A Sharpe Strategy:
Volatility-Adjusted Cross-Asset Momentum

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Introduction

Momentum is a behavior that often persists across multiple asset classes, creating systematic opportunities for disciplined quantitative trading. This strategy leverages this trend by investing in liquid assets (equities, ETFs, futures, currencies, etc.) with the strongest indications of momentum. By investing in different asset classes, hedge funds can reduce their exposure to any one market or instrument, providing a cushion for idiosyncratic risk. Additionally, this allows funds to develop a portfolio that balances long and short positions, remaining market-neutral while capitalizing on consistent directional moves.

The approach is fully algorithmic and rules-based, executing according to predefined signals. Assets are ranked by momentum and position weights are scaled by volatility to prevent any single holding from dominating. Monthly rebalancing with intra-month stop-losses provides discipline without over-trading. The combination of trend-focused signal generation, controlled risk management, and systematic execution creates a strategy designed to deliver consistent, measurable, and risk-adjusted returns.

Economic Hypothesis

The foundation of this strategy relies on momentum persistence – the validated tendency for assets exhibiting strong recent performance to continue trending in the same direction. Academic literature has long documented this phenomenon across various markets and time periods. By ranking our investments and capturing these trends, we position the portfolio to harvest consistent returns from an “unpredictable” market.

Portfolio-level risk is managed through inverse volatility weighting, which prevents high-volatility assets from heavily influencing the portfolio. The intention of this approach is to maximize the Sharpe ratio of our portfolio's returns as a whole. Sharpe ratio is a metric quantifying risk-adjusted performance as return divided by volatility. A higher Sharpe indicates returns are achieved with lower risk; Figure 1 illustrates a comparison between different Sharpe ratios. Despite all simulated assets returning the same value at the end, each had different volatilities reflected on their Sharpe, and a higher Sharpe indicates a more smooth, safe investment. The comparison displays why risk-adjusted performance is important, especially during volatile markets and when uncontrolled momentum strategies falter.

The market-neutral construction through balanced long/short exposure further insulates the portfolio from systematic market risk. When trends reverse, the strategy reallocates capital dynamically – exiting losing positions through stop-losses and rotating into newly emerging opportunities identified by the ranking system. This flexibility, combined with disciplined

rebalancing, allows the strategy to adapt to regime changes while maintaining consistent risk targeting.

Visual evidence has reinforced the rationale of the strategy. Figure 3 demonstrates an equity curve of the sustained growth from a sample portfolio (Figure 2) for the year 2025 . There is a steady compounding increase despite the varied market conditions throughout 2025.

Implementation

The strategy works with a predefined portfolio of liquid and diversified assets spanning equities, fixed income commodities, and currencies. They are selected based on high average daily volume, tight bid-ask spreads, and the availability of historical data. These criteria ensure that strategy performance reflects genuine signal quality rather than execution limitations. Figure 2 displays a representative portfolio snapshot, including US equities (both individual stocks and broad market ETFs), sector and style ETFs, commodities, US Treasury Bond ETFs, and major currency pairs. This portfolio will remain constant throughout the evaluation to eliminate survivorship or selection bias and ensure that the results from this strategy reflect systematic decision-making rather than ex post asset selection or cherry-picking.

All calculations use daily adjusted close prices. Signals are evaluated daily, but portfolio rebalancing occurs monthly or when an asset's momentum or volatility changes substantially enough to warrant adjustment. Both momentum and volatility are computed using a 63-day lookback window – approximately one trading quarter. This was specifically chosen to balance signal reliability against responsiveness. Shorter windows would introduce excessive noise, and longer windows would miss trends. Which makes the quarterly 63-day period a perfect median timeframe.

Momentum is defined as the simple cumulative return: the percentage price change between the current close and the close 63 trading days prior. To avoid trading on marginal momentum signals that could easily reverse, a ±1% buffer is applied. Assets with momentum exceeding a +1% qualify as long candidates, assets below -1% become short candidates, and assets within the buffer zone are labeled neutral and receive no investment until a trend occurs. This buffer is critical; it prevents capital churn from minor oscillations around zero momentum, reducing transaction costs and improving net returns. The 1% threshold was established after analyzing historical momentum decay rates and represents the minimum move size that meaningfully separates a trend from a temporary oscillation.

Volatility is measured as the standard deviation of daily log returns over the same 63-day window, then annualized by scaling with $\sqrt{252}$. The standardization enables uniform risk

comparison across assets. For example, an asset with 20% annualized volatility represents twice the risk of one showing 10%, regardless of absolute price levels or units of measurement.

Position sizing integrates both momentum and volatility through a signal score calculated as |momentum|/volatility. This ratio favors strong trends (high numerator) while penalizing instability (high denominator). It makes it easy: an asset with 15% momentum and 10% volatility received a higher allocation than one with 15% momentum but 20% volatility. Additionally, the total invested capital is capped at 90%, leaving 10% held in cash. This acts as a safety net with many purposes – it prevents deleveraging during drawdowns, provides liquidity for rebalancing, and ensures stop-loss exits can be executed without distributing unrelated positions. Long positions receive the majority of capital allocation while short positions are assigned smaller, controlled weights (1-3% each) to limit asymmetric risk. Position weights are normalized separately within long and short groups to keep the balance.

Just like the parameters above, trading logic is entirely rules-based as well. At month-start, all assets are evaluated using their 63-day momentum and volatility, and their positions weights are calculated accordingly. These allocations remain until the next monthly rebalance, or its signals materially change. If a long position's momentum crosses below 0.1%, the asset is exited and potentially shorted at the new calculated weight; the reverse applies for short positions. Positions will be held during neutral signals to deliberately reduce turnover. Intra-month, a 5% stop-loss applies to all positions – longs are exited if price falls 5% below entry, and shorts are exited if price rises 5% above entry. This mechanism limits risk from sudden adverse moves without interfering with the primary monthly rebalancing system. Trades execute at the daily close, with minimal assumed slippage given the focus on highly liquid instruments.

Risk Assessment

No strategy is without risk. Momentum signals can fail during sudden regime shifts involving market crashes, policy interventions, or liquidity crises. These can cause rapid reversals that even tight stop-losses may not fully mitigate. And short positions carry asymmetric risk since prices can theoretically rise indefinitely, whereas longs are bounded at zero. Additionally, high volatility assets could dominate portfolios if correlations shift unexpectedly or if volatility spikes faster than rebalancing can respond.

Despite all of this, the strategy establishes multiple controls to address these risks. Volatility-adjusted position sizing is the first line of defense, which mathematically prevents a single asset from taking too much capital weight regardless of its momentum. The 90% capital cap with a 10% cash safety net provides a liquid source of protection during adverse periods. Additionally, the 5% stop-loss applies uniformly to all positions, capping losses before they cause huge damage to the portfolio.

Cross-asset diversification was an important theme that was more structural than incidental. By spanning investments across different assets like equities, bonds, commodities, and currencies, the portfolio reduces dependence on any single market or economic factor. When equity momentum falls, commodity trends may rise. This diversification is vital to the health of the portfolio.

The portfolio is also continuously monitored via the Sharpe ratio. If the rolling Sharpe drops below 0.7, indicating returns are coming in with noticeable risk, position sizes are reduced, and rebalancing becomes more conservative until signals improve. This dynamic risk targeting prevents the strategy from compounding losses during harsh times. The threshold of 0.7 serves as a boundary between acceptable and unacceptable risk-adjusted performance.

Liquidity and Capital Implications

This strategy is explicitly designed with liquidity and capital efficiency as core constraints. Every asset in the portfolio has high daily volume and tight bid-ask spreads, ensuring entries and exits execute without significant spillage or market impact. By focusing on liquid ETFs, large-cap equities, treasury instruments, and major FX pairs, the strategy avoids the risks that come along with less liquid assets.

Scalability improves with capital growth. Monthly rebalancing minimized turnover and transaction costs, while liquid instruments allow position sizes to scale without degrading execution quality. Capital is managed dynamically as a percentage of the current portfolio value rather than fixed dollar amounts, ensuring consistent risk targeting as equity grows or declines. A $100,000 portfolio and a $10 million portfolio maintain identical risk profiles through proportional scaling. Testing indicates the strategy remains implementable up to approximately $50 million before market impact becomes material – at this size, expanded portfolios or multiple strategies become more appropriate over this single strategy.

Analytical Evidence

To validate the effectiveness of this strategy, a 10-year backtest was conducted using assets from the predefined portfolio (Figure 2). Results provide both quantitative and visual evidence of systematic decision-making. Figures 4 and 5 present representative assets – Apple (AAPL) and Amazon (AMZN) – with the historical price overlaid by green dots marking buy entries (or short initiations) and red dots indicating sell exits (or stop-loss triggers). The annotations on the top-right display the total gain, total loss, and net profit as a percent, summarizing the realized outcomes.

Figure 3's equity curve illustrates portfolio growth throughout 2025, starting from $100,000 and compounding through varied market conditions. Despite the volatile trading year of 2025, the strategy managed to grow a little over 17% that year. This demonstrates risk-controlled growth rather than explosive returns, reiterating the strategy's emphasis on consistency. Figure 6 displays the rolling Sharpe ratio below the same equity curve, revealing an annual Sharpe of 0.9 despite 2025's heightened volatility and regime shifts. The strategy maintained this risk-adjusted performance by automatically reducing exposure during unfavorable periods (visible as equity curve flattening around Q1), confirming that dynamic risk management prevents catastrophic drawdowns even when momentum signals weaken.

The decision to showcase actual backtest results rather than optimized simulations reflects confidence in methodology over outcomes. While returns are moderate compared to overfitted strategies, this transparency demonstrates that the approach is implementable and robust. The system of volatility-adjusting position sizing proves valuable during periods where Sharpe ratios deteriorate.

To address overfitting concerns, no parameters were optimized on the full backtest dataset. The 63-day window, 1% momentum buffer, 5% stop-loss, and 90/10 capital split were selected based on theoretical reasoning and market understanding rather than curve-fitting. The strategy was intentionally designed to be strong across market regimes rather than optimized for any specific historical period.

Capital constraints were directly incorporated into testing. The backtest assumes realistic position sizing subject to minimum lot constraints, meaning fractional shares were rounded according to execution rules. This prevents overstating the diversification that would be impossible to achieve with smaller capital bases. At the tested $100,000 level, the strategy maintains 12-15 positions on average.

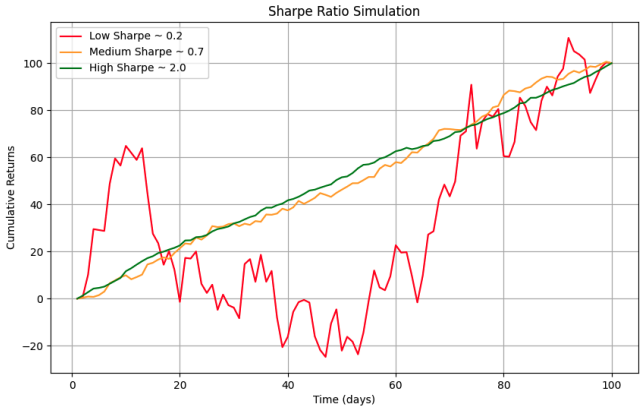
Conclusion

This strategy demonstrates that systematic cross-asset momentum, implemented with disciplined volatility-adjusted position sizing and rigorous risk controls, can generate consistent risk-adjusted returns. The 10-year backtest confirms that momentum persists across asset classes that portfolios constructed to capture these trends while managing volatility can bring capital steadily through varied market conditions. Momentum exists because individuals face structural constraints and behavioral biases that prevent perfect efficiency, creating a persistent inefficiency that algorithmic traders can monetize.

The transparency in presenting results – even with moderate returns, realistic drawdowns, and even negative periods – reflects confidence in methodology over outcomes. By integrating

momentum ranking with volatility-based risk management, continuous Sharpe monitoring, and rigorous overfitting, this approach balances opportunity capture with capital preservation. Although this is not the next market-beating miracle, it is a practical demonstration that well-understood market phenomena, applied systematically, can generate reliable returns in real-world trading environments.

Appendix



Asset	Type	Momentum (%)	Volatility (%)	Position	Weight (%)
GLD	Gold ETF	11.7	1.57	Long	32.25
AAPL	US Equity Stock	5.83	1.1	Long	22.94
AMZN	US Equity Stock	3.78	2.08	Long	7.87
SPY	US Equity ETF	2.2	0.8	Long	11.9
QQQ	US Tech ETF	1.55	1.14	Long	5.88
IWM	Small-Cap ETF	1.22	1.27	Long	4.16
EUR/USD	Currency Futures (via spot FX proxy)	0.19	0.26	Neutral	0
TLT	US Treasury Bond ETF	-1.59	0.52	Short	1.21
VNQ	Real Estate ETF	-1.96	0.77	Short	1.39
USO	Crude Oil ETF	-3.33	1.62	Short	2.4
Date: Jan 2, 2026					90

Figure 1: Sharpe Ratio Comparison - Compares the strategy's Sharpe ratio against a benchmark to illustrate risk-adjusted performance.

Figure 2: Example Portfolio - Snapshot of assets, their momentum, volatility, positions, and weights as of January 2, 2026.

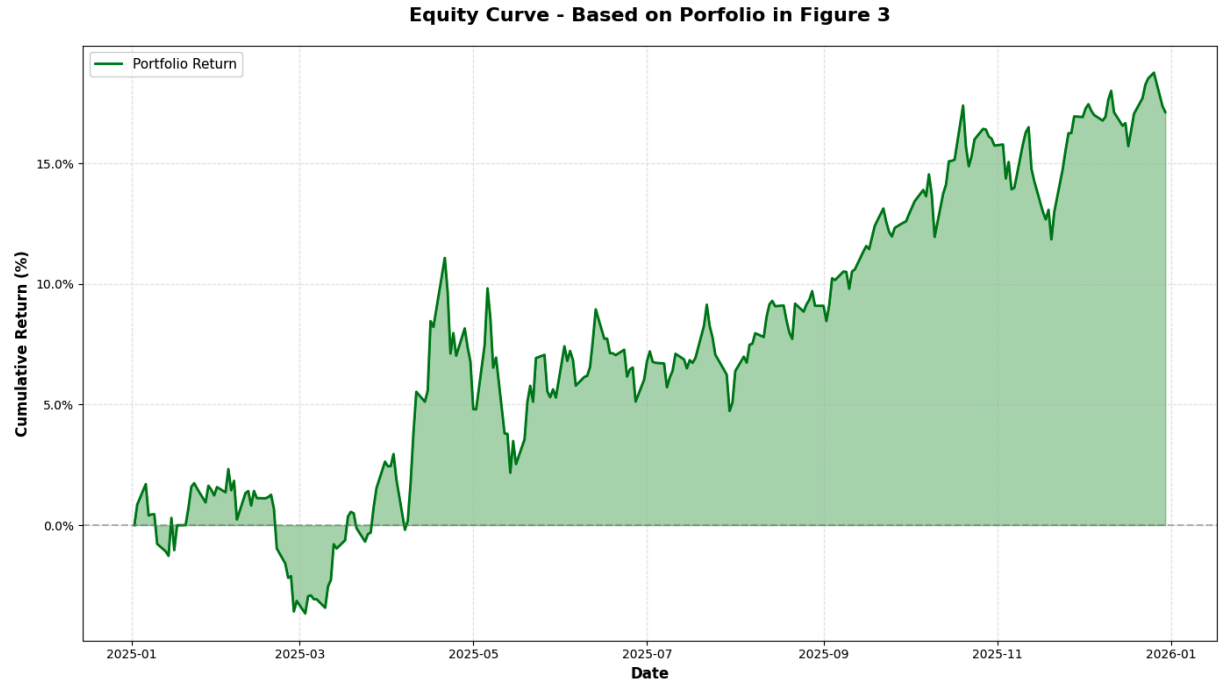


Figure 3: Equity Curve - Shows portfolio growth over 2025 starting from $100,000, visualizing cumulative returns.

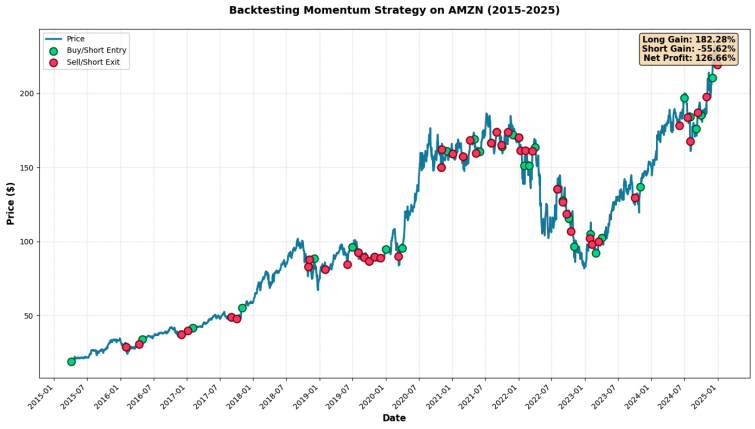


Figure 4: AMZN Backtest - Line chart for a selected asset showing buy (green) and sell (red) markers, demonstrating algorithmic signals and volatility-adjusted position sizing over the past 10 years.

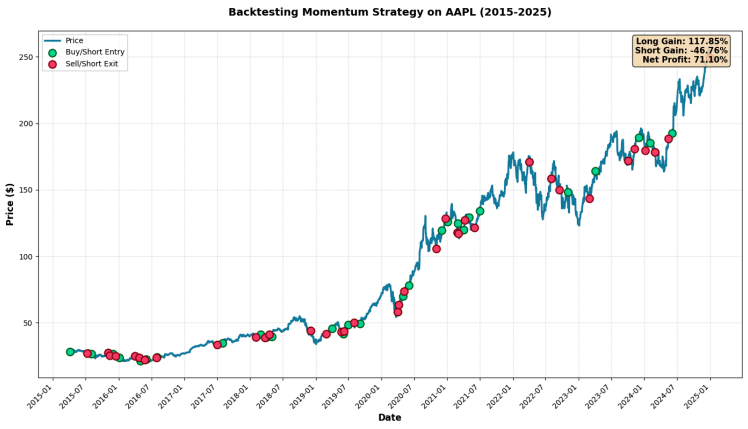


Figure 5: AAPL Backtest - Same as Figure 4 but with AAPL.

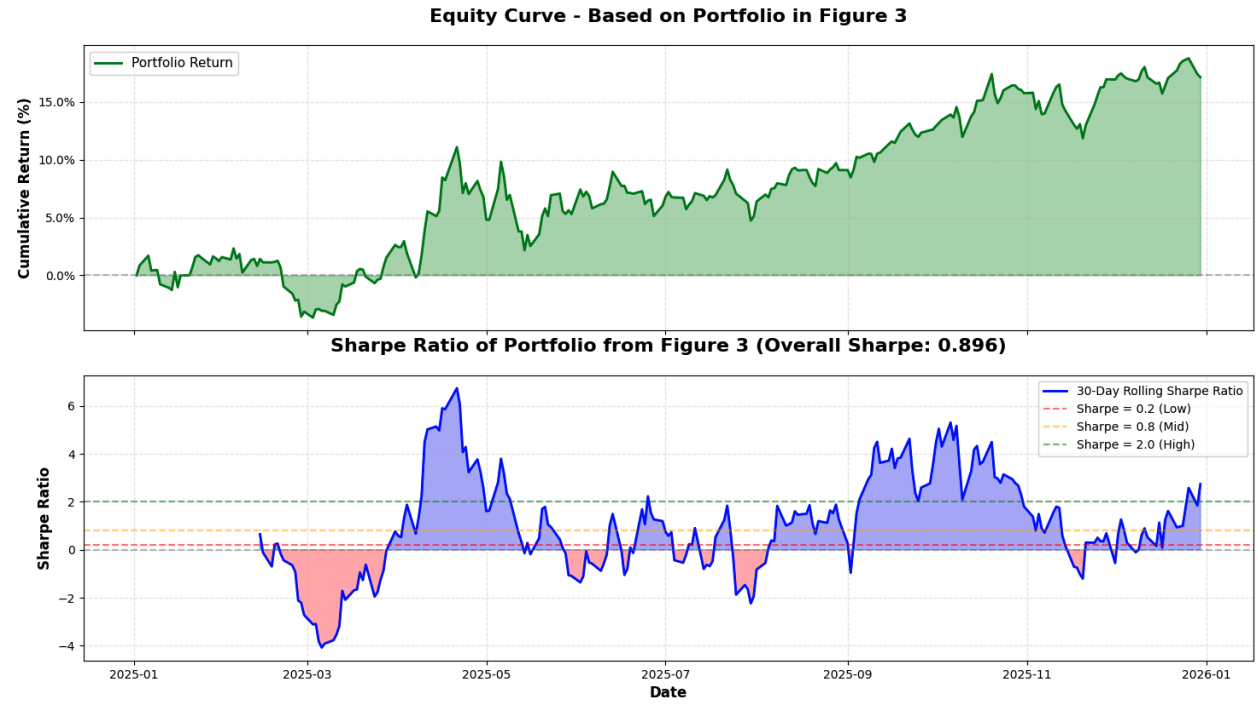


Figure 6: Equity Curve with Sharpe Ratio - Same as Figure 2, but overlays the portfolio's Sharpe ratio throughout the timeframe to illustrate risk-adjusted consistency.