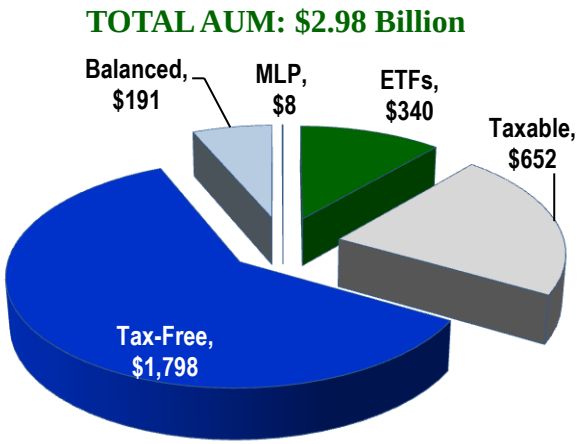
# Market Volatility & Leveraged Market Volatility

# Company Profile

- ✓ Managing client portfolios since 1973
- ✓ Over $2.9 billion total assets under management
  - Individuals
  - Institutions
  - Retirement plans
  - Government entities
  - Cash management portfolios
  - Foundations and Charitable Accounts
- ✓ Team-based approach with average investment experience of over 25 years
- ✓ Clients located throughout the US and abroad
- ✓ Offices
  - Headquartered in Sarasota, Florida
  - Branch office in Vineland, New Jersey



# ETF Team

**David R. Kotok** cofounded Cumberland Advisors in 1973 and has been its Chief Investment Officer since inception. He holds a B.S. in economics from The Wharton School of the University of Pennsylvania, an M.S. in organizational dynamics from The School of Arts and Sciences at the University of Pennsylvania, and an M.A. in philosophy from the University of Pennsylvania. Mr. Kotok's articles and financial market commentaries have appeared in The New York Times, The Wall Street Journal, Barron's, and other publications. He is a frequent contributor to Bloomberg TV and Bloomberg Radio, Fox Business, and other media. Mr. Kotok has served as Program Chairman and currently serves as a Director of the Global Interdependence Center (GIC), www.interdependence.org, whose mission is to encourage the expansion of global dialogue and free trade in order to improve cooperation and understanding among nation states, with the goal of reducing international conflicts and improving worldwide living standards. Mr. Kotok chaired its Central Banking Series and organized a five-continent dialogue held in Cape Town, Hong Kong, Hanoi, Milan, Paris, Philadelphia, Prague, Rome, Santiago, Shanghai, Singapore, Tallinn, and Zambia (Livingstone). He has received the Global Citizen Award from GIC for his efforts. Mr. Kotok is a member of the National Business Economics Issues Council (NBEIC), the National Association for Business Economics (NABE) and served on the Research Advisory Board of BCA Research. Mr. Kotok has served as a Commissioner of the Delaware River Port Authority (DRPA) and on the Treasury Transition Teams for New Jersey Governors Kean and Whitman. He has also served as a board member of the New Jersey Economic Development Authority and as Chairman of the New Jersey Casino Reinvestment Development Authority. He has authored or co-authored four books, including the second edition of *From Bear to Bull with ETFs* and *Adventures in Muniland*.

**Dr. Leo Chen** joined Cumberland Advisors as a consultant in 2014 and became a portfolio manager in 2016. Dr. Chen is an investment adviser representative. He is also an assistant professor of finance at the University of Southern Mississippi. Dr. Chen holds a Ph.D. in finance from the University of South Florida and a B.A. in economics from the University of Rochester. In 2010, he was a research scholar in mathematics at the Fields Institute for Research in Mathematical Sciences. Dr. Chen specializes in quantitative analysis, particularly in time-series empirical research. He also works in areas such as stochastic calculus and Brownian motion. His research utilizes quantitative methods to examine market returns and underlying volatilities. Dr. Chen provides applications of mathematics targeted at improving risk adjusted returns relative to benchmarks. Dr. Chen's research has been quoted by the Wall Street Journal, Barron's, Morningstar, Bloomberg Radio, MarketWatch, Business Insider, Yahoo!, and various international media in Asia and Europe.

**Dr. Robert A. Eisenbeis** serves as Cumberland Advisors' Chief Monetary Economist. In this capacity, he advises Cumberland's asset managers on developments in US financial markets, the domestic economy and their implications for investment and trading strategies. Dr. Eisenbeis was formerly Executive Vice-President and Director of Research at the Federal Reserve Bank of Atlanta, where he advised the bank's president on monetary policy for FOMC deliberations and was in charge of basic research and policy analysis. Prior to that, he was the Wachovia Professor of Banking at the Kenan-Flagler School of Business at the University of North Carolina at Chapel Hill. He has also held senior positions at the Federal Reserve Board and FDIC. He is currently a member of the Shadow Financial Regulatory Committee and Financial Economist Roundtable and a Fellow of both the National Association of Business Economics and Wharton Financial Institutions Center. He holds a Ph.D. and M.S. degree from the University of Wisconsin and a B.S. degree from Brown University. Dr. Eisenbeis moved to Lakewood Ranch, Florida with his wife and daughter in 2012. He now works out of the firm's Sarasota, Florida headquarters office.

**Matthew McAleer** serves as the Executive Vice President and Director of Equity Strategies. He is responsible for overseeing all aspects of Cumberland Advisors' equity group including portfolio management, research and trading. With a focus on quantitative research, Mr. McAleer uses detailed trend, price and relative strength analysis to manage portfolio construction and to identify investment opportunities across multiple asset classes. Mr. McAleer began as an investment advisor in 1994 analyzing bonds, stocks, mutual funds and eventually exchange-traded funds at Wheat First Securities. At Wheat First Securities, he began developing the portfolio management style that has become his hallmark management style that focuses on tactical asset allocation using trend and relative strength analysis. Mr. McAleer has over 25 years of investment management experience and previously led the tactical asset allocation strategies at Hudson Canyon Investment Counselors and Classic Asset Management. The strategy was recognized as a "Top Gun" performer by PSN Informa in 2013. He holds a B.S. degree in marketing/economics from Rider University, where he also competed for the wrestling team.

# Portfolio Style

## Investment Objective

- ✓ Match or exceed the benchmark's performance (S&P 500) with lower volatility

## Investment Philosophy

- ✓ Market tends to overreact in volatile environments and generates downward momentum
- ✓ Market behavior demonstrates mean-reversal pattern throughout long-term history
- ✓ Discover critical periods of market overreaction representing buying opportunities, using quantitative analysis, in order to capture upside reversal of returns

## Investment Approach

- ✓ Actively manage index portfolios with focus on market volatilities by using exchange-traded funds (ETFs)
- ✓ Portfolio may hold one of two potential ETFs, whichever is deemed more beneficial to investors
  - ✓ Market Volatility employs either SPY or IVV and does not use leverage
  - ✓ Leveraged Market Volatility uses leverage by employing either the 3-times leveraged ETF, SPXL, or the 3-time leveraged ETF, UPRO.

# 3 Stage Quantitative Model Process

## 1. Dynamic Indicator Selection

Quantitative selection process sorting market variables that have current predictive power based on market conditions. Approximately 10 to 15 indicators selected by quantitative screening.

## 2. Buying Discipline

When all current indicators hit buying threshold, the portfolio will buy the market and become fully invested

## 3. Surveillance & Exit Rule

- 90-day holding period (trading days)
- 10% exit target
- If the current position encounters a negative return at the end of the holding period, the strategy will extend another holding period and apply the same rules
- Complacency indicator
- Rolling forecast

# Volatility & Contrarian Strategy

- ✓ Market volatility index (VIX)
  - Also known as the fear gauge
  - Measures the expected volatility in the S&P 500 over the next 30-day period
  - Reflects the market's perception of the upcoming risk
- ✓ Take advantage of the stock market's volatility
  - Market sometimes misprices the underlying risk and over-panics during downturns
  - Proprietary quantitative analysis to identify those oversold market moments
- ✓ A contrarian market-timing strategy
  - A binary model that either fully invests when market becomes oversold or stays in cash until a buy signal is triggered
  - Enter the market when model reaches a high confidence level

# Dynamic Modeling

- ✓ Quantitative Indicators
  - Multi-factor model using quantitative analysis to decide entry and exit points
  - Entry and exit indicators differ due to different model analyses
  - Daily model updates with the latest numerical input
- ✓ Market Conditions
  - Bayes' theorem used for updating rolling forecast
    - Bayes' theorem is a method of calculating probability
  - The rolling forecast overweighs the most recent market conditions
- ✓ Regime change **
  - Regime change refers to market characteristic shift
  - Market regime switches from time to time
  - Monitor markets continuously to identify a regime change
  - Should a regime change occur, the model will adjust promptly

**For more information about Bayes' theorem, refer to Page 10.

**For more information about regime change, refer to Page 11.

# Quantitative Indicators

- ✓ Large sample of quantitative indicators
  - Macro and Micro Factors
    - Macro indicators include economic data such as GDP, Treasury yields, LIBOR, etc.
    - Micro indicators include data such as options pricing on S&P 500 stocks, market trading volume, commodity prices, etc.
  - Daily Updates

- ✓ Components of key indicators may shift over time
  - Example: The volatility after Brexit did not justify the underlying market risk during summer 2016. As a result, an additional market risk was added to the model to reflect such mispricing.

- ✓ All decisive criteria are based upon the quantitative indicators
  - Each criteria must be met to trigger a buy signal
  - Equally weighted criteria

# Market Conditions

- ✓ Bayes' theorem argues that the probability of an event in the future depends on prior knowledge of past related events. This model builds upon Bayes' rule and overweighs the most recent market conditions
  - Past performance is not a guarantee of future returns
- ✓ Market conditions refer to the features of financial markets that reveal current market conditions
- ✓ Examples of important features
  - Volatility
  - Interest rates
  - Investor sentiment
- ✓ Impacts of market conditions on the model
  - Components of multi-factor model may vary
  - Entry and exit levels depend on market conditions

# Regime Changes

- ✓ A financial market regime change indicates underlying statistical alterations of asset returns such as means, volatilities, autocorrelations, cross-variances, etc.
- ✓ The frequency of regime changes is unpredictable and depends on broad market conditions
- ✓ Examples of a regime change trigger
  - Dot-com bubble
  - Financial crisis
  - 2016 U.S. presidential election
- ✓ Factors that regime changes affect
  - Entry and exit criteria
  - Dynamic modeling process
  - Weights assigned to model factors

# Entry Signals & Buying Rules

- ✓ **Examples of entry signals**
  - Market volatility
  - Options pricing
    - ❖ Call and put options on all S&P 500 stocks
  - Interest rates
  - Investor sentiment

- ✓ **Buying rules**
  - A buy signal only occurs when all criteria are met in the model
  - Do not enter the market when volatility is too high
    - ❖ Example: Cash would have been held in 2008 and 2009 due to high volatility in the back-test
  - The exit target overrules the entry signal
    - ❖ No entry if the exit target is too low, even if a buy signal is generated

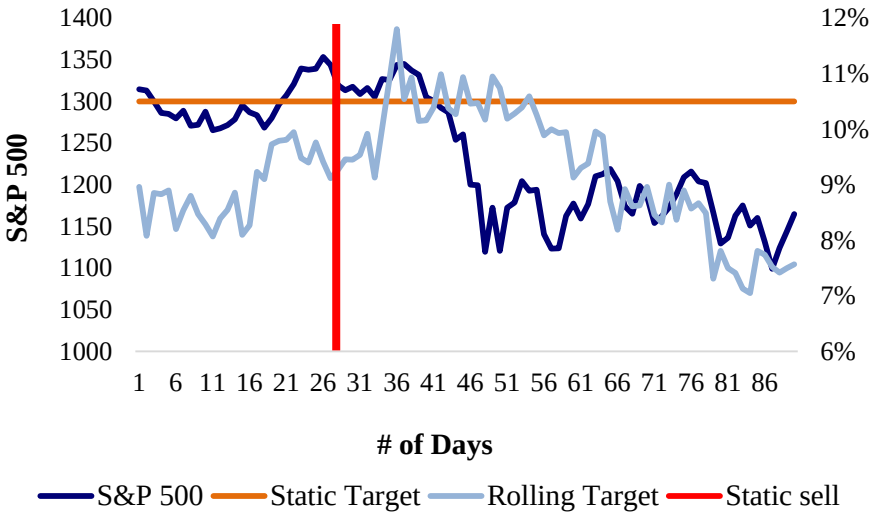
# Exit Signals & Selling Rules

- ✓ **Examples of exit signals**
  - Market volatility
  - Proprietary Complacency Indicator

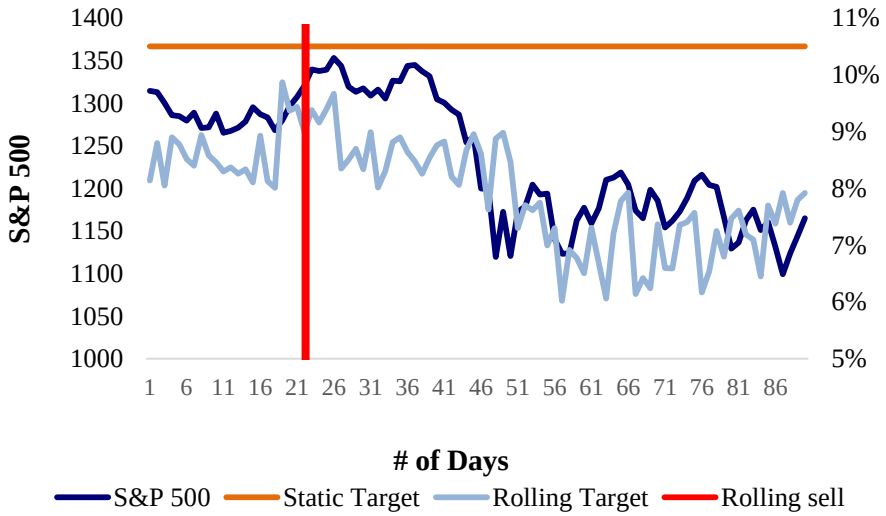
- ✓ **Selling rules**
  - Target Sell
    - ➢ Within a cycle, the position is sold at the lower of the static or rolling target
      - Static Target: 10% (optimal percentage return determined during back-test)
      - Rolling Forecast Target: Established upon each market entry cycle
  - End-of-Cycle Sell
    - ➢ At the end of one cycle (91 trading days), if no target has been met and there is a profit, the position will be sold
      - If no target has been met at the end of the first cycle and there is a loss, the position will be extended one cycle (91 trading days) with the same selling rules
      - At the end of two cycles (182 trading days), regardless if there is a profit or loss, the position is sold
  - Force Sell
    - ➢ If the Complacency Indicator signals a sell and there is a profit, we will sell

# Selling Rule Graphic

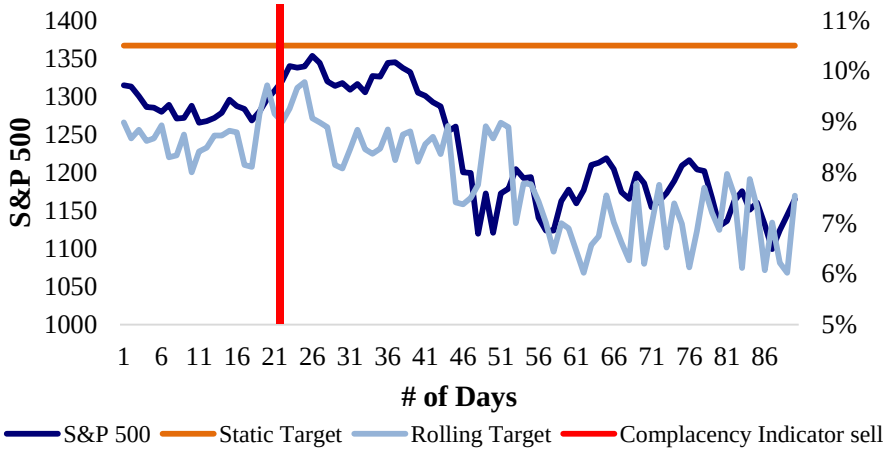
**Rolling Forecast > Static = Sell at Static**




**Rolling Forecast < Static = Sell at Rolling Forecast**




**Complacency Indicator: Sell for Profit**



# Trading Rule Exception

- ✓ A trading exception occurs when there is a buy signal on the same day that there is a sell signal.
  - If a trading exception occurs, the position ***will not*** be sold
    - Benefits client by saving round-trip transaction fees
    - Helps reduce possibility of wash sales
- ✓ If a trading exception occurs, a new cycle is established
  - Entry price for new cycle is end-of-day close
  - New rolling forecast targets established
  - Strategy cycle selling rules restart
- ✓ If a trading exception occurs, position's holding period in live accounts may be longer than the stated maximum of two cycles (182 trading days)

# Trading Rationale

- ✓ Why use both static and rolling targets?
  - The static target is calculated daily based on the latest 10-year sample period, including the financial crisis and the ongoing bull market. Therefore, the target may not be applicable as the bull market ages.
  - The rolling target focuses on current market conditions
  - These two targets together optimize overall returns
- ✓ Why exit at the lower of the static and rolling targets?
  - Minimize downside movements and maximize investment returns
  - Back-test suggests compounding returns are optimized when exiting at the lower of the static and rolling targets
- ✓ Why not enter if rolling forecast is negative?
  - Rolling forecast factors in the downside market momentum
    - ➢ Do not enter the market if model indicates further downward draft

# Disclosure

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Calculation Methodology: All performance data is calculated in US dollars. Quarterly and year to date time-weighted returns are calculated by linking monthly returns. Market Volatility does not use leverage. Leveraged Market Volatility employs leverage. Due to different entry and exit dates, individual accounts may vary in performance.

Returns consider interest income only on an accrual basis; dividends are considered on a cash basis. All calculations are based on trade date. Securities traded on a national exchange are valued based on closing prices on the exchange; data is provided by major pricing services. Stocks traded on the over the counter market are valued based upon prices provided by major pricing services. Fixed income securities that do not trade on a national exchange are valued based upon estimates provided by a variety of services including major pricing services. The above figures do not represent any single or model portfolio. Accounts may at times include cash equivalents. Performance is on a total return basis. Internal dispersion is calculated using the dollar-weighted standard deviation of all portfolios that were included in the composite for the entire period.

Benchmark: The benchmark for the Market Volatility and Leveraged Market Volatility styles is the S&P 500 Index. The S&P 500 Index consists of 500 stocks chosen for market size, liquidity and industry group representation. It is a market value-weighted index and one of the most widely used benchmarks of U.S. stock performance.

Past Performance: Although the back tested results do not possess any loss, the possibility of loss exits. Past performance is not an indication or guarantee of future performance. No alterations of the composite as presented here have occurred because of changes in personnel or other reasons at any time.

Due to the rebalancing methodology used for ETF strategies, positions may be sold or closed in the very short-term (within 30 days). Also, the same security may be bought for some accounts, while being sold for others. This may result in increased commissions for some clients. This rebalancing methodology does not take into consideration any tax implications that may result from this type of trading. Due to different entry and exit dates, individual accounts may vary in performance. Exchange traded funds may not correlate to designated indices and, may have additional fees and expenses, including the possible duplication of management fees. Indices are provided for comparative purposes only as you cannot invest directly in an index.