effort to bring to market the first family of ETFs to provide defined outcomes on the S&P 500 Index. The ETFs were built in line with the Cboe S&P 500 Target Outcome Index Series—four "issues" of the same ETF (January, April, July, October)—which allows each ETF to hold a basket of FLEX Options contracts with varying strike prices, but the same expiration. This gives each ETF a defined protection level and upside cap, over the outcome period. Issuing four series of the "same" ETF provides multiple new entry points throughout the year.

Target outcome strategies have a number of differentiating factors relative to traditional asset management strategies, and when used inside the ETF wrapper, investors may benefit even further.

Potential Benefits of Target Outcome Strategies in ETFs

1. **Minimization of Counterparty Credit Risk:** The income payment of a structured product, similar to any debt obligation from a single issuer, is subject to the credit quality of the issuer. Depending on the credit quality of the issuer, there can also be significant cost borne to enter a credit default swap ultimately to protect against issuer bankruptcy. ETFs are Regulated Investment Companies (RICs) subject to the Investment Act of 1940. In effect, shareholders' ownership of the ETF holdings are protected by a trust and board of trustees to protect shareholders. Additionally, the FLEX Options held by the ETFs are centrally cleared by the Options Clearing Corporation (OCC).
2. **Liquidity:** Relative to ETFs, structured notes are less liquid (by design). ETFs are among the most liquid investment vehicles, even compared to mutual funds, because they are traded throughout the day on an exchange, rather than at the end of the day, or at the discretion of the issuing bank as in the case of structured notes.
3. **Cost-Efficient:** Structured notes are generally more expensive than ETFs due to high initial fees and spreads determined by the product issuer. The ETF structure provides transparency to the pricing of target outcome strategies. ETF vehicles also do not charge advertising fees (12b-1) or sales charges like other types of investment vehicles.
4. **Increased Transparency:** ETFs are by nature transparent vehicles. Investors are able to know the holdings of an ETF at all times. They often track indexes, or in the case of active ETFs, publish their investment strategies in the prospectus. Structured notes are not only opaque in regards to fee structure, but also in daily operations, overall strategy, and their intra-reporting period value.

5. **Taxes:** Target Outcome Equity ETFs are comprised of options contracts and are likely subject to the tax treatment of 1256 contracts, such that 40% of gains/losses are treated as short-term and 60% of gains/losses are treated as long-term. All that aside, if the product is purchased and sold within a qualified account, there may be benefits from a tax deferral. Investors should consult their tax advisors for further information.
6. **Accessibility:** ETFs do not have investment minimums, and are generally easier to trade and incorporate into a portfolio.

Applications For Investors

1. **As a Growth Engine:** Investors seeking enhanced growth with non-enhanced downside risk may consider replacing a portion of their domestic equity exposure with an Enhanced Growth Target Outcome Index.
2. **As a Risk Management Tool:** Managing portfolio risk has historically been accomplished through fixed allocations to fixed income assets in order to meet a long-term risk tolerance level, or through more tactical measures that allocate away from stocks (into safer assets) when markets become volatile. With Cboe Buffer Protect Indexes, the implied volatility of the S&P 500 contributes positively to upside caps. Conversely, in times of low implied volatility, upside caps tend to be lower. This feature is designed to promote staying invested in the market through all market conditions (regardless of volatility). This is starkly different from most risk management techniques, which reduce equity exposure as volatility increases.
3. **To Meet a Downside Protection Goal:** Most (if not all) risk tolerance levels are established using long-term historical or stochastic volatility data; however, the downside risk investors actually experience over shorter periods may be remarkably different from their expected risk tolerance level. Target Outcome Indexes allow investors to know their downside protection level over an outcome period before they invest.
4. **A Measure of Gap Risk Protection:** For many institutional investors, gap risk (the risk of a market movement from one level to another with no trading in between (e.g., the S&P 500 Index dropping substantially from the previous day's close) is difficult and expensive to mitigate. Because Target Outcome Indexes provide defined levels of protection over an outcome period, a measure of gap risk protection may be achieved, so long as the ETF is held until the end of the outcome period.
5. **As a Complement to Guaranteed Lifetime Income:** A successful retirement often includes multiple sources of income and risk management, which may include guaranteed lifetime income sources such as Social Security, pensions, and annuities. Target Outcome Indexes may be a complement to these income sources, providing liquidity and risk management to a retiree's investment portfolio that might not otherwise be available.
6. **Take a View on the Market:** Investors looking to take a tactical position on the market may often use enhanced growth strategies in modest bull or range-bound market environments that experience normal or elevated levels of volatility, and buffer protect strategies in bear or range-bound markets.

Section 4: Index Construction

A typical enhanced or buffered equity-linked structured product relies on the credit worthiness of a bank to deliver the upside performance of an asset, and a level of downside protection over a defined time frame. The construction of these types of products is often opaque and not disclosed. Cboe Target Outcome Indexes are built differently, tracking a portfolio of custom exchange-traded FLexible EXchange® Options ("FLEX® Options") that are based on the S&P 500 Index.

Layered Flex Options to Create Target Outcomes

Each Target Outcome Index Series seeks to track constructed outcomes by layering Cboe S&P 500 FLEX Options that have varying strike prices (the price at which the option purchaser may buy or sell the security, at the expiration date), and the same expiration date (approximately one year). The Target Outcome Indexes roll FLEX Options components annually, on the last business day of the month associated with each Index. The full index investment methodology may be found on Cboe's website (cboe.com/products).

FLEX Options

FLEX Options were developed in 1993 by the Cboe Options Exchange. They were designed to broaden institutional investor access to customized derivative products, similar in structure to privately negotiated, "over-the-counter" (OTC) options, but with the surety and convenience of exchange-traded options. FLEX Options have features that may appeal to institutional investors, and product developers with particular risk management requirements. For example, FLEX Options are particularly useful for designing and implementing large-scale equity portfolio hedges with specific time horizons or performance objectives. FLEX Options provide important features such as:

- Minimization of counterparty credit risk
- Contract guarantees provided by The Options Clearing Corporation
- Customized contract terms, such as expiration style and date
- Price discovery in a competitive auction market with price transparency
- The administrative convenience of exchange-traded options
- Daily closing prices that are set independently by The Options Clearing Corporation
- A secondary market to offset positions

Shaping the Return Profile of the S&P 500 Index

Each new series of Cboe Target Outcome Index Series is made up of three main options layers (or two layers, in the case of the Cboe S&P 500 3x Up, 1x Down Enhanced Growth Index), depicted in Figure 5.

Each Target Outcome Index is typically made up of three main layers of options.

Figure 5: Target Outcome Index Options Layers

1. **S&P 500 Participation & Enhancement Layer:** The first layer involves buying and selling calls and puts (A), (B), (C), and (D), at pre-determined strikes to provide the desired S&P 500 participation. For Indexes that seek enhanced upside participation over the outcome period, Additional call options (E) are purchased.
2. **Downside Protection Layer:** Buffer Protect Indexes incorporate a second layer, which involves buying and selling puts (F) and (G). Together they produce the downside buffer (when applicable).
3. **Upside Cap Layer:** The final layer involves selling a call (H), which creates the upside cap. The strike price at which (H) is sold is determined so that the combined net options purchase price is approximately equal to the Index's current value.

				Cboe S&P 500 3x Up, 1x Down Enhanced Growth Index		Cboe S&P 500 2x Up, 1x Down, 10% Buffer Protect Index		Cboe S&P 500 15% Buffer Protect Index		Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index	
Layer	**Label**	**Position**	**Index**	**Strike**	**Pro Rata Weight**	**Strike**	**Pro Rata Weight**	**Strike**	**Pro Rata Weight**	**Strike**	**Pro Rata Weight**
1	(a)	Purchased CAll Option	S&P 500 Price Index	60%	2	60%	2	60%	2	60%	2
	(B)	Sold Put Option		60%	2	60%	2	60%	2	60%	2
	(C)	Purchased Put Option		120%	1	120%	1	120%	1	120%	1
	(D)	Sold Call Option		120%	1	120%	1	120%	1	120%	1
	(e)	Purchased Call Option		100%	2	100%	1	-	-	-	-
2	(F)	Sold Put Option		-	-	90%	1	85%	1	65%	1
	(G)	Purchased Put Option		-	-	100%	1	100%	1	95%	1
3	(H)	Sold Call Option		TBD*	3	TBD*	2	TBD*	1	TBD*	1

* Upside caps are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The table above is for illustrative purposes only and is is not representative of any fund or investment. These results do not represent actual trading.

A 30% buffer protection level that begins at -5% is constructed with a sold put option at a 65% strike, and a purchased put option at a 95% strike. Participation in the first 5% of S&P 500 loss allows for a higher upside cap.

Cboe Target Outcome Indexes seek to reshape the payoff profile of the S&P 500, providing more definition to the investment experience.

Together, these FLEX options positions create a “shaped” return profile relative to the underlying asset (S&P 500 Price Index). In Figure 6, the dotted line depicts the return profile of the S&P 500, which affords investors unlimited downside risk, and unlimited upside potential. The solid line depicts the shaped payoff profile of the Target Outcome Index. At the end of the outcome period it is expected that the Target Outcome Index return will fall somewhere along it's payoff profile.

One could also derive the expected return of the Target Outcome Index in relation to the S&P 500 by drawing a vertical line through any point along the S&P 500 (dotted line); the intersection of the vertical line with the Target Outcome Index payoff profile line is the expected outcome in relation to the S&P 500 (see pen icon).

Figure 6: Payoff Profiles: Cboe S&P 500 Target Outcome Indexes

Cboe S&P 500 3X UP, 1X DOWN ENHANCED GROWTH INDEX

Cboe S&P 500 2X UP, 1X DOWN, 10% BUFFER PROTECT INDEX

Cboe S&P 500 15% BUFFER PROTECT INDEX

Cboe S&P 500 30% (-5% TO -35%) BUFFER PROTECT INDEX

Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. Upside caps are meant to be illustrative and are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

Section 5: Historical Analysis

In this section, we compare the historical performance of the new series of Cboe Target Outcome Indexes to the S&P 500 Total Return Index. Given the objectives and applications of the Enhanced Growth Series and Buffer Protect Series are different, we have broken the performance analysis into these two respective categories. For brevity, we analyze the January issue of each Cboe Target Outcome Index Series.

Enhanced Growth Series

- Cboe S&P 500 3x Up, 1x Down Enhanced Growth Index - January (SPEG-01)

Buffer Protect Series

- Cboe S&P 500 2x Up, 1x Down, 10% Buffer Protect Index - January (SPEB-01)
- Cboe S&P 500 15% Buffer Protect Index - January (SPRF-01)
- Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index - January (SPRS-01)

A Word Regarding Dividends

Cboe Target Outcome Indexes provide defined outcomes related to the performance of the S&P 500 Price Return Index, which does not include the reinvestment of dividends. This is because Cboe S&P 500 Target Outcome Indexes use the dividend yield of the S&P 500 Index to "fund" each Target Outcome Index's defined outcomes (see previous option layering section). For context, dividends accounted for around 1.85% of the S&P 500's total return in 2017.

Why Compare Performance to the S&P 500 Total Return?

Cboe Target Outcome Indexes are not reliant on history. They seek to deliver mathematical outcome parameters to investors, in the future. This equates to better control over the financial planning process.

Investors and financial professionals tend to refer to the more widely used S&P 500 Total Return Index when comparing investment performance because it is more pertinent to a "real-world" investment in the S&P 500. With this in mind, we use the S&P 500 Total Return Index (which includes the reinvestment of dividends in its price) in our analysis.

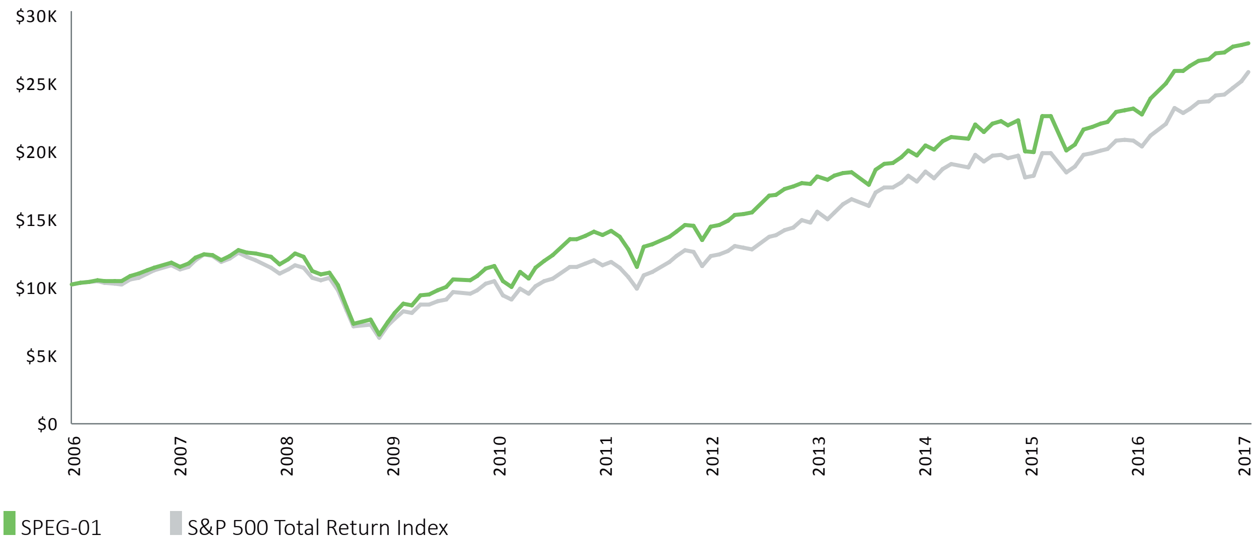
However, it is worth pointing out that comparing against the S&P 500 Total Return Index provides slightly less intuitive results, particularly evident in years where the S&P 500 Total Return Index is down or flat (i.e., 2008, 2011, and 2015). In 2008, for example, the Buffer Protect Indexes provided a buffer against a price decline in the S&P 500 Price Index that was in line with the buffer level outlined in each Index. However when compared to the S&P 500 Total Return, the outperformance was less than that of the buffer. This is due to the presence of dividends in the comparative analysis.

Performance Analysis

Enhanced Growth Target Outcome Index Series

Figures 7-9 explore the data of the Cboe S&P 500 3x Up, 1x Down Enhanced Growth Index - January (SPEG-01).

Figure 7: Growth of $10,000
Cboe S&P 500 3x Up, 1x Down Enhanced Growth Index - January (SPEG-01)



Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. **THESE RESULTS ARE BASED ON SIMULATED OR HYPOTHETICAL PERFORMANCE RESULTS HAVE CERTAIN INHERENT LIMITATIONS. UNLIKE THE RESULTS SHOWN IN AN ACTUAL PERFORMANCE RECORD, THESE RESULTS DO NOT REPRESENT ACTUAL TRADING. ALSO, BECAUSE THESE TRADES HAVE NOT ACTUALLY BEEN EXECUTED, THESE RESULTS MAY HAVE UNDER-OR OVER-COMPENSATED FOR THE IMPACT, IF ANY, OF CERTAIN MARKET FACTORS, SUCH AS LACK OF LIQUIDITY. SIMULATED OR HYPOTHETICAL TRADING PROGRAMS IN GENERAL ARE ALSO SUBJECT TO THE FACT THAT THEY ARE DESIGNED WITH THE BENEFIT OF HINDSIGHT. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THESE BEING SHOWN.**

On a cumulative basis, SPEG-01 outperformed the S&P 500 Total Return Index (187% versus 165%) with similar downside risk and enhanced upside performance. This suggests that, over time, the enhanced upside potential and non-enhanced downside exposure over the outcome period may provide alpha relative to the market, even when accounting for the dividend reinvestment on the S&P 500, and with the presence of an upside cap on the Target Outcome Index.

This is illustrated further in Figure 8, which depicts SPEG-01's historical upside caps (light green), SPEG-01's historical return (dark green), and the S&P 500 Total Return Index returns (grey).

Figure 8: Annual Upside Caps and Returns
Cboe S&P 500 3x Up, 1x Down Enhanced Growth Index

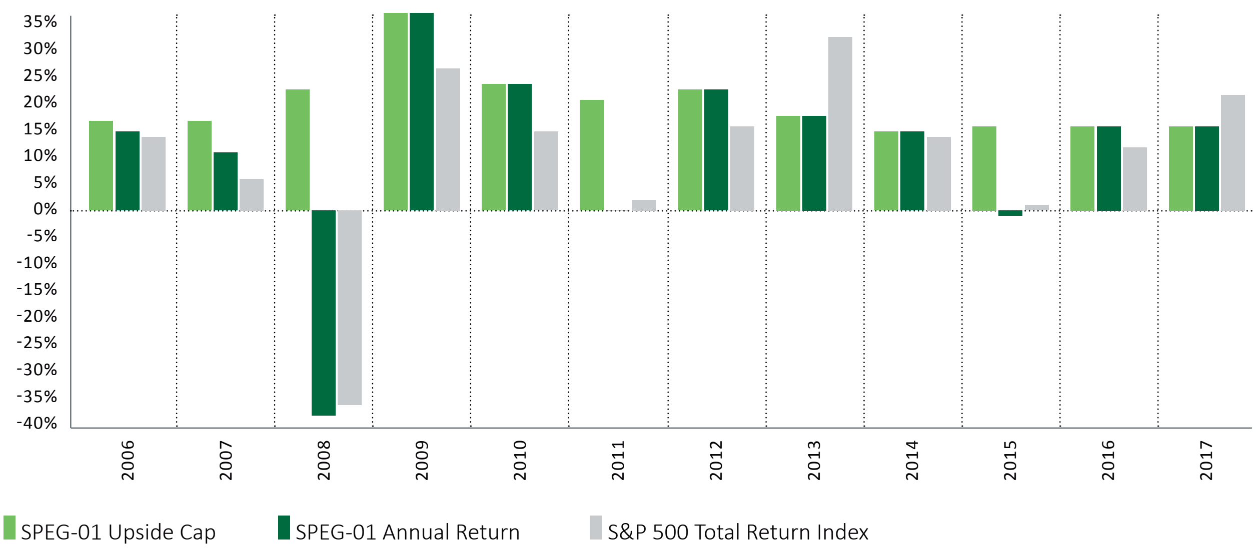


Figure 9 provides historical analysis of SPEG-01 on an annual basis.

Figure 9: Annual Performance Statistics
Cboe S&P 500 3x Up, 1x Down, Enhance and Growth Index - January (SPEG-01)

	Protection Level		Upside Cap		Return		Volatility		Maximum Drawdown		Sharpe	
2006	0%	–	16.71%	–	16.71%	15.79%	14.18%	9.94%	-6.56%	-2.71%	0.83	1.10
2007	0%	–	16.72%	–	10.59%	5.49%	15.81%	15.99%	-8.63%	-2.68%	0.35	0.03
2008	0%	–	22.51%	–	-38.49%	-37.00%	40.30%	40.96%	-49.08%	-46.95%	-1.01	-0.95
2009	0%	–	35.12%	–	35.12%	26.46%	28.20%	27.27%	-27.60%	-26.96%	1.24	0.96
2010	0%	–	23.77%	–	23.77%	15.06%	20.59%	18.06%	-15.31%	-8.85%	1.15	0.83
2011	0%	–	20.51%	–	0.00%	2.11%	28.08%	23.29%	-20.32%	-12.27%	0.00	0.09
2012	0%	–	22.80%	–	22.80%	16.00%	10.85%	12.75%	-7.91%	0.00%	2.09	1.25
2013	0%	–	18.28%	–	18.28%	32.39%	7.08%	11.05%	-3.00%	-0.33%	2.57	2.92
2014	0%	–	14.81%	–	14.81%	13.69%	10.43%	11.38%	-6.72%	-4.83%	1.42	1.20
2015	0%	–	15.61%	–	-0.73%	1.38%	19.93%	15.49%	-14.06%	-8.05%	-0.04	0.09
2016	0%	–	16.46%	–	16.46%	11.96%	14.08%	13.10%	-10.53%	-8.90%	1.15	0.89
2017	0%	–	15.61%	–	15.61%	21.83%	4.45%	6.70%	-1.43%	0.00%	3.31	3.13
AVG. Ann.	–	–	19.91%	–	9.32%	8.68%	20.38%	19.46%	–	–	0.40	0.39

SPEG-01   S&P 500 Total Return Index

Source for Figures 8 and 9: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. Upside caps are meant to be illustrative and are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

Over the entire time period, SPEG-01 provided enhanced annualized returns relative to the S&P 500 Total Return Index, and comparable volatility and downside risk.

Key Takeaways (SPEG-01)

- Over the entire time period, SPEG-01 provided enhanced annualized returns relative to the S&P 500 Total Return Index (9.32% versus 8.68%), and comparable volatility and downside risk.
- SPEG-01 has historically provided returns that are in line with or exceed the S&P 500 Index in most market environments.

- SPEG-01 tends to underperform during rapidly rising markets that also exhibit low volatility, like those seen in 2013 and 2017. In certain periods when the market may be both rising and experiencing heightened volatility (e.g., 2009 and 2010), SPEG-01 not only participated in the growth of the market, but outpaced it.
- During the only down year (2008), SPEG-01 worked as expected, experiencing non-enhanced downside returns in line with the S&P 500 (excluding dividends).
- On an annual basis, SPEG-01 outperformed the S&P 500 Total Return Index seven out of the past 12 years. Over the entire time period, we see two years (2013 and 2017) where the S&P 500 outpaced SPEG-01's upside cap.

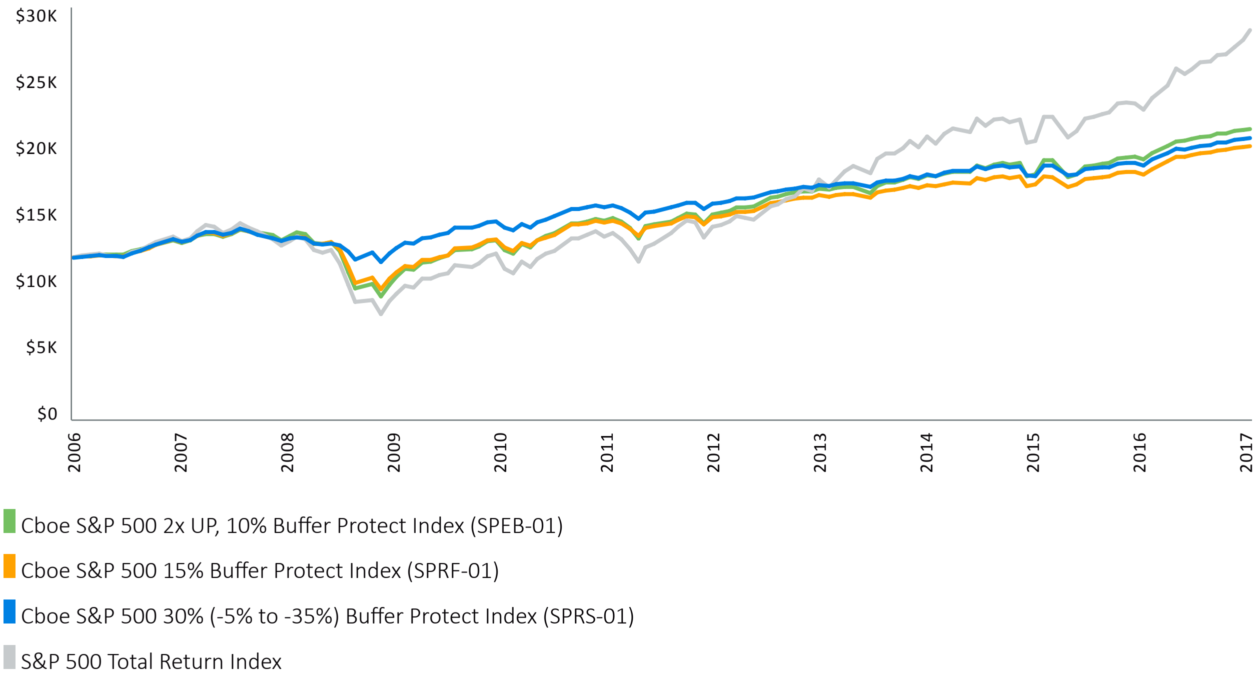
Performance Analysis

Buffer Protect Target Outcome Indexes

Figures 10-14 take a similar look at the data of the three Cboe S&P 500 Buffer Protect Indexes:

- Cboe S&P 500 2x Up, 1x Down, 10% Buffer Protect Index - January (SPEB-01)
- Cboe S&P 500 15% Buffer Protect Index - January (SPRF-01)
- Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index - January (SPRS-01)

Figure 10: Growth of $10,000
New Series of Cboe S&P 500 Buffer Protect Indexes



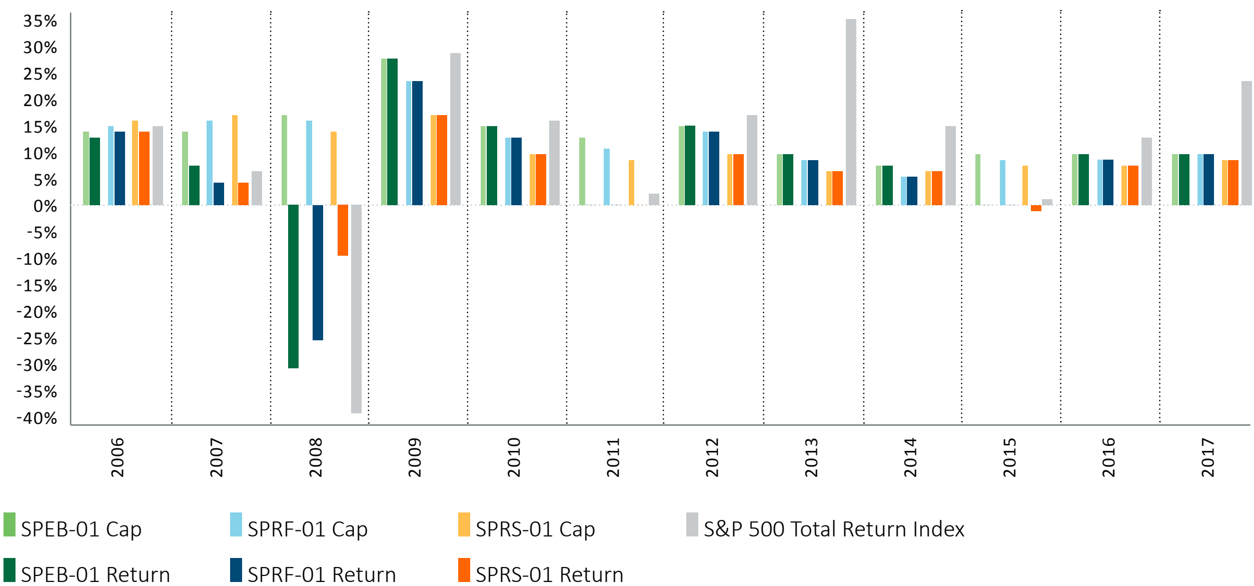
Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. **THESE RESULTS ARE BASED ON SIMULATED OR HYPOTHETICAL PERFORMANCE RESULTS HAVE CERTAIN INHERENT LIMITATIONS. UNLIKE THE RESULTS SHOWN IN AN ACTUAL PERFORMANCE RECORD, THESE RESULTS DO NOT REPRESENT ACTUAL TRADING. ALSO, BECAUSE THESE TRADES HAVE NOT ACTUALLY BEEN EXECUTED, THESE RESULTS MAY HAVE UNDER-OR OVER-COMPENSATED FOR THE IMPACT, IF ANY, OF CERTAIN MARKET FACTORS, SUCH AS LACK OF LIQUIDITY. SIMULATED OR HYPOTHETICAL TRADING PROGRAMS IN GENERAL ARE ALSO SUBJECT TO THE FACT THAT THEY ARE DESIGNED WITH THE BENEFIT OF HINDSIGHT. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THESE BEING SHOWN.**

On a cumulative basis, the new series of Cboe S&P 500 Buffer Protect Indexes illustrate their ability to shield investors from severe drawdowns in the market, in exchange for a measure of upside growth potential in rising markets.

Figure 11 depicts the historical upside caps of the Buffer Protect Indexes, followed by the annual performance statistics of each Buffer Protect Index (Figures 12-14).

Figure 11: Annual Upside Caps and Returns of Cboe S&p 500 Buffer Protect Indexes

- Cboe S&P 500 2x up, 1x Down, 10% Buffer Protect Index - January (SPEB-01)
- Cboe S&P 500 15% Buffer Protect Index - January (SPRF-01)
- Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index - January (SPRS-01)



Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. Upside caps are meant to be illustrative and are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

Figure 12: Annual Performance Statistics
Cboe S&P 500 2x Up, 1x Down, 10% Buffer Protect Index - January (SPEB-01)

	Protection Level		Upside Cap		Return		Volatility		Maximum Drawdown		Sharpe	
2006	10%	–	12.69%	–	12.69%	15.79%	9.47%	9.94%	-0.43%	-2.71%	0.82	1.10
2007	10%	–	13.20%	–	7.06%	5.49%	10.71%	15.99%	-1.01%	-2.68%	0.19	0.03
2008	10%	–	16.14%	–	-28.49%	-37.00%	32.61%	40.96%	-38.64%	-46.95%	-0.94	-0.95

2009	10%	–	25.57%	–	25.57%	26.46%	20.70%	27.27%	-20.12%	-26.96%	1.23	0.96
2010	10%	–	14.35%	–	14.35%	15.06%	12.69%	18.06%	-4.64%	-8.85%	1.12	0.83
2011	10%	–	11.75%	–	0.00%	2.11%	16.21%	23.29%	-6.64%	-12.27%	-0.01	0.09
2012	10%	–	14.48%	–	14.48%	16.00%	6.96%	12.75%	0.00%	0.00%	2.06	1.25
2013	10%	–	9.24%	–	9.24%	32.39%	3.87%	11.05%	-0.16%	-0.33%	2.37	2.92
2014	10%	–	7.44%	–	7.44%	13.69%	5.25%	11.38%	-2.67%	-4.83%	1.41	1.20
2015	10%	–	8.69%	–	0.00%	1.38%	10.27%	15.49%	-3.54%	-8.05%	-0.01	0.09
2016	10%	–	9.20%	–	9.20%	11.96%	8.29%	13.10%	-5.58%	-8.90%	1.07	0.89
2017	10%	–	8.97%	–	8.97%	21.83%	2.50%	6.70%	0.00%	0.00%	3.24	3.13
AVG. Ann.			12.64%		5.76%	8.68%	14.07%	19.46%			0.33	0.39

SPEB-01   S&P 500 Total Return Index

Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. Upside caps are meant to be illustrative and are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

Due to the presence of the 10% downside protection level, the upside cap levels are lower than that of an enhanced growth strategy without a protection level.

Key Takeaways (SPEB-01)

- SPEB-01 participated in enhanced growth up to a cap, and shielded the Index from a 10% loss in 2008, relative to the S&P 500 (excluding dividends).
- Over the entire time period, SPEB-01 provided annualized returns of 5.76%, versus 8.68% for the S&P 500 Total Return Index with approximately 27% less volatility and the continual presence of a 10% buffer.
- Due to the presence of the 10% downside protection level, the upside cap levels are lower than that of an enhanced growth strategy without a protection level.

Figure 13: Annual Performance Statistics
Cboe S&P 500 15% Buffer Protect Index - January (SPRF-01)

	Protection Level		**Upside Cap**		**Return**		**Volatility**		**Maximum Drawdown**		**Sharpe**	
2006	15%	–	13.96%	–	13.62%	15.79%	10.43%	9.94%	-0.75%	-2.71%	0.84	1.10

2007	15%	–	14.54%	–	3.53%	5.49%	9.80%	15.99%	-1.04%	-2.68%	-0.16	0.03
2008	15%	–	14.99%	–	-23.49%	-37.00%	29.20%	40.96%	-33.44%	-46.95%	-0.87	-0.95
2009	15%	–	22.24%	–	22.24%	26.46%	17.64%	27.27%	-16.81%	-26.96%	1.25	0.96
2010	15%	–	12.30%	–	12.30%	15.06%	10.30%	18.06%	-3.82%	-8.85%	1.18	0.83
2011	15%	–	10.32%	–	0.00%	2.11%	11.97%	23.29%	-5.00%	-12.27%	-0.01	0.09
2012	15%	–	12.61%	–	12.61%	16.00%	6.66%	12.75%	0.00%	0.00%	1.88	1.25
2013	15%	–	7.78%	–	7.78%	32.39%	3.26%	11.05%	-0.13%	-0.33%	2.36	2.92
2014	15%	–	5.47%	–	5.47%	13.69%	3.87%	11.38%	-1.90%	-4.83%	1.40	1.20
2015	15%	–	7.63%	–	0.00%	1.38%	7.23%	15.49%	-2.65%	-8.05%	-0.01	0.09
2016	15%	–	8.45%	–	8.45%	11.96%	7.05%	13.10%	-4.54%	-8.90%	1.15	0.89
2017	15%	–	8.56%	–	8.56%	21.83%	2.36%	6.70%	0.00%	0.00%	3.26	3.13
AVG. Ann.			11.57%		5.22%	8.68%	12.16%	19.46%			0.34	0.39

SPRF-01 S&P 500 Total Return Index

Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. Upside caps are meant to be illustrative and are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

Key Takeaways (SPRF-01)

- SPRF-01 participated in enhanced growth up to a cap, and shielded the Index from a 15% loss in 2008, relative to the S&P 500 (excluding dividends).
- Over the entire time period, SPRF-01 provided annualized returns of 5.22%, versus 8.68% for the S&P 500 Total Return Index, with significantly less volatility and downside risk.
- SPRF-01 has historically participated most fully in market growth during periods when the market is both rising and experiencing "normal" or heightened volatility (e.g., 2009 and 2010). The Index tends to underperform when the market is both rising rapidly and experiencing lower than normal levels of volatility.

Figure 14: Annual Performance Statistics
Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index - January (SPRS-01)

	Protection Level		Upside Cap		Return		Volatility		Maximum Drawdown		Sharpe	
2006	-5% – -35% (30%)	–	15.03%	–	13.62%	15.79%	11.83%	9.94%	-1.08%	-2.71%	0.74	1.10

2007	-5% – -35%	–	15.60%	–	3.53%	5.49%	11.03%	15.99%	-1.27%	-2.68%	-0.14	0.03
2008	-5% – -35%	–	13.13%	–	-8.49%	-37.00%	18.79%	40.96%	-19.10%	-46.95%	-0.56	-0.95
2009	-5% – -35%	–	15.63%	–	15.63%	26.46%	12.20%	27.27%	-11.46%	-26.96%	1.26	0.96
2010	-5% – -35%	–	9.24%	–	9.24%	15.06%	7.78%	18.06%	-2.98%	-8.85%	1.17	0.83
2011	-5% – -35%	–	7.80%	–	0.00%	2.11%	10.26%	23.29%	-4.15%	-12.27%	-0.01	0.09
2012	-5% – -35%	–	8.93%	–	8.93%	16.00%	4.82%	12.75%	0.00%	0.00%	1.83	1.25
2013	-5% – -35%	–	6.27%	–	6.27%	32.39%	2.81%	11.05%	-0.15%	-0.33%	2.21	2.92
2014	-5% – -35%	–	6.22%	–	6.22%	13.69%	4.34%	11.38%	-1.65%	-4.83%	1.43	1.20
2015	-5% – -35%	–	6.63%	–	-0.73%	1.38%	7.95%	15.49%	-3.67%	-8.05%	-0.10	0.09
2016	-5% – -35%	–	7.15%	–	7.15%	11.96%	5.95%	13.10%	-3.52%	-8.90%	1.15	0.89
2017	-5% – -35%	–	8.05%	–	8.05%	21.83%	2.34%	6.70%	0.00%	0.00%	3.07	3.13
AVG. Ann.		–	9.97%	–	5.50%	8.68%	9.42%	19.46%			0.46	0.39

SPRS-01 S&P 500 Total Return Index

Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. Upside caps are meant to be illustrative and are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

Over the time series, SPRS-01 exhibited higher risk-adjusted returns relative to the S&P 500 Total Return Index.

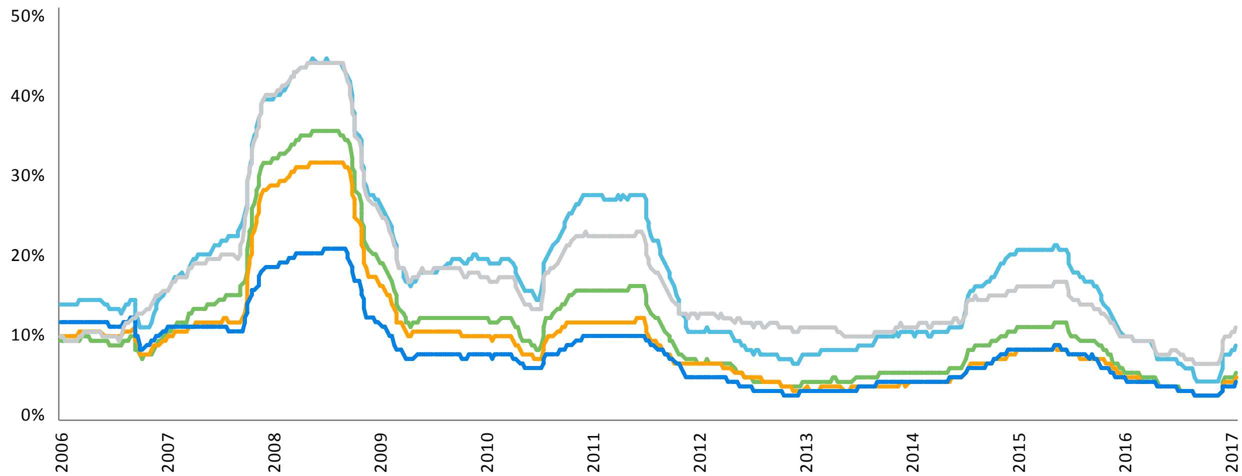
Key Takeaways (SPRS-01)

- Over the time series, SPRS-01 exhibited higher risk-adjusted returns over the S&P 500 (Sharpe of 0.46 vs 0.39).
- During a market environment SPRS-01 was designed to protect against (i.e., 2008), SPRS-01 returned -8.49% versus -37.00% for the S&P Total Return Index, shielding investors from 30% of S&P 500 losses (excluding dividends).
- By forgoing protection on the first 5% of market losses, SPRS-01 is generally able to afford investors "tail risk" protection, while maintaining a measure of upside growth potential.
- The average annual return for SPRS-01 was 5.50%, versus 8.68% for the S&P 500, with average volatility of 9.42% versus 19.46% respectively.

Historical Volatility

Figure 15 illustrates the historical volatility of the S&P 500 Index and Cboe Target Outcome Indexes.

Figure 15: Rolling One-Year Volatility



- Cboe S&P 500 3x UP, 1x Down Enhanced Growth Index (SPEG-01)
- Cboe S&P 500 2x UP, 1x Down, 10% Buffer Protect Index (SPEB-01)
- Cboe S&P 500 15% Buffer Protect Index (SPRF-01)
- Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index (SPRS-01)
- S&P 500 Total Return Index

Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

As the figure suggests, the greater the protection level of the Target Outcome Index, the lower the volatility that the respective Index displays. The risk appetites afforded each Target Outcome Index are best illustrated in years when the market exhibits higher than normal levels of volatility (e.g., 2008, 2011, 2015).

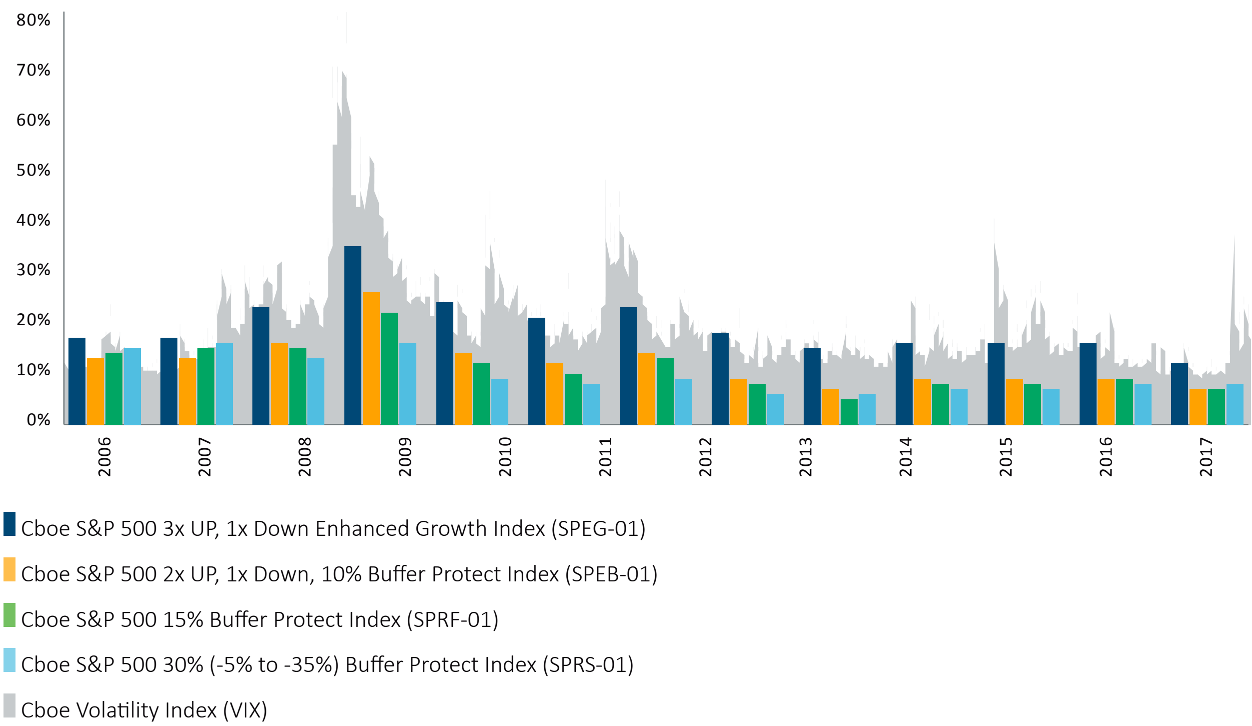
Volatility's Relationship to Caps

Elevated implied market volatility tends to contribute positively to upside caps, and vice versa.

The upside cap of each Target Outcome Index is influenced by several factors, including S&P 500 dividend yield, volatility, interest rates, and skew (the difference in implied volatility between out-of-the-money options, at-the-money options and in-the-money options). Generally, in times of elevated volatility, when risk management is typically needed, the implied volatility of S&P 500 Options contributes positively to upside caps. Conversely, in times of low implied volatility, upside caps tend to be lower.

Figure 16 illustrates this relationship through the historical implied volatility of the S&P 500 Index (Cboe Volatility Index) and the historical upside caps of each Target Outcome Index.

Figure 16: S&P 500 Implied Volatility and Target Outcome Index Caps



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Section 6: Sample Portfolio Analysis

In this section we perform portfolio analysis on three hypothetical portfolios (growth, moderate, and conservative) allocated to various degrees of equities, target outcome equities, and fixed income asset classes. The equity allocation of the portfolio is represented by the S&P 500 Total Return Index. The target outcome equity allocation is represented by two Cboe Target Outcome Indexes (outlined below). The fixed income portion is represented by the Barclays Capital U.S. Aggregate Bond Index.

Moving Portfolio Risk Management to the Equity Side

Cboe Target Outcome Indexes allow people to stay invested in the market, knowing they have upside potential with defined downside risk through all market environments (even volatile ones).

Managing portfolio risk has historically been accomplished through fixed allocations to bonds, or through more tactical measures that allocate away from stocks (into safer assets) when markets become volatile. Cboe Target Outcome Indexes' defined upside and downside buffers may allow investors to more confidently participate in all market environments (including volatile ones).

Additionally, given today's low rising interest rate environment, and a growing consensus that the relationship between stocks and bonds observed in recent decades may be changing, many financial professionals are seeking alternative methods to lower portfolio volatility and drawdown risk than simply allocating more heavily to bonds.

Through the Target Outcome Portfolios, we analyze the effects of maintaining a "growth" like equity allocation across all three portfolios (growth, moderate, and conservative), but replace the S&P 500 component with varying degrees of enhanced growth target outcome equities (represented by the Cboe S&P 500 3x Up, 1x Down, Enhanced Growth Index - January (SPEG-01)), and buffer protected target outcome equities (represented by the Cboe S&P 500 30% (-5% to -35%) Buffer Protect Index - January (SPRS-01)) in order to generate the desired risk tolerance levels. This is outlined in the table below.

Hypothetical Target Outcome Portfolio Composition				
	S&P 500	**SPEG-01 (3x Up, 1x Dn)**	**SPRS-01 (30% Buffer)**	**Barclay's Agg.**
Traditional Portfolio - Growth	80%	–	–	20%
Target Outcome Portfolio - Growth	–	80%	–	20%
Traditional Portfolio - Moderate	70%	–	–	30%
Target Outcome Portfolio - Moderate	–	60%	20%	20%
Traditional Portfolio - Conservative	60%	–	–	40%
Target Outcome Portfolio - Conservative	–	40%	40%	20%

Figures 18-22 analyze these three hypothetical Target Outcome Portfolios across two investment and/or life phases—accumulation and decumulation.

Accumulation Phase

Accumulating portfolios that incorporate Target Outcome Indexes have

Figure 17 illustrates the hypothetical growth of $100,000 of all six portfolios (growth in orange, moderate in green, conservative in blue), rebalanced annually.

Figure 17: Portfolio Analysis: Growth of $100,000 (Hypothetical)

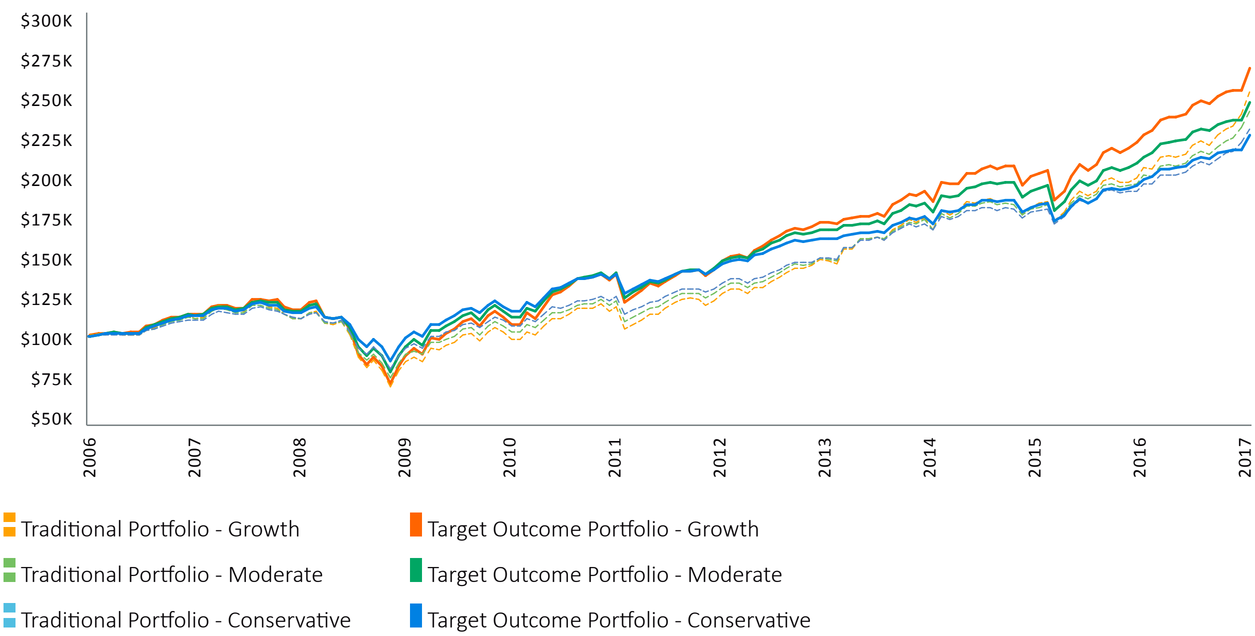


Figure 18 depicts each portfolio from an annualized risk/return perspective.

Figure 18: Portfolio Analysis: Target Outcome Portfolios (Hypothetical)

	Return	Volatility	Max. 21 Day Rolling Vol.	Alpha	Beta	Sharpe
Traditional Portfolio - Growth	7.54%	14.71%	65.37%	0.74%	0.75	0.45
Target Outcome Portfolio - Growth	8.11%	15.47%	59.95%	1.34%	0.75	0.44
Traditional Portfolio - Moderate	7.22%	12.52%	54.65%	1.28%	0.64	0.49
Target Outcome Portfolio - Moderate	7.45%	13.14%	49.49%	1.59%	0.63	0.48
Traditional Portfolio - Conservative	6.86%	10.43%	44.77%	1.75%	0.53	0.55
Target Outcome Portfolio - Conservative	6.71%	10.97%	41.16%	1.73%	0.51	0.51

Source for Figures 17 and 18: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. Beta is relative to the S&P 500 Index.

THESE RESULTS ARE BASED ON SIMULATED OR HYPOTHETICAL PERFORMANCE RESULTS HAVE CERTAIN INHERENT LIMITATIONS. UNLIKE THE RESULTS SHOWN IN AN ACTUAL PERFORMANCE RECORD, THESE RESULTS DO NOT REPRESENT ACTUAL TRADING. ALSO, BECAUSE THESE TRADES HAVE NOT ACTUALLY BEEN EXECUTED, THESE RESULTS MAY HAVE UNDER-OR OVER-COMPENSATED FOR THE IMPACT, IF ANY, OF CERTAIN MARKET FACTORS, SUCH AS LACK OF LIQUIDITY. SIMULATED OR HYPOTHETICAL TRADING PROGRAMS IN GENERAL ARE ALSO SUBJECT TO THE FACT THAT THEY ARE DESIGNED WITH THE BENEFIT OF HINDSIGHT. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THESE BEING SHOWN.

Key Takeaways

By using an Enhanced Growth Index as the growth engine, and a Buffer Protect Index as the risk management engine, we can derive a few results:

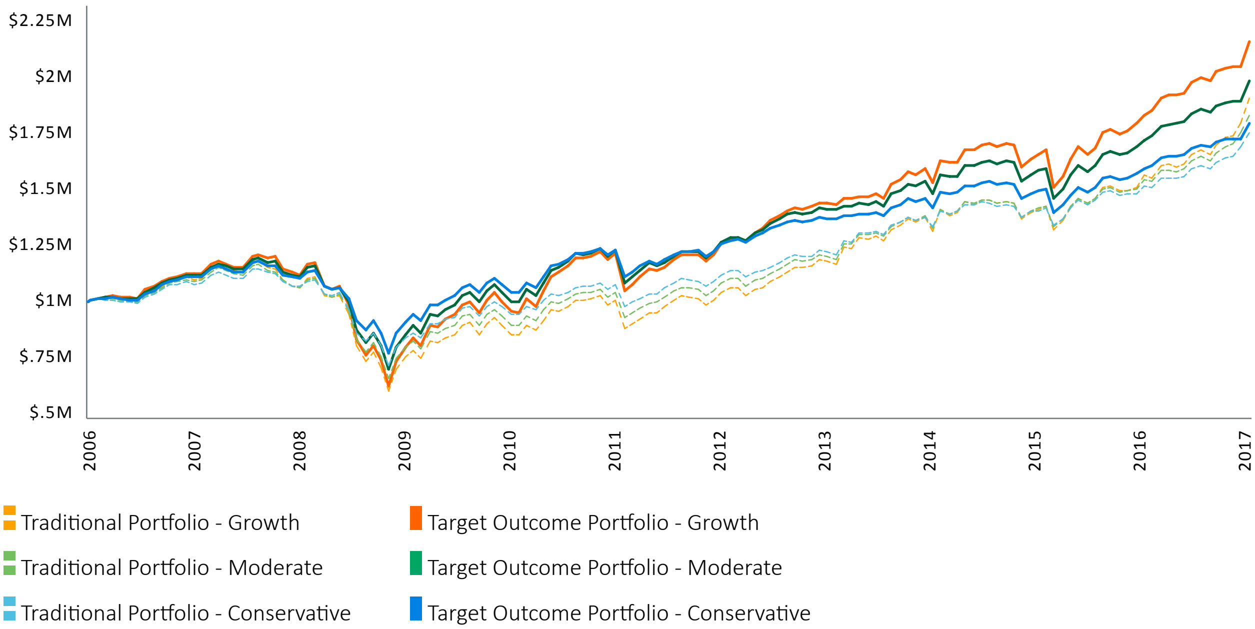
- The Target Outcome Growth Portfolio allowed investors to obtain increased upside performance over the traditional growth portfolio, with similar volatility and downside risk.
- When enhanced equities are used in place of traditional equities, growth may be enhanced over time, with the exception of certain stock market environments that are both rapidly rising and exhibiting low volatility. In these instances, uncapped (and unhedged) market exposure is preferable.
- Through the use of buffer protected equities (e.g., Cboe S&P 500 30% [-5% to -35%] Buffer Protect Index) the Target Outcome Moderate and Conservative Portfolios were able to maintain a "growth" like equity allocation, with similar volatility and drawdown levels as their traditional counterparts.
- Given the presence of defined downside protection levels, investors may be better able to meet their risk tolerance profiles.

Decumulation Phase

Decumulating investors, such as retirees and defined benefit plans must view performance differently. Often, their long-term goals are often related to providing for themselves when they no longer work (for retirees), or meeting long-term liabilities and forced distributions through volatile markets (for pension plans). For these groups, their goals are solved through risk management.

Figure 19 depicts the results of each portfolio, with a starting portfolio value of $1 million, withdrawing $50,000 per year, distributed monthly, adjusted for inflation, and rebalanced annually.

Figure 19: Decumulating Target Outcome Portfolio Values (Hypothetical)



Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2006 - 12/31/2017. **THESE RESULTS ARE BASED ON SIMULATED OR HYPOTHETICAL PERFORMANCE RESULTS HAVE CERTAIN INHERENT LIMITATIONS. UNLIKE THE RESULTS SHOWN IN AN ACTUAL PERFORMANCE RECORD, THESE RESULTS DO NOT REPRESENT ACTUAL TRADING. ALSO, BECAUSE THESE TRADES HAVE NOT ACTUALLY BEEN EXECUTED, THESE RESULTS MAY HAVE UNDER-OR OVER-COMPENSATED FOR THE IMPACT, IF ANY, OF CERTAIN MARKET FACTORS, SUCH AS LACK OF LIQUIDITY. SIMULATED OR HYPOTHETICAL TRADING PROGRAMS IN GENERAL ARE ALSO SUBJECT TO THE FACT THAT THEY ARE DESIGNED WITH THE BENEFIT OF HINDSIGHT. NO REPRESENTATION IS BEING MADE THAT ANY ACCOUNT WILL OR IS LIKELY TO ACHIEVE PROFITS OR LOSSES SIMILAR TO THESE BEING SHOWN.**

Key Takeaways

- When withdrawals are taken into consideration, the benefits of using Target Outcome Indexes are further illustrated. This is due to the Indexes' ability to shield portfolios from defined measures of downside risk, as well as participate in enhanced growth potential (to a cap).
- The Target Outcome Growth Portfolio provided an additional $237,089 over the time series, relative to the traditional growth portfolio. Target Outcome Moderate provided an additional $140,141 over its traditional moderate portfolio counterpart, and Target Outcome Conservative an additional $41,004.

- Known levels of upside participation and downside protection may allow retirees and institutional investors to overcome the longevity risk and sequencing risk that is typically associated with decumulation portfolios.
- The Target Outcome Portfolios are not reliant on a large down market for long-term outperformance. Rather, they are able to participate in the upside potential of the market (to a cap), with a degree of drawdown protection.
- All three Target Outcome Portfolios delivered upside performance in line with the traditional growth portfolio, beating their respective traditional portfolio counterparts, with volatility in line with the traditional conservative portfolio.

Section 7: Interim Periods Shareholders

Transparency and Liquidity

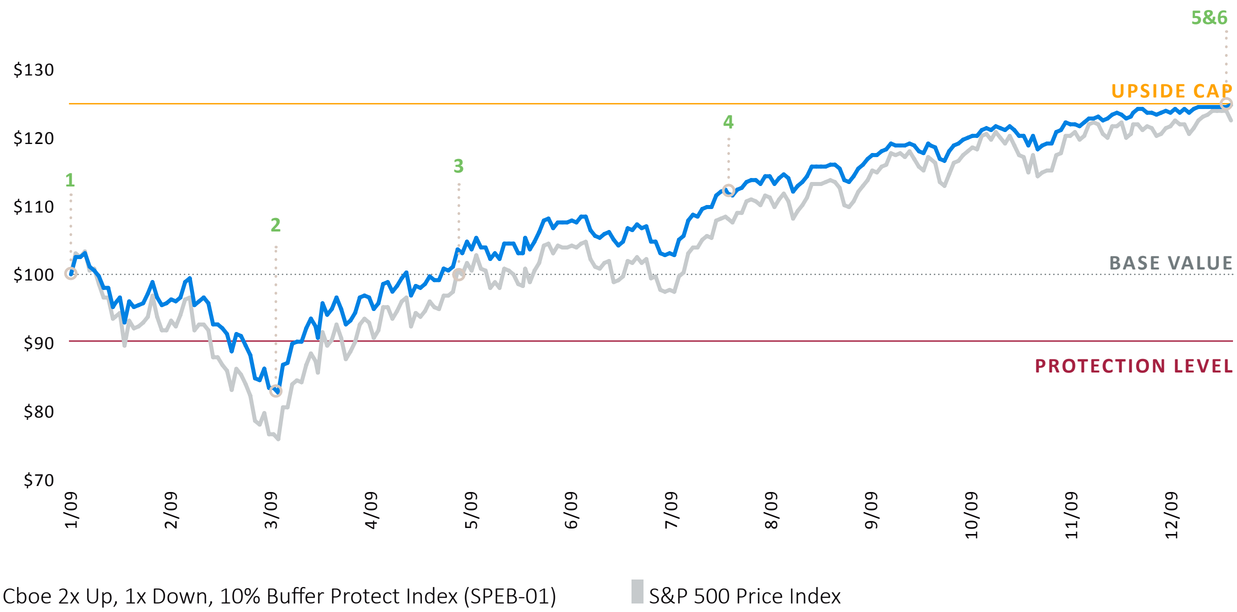
Structured products provide defined outcome parameters over a stated time period. These products typically have an initial "raise up" period, where the issuers accept investors' money, and then that money is invested on a certain day, with the expectation that it will be returned (according to the investment methodology) to the investors at a specific point in the future (e.g., 18 months). Investors who purchase these products are generally informed that they should intend to leave their money in the product for the life of the product. By design, structured products are relatively illiquid and opaque.

When target outcome strategies are replicated inside an ETF, transparency and liquidity are not only improved, but are often touted as benefits of the ETF vehicle. As a result, some education is necessary for interim period shareholders—those investors who purchase shares of the ETF after the first day of the outcome period (when the new options contracts are purchased, and the protection level and upside cap is established)—and for those who purchased on day one, but sell before the end of the outcome period.

The experience of these shareholders is illustrated in Figures 21 and 22, which depict that, because of the transparent underlying positions and exchange-traded nature, each Target Outcome ETF delivers a defined set of parameters throughout the day, as the ETF's NAV changes, thus providing financial professionals and investors information that allows them to make an informed decision about the investment opportunity in front of them, and the future outcome of their investment dollars.

Figure 20 shows the historical index values of the Cboe 2x Up, 1x Down, 10% Buffer Protect Index throughout 2009—a period that exhibit many of the scenarios an investor might encounter throughout the outcome period (e.g., positive and negative market movements, elevated levels of volatility, downside risk below the protection zone, upside growth to a cap)—ultimately finishing the year positive. We have also included the S&P 500 Price Index for comparison (to best illustrate the defined outcome)and have converted both index values to a base of $100, keeping in mind index data is historical, and does not account for fees and expenses.

Figure 20: Interim Period Shareholders - 2009				
	Protection Level	**Cap**	**Upside**	**Downside**
Cboe 2x Up, 1x Down 10% Buffer Protect Index - January Series (SPEB-01)	10%	25.57%	2x	1x
S&P 500 Price Return Index	N/A	N/A	1x	1x



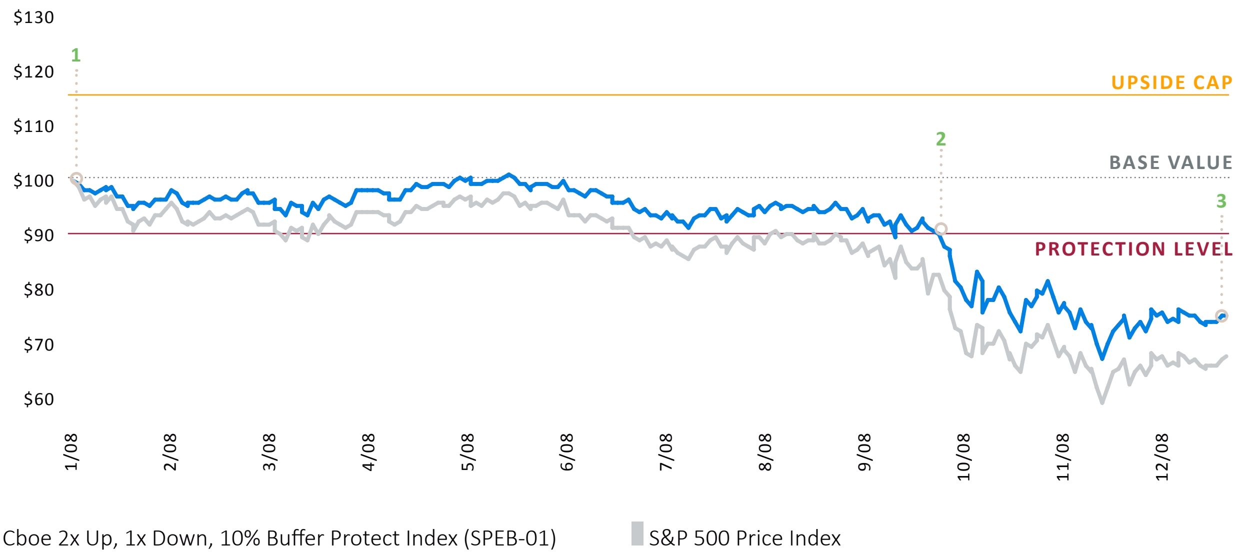
Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2008 - 12/31/2009. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. Upside caps are meant to be illustrative and are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

	Analysis
1	Hypothetical portfolios that hold the Index when the new options positions are purchased, and hold the Index for the entire outcome period (1 year), obtain a defined protection level, and enhanced upside growth to a defined cap, delivered at the end of the outcome period.
2	Over the first 90 days, the S&P 500 declined by approximately 25%. The Target Outcome Index also declined into the "protection zone." This is possible because there is still time value left in the options positions. Had the S&P 500 Index ended the year in this position (down 25%), the Target Outcome Index would have experienced a loss of approximately 15% (25% - 10%).

3	By May, the S&P 500 recovered all of its losses, and the Target Outcome Index also exhibited upside growth. On May 4th, the S&P 500 crossed back through its baseline price, closing at $100.44, while the Target Outcome Index closed at $103.83 (up 3.38%). It is important to note that the 2:1 upside "enhancement" is designed to deliver this factor on a point-to-point (annual) basis, and will likely not deliver a 2:1 enhancement over shorter time periods.
4	The S&P 500 Index continued to climb through the second half of the year, and the Target Outcome Index provided exposure to this growth (to a cap).
5	The Target Outcome Index approached its cap near the end of the outcome period. Because the underlying options contracts had little time value remaining, and the S&P 500 was below the cap, the Target Outcome "NAV" remained near the cap even while the S&P 500 experiences more volatility.
6	On the last day of the outcome period (12/31/09), the price of the Target Outcome Index ended at $125.57, which equates to the initially stated cap of 25.57%. The S&P 500 Index declined 1.00% on 12/31/09, but due to the enhanced upside, had no bearing on the Target Outcome NAV.

To review a time period where the buffer protection level was used, we can review the only down year in the time series—2008.

Figure 21: Interim Period Shareholders - 2008				
	Protection Level	**Cap**	**Upside**	**Downside**
Cboe 2x Up, 1x Down 10% Buffer Protect Index - January Series (SPEB-01)	10%	16.14%	2x	1x
S&P 500 Price Return Index	N/A	N/A	1x	1x



Source: Cboe Exchange, Inc., and Bloomberg LP, as of 12/31/2007 - 12/31/2008. The results shown are historical, for informational purposes only, not reflective of any investment, and do not guarantee future results. Any reference to a market index is included for illustrative purposes only, as it is not possible to directly invest in an index. Indices are unmanaged, hypothetical vehicles that serve as market indicators and do not account for the deduction of management fees or transaction costs generally associated with investable products, which otherwise have the effect of reducing the results of an actual investment portfolio. Upside caps are meant to be illustrative and are determined at the inception of each outcome period. Actual cap levels are affected by multiple factors and may be materially different than what is illustrated. The new series of Cboe S&P 500 Target Outcome Indexes were launched 2/2/18. All index data prior to the launch is backfilled.

	Analysis
1	Hypothetical portfolios that are holding the Index when the new options positions are purchased, and hold the Index for the entire outcome period (1 year), obtain a 10% buffer relative to the S&P 500 Price Index.
2	The S&P 500 spent all of 2008 in negative territory. Through the latter half of the year, we see the Target Outcome Index's buffer "growing." Toward the end of September 2008, the S&P 500 was down approximately 20%, and we see the Target Outcome Index cross below its buffer zone (10%) for the first time.
3	The S&P 500 ended the year down approximately -38.55%, while SPEB-01 ended the year 10% higher, at -28.55%. However, because the market was down so extensively, we see much of the buffer protection level in effect months prior to the end of the outcome period.

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