



Welcome

JULY 2026

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Background

Ryan Harder, CFA

- 1998-1999 CIBC World Markets
 - Graduate Trainee – Trading Credit Risk Management
- 1999-2004 WestLB Asset Management
 - Equity Analyst, Assistant Portfolio Manager
- 2004-2022 Rydex Investments → Security Global Investors → Guggenheim Investments
 - Managing Director, Portfolio Manager
- 2022- Sierra Investment Management / Ocean Park Asset Management
 - Chief Investment Strategist, Portfolio Manager

Agenda

- **Trend Following**
 - ETF signal examples
- **Portfolio Construction**
 - Weighting methodologies
- **Other items:**
 - S&P 500 Return Forecast Matrix
 - Stocks and Valuation examples
 - Interest Rates

Trend Following History

Early concepts of trend following are over 200 years old

- **David Ricardo** (early 1800's): "Cut short your losses; let your profits run on"
- **Charles Dow** (late 1800s'): Pioneer of modern technical analysis and the Dow Theory—price trends are meaningful and persistent
- **Richard Donchian** (1940's-50's): Father of trend following—utilized simple moving averages and rules-based systems for managing investments (Donchian Channel)
- **J. Welles Wilder** (1970's): Introduced new concepts and building blocks such as ATR, ADX, Parabolic SAR, and RSI
- **CTAs and Turtle Traders** (1970's-80's): Institutional adoption with the evolution of financial derivatives and computer technology
- **Jegadeesh and Titman** (1993): First academics to study (and validate) cross-sectional momentum in stocks, and then **Moskowitz, Ooi & Pedersen** (2012): time-series momentum

Why does Trend Following Work?

Underreaction

- When news arrives, prices don't immediately jump to reflect the new information, but instead drift toward a new equilibrium over time
 - **Anchoring:** people tend to anchor their expectations to old price levels and adjust their estimates too slowly
 - **Disposition Effect:** investors sell winners too early to lock in gains and hold losers too long to avoid realizing a loss

Herding and overreaction

- As the trend matures, more traders pile in, creating a feedback loop that can drive prices further away from fundamentals
 - **Confirmation Bias:** tendency to search for and favor information that confirms preexisting beliefs, while ignoring or dismissing contradictory evidence

Trend Following Strategies

Momentum

- Buy signal if an asset's return over a certain period (e.g. 3 months) is positive
- Sell signal (or flat) if the return is negative

Simple Moving Average (SMA)

- Buy signal when price is above a chosen moving average (e.g. 10 day)
- Sell signal (or flat) if price is below

*Variations: **Exponential Moving Average (EMA)**, **Weighted Moving Average (WMA)**, ...*

Moving Average Crossover

- Buy signal when a fast-moving average (e.g. 50 day) crosses above a slow-moving average (e.g. 200 day)
- Sell signal (or flat) when the opposite occurs

Simple Moving Average

Calculation of a 10-day simple moving average

$$\text{SMA} = \frac{P_1 + P_2 + \dots + P_{10}}{n}$$

$$\text{SMA} = \frac{1}{n} \sum_{i=1}^n P_i$$

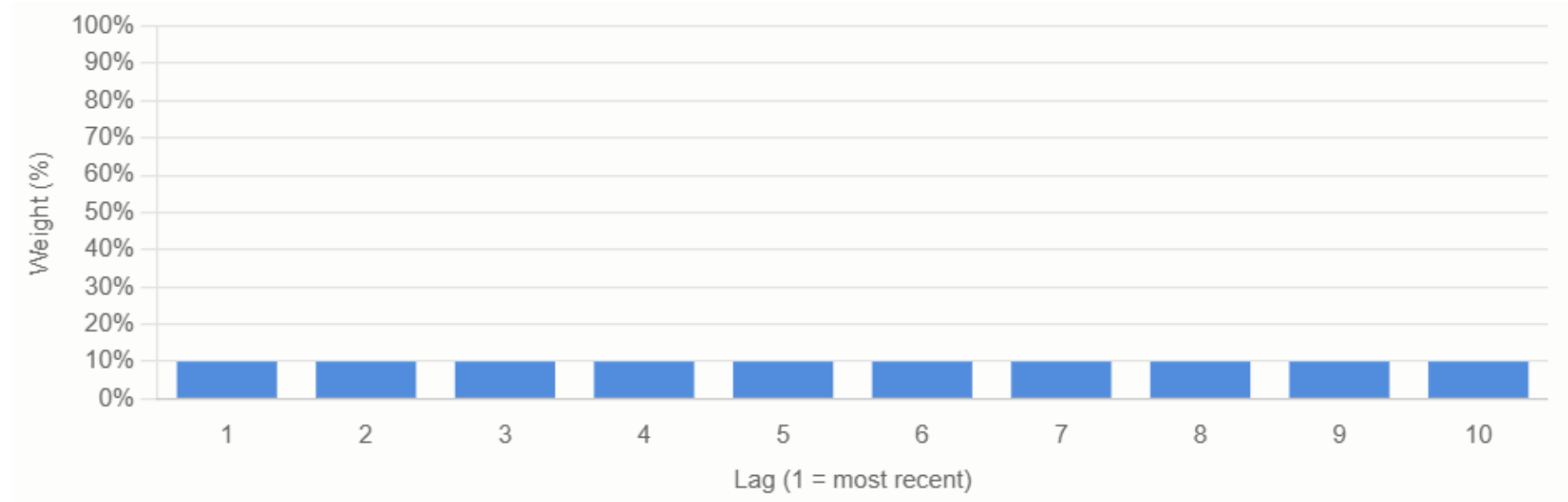
where P_i is the price i days ago and n is the total number of days



Weights on Prices (10-day Simple Moving Average)

Weights on prices:

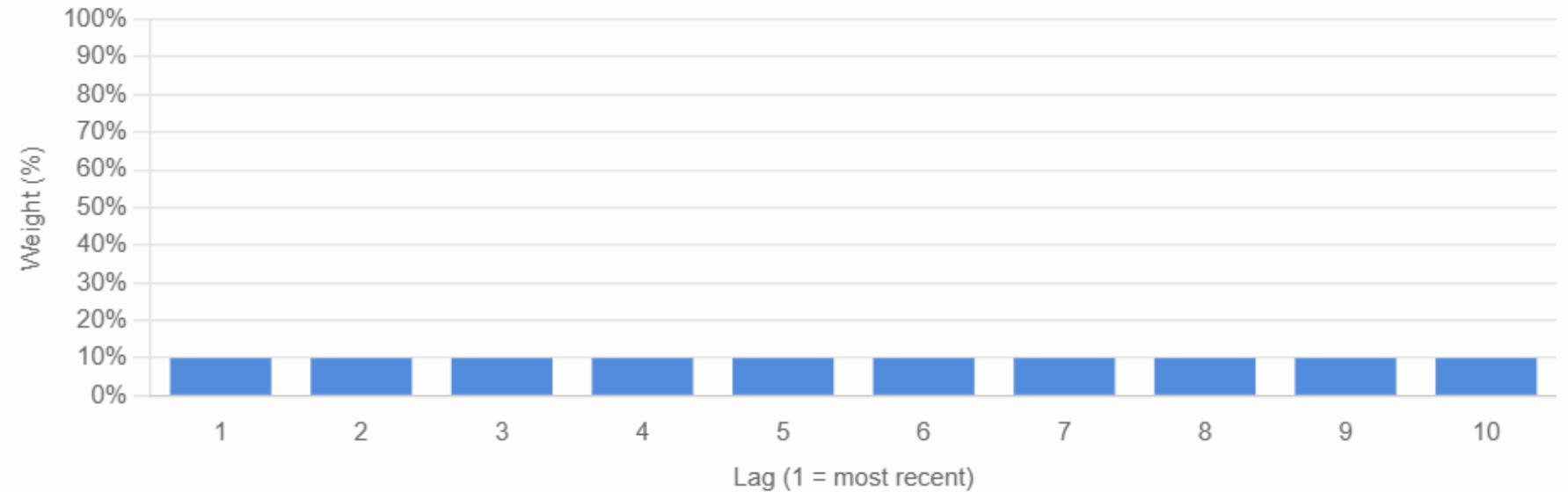
- Each of the past 10 prices gets an equal 10% weighting



Weights on Prices & Returns (10 day Simple Moving Average)

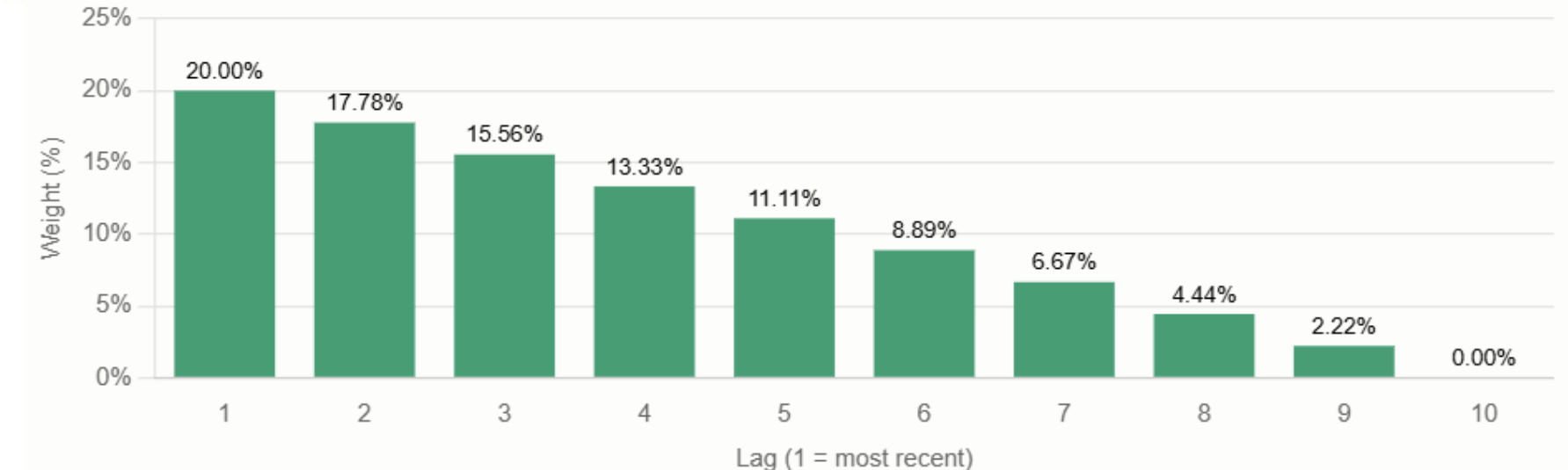
Weights on prices:

- Each of the past 10 prices gets an equal 10% weighting



Weights on returns:

- Declines linearly from 20% on the most recent return to 0% on the oldest



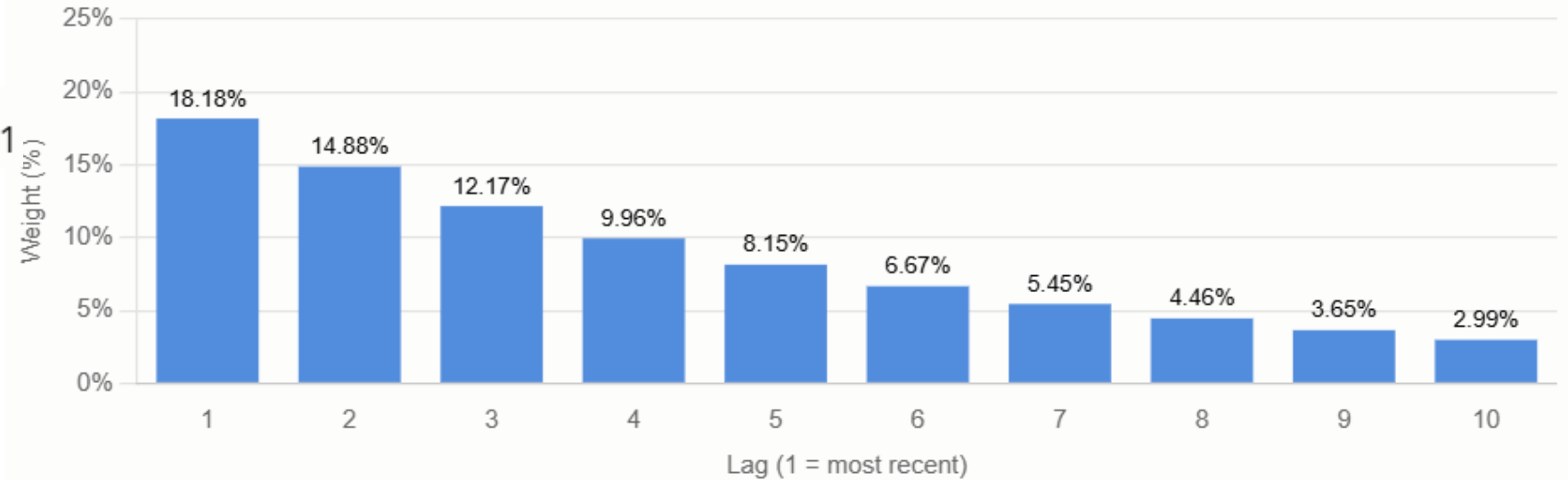
Weights on Prices & Returns (10-day Exponential Moving Average)

Weights on prices:

- $EMA_t = \alpha \cdot P_t + (1 - \alpha) \cdot EMA_{t-1}$

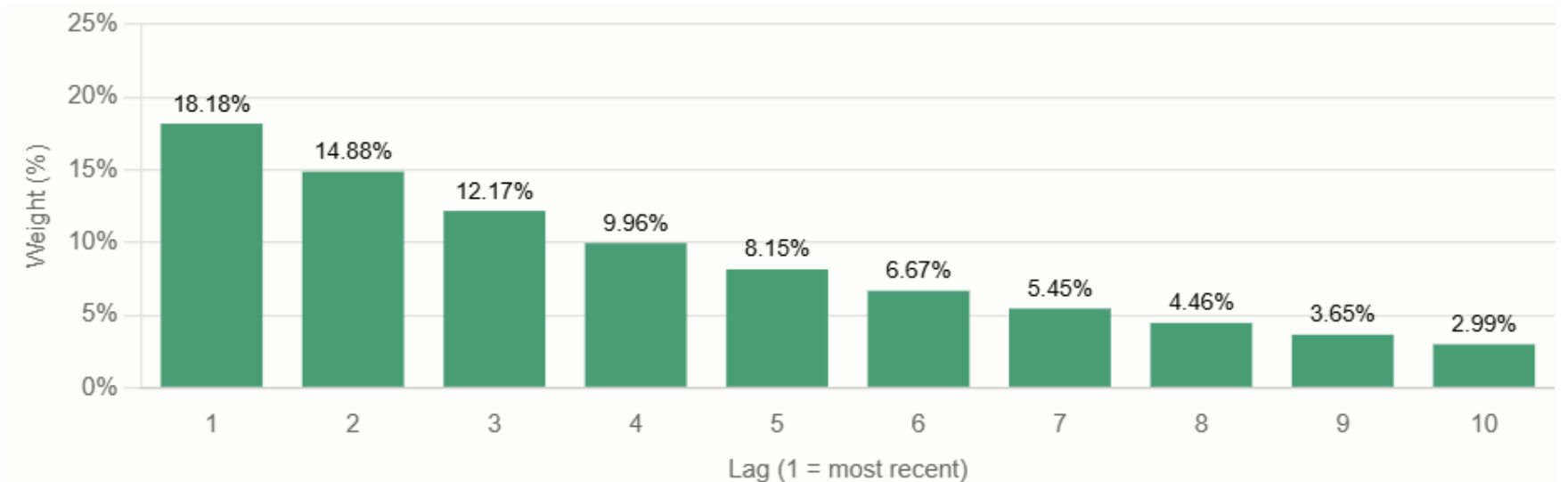
$$\alpha = \frac{2}{n+1} = \frac{2}{11} \approx 0.1818$$

$$w_k = \alpha (1 - \alpha)^{k-1}$$



Weights on returns:

- Shares the same geometric decay profile as weights on prices

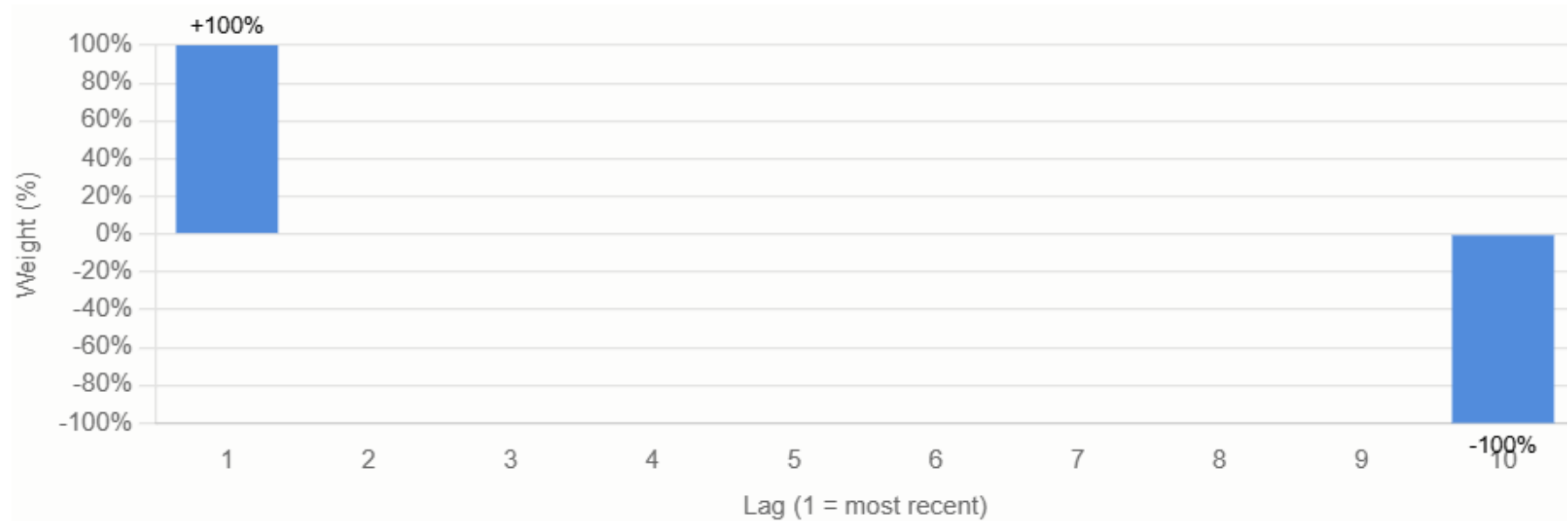


Weights on Prices & Returns (10-day Momentum)

Weights on prices:

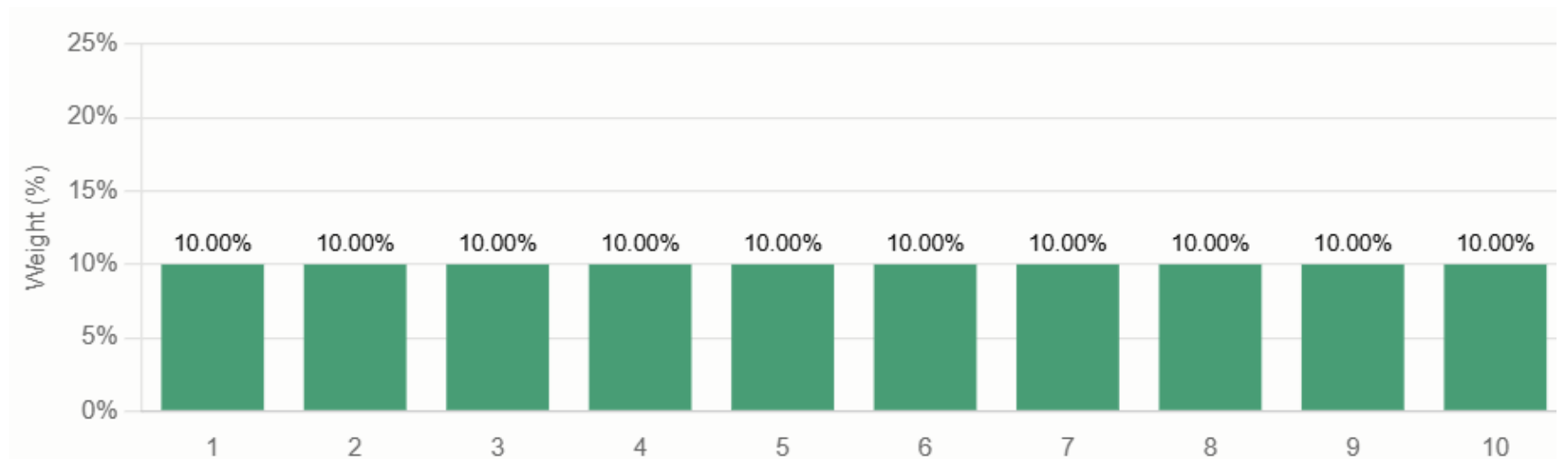
- $M_t = P_t - P_{t-10}$

100% weight on the most recent price and -100% weight on the price from 10 periods ago



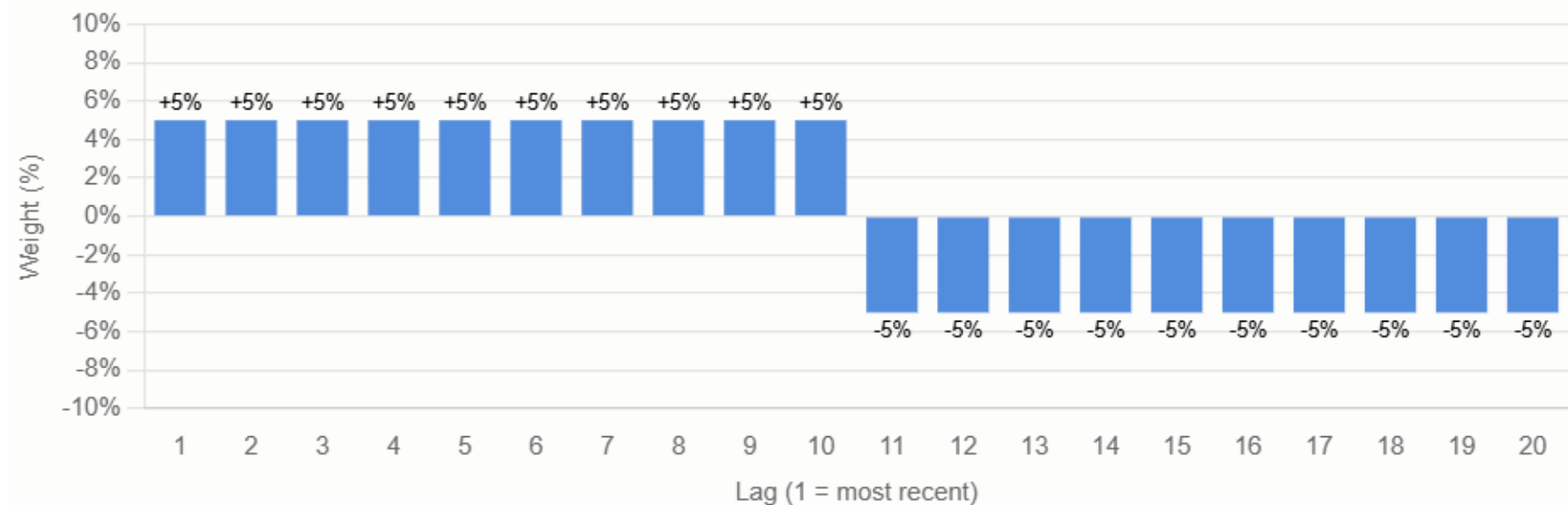
Weights on returns:

- Equal weight on every return

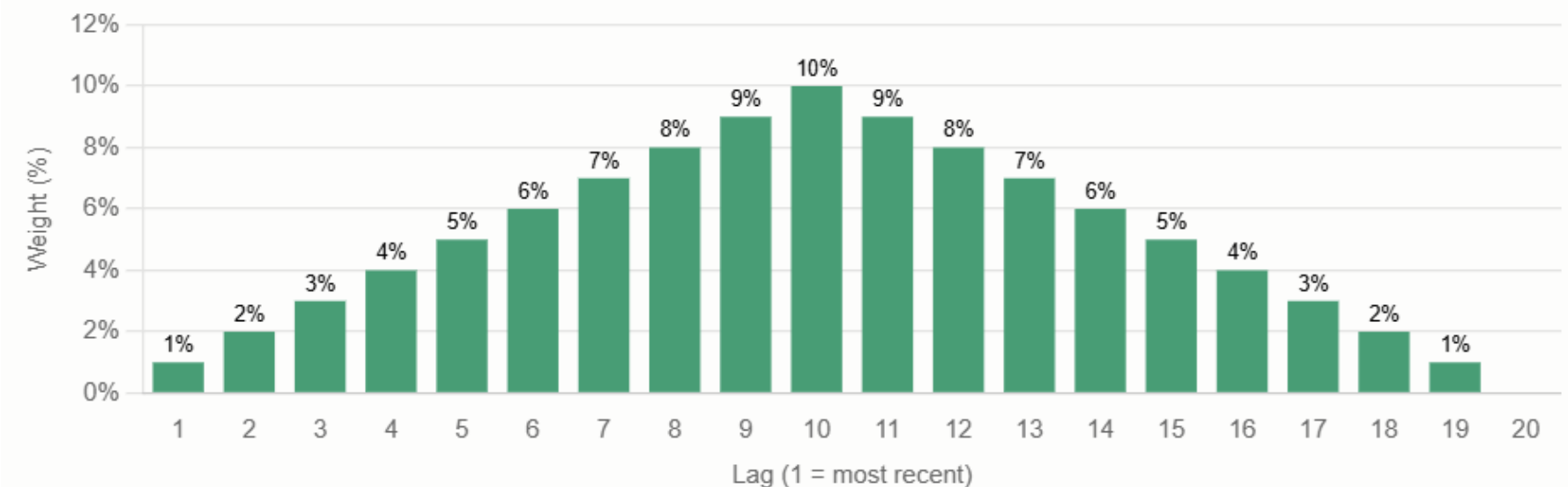


Weights on Prices & Returns (10 / 20 day Moving Average Crossover)

Weights on prices:

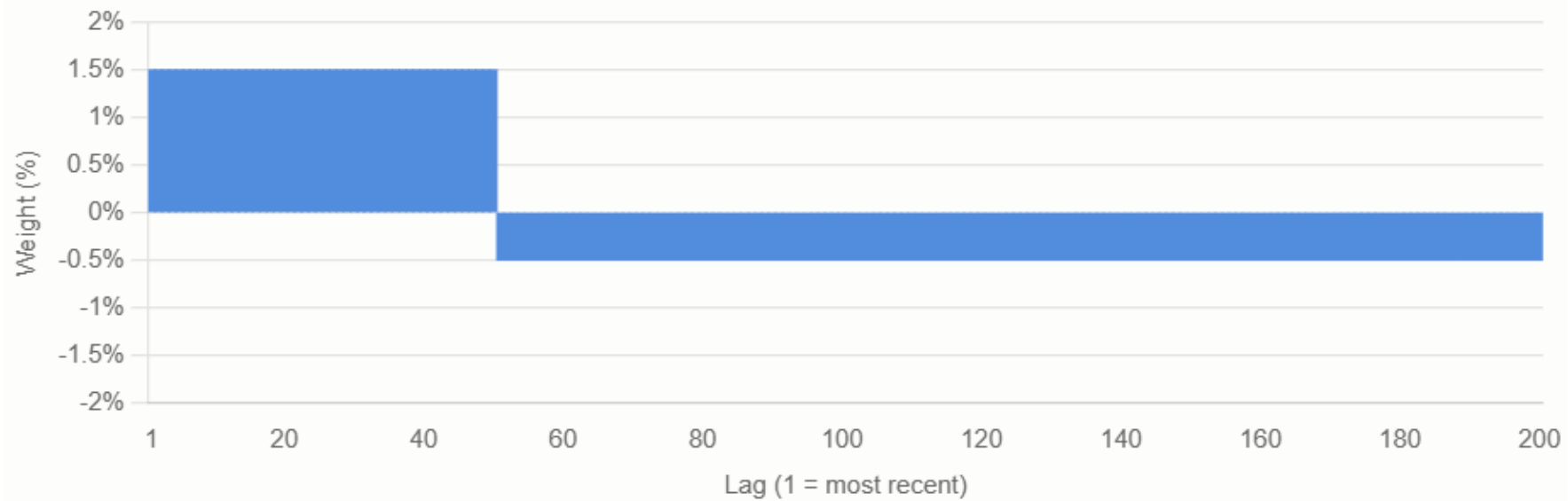


Weights on returns:

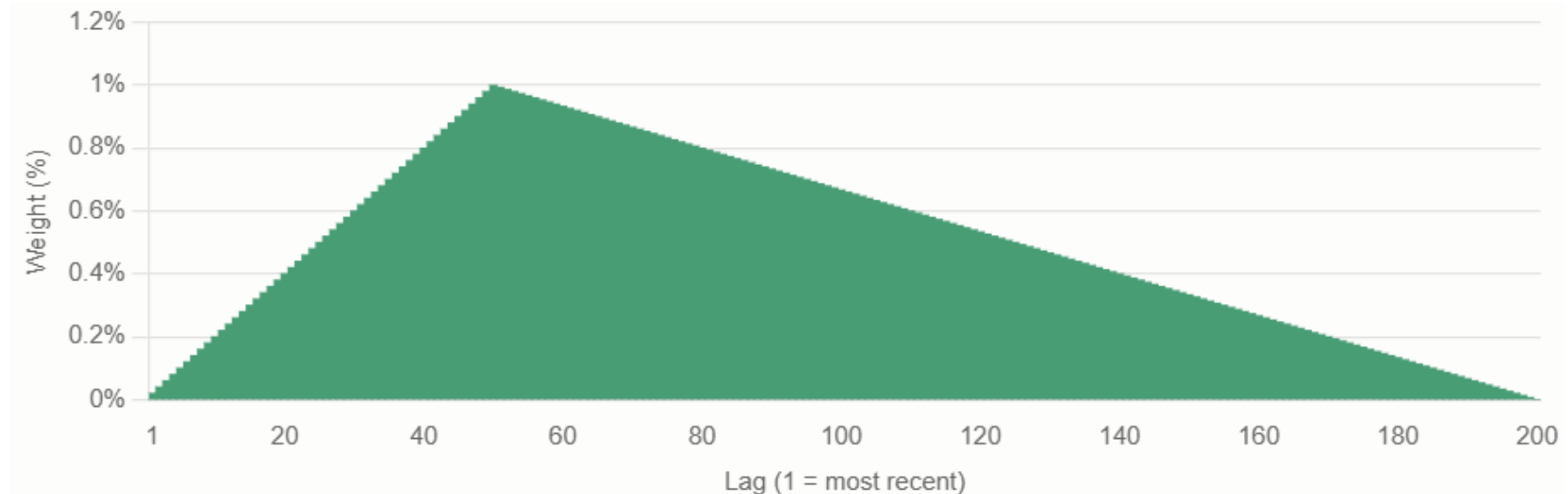


Weights on Prices & Returns (50 / 200 day Moving Average Crossover)

Weights on prices:

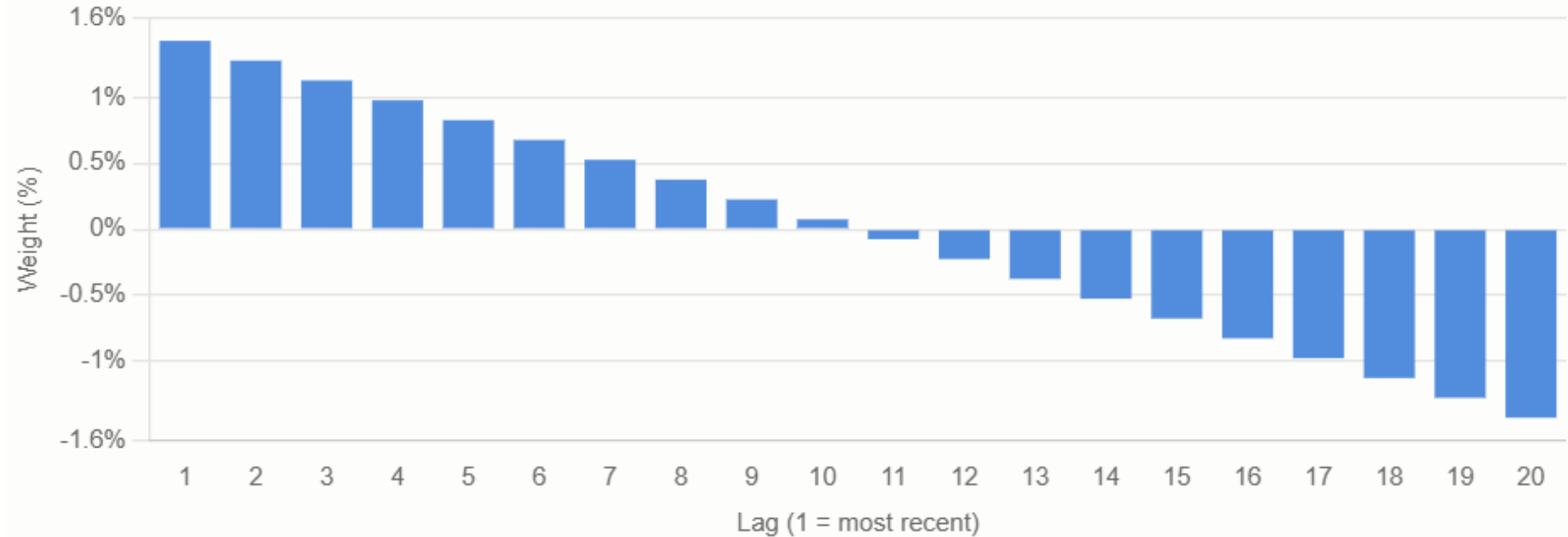


Weights on returns:



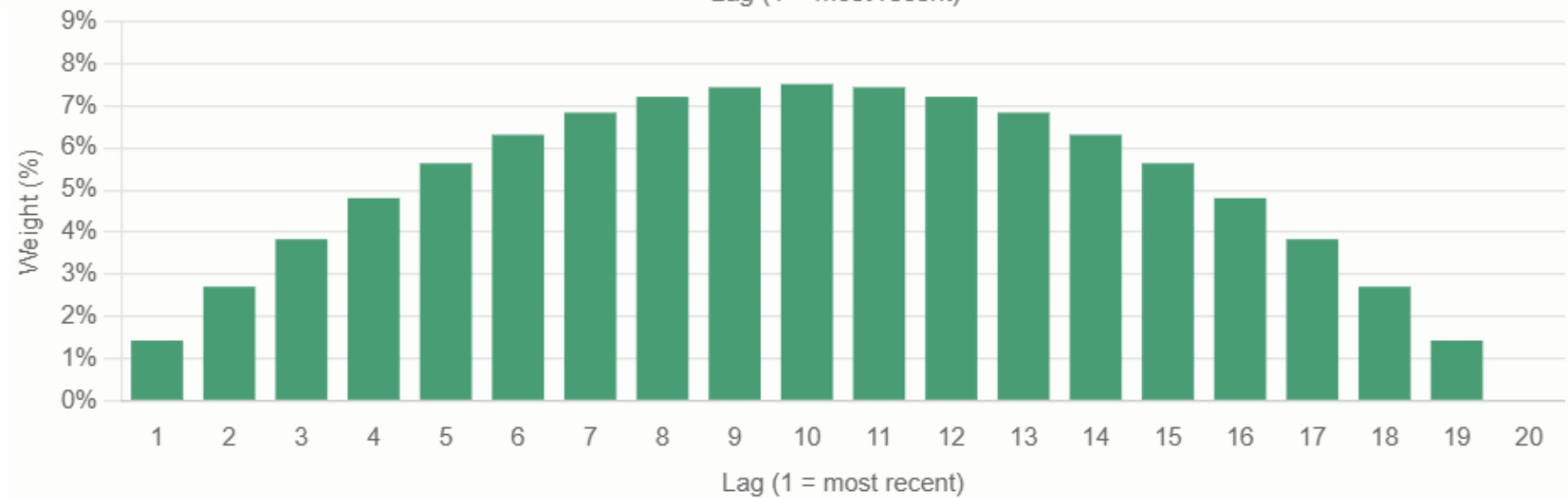
Weights on Prices & Returns (20-day Regression)

Weights on prices:



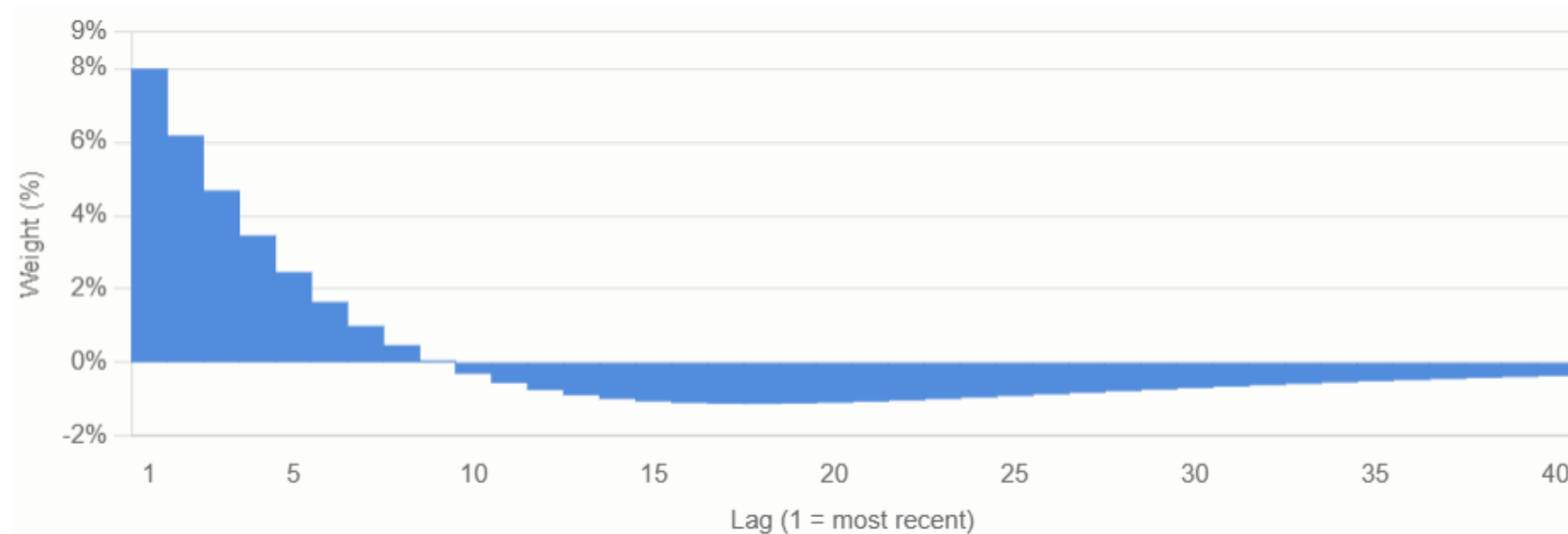
Weights on returns:

Side note: this shape has a name, the Epanechnikov kernel

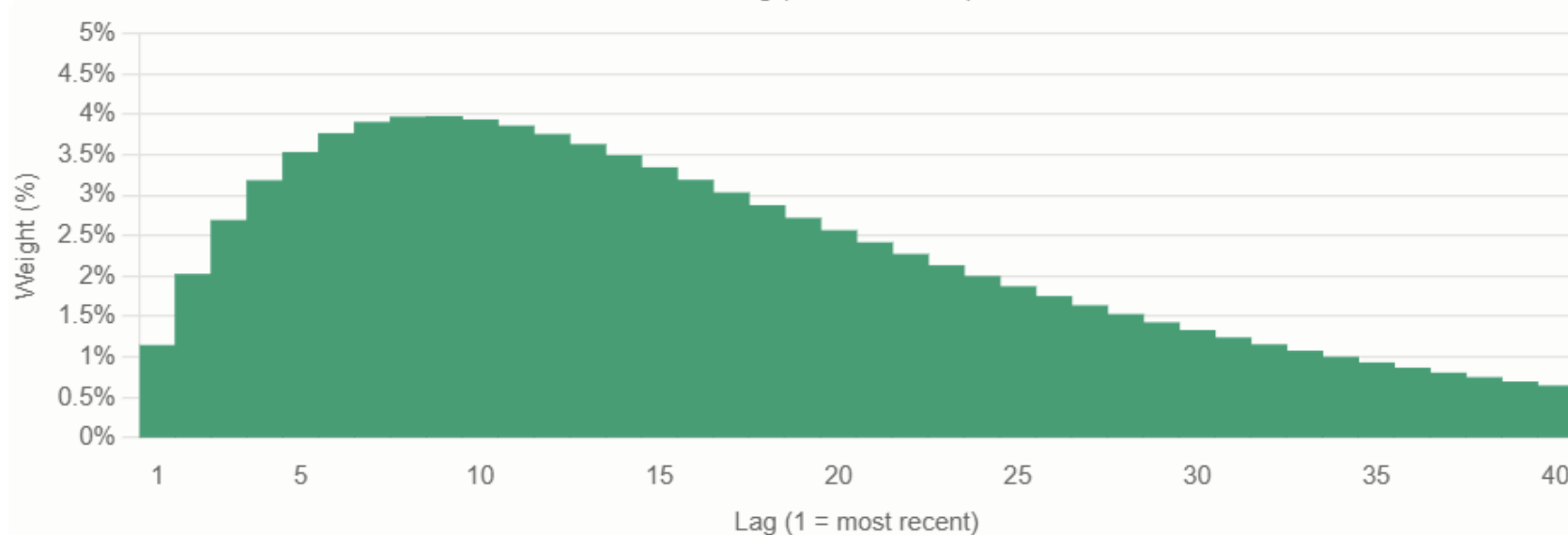


Weights on Prices & Returns (12/26 MACD)

Weights on prices:



Weights on returns:



What is the pattern?

Weights on prices:

- Is the first derivative (difference) of the return weights

Weights on returns:

- Is the discrete integral (cumulative sum) of price weights

Why?

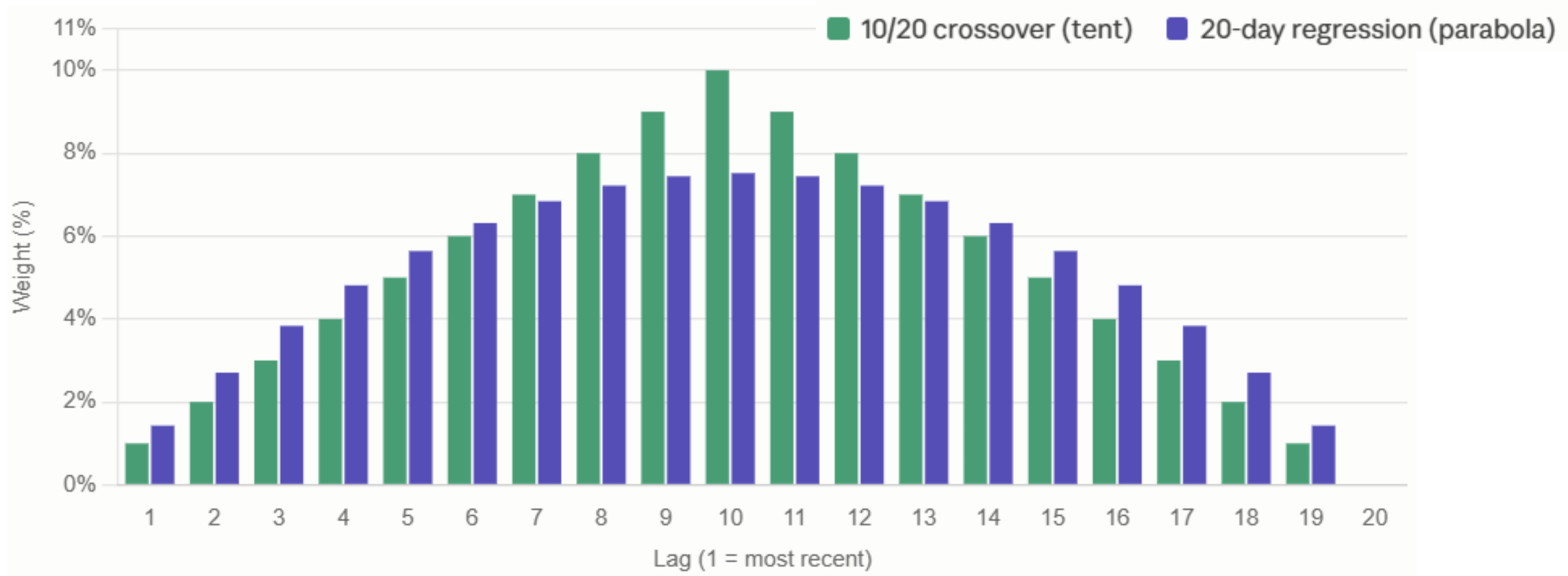
- Returns are the derivative of prices.
- So by summation by parts (the discrete integration by parts), the weights must transform in the opposite direction to keep the two sums equal: differentiating prices into returns forces the weights to integrate the opposite direction.

Why does this matter?

A signal's return weights reveal which market movements it actually responds to

- Two signals with similarly shaped return weights are highly correlated, even when they are built from completely different formulas
- Take the following two signals:
 - 10/20 moving average crossover, and
 - 20-day regression slope
- They seem to be different indicators, but their return weights are nearly the same shape, both centered on lag 10—so combining them adds almost no diversification.
- These two signals are 98.77% correlated with each other

10/20 moving average crossover and 20-day regression slope



$$\rho = \frac{\sum_m b_m^{\text{reg}} b_m^{\text{cross}}}{\sqrt{\sum_m (b_m^{\text{reg}})^2} \sqrt{\sum_m (b_m^{\text{cross}})^2}} = 0.9877$$

Reducing Parameterization

A key to potentially improving a model's out of sample performance is to reduce the number of parameters that need to be chosen or optimized

- Every parameter is another chance to overfit the data.
- Suppose you are building a trend model on two signals: a short term 20-day simple moving average and a long term 250-day simple moving average.
- You would like a third, intermediate term moving average between them.
- Rather than searching over ranges and fitting whichever backtests best, you would prefer a rule that chooses the length directly.
- **What length should it be?**

Choosing the Intermediate Lookback

Use a Rule, not a Fit

- One option: Choose the simple moving average least correlated with both the 20-day and the 250-day simple moving averages
 - Answer: 70.7 days
- For any fixed shape return weight profile (SMA, EMA, regression), the point equally correlated to both endpoints is the geometric mean

$$N^* = \sqrt{N_1 N_2}$$

- $N^* = \text{sqrt} (20 \times 250) = 70.7 \text{ days or } 71\text{-day simple moving average}$

Correlations of Signals

Equally correlated to both ends

- The 20-day and 250-day simple moving averages are already fairly distinct, with a 0.41 correlation between them
- The 71-day intermediate simple moving average is equally correlated at 0.72 to the 20-day simple moving average and 0.72 to the 250-day simple moving average

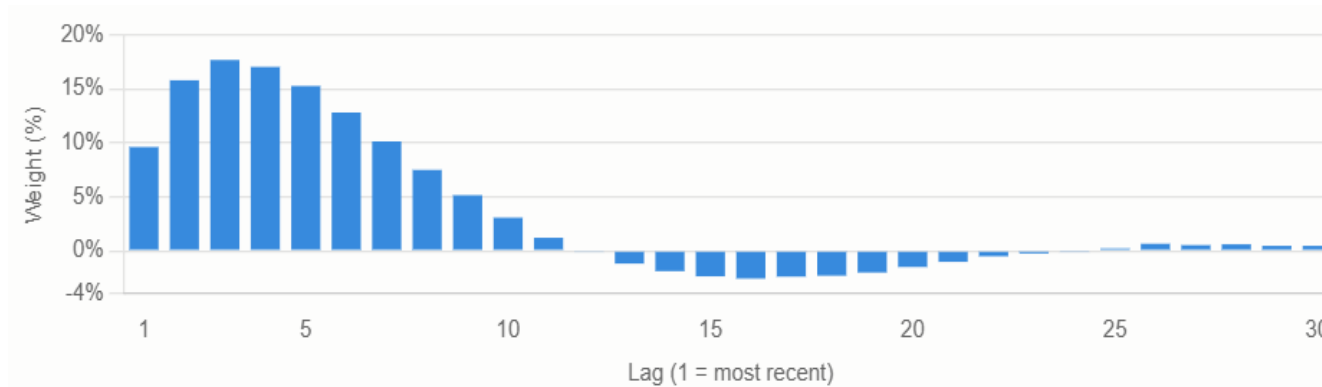
Signal Correlation Matrix

SMA	20-day	71-day	250-day
20-day	1		
71-day	0.72	1	
250-day	0.41	0.72	1

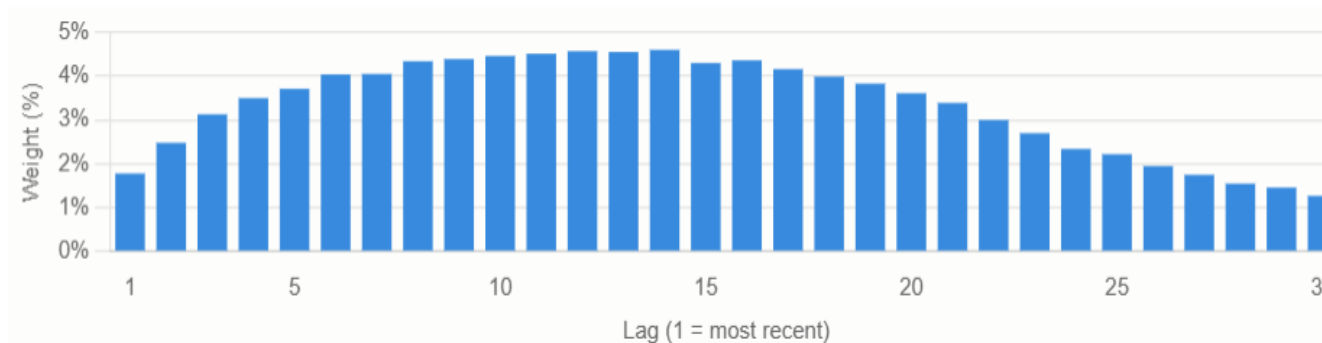
Other Trend Following Strategies (weights on returns only)

These return weights are estimated numerically, not from a closed-form formula

Parabolic SAR



Breakout Model (20-day)



Which Past Returns Is Your Signal Actually Using?

Use Regression

- Regress the signal (dependent variable) on the past n daily returns (independent variables)
 - Works for any signal, continuous or discrete (+1/-1)
- The estimated coefficients are the strategy's effective return weights—how much each past return contributes to today's position
- The standard errors show which weights are significant and which are noise
- R^2 measures how linear the signal is:
 - A high R^2 means the return weights tell almost the whole story
 - A low R^2 means that the signal is path dependent, so the weights are only an approximation

Trend Following Strategy with a Trailing Stop Discipline

David Ricardo “Cut short your losses; let your profits run on”

Buy Signal

- Trend Following Strategy (let your profits run on)
- **Goal: to participate in up markets**

Sell Signal

- Trailing Stop Discipline
- **Goal: to avoid large drawdowns**

Investment Strategy

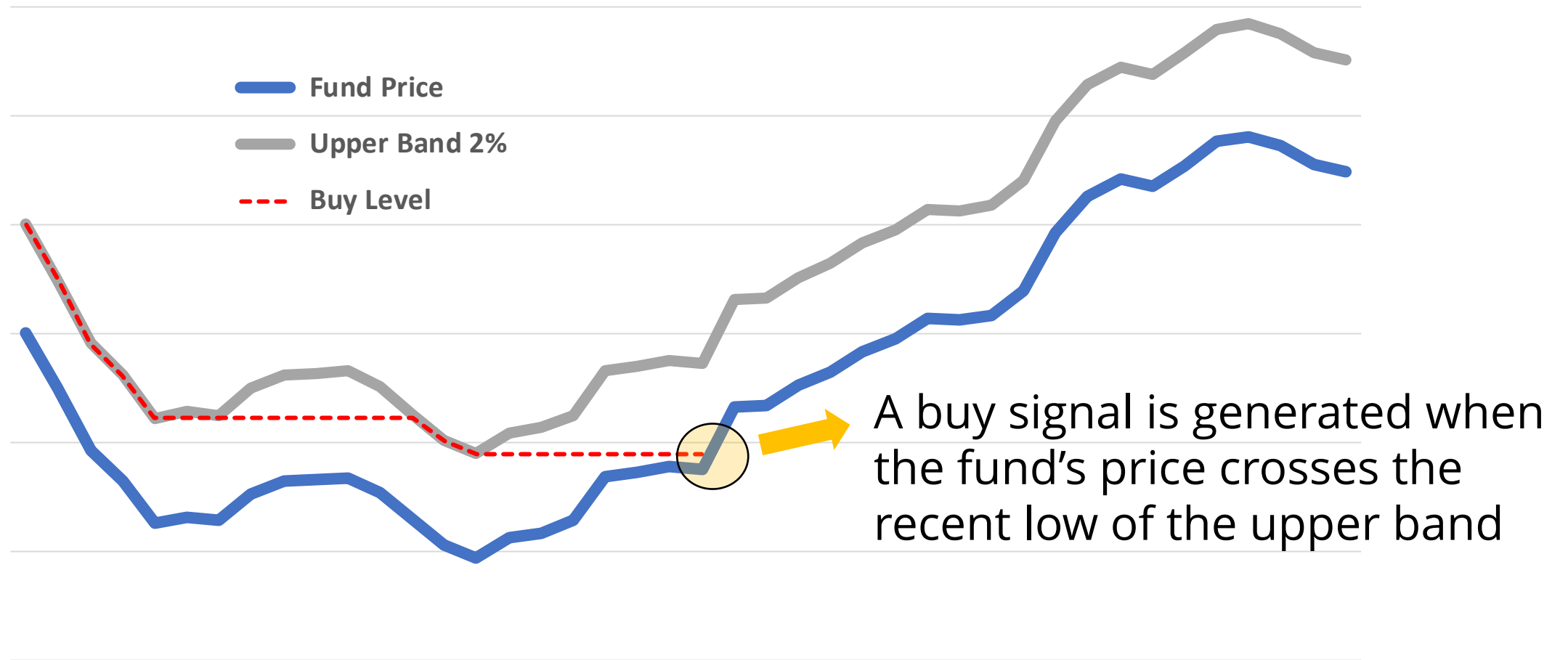
Place an upper band $x\%$ (e.g. 2%) above the security's price

- A buy signal (uptrend) is triggered when a security's price rises above the recent low of its upper band

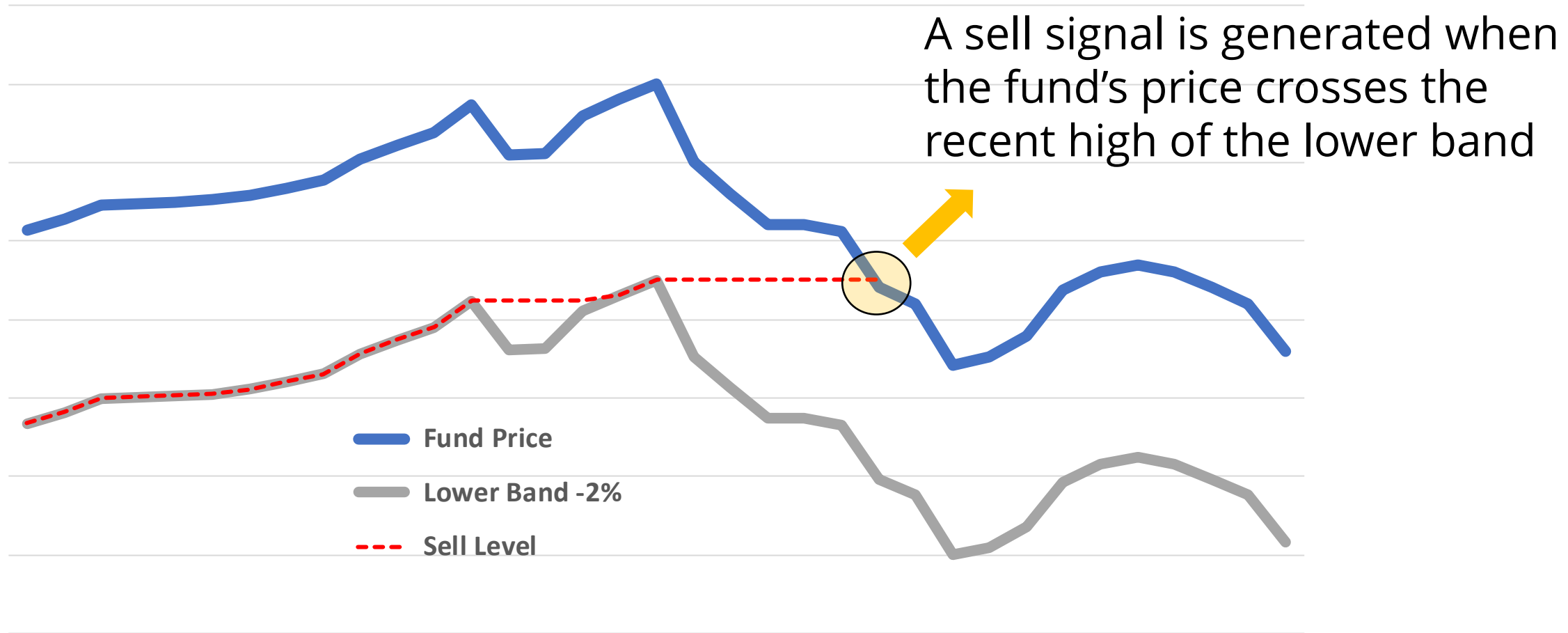
Place a lower band $-x\%$ (e.g. -2%) which is below the security's price

- A sell signal (downtrend) is triggered when a security's price falls below the recent high of its lower band

Example of a Buy Signal



Example of a Sell Signal



Selected Investment Universe

Selected Fixed Income Investment Universe

- **Treasury Bonds** – VGIT – Vanguard Intermediate-Term Treasury ETF
- **Corporate Bonds** – VCIT – Vanguard Intermediate-Term Corporate Bond ETF
- **Mortgage-Backed Securities** – MBB – iShares MBS ETF
- **Convertible Bonds** – CWB – State Street SPDR Bloomberg Convertible Securities ETF
- **Preferred Securities** – PFF – iShares Preferred and Income Securities ETF
- **Bank Loans** – BKLN – Invesco Senior Loan ETF
- **High Yield Corporate Bonds** – HYG – iShares iBoxx USD High Yield Corporate Bonds ETF
- **Emerging Market Bonds (USD)** – EMB – iShares J.P. Morgan USD Emerging Markets Bond ETF

Selected Investment Universe

These asset classes make up the bulk of the Bloomberg US Aggregate Bond Index



Selected Fixed Income Investment Universe

- **Treasury Bonds** – VGIT – Vanguard Intermediate-Term Treasury ETF
- **Corporate Bonds** – VCIT – Vanguard Intermediate-Term Corporate Bond ETF
- **Mortgage-Backed Securities** – MBB – iShares MBS ETF
- **Convertible Bonds** – CWB – State Street SPDR Bloomberg Convertible Securities ETF
- **Preferred Securities** – PFF – iShares Preferred and Income Securities ETF
- **Bank Loans** – BKLN – Invesco Senior Loan ETF
- **High Yield Corporate Bonds** – HYG – iShares iBoxx USD High Yield Corporate Bonds ETF
- **Emerging Market Bonds (USD)** – EMB – iShares J.P. Morgan USD Emerging Markets Bond ETF

ETF Net Asset Value (NAV) and Market Price

Net Asset Value (NAV)

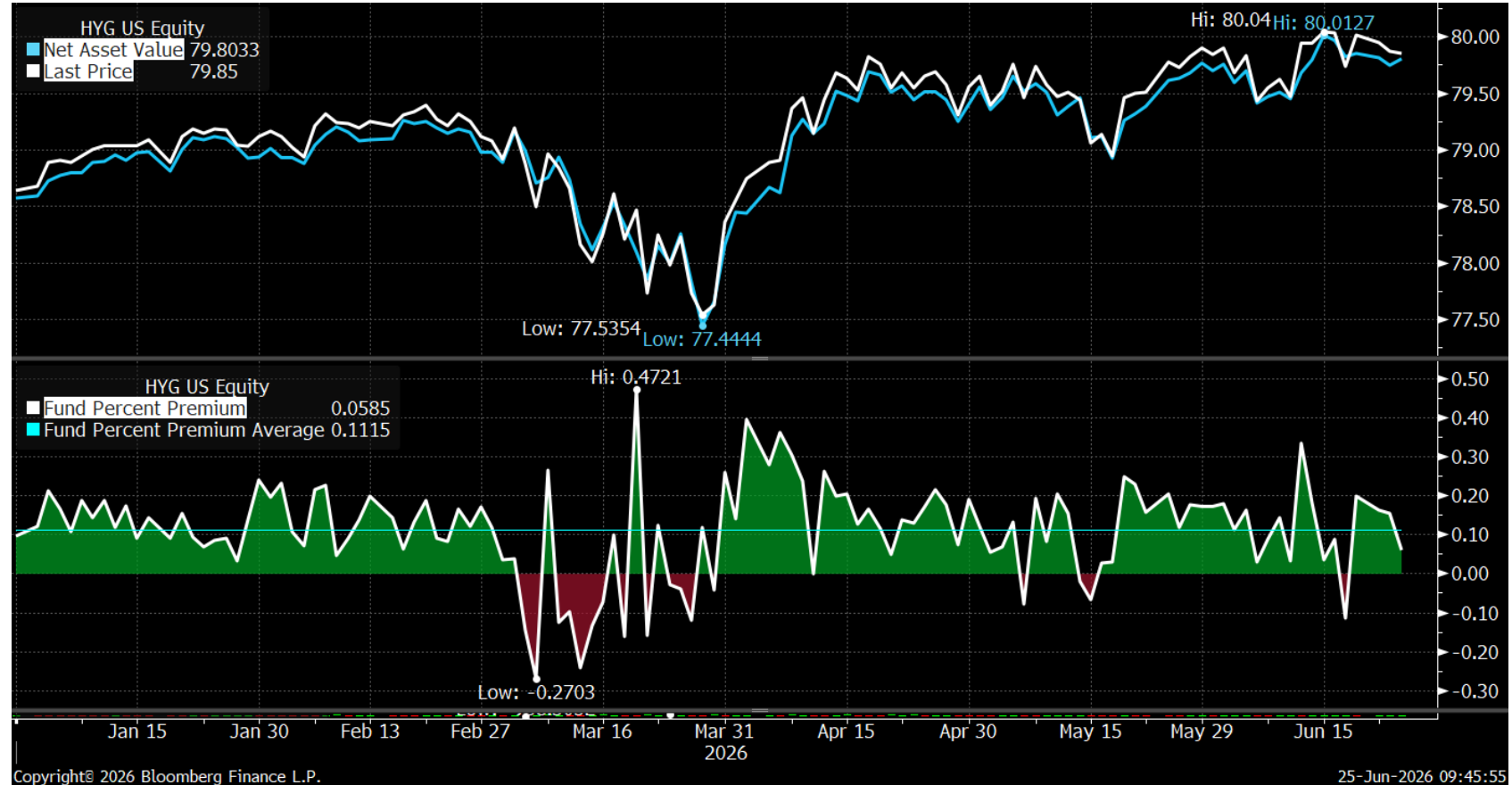
- Is the per-share value of the ETF's underlying holdings, calculated once a day

Market Price

- Is what the ETF actually trades at during the day, set by supply and demand, and updated continuously

Premium / Discount

- If the market price is above the NAV, the ETF is trading at a premium (below NAV, at a discount)



Signal vs Noise (NAV vs Price)

Should I use an ETFs Net Asset Value or and ETFs Market Price when building a trend following system?

- My opinion: use Net Asset Value
- Why? The premium or discount embedded in market prices is mostly noise—not information about the trend of the underlying holdings
- One wants to remove as much noise as possible to isolate the underlying signal, and the NAV reflects the value of the holdings directly, without the premium/discount layer on top
- **Problem:** Clean historical end of day ETF market prices are generally easy to get
Historical end of day ETF NAVs are harder to get and need to be adjusted for historical income distributions, capital gain distributions, splits, etc.

But...

...one can't ignore ETF market prices

- When evaluating the effectiveness (performance) of the trend following system, one should use ETF market prices
 - ETF NAVs → use for generating the signal
 - ETF Prices → use for evaluating the performance of the signal

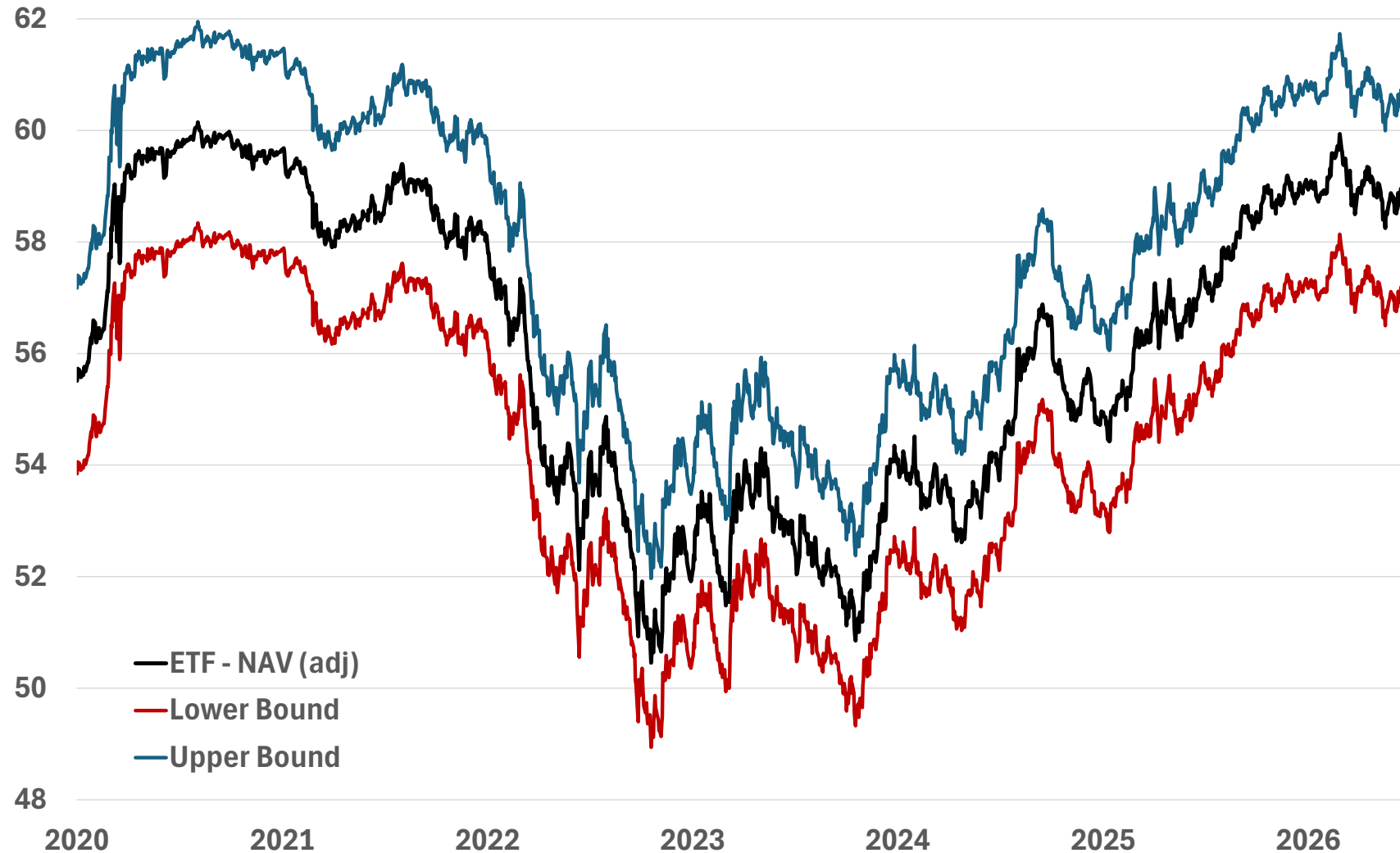
Treasury Bonds - VGIT

NAV (adjusted) from January 2020 to June 2026



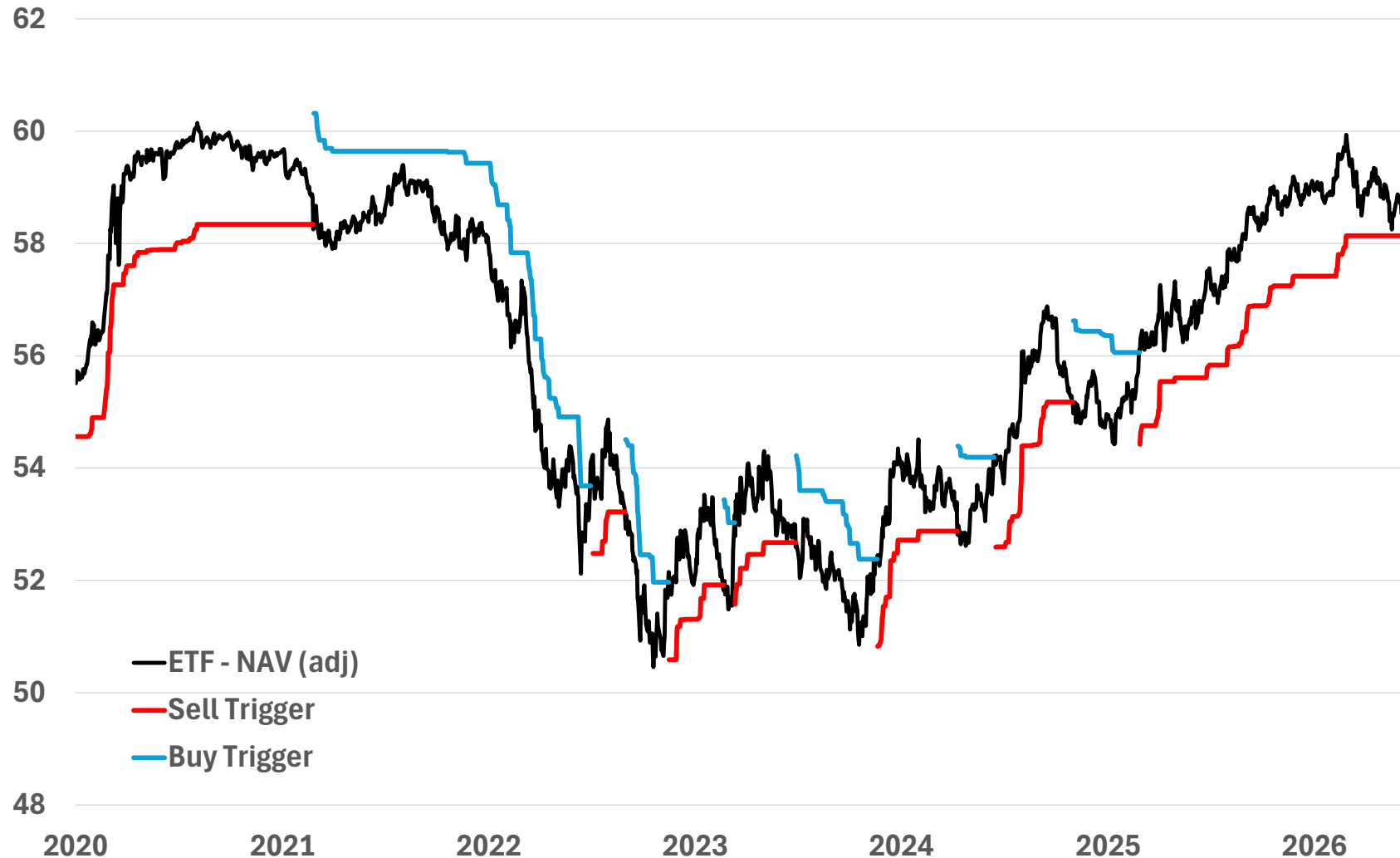
Treasury Bonds - VGIT

...with Upper and Lower Bands (+3 / -3%)



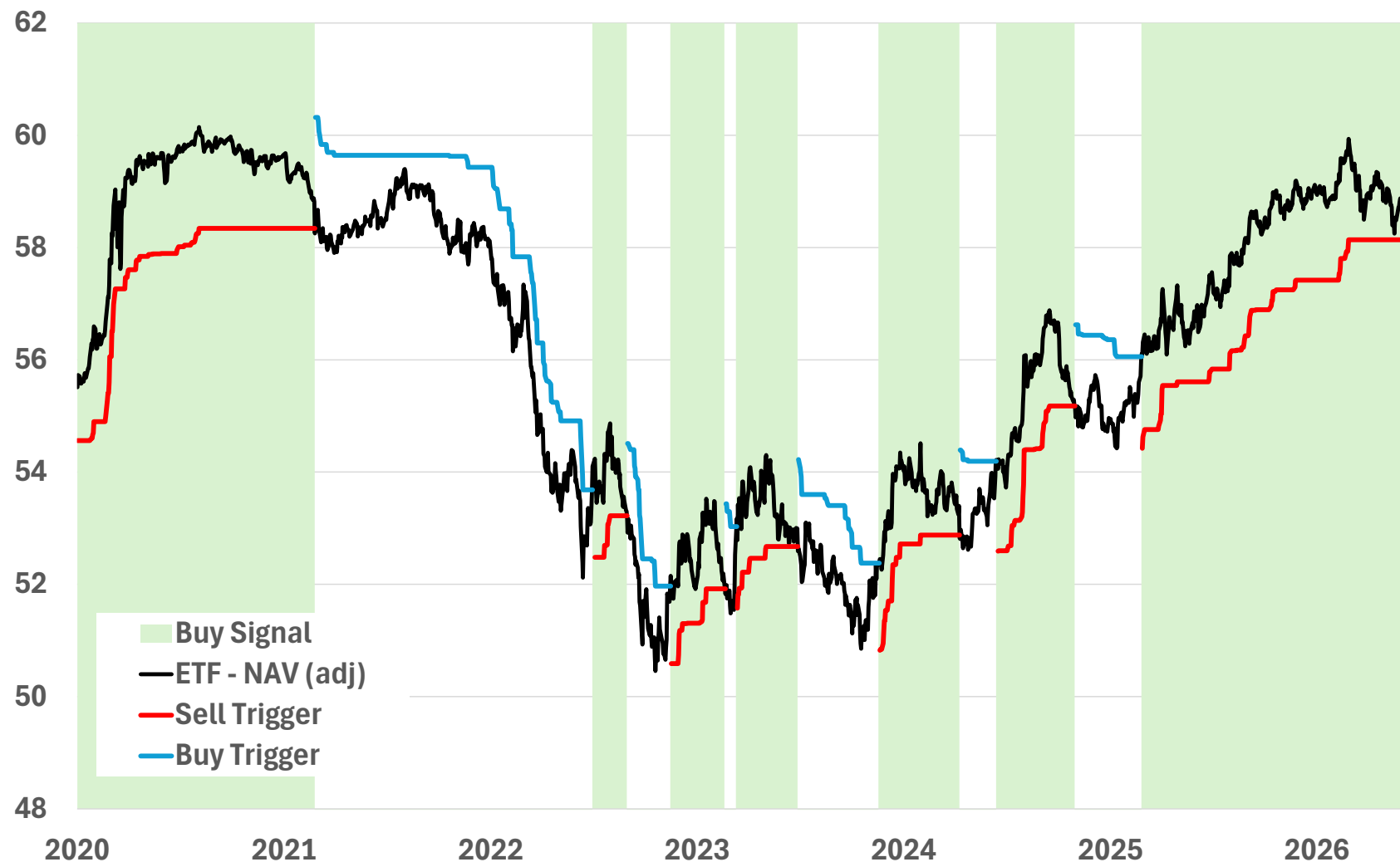
Treasury Bonds - VGIT

NAV (adjusted) with Buy and Sell Triggers



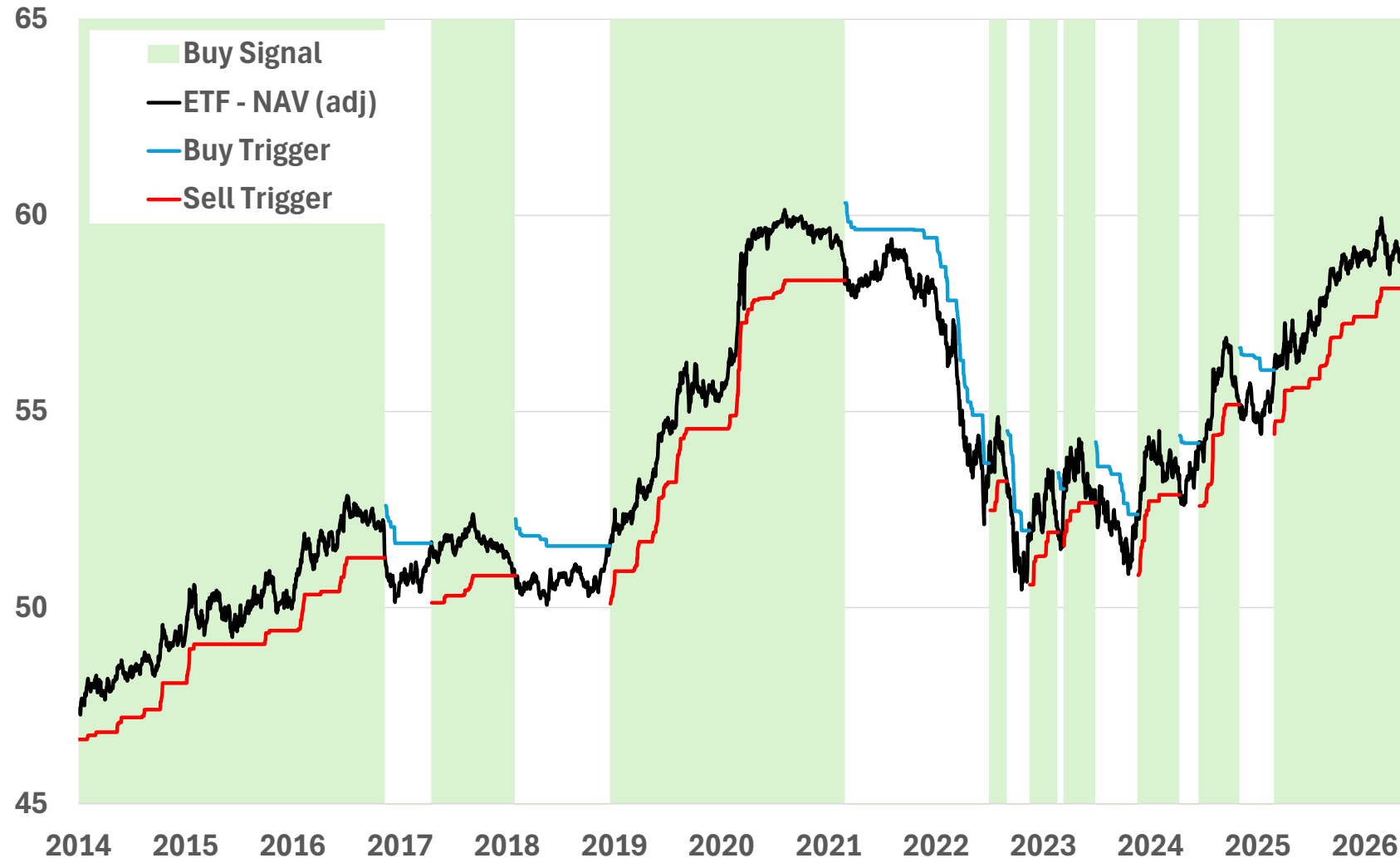
Treasury Bonds - VGIT

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals



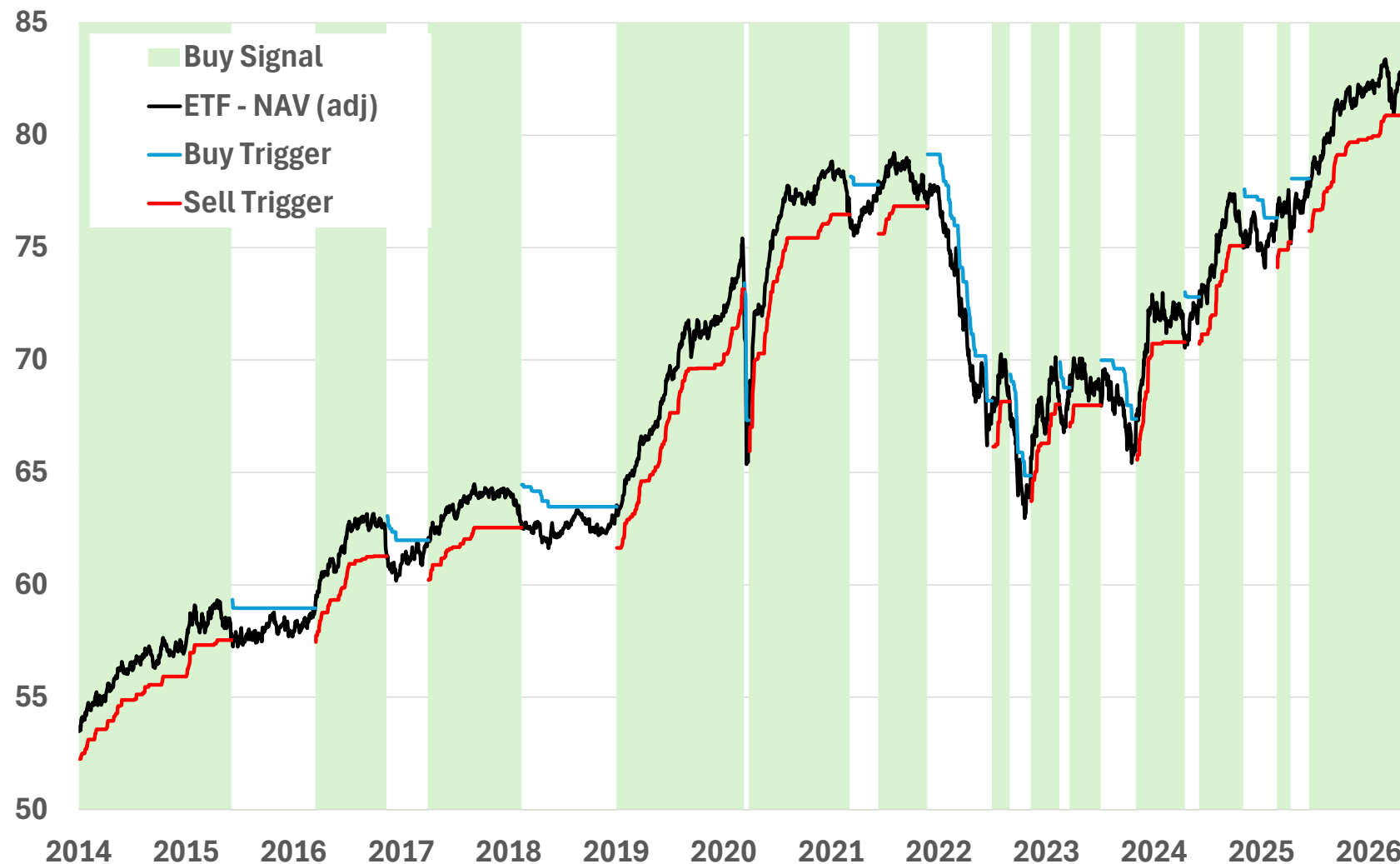
Treasury Bonds - VGIT (+3% / -3%)

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals from 2014



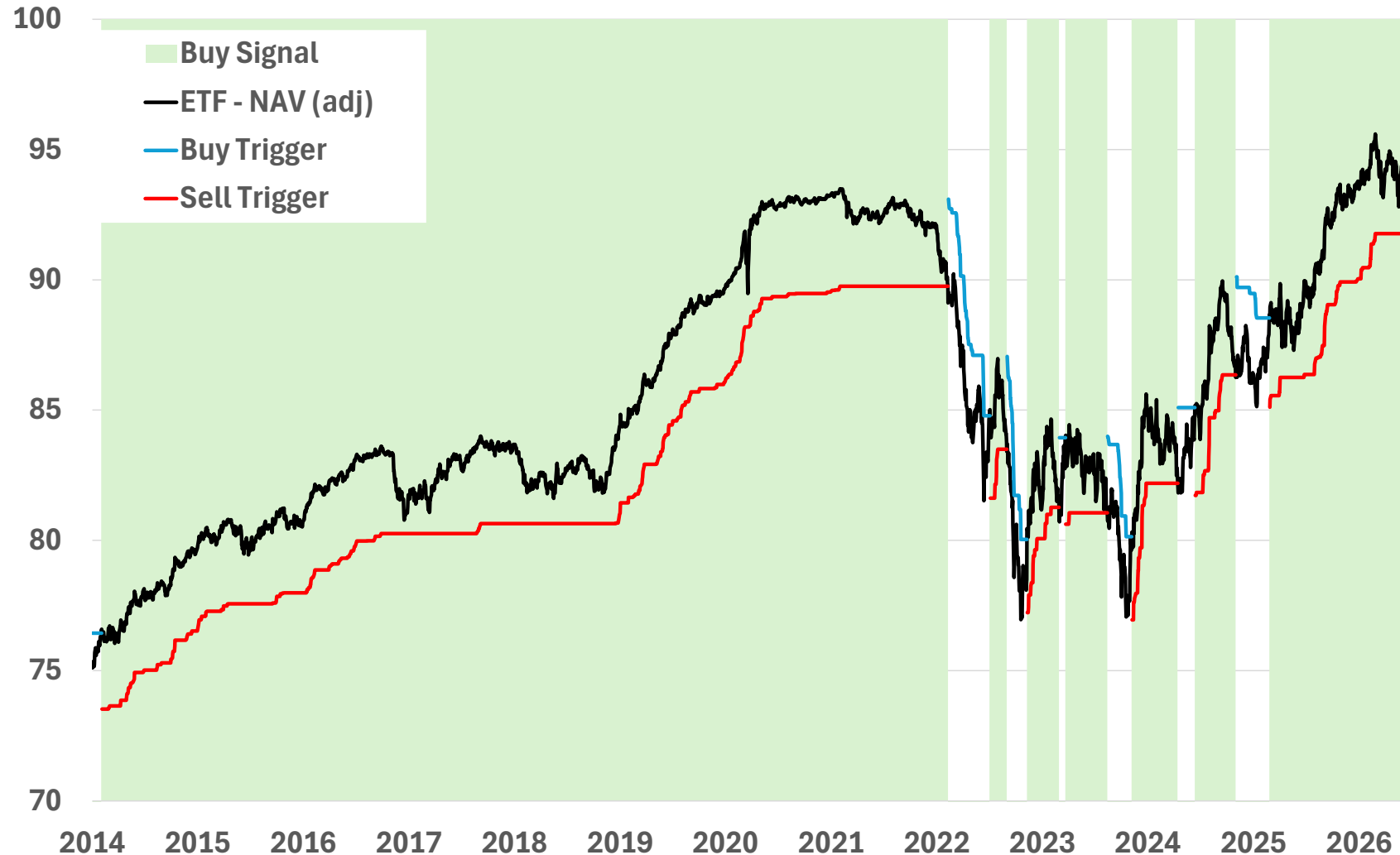
Corporate Bonds - VCIT (+3% / -3%)

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals from 2014



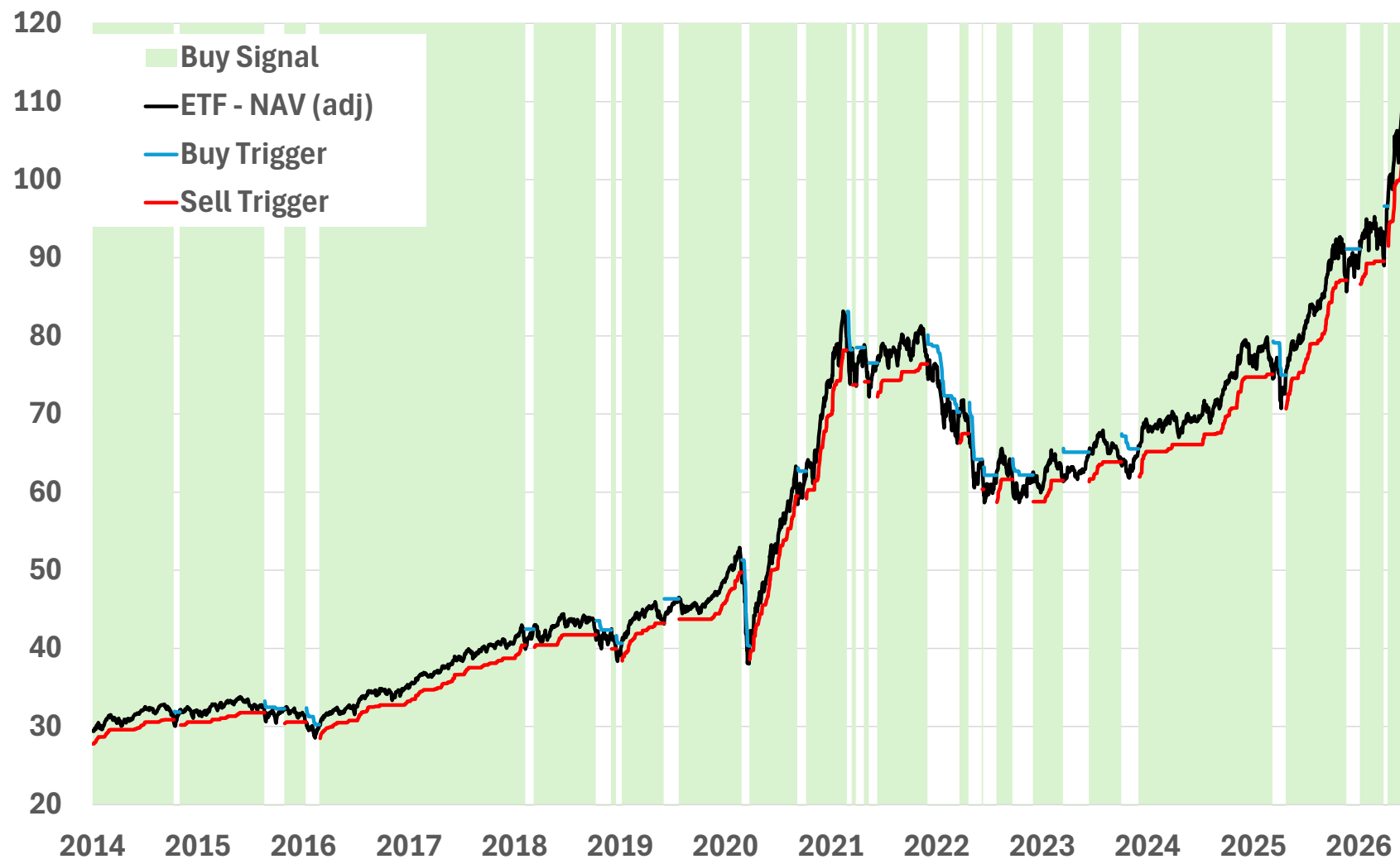
Mortgage-Backed Securities - MBB (+3% / -3%)

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals from 2014



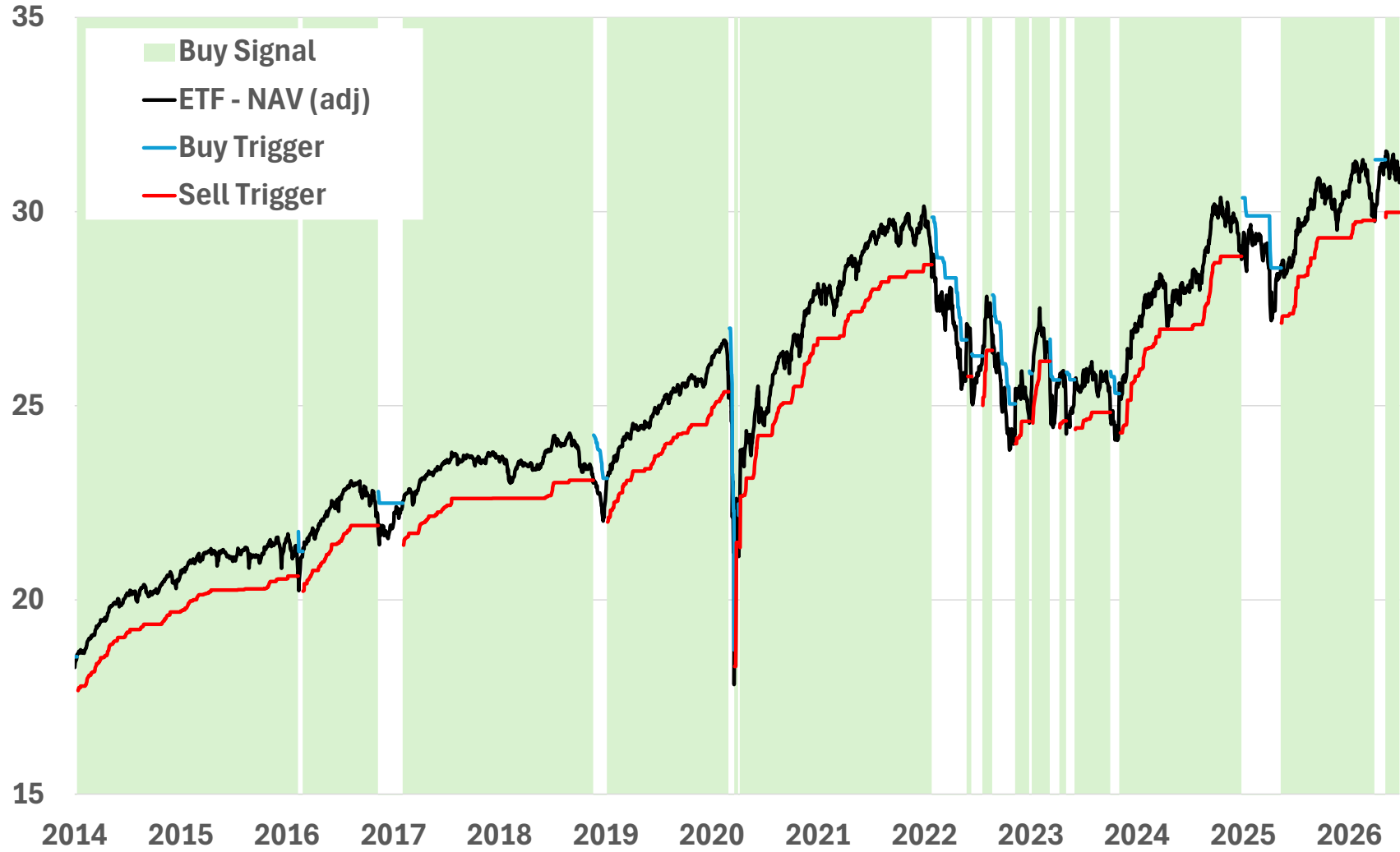
Convertible Securities - CWB (+6% / -6%)

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals from 2014



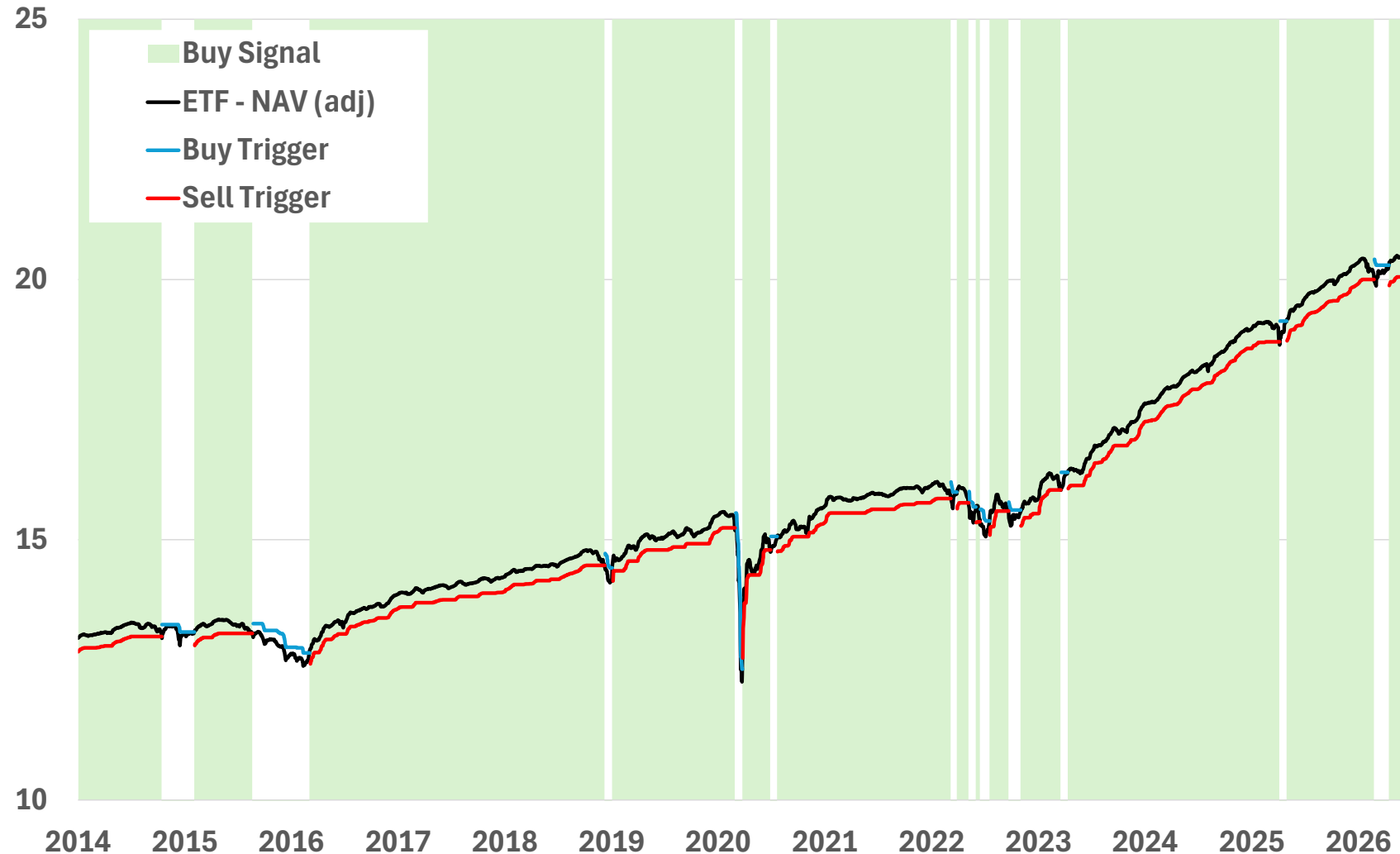
Preferred Securities - PFF (+5% / -5%)

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals from 2014



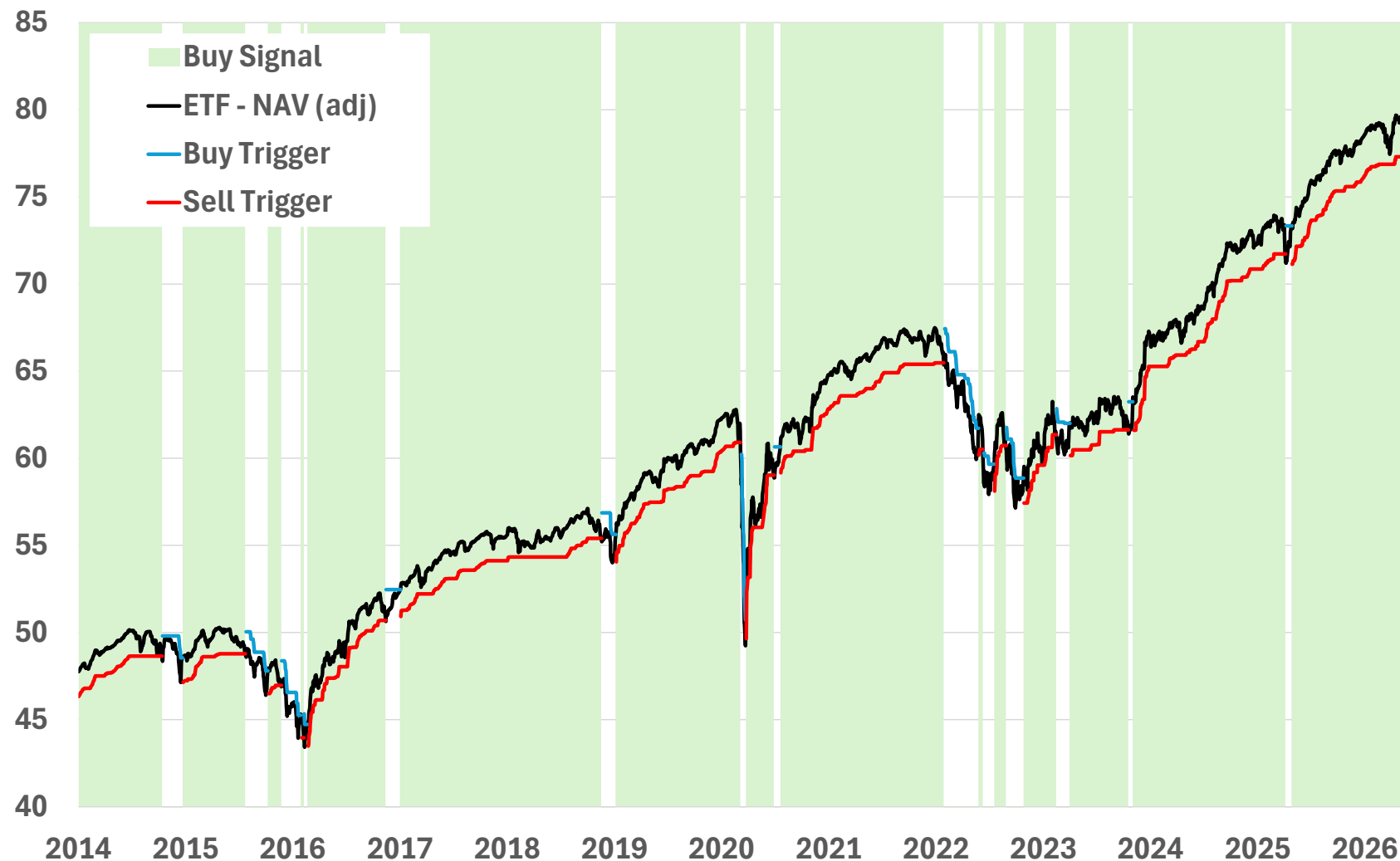
Bank Loans - BKLN (+2% / -2%)

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals from 2014



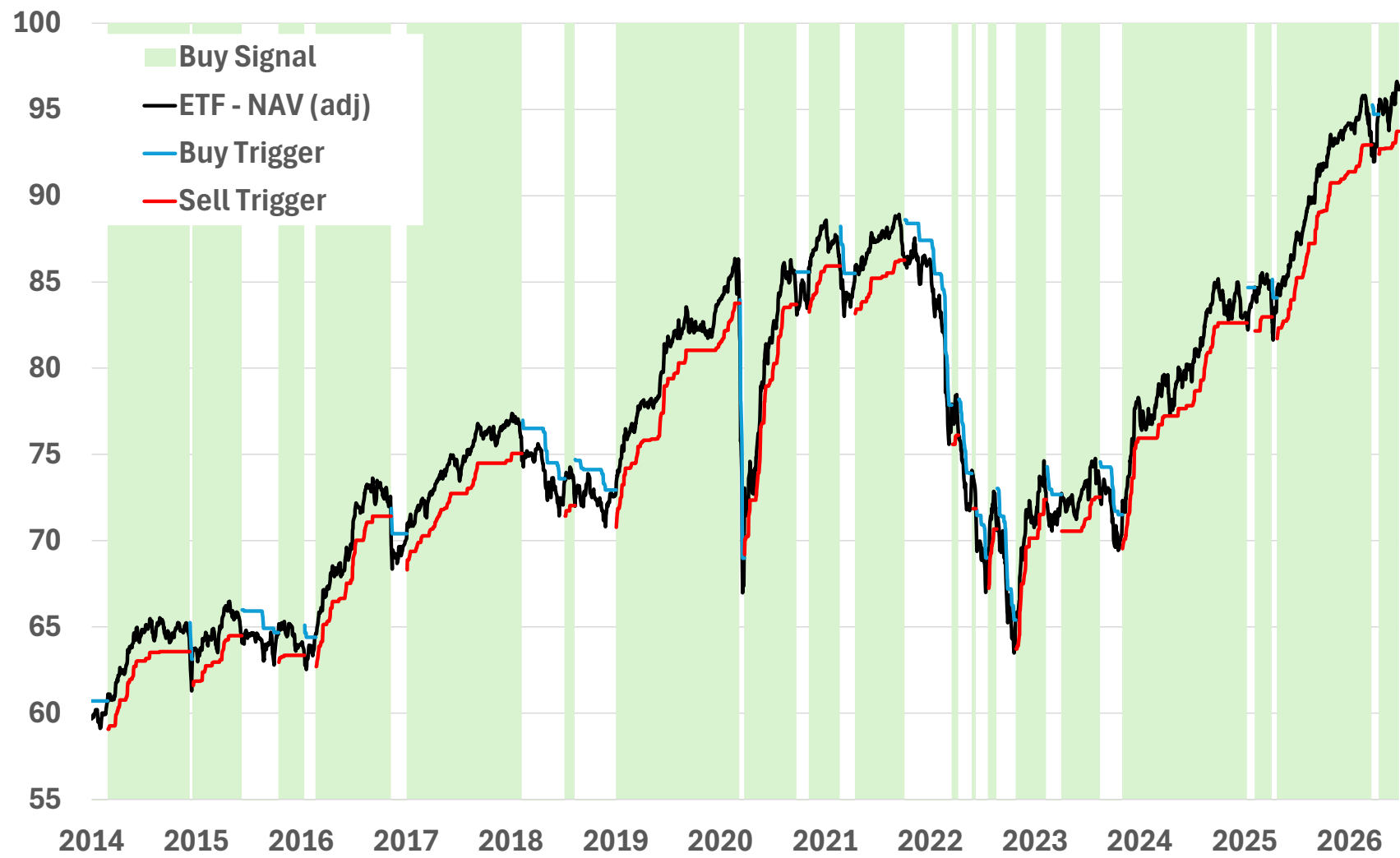
High Yield Bonds - HYG (+3% / -3%)

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals from 2014



Emerging Market Bonds - EMB (+3% / -3%)

NAV (adjusted) with Buy and Sell Triggers and shaded Buy Signals from 2014



Trading Statistics

Average Number of Trades per Year

Asset Class	Trades / Year
Treasury Bonds	1.3
Corporate Bonds	1.9
Mortgage-Backed Securities	1.0
Convertible Securities	3.4
Preferred Securities	2.2
Bank Loans	1.9
High Yield Bonds	2.2
Emerging Market Bonds	3.2

Other Considerations

- Look-ahead bias
- Upper / Lower Bands
- Moving Averages

Portfolio Construction

Several methods

- Market capitalization (market cap) weighted
- Equal weighted
- Fundamental weighting
- Score / Signal weighting
- Risk parity (equal risk contribution)—special case: inverse volatility if all correlations are equal
- Minimum variance (equal marginal risk contribution)
- Maximum Sharpe
- Growth Optimal (Kelly)
- Volatility targeting

Constraints / Considerations

Portfolio construction may be subject to:

- Long only constraints
- Position caps or sector limits
- Diversification requirements
- Liquidity (volume, bid-ask spreads)
- Capacity
- Estimation risk
- Turnover / Transaction costs

Mean Variance Optimization...

...is also error maximization

- Treats all noisy inputs as if they were true
- Expected returns are the hardest to estimate, yet are the largest drivers of weights
- Result: concentrated, unstable weights that look great in sample

Simple Portfolio: Stocks and Bonds

Stocks: S&P 500 Index, Bonds: Bloomberg US Aggregate Bond Index
January 1999 – June 2026 (monthly total returns)

- Annualized Returns and Risk

Asset	Arithmetic Mean	Geometric Mean	Standard Deviation (Risk)
S&P 500	9.57%	8.75%	15.14%
Bloomberg US Aggregate Bond	3.85%	3.83%	4.12%

- Correlation Matrix

Asset	S&P 500	Bloomberg US Aggregate Bond
S&P 500	1.000	0.131
Bloomberg US Aggregate Bond	0.131	1.000

Equal Weight Portfolio

Stocks: S&P 500 Index, Bonds: Bloomberg US Aggregate Bond Index
January 1999 – June 2026 (monthly total returns)

- Equal Weight Portfolio

Asset	Weight	Marginal Risk Contribution	Risk Contribution	Percent of Total Risk
S&P 500	50%	0.1465	0.0732	90.4%
Bloomberg US Aggregate Bond	50%	0.0155	0.0077	9.6%

- Portfolio Risk: 8.10%

Equal Weight Portfolio

Stocks: S&P 500 Index, Bonds: Bloomberg US Aggregate Bond Index
January 1999 – June 2026 (monthly total returns)

- Equal Weight Portfolio

Asset	Weight	Marginal Risk Contribution	Risk Contribution	Percent of Total Risk
S&P 500	50%	0.1465	0.0732	90.4%
Bloomberg US Aggregate Bond	50%	0.0155	0.0077	9.6%

- Portfolio Risk: 8.10%
Add 1% to S&P 500 allocation and remove 1% to Bloomberg US Aggregate Bond allocation

+1% * 0.1465 - 1% * 0.0155 = +0.1310%

Expect portfolio risk to increase from 8.10% to 8.23%

New Portfolio

Stocks: S&P 500 Index, Bonds: Bloomberg US Aggregate Bond Index
January 1999 – June 2026 (monthly total returns)

- New Portfolio

Asset	Weight	Marginal Risk Contribution	Risk Contribution	Percent of Total Risk
S&P 500	51%	0.1468	0.0749	91.0%
Bloomberg US Aggregate Bond	49%	0.0151	0.0074	9.0%

- **Portfolio Risk: 8.23%**

Risk Parity Portfolio

Stocks: S&P 500 Index, Bonds: Bloomberg US Aggregate Bond Index
January 1999 – June 2026 (monthly total returns)

- Risk Parity Portfolio

Asset	Weight	Marginal Risk Contribution	Risk Contribution	Percent of Total Risk
S&P 500	21.38%	0.1138	0.0243	50.0%
Bloomberg US Aggregate Bond	78.62%	0.0310	0.0243	50.0%

- Portfolio Risk: 4.87%

- **Risk contributions** across each asset in the portfolio are **equal**

Minimum Risk Portfolio

Stocks: S&P 500 Index, Bonds: Bloomberg US Aggregate Bond Index
January 1999 – June 2026 (monthly total returns)

- Minimum Risk Portfolio

Asset	Weight	Marginal Risk Contribution	Risk Contribution	Percent of Total Risk
S&P 500	3.84%	0.0408	0.0016	3.8%
Bloomberg US Aggregate Bond	96.16%	0.0408	0.0392	96.2%

- Portfolio Risk: 4.08%

- **Marginal risk contributions** across each asset in the portfolio are **equal**

Portfolio Overview

Stocks: S&P 500 Index, Bonds: Bloomberg US Aggregate Bond Index
January 1999 – June 2026 (monthly total returns)

- Weights and risk of selected portfolio constructions

	Minimum Risk Portfolio	100% Bonds	Risk Parity Portfolio	Equal Weight Portfolio	100% Stocks
% Stocks	4%	0%	21%	50%	100%
% Bonds	96%	100%	79%	50%	0%
Portfolio Risk	4.08%	4.12%	4.87%	8.10%	15.14%

Adding Emerging Market Stocks (MSCI Emerging Markets)

January 1999 – June 2026 (monthly total returns)

- Annualized Returns and Risk

Asset	Arithmetic Mean	Geometric Mean	Standard Deviation (Risk)
S&P 500	9.57%	8.75%	15.14%
MSCI Emerging Markets	10.96%	9.13%	21.00%
Bloomberg US Aggregate Bond	3.85%	3.83%	4.12%

Adding Emerging Market Stocks (MSCI Emerging Markets)

January 1999 – June 2026 (monthly total returns)

- Correlation Matrix

Asset	S&P 500	MSCI Emerging Markets	Bloomberg US Aggregate Bond
S&P 500	1.000	0.732	0.131
MSCI Emerging Markets	0.732	1.000	-0.006
Bloomberg US Aggregate Bond	0.131	-0.006	1.000

Risk Parity Portfolio (2- and 3-asset cases)

January 1999 – June 2026 (monthly total returns)

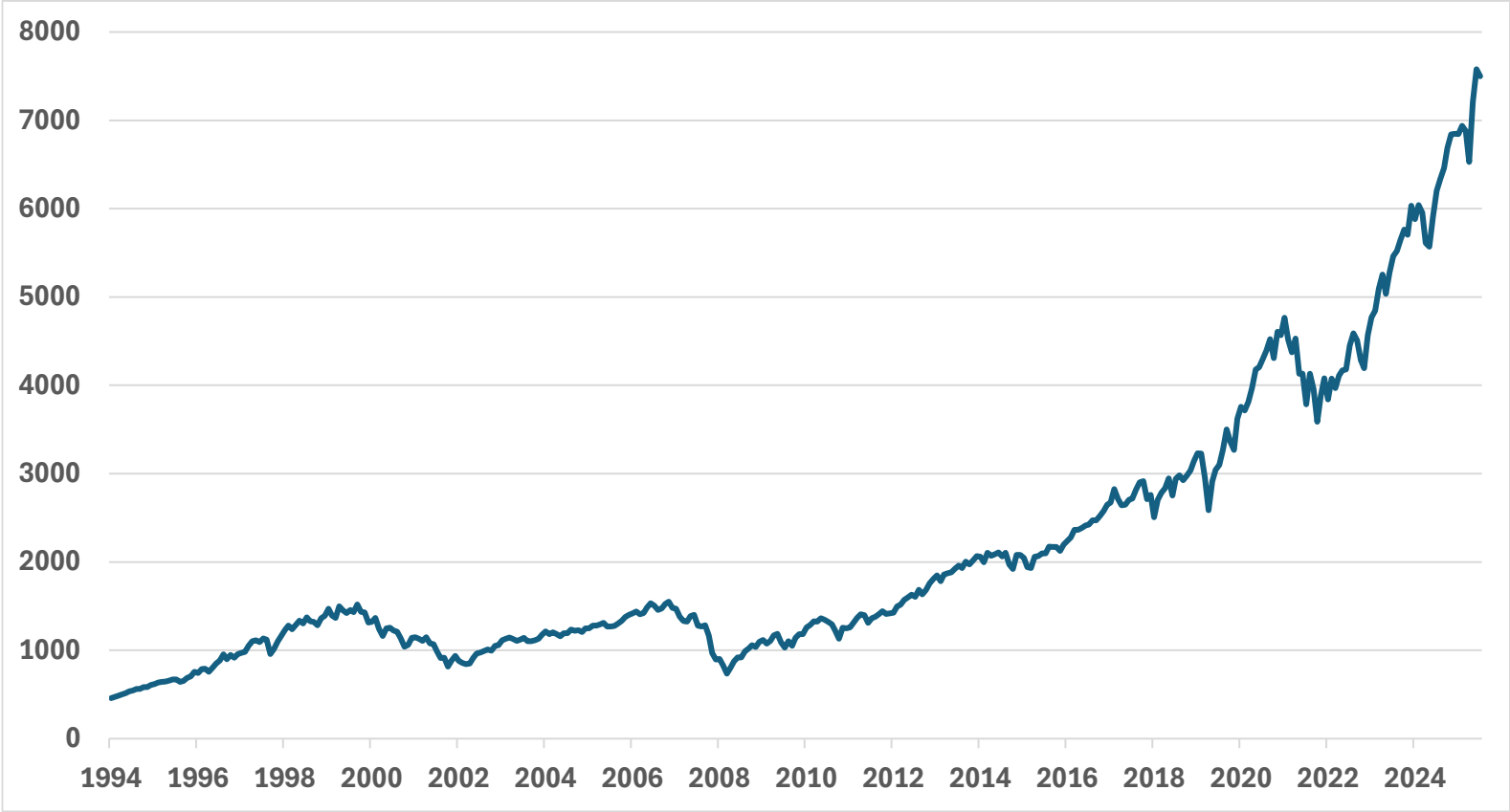
- 2-asset portfolio

Asset	Weight	Marginal Risk Contribution	Risk Contribution	Percent of Total Risk
S&P 500	21.38%	0.1138	0.0243	50.0%
Bloomberg US Aggregate Bond	78.62%	0.0310	0.0243	50.0%

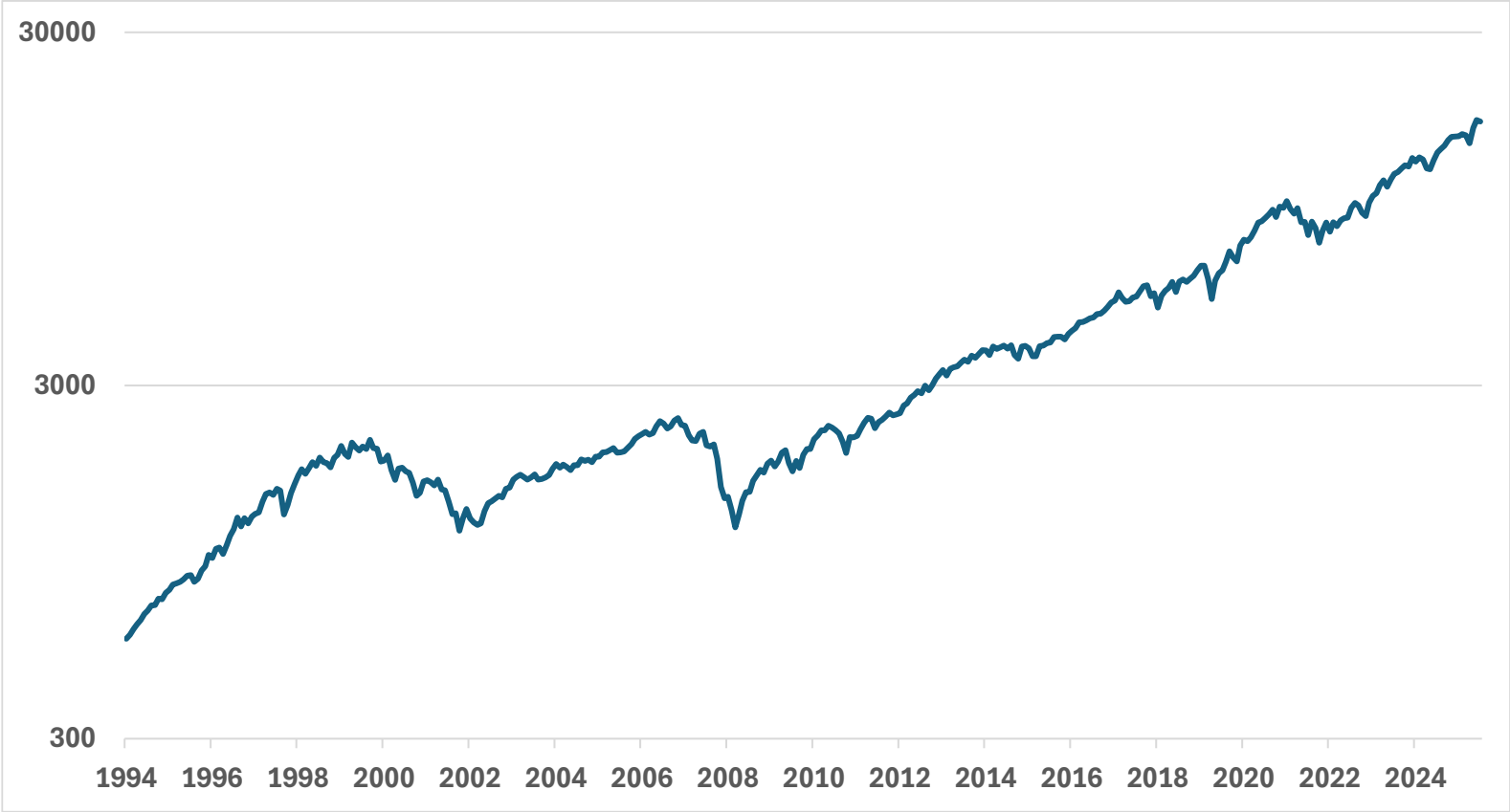
- 3-asset portfolio

Asset	Weight	Marginal Risk Contribution	Risk Contribution	Percent of Total Risk
S&P 500	16.03%	0.1198	0.0192	33.3%
MSCI Emerging Markets (Net)	11.33%	0.1695	0.0192	33.3%
Bloomberg US Aggregate Bond	72.64%	0.0264	0.0192	33.3%

Price Level

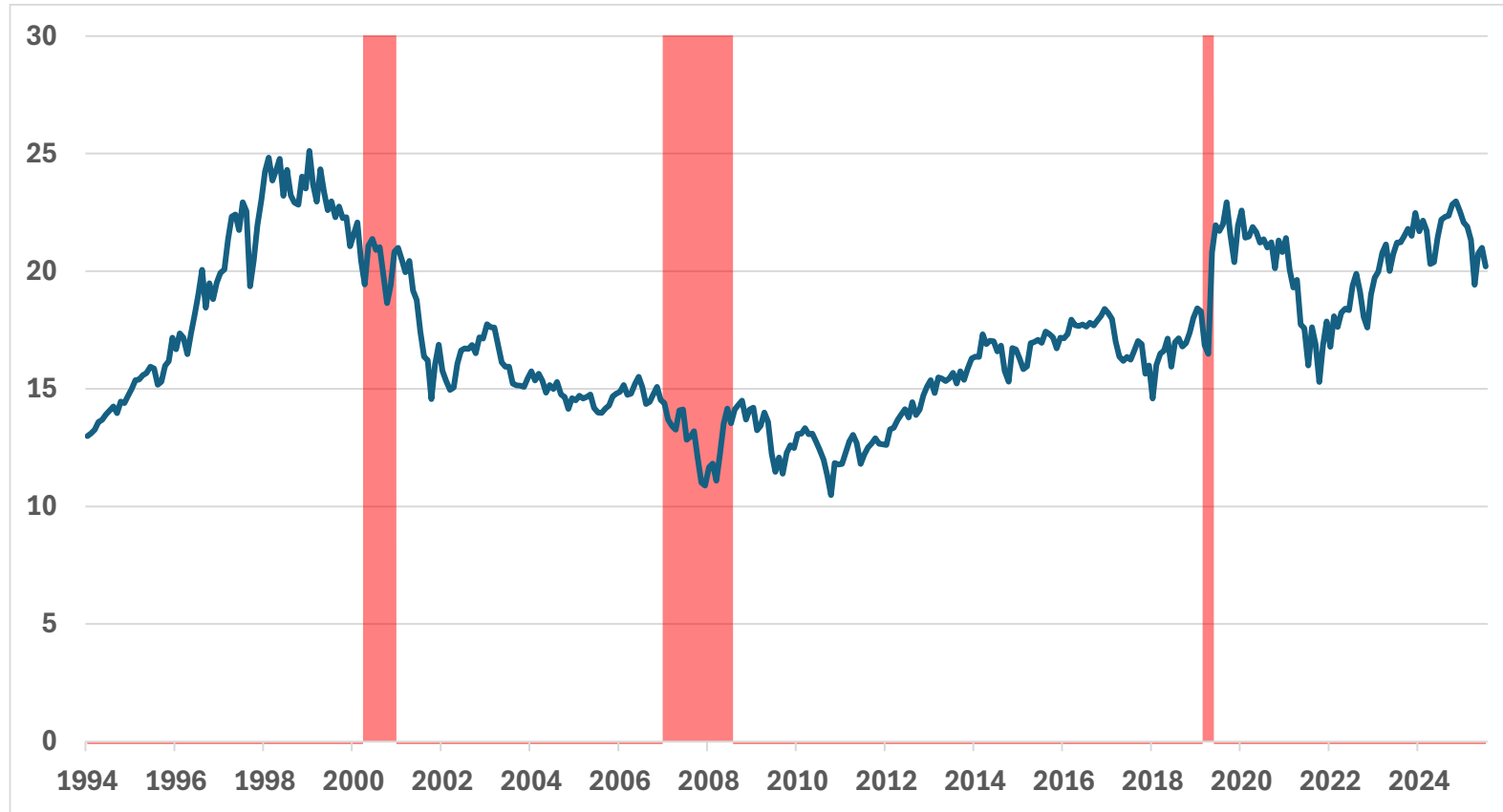


Total Return Level (log chart)



S&P 500 Forward Price Earnings Ratio

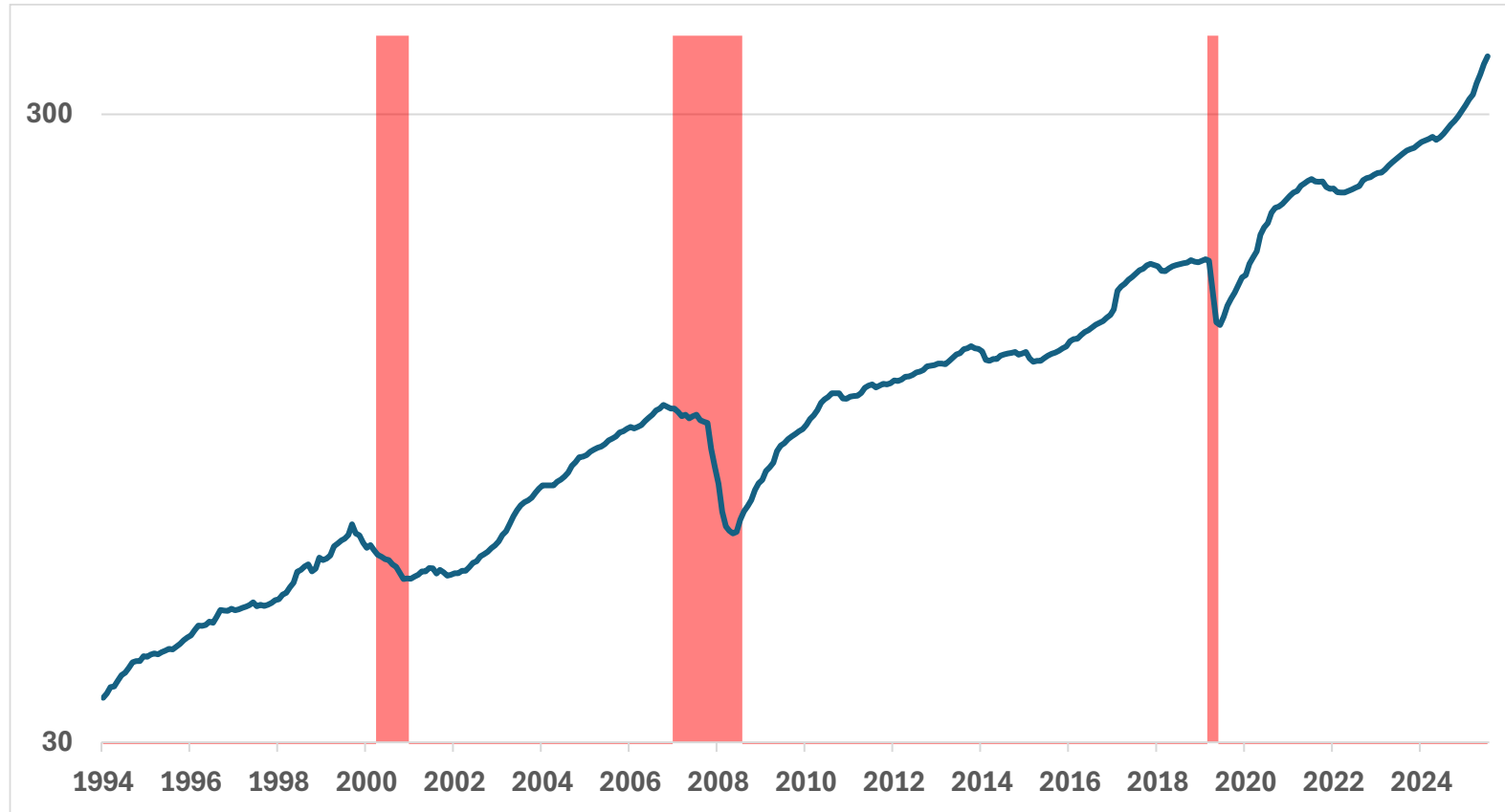
BEST P/E Ratio (Blended 12-month forward)



Red shaded areas indicate recessions

S&P 500 Earnings

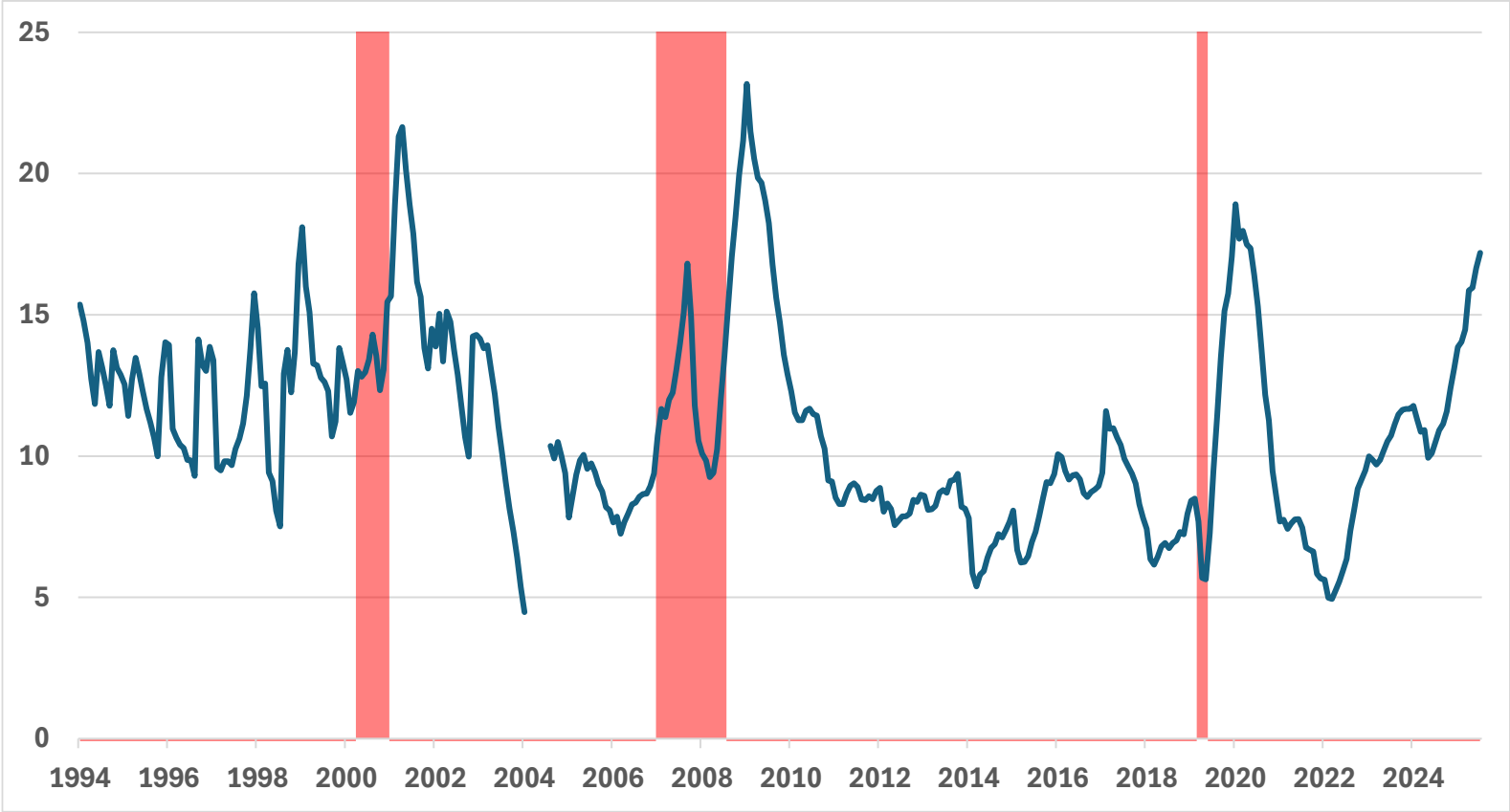
EPS (Blended 12-month forward)



Red shaded areas indicate recessions

S&P 500 Earnings Growth

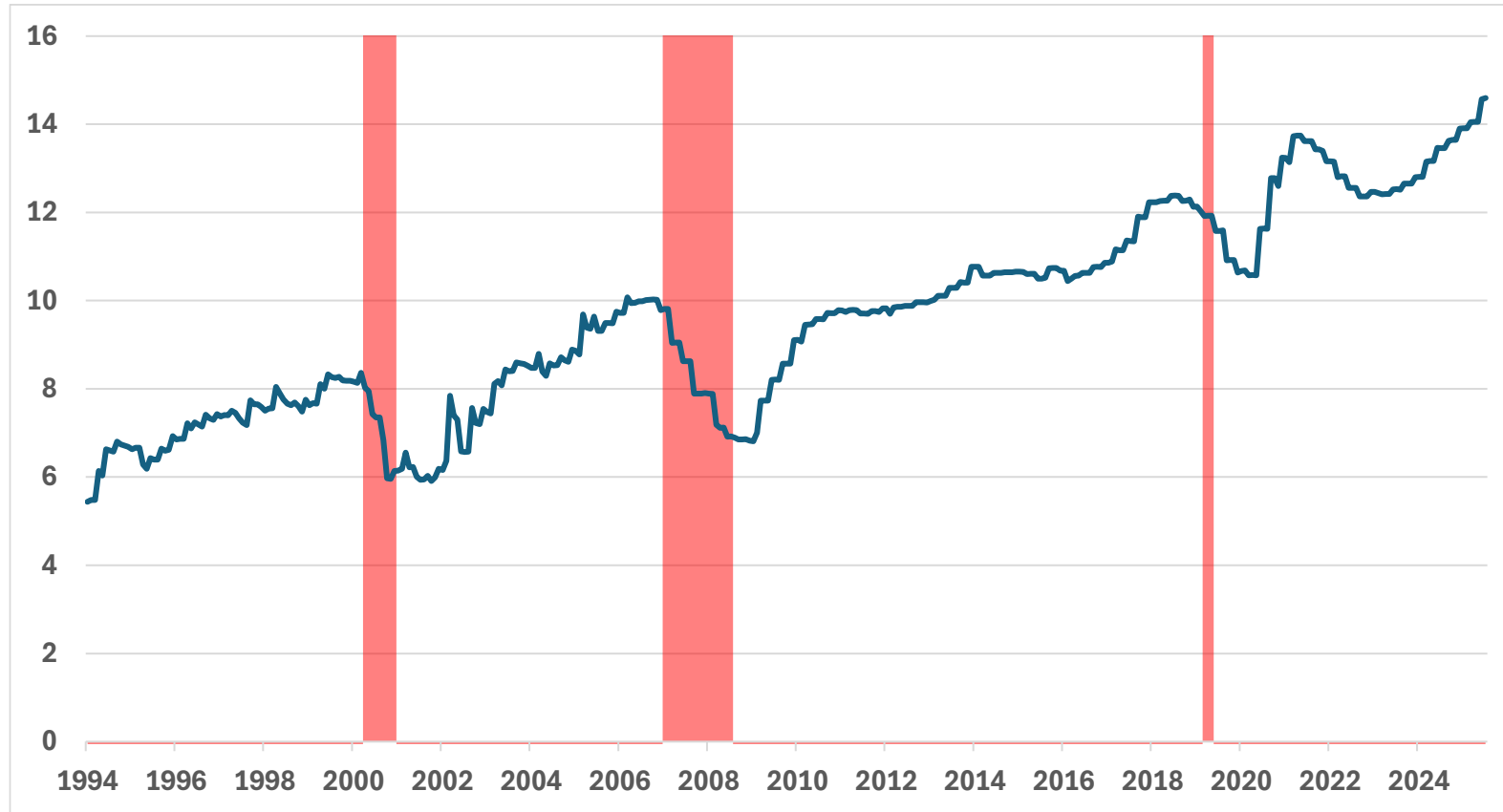
BEST Long-Term EPS Growth (3-5 years)



Red shaded areas indicate recessions

S&P 500 Profit Margins

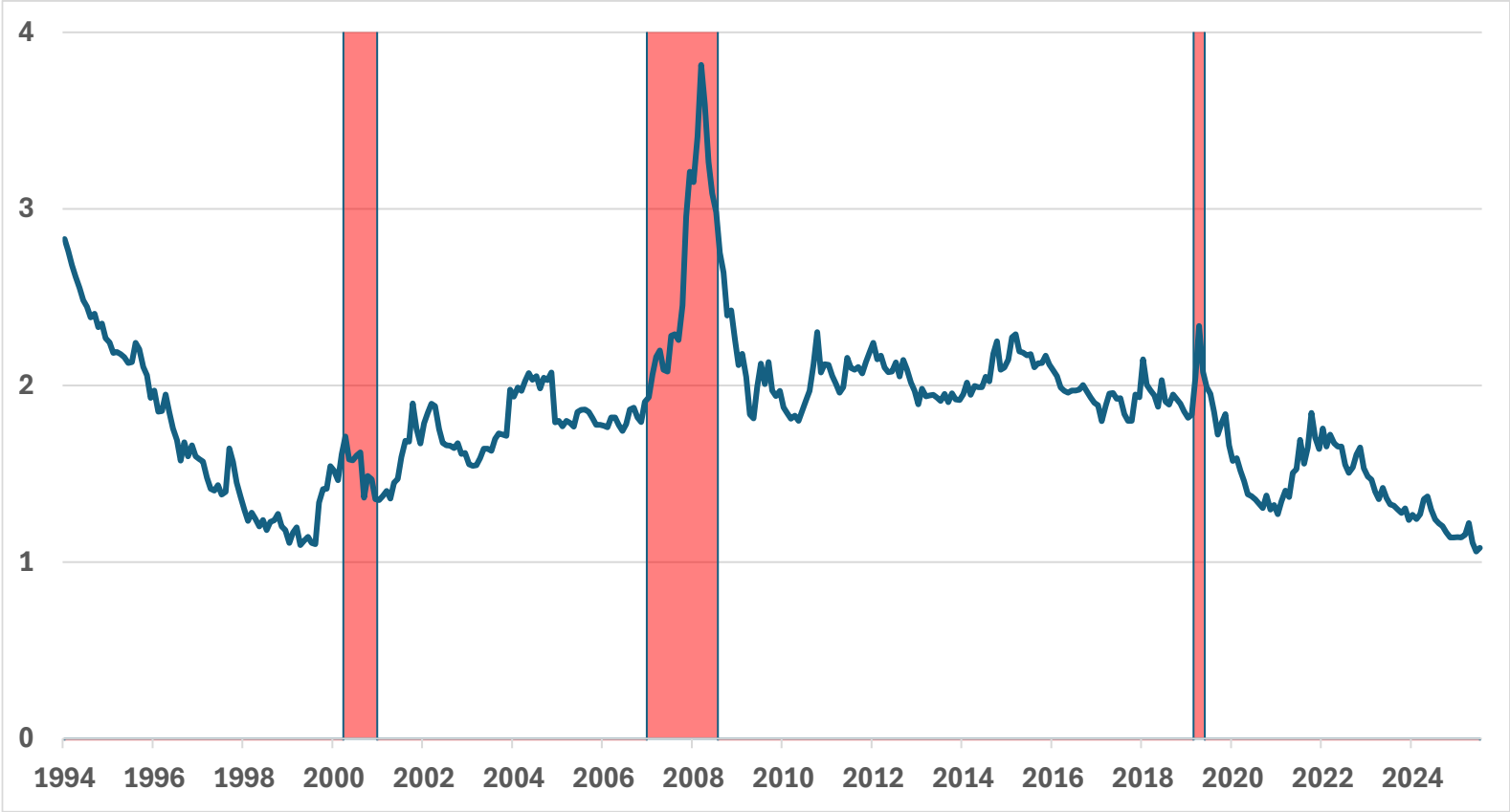
Trailing 12-month Profit Margin



Red shaded areas indicate recessions

S&P 500 Dividend Yield

Trailing 12-month Dividend Yield



Red shaded areas indicate recessions

Stock Valuations

Where do we stand?

- S&P forward P/E ratio close to 30-year highs, but we also have...
- ...High forecasted earnings growth
- ...High profit margins

Equity Returns

Main Drivers of return

- Earnings Growth
- Multiple Expansion (or Contraction) of the P/E ratio
- Dividends

S&P 500: 5 Year Return Forecast

As of 6/30/2026 Price Level: 7499.36, BEST blend 12m fwd EPS 371.14, Dividend Yield 1.1%

		Future P/E Ratio (in 5 years)			
5 yr Earnings Growth		10	15	20	25
	4%	-8.5%	-0.9%	4.9%	9.6%
	6%	-6.8%	1.0%	6.9%	11.7%
	8%	-5.1%	2.9%	8.9%	13.8%
	10%	-3.3%	4.7%	10.9%	15.9%
	12%	-1.6%	6.6%	12.9%	18.0%

S&P 500: 5 Year Return Forecast

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	10%	-3.3%	4.7%	10.9%	15.9%
	12%	-1.6%	6.6%	12.9%	18.0%

5 Year Forecasted Earnings growth: $371.14 * (1 + 0.10)^5 = 597.73$

5 Year Forecasted S&P Price Level: $15 * 597.73 = 8965.89$

5 Year Forecasted S&P Return: $(8965.89 / 7499.36)^{(1/5)} - 1 + 1.1\% = 4.7\%$ (per year)

S&P 500: 5 Year Return Forecast

As of 6/30/2026 Price Level: 7499.36, BEST blend 12m fwd EPS 371.14, Dividend Yield 1.1%

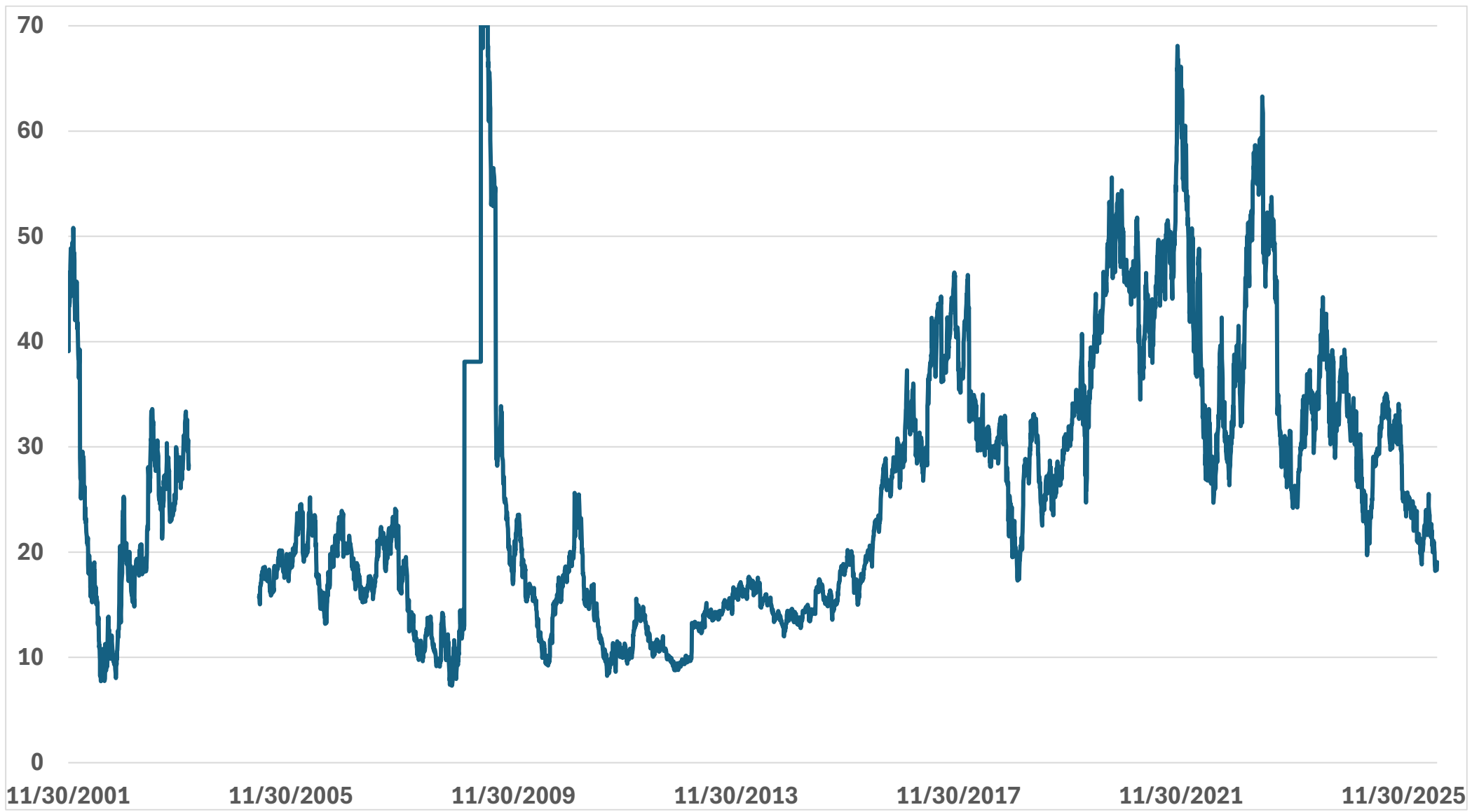
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	8%	-5.1%	2.9%	8.9%	13.8%
	10%	-3.3%	4.7%	10.9%	15.9%
	12%	-1.6%	6.6%	12.9%	18.0%

- Current Bloomberg US Aggregate Bond Yield to Worst (6/30/2026): 4.7%

NVIDIA Blended 12-Month Forward P/E Ratio

Last reading

■ 7/8/2026:
19.05



NVIDIA Blended 12-month Forward P/E Ratio

Last reading

- **7/8/2026:**
19.05
- Long Term Growth: 58%
- Gross Margin: 71%
- Profit Margin: 55%
- Div Yield: 0.5%



Tesla Blended 12-month Forward P/E Ratio

Last reading

■ 7/8/2026:
179.46



Tesla Blended 12-month Forward P/E Ratio

Last reading

- **7/8/2026:**
179.46
- Long Term Growth: n/a
- Gross Margin: 18%
- Profit Margin: 4%
- Div Yield: 0.0%



S&P 500: 5 Year Return Forecast

As of 6/30/2026 Price Level: 7499.36, BEST blend 12m fwd EPS 371.14, Dividend Yield 1.1%

		Future P/E Ratio (in 5 years)			
5 yr Earnings Growth		10	15	20	25
	4%	-8.6%	-1.0%	4.8%	9.5%
	6%	-6.9%	0.9%	6.8%	11.6%
	8%	-5.2%	2.8%	8.8%	13.7%
	10%	-3.4%	4.6%	10.8%	15.8%
	12%	-1.7%	6.5%	12.8%	17.9%

Interest Rates

Where will rates go?

- CME FedWatch

Interest Rates

What is the market saying?

- 75.95% chance of no rate hike at the next meeting in July. (24.05% chance of 1 rate hike.)
- 75.91% chance of 1 rate hike by September.
- 73.77% chance of 2 rate hikes by March 2027.
- “Market is pricing in 1-2 hikes over the next year.”

www.cmegroup.com/markets/interest-rates/cme-fedwatch-tool.html

FedWatch Tool

Target Rate

Current
Compare
Probabilities
Aggregated

Historical

Historical
Downloads
Prior Hikes

Dot Plot

Chart
Table

Tools

CVOL
SOFR Watch
ESTR Watch

FED FUND FUTURES

ZQN6	ZQQ6	ZQU6	ZQV6	ZQX6	ZQZ6	ZQF7	ZQG7	ZQH7	ZQJ7	ZQK7	ZQM7	ZQN7
96.3738	96.3175	96.2525	96.1825	96.1325	96.0625	96.0275	95.9925	95.9700	95.9425	95.9325	95.9400	95.9475

CME FEDWATCH TOOL - AGGREGATED MEETING PROBABILITIES

MEETING DATE	350-375	375-400	400-425
7/29/2026	75.95 %	24.05 %	0.00 %
9/16/2026	24.09 %	75.91 %	0.00 %
10/28/2026	1.95 %	98.05 %	0.00 %
12/9/2026	0.00 %	62.02 %	37.98 %
1/27/2027	0.00 %	45.95 %	54.05 %
3/17/2027	0.00 %	26.23 %	73.77 %
4/28/2027	0.00 %	21.95 %	78.05 %
6/9/2027	0.00 %	27.09 %	72.91 %
7/28/2027	0.00 %	35.95 %	64.05 %
9/15/2027	0.00 %	49.76 %	50.24 %
10/27/2027	0.00 %	58.95 %	41.05 %
12/8/2027	0.00 %	67.04 %	32.96 %

The Fedwatch tool's "Aggregated" view compares the rates implied by CME's Fed Funds futures with the current target rate range as set by the Federal Reserve. As such, it provides a view into the cumulative number of hikes or cuts that the market is pricing by a certain point in the future. This is provided in addition to the traditional "Conditional" view of probabilities, familiar to long-term users of the FedWatch tool.

Powered by QuikStrike®

Federal Funds Rate

Current Target Range:

- 3.50% – 3.75% (Actual level 3.63% on 7/3/2026)

FOMC Longer Run Target:

- Median: 3.1% (Ranges from 2.9% to 3.9%) -- from June 2026 Summary of Economic Projections ("SEP")

Result:

- FOMC's current monetary policy is still applying the brakes to the economy as the fed funds rate is above the long run rate. Still in a restrictive monetary policy stance.

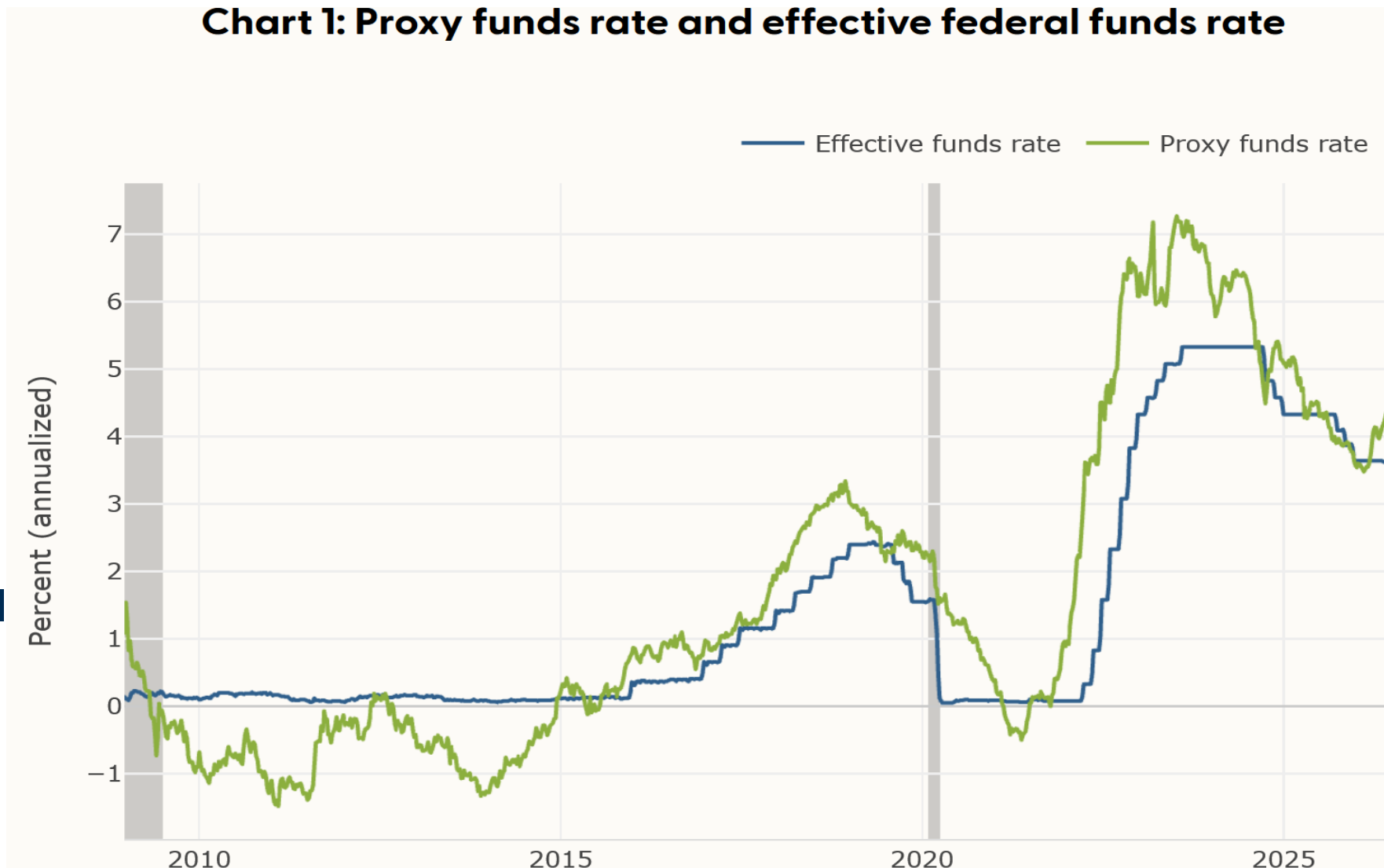
Proxy Funds Rate (San Francisco Fed)

- Uses 12 variables including Treasury rates, mortgage rates, and borrowing spreads

Interpreted as:

- Indicating what federal funds rate would typically be associated with prevailing financial market conditions if these conditions were driven solely by the funds rate.

Chart 1: Proxy funds rate and effective federal funds rate

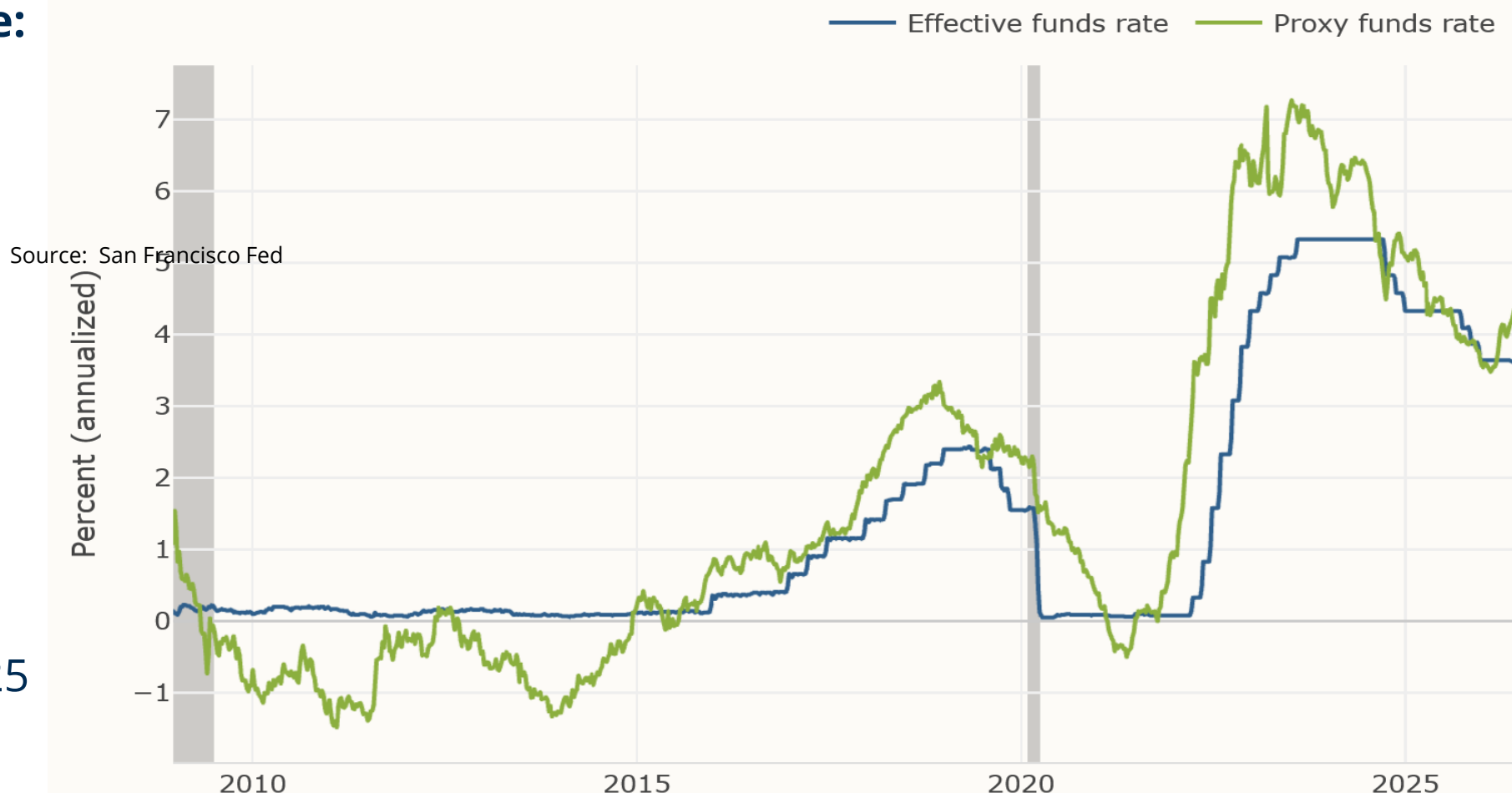


Proxy Funds Rate (San Francisco Fed)

Last reading: 7/3/2026

- **Effective Funds Rate:**
3.63%
- **Proxy Funds Rate:**
4.52%
- Current monetary conditions already implies almost 1% of tightening already since the last Fed cut on December 10, 2025

Chart 1: Proxy funds rate and effective federal funds rate





Thank you!