Yield Curve-Driven Moving Averages

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Agenda

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Tentative Outline:

- Thesis
- Yield Curve Literature Review
- Moving Averages Literature Review
- Moving Averages
- Data
- Yield Curve-Adjusted Strategy
- Key Finding
- Conclusion
- Appendix

Thesis

Enhancing the performance of a technical analysis strategy by incorporating the predictive power of the yield curve.

Key Points

- Traditional technical analysis strategies rely solely on price trends.
- The yield curve is a proven macroeconomic indicator.
- This study integrates yield curve signals into a moving average strategy to adjust risk exposure dynamically.

Yield Curve Literature Review

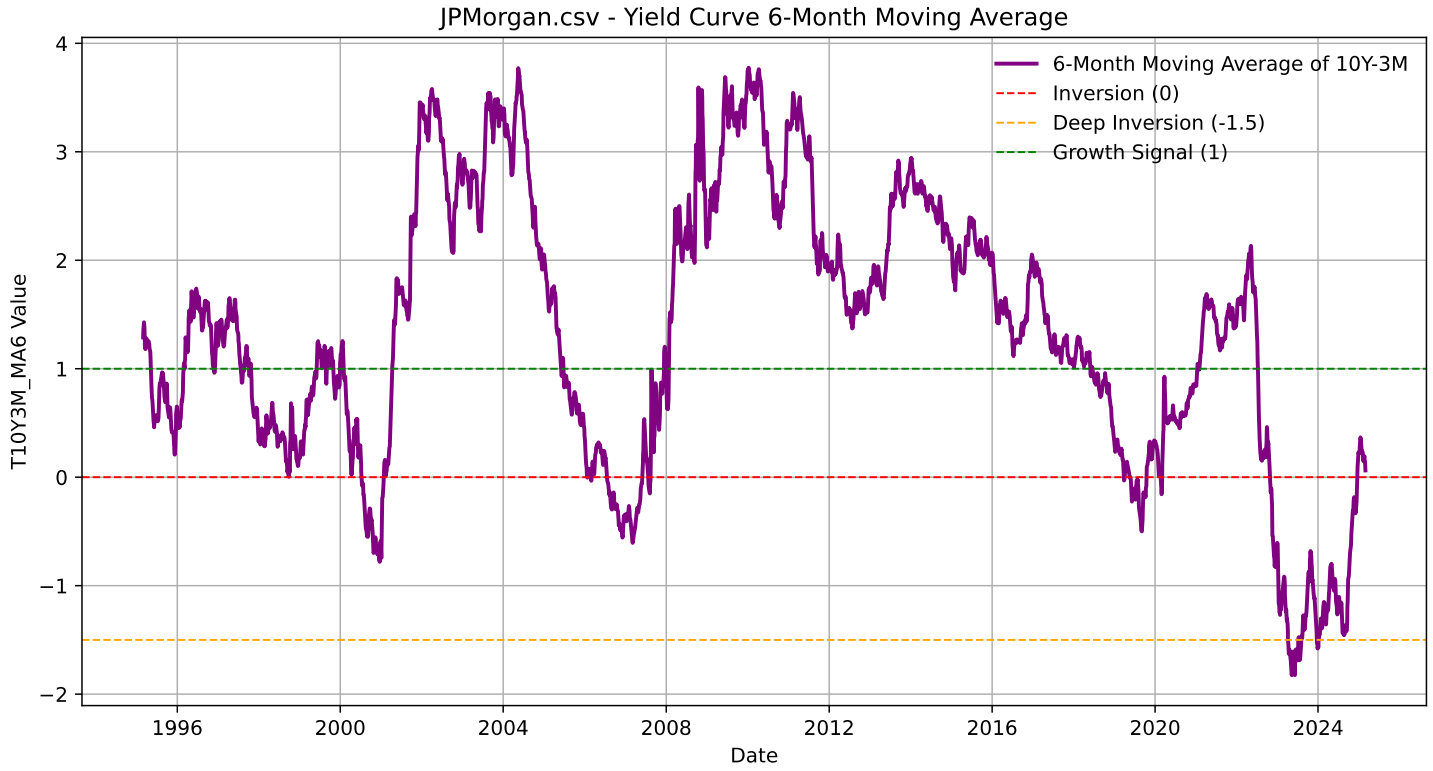
The yield curve as a predictor of U.S. recessions. - By Estrella, A., & Mishkin

Key Points

- Yield curve spread predicts recessions
- Outperforms other macro indicators
- Short-term rates → Monetary policy
- Long-term rates → Growth expectations

Probit Model Findings

- 0.76% spread → 10% recession risk
- -0.82% spread → 50% risk
- -2.40% spread → 90% risk



The 1981 recession was correctly predicted with an 86.5% probability when the yield curve inverted in 1980.

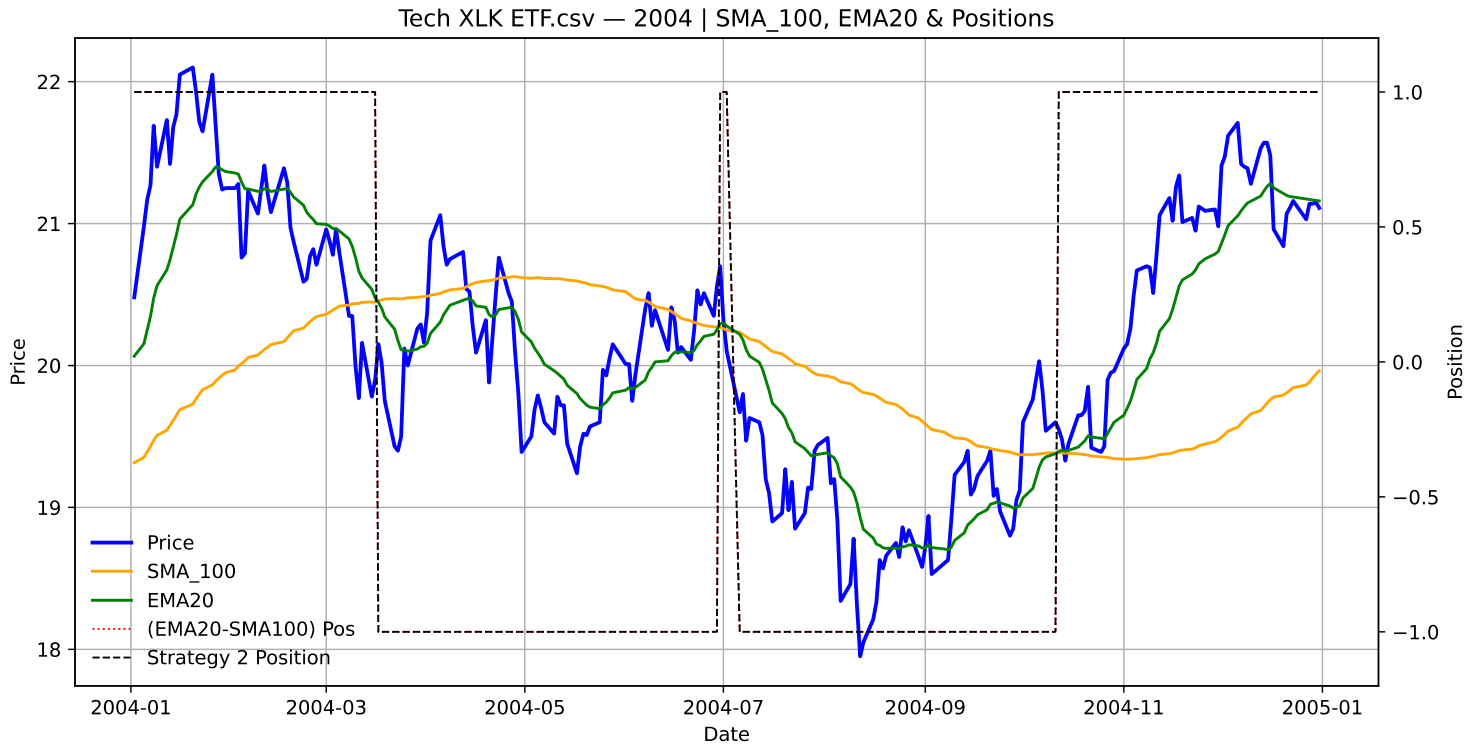
Moving Averages Literature Review

Study of Predictive Power of Moving Averages as a Tool of Technical Analysis - By Bahl, J.

Key Points
Buy: EMA20 > SMA100
Short: EMA20 < SMA100

Empirical Evidence

- Studies show moving averages generate profitable signals in certain markets.
- Performance varies based on market conditions and stock characteristics.



Moving Averages

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Simple Moving Average (SMA)

Purpose: Identifies long-term trends by smoothing price fluctuations.
How it works: Averages past N prices to remove short-term noise.
Usage: If price is above SMA, trend is bullish; if below SMA, trend is bearish.

Exponential Moving Average (EMA)

Purpose: Reacts faster to price changes than SMA, useful for short-term trends.
How it works: More weight to recent prices, adjusts quicker to market shifts.
Usage: Trend confirmation and buy/sell signals.

Alpha (Smoothing Factor)

- Controls how fast the EMA reacts to new price changes.
- Higher α (shorter period EMA) → Faster reaction to price movements.
- Lower α (longer period EMA) → More stable, less responsive.

Key Formulas

$$SMA_t = \frac{1}{N}\sum_{i=0}^{N-1} P_{t-i}$$

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

$$\alpha = \frac{2}{N+1}$$

Data

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Data Selection & Rationale

S&P 500 (SPY): Broad market representation.

XLK (Tech ETF): Sector-specific test for momentum-driven assets.

Apple (AAPL): Individual stock with strong trend-following characteristics.

JPMorgan (JPM): Out-of-sample test for financial sector, which is interest-rate sensitive.

Assumptions

- Moving averages capture trends effectively.
- The yield curve influences economic conditions and market risk.
- Combining both should enhance risk-adjusted returns.

Yield Curve-Adjusted Strategy

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Key Concept

- Adjusts position sizing based on yield curve inversion.

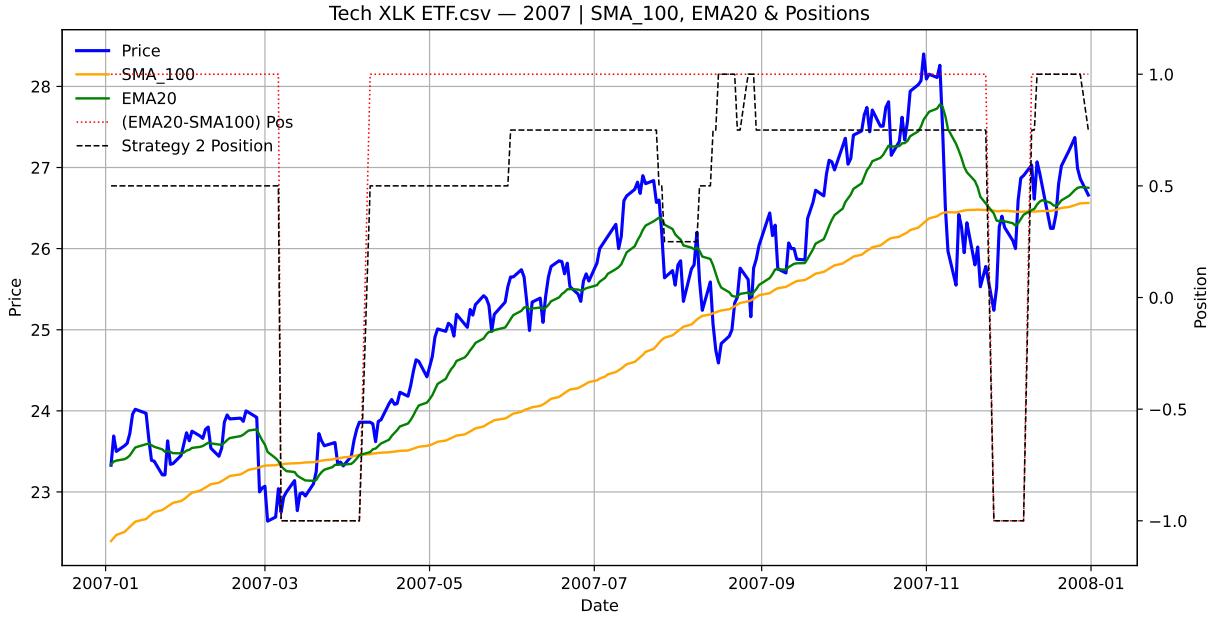
- Reduces exposure during periods of economic downturn risk.

Risk Adjustment Rules

Mild Inversion (0% to 1%) → Reduce position by 25%
Moderate Inversion (-1% to 0%) → Reduce by 50%
Deep Inversion (-2% to -1%) → Reduce by 75%
Strong Inversion (< -2%) → Eliminate long positions.

Additional Risk Control

- Rapid Yield Curve Decline → If falling > 0.5% in 30 days, cut remaining long position by 50%.
- Stability Filter → If yield curve remains stable.
- (< 0.2% variance in 3 months), keep risk-adjusted position.



Key Findings

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Overly Conservative Risk Adjustments

- Strategy over-filtered trades, reducing exposure too aggressively.
- Missed profitable trends due to excessive caution.

Yield Curve Lag Timing Issues

- Static lags may not be optimal across asset classes.

Strategy Not Capturing Momentum

- Returns dropped significantly in optimized strategy.
- Moving average signals suppressed by overly strict macro filters.

	Tech XLK ETF	S&P 500 SPY	APPL	JP Morgan
Cumulative Return (%)	496.841	209.088	3917.73	23.0031
Annualized Return (%)	6.23236	2.40238	12.4092	-4.9708
Annualized Standard Deviation	25.7062	18.9184	44.6214	36.7901
Sharpe Ratio (Risk-Adjusted Return)	0.242446	0.126986	0.2781	-0.135112

	Tech XLK ETF	S&P 500 SPY	APPL	JP Morgan
Cumulative Return (%)	375.59	157.762	2260.07	23.3209
Annualized Return (%)	5.14469	1.48495	10.5481	-4.92439
Annualized Standard Deviation	23.4716	17.494	37.8718	33.8814
Sharpe Ratio (Risk-Adjusted Return)	0.219188	0.0848831	0.278522	-0.145342
T10Y3M_MA6 Lag	296	95	172	310

Conclusion

Key takeaways from performance analysis

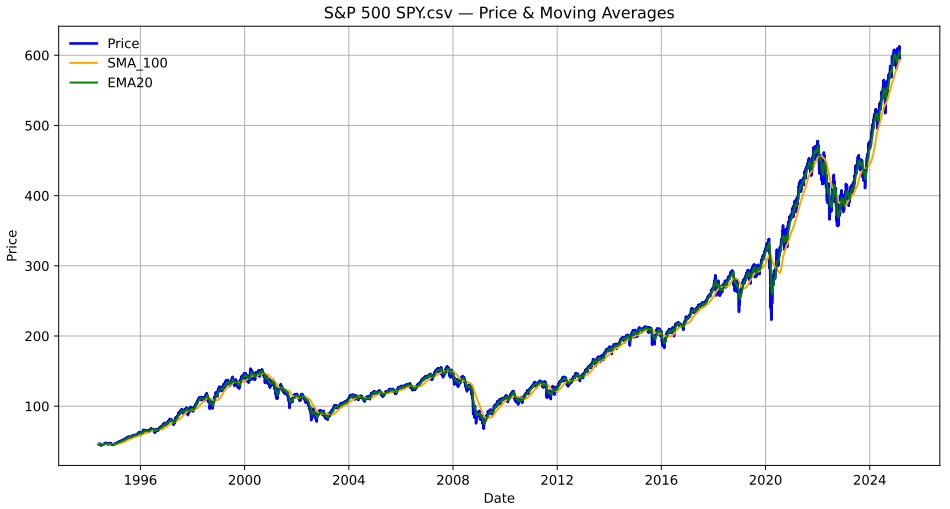
- Moving averages remain effective for trend-following assets.

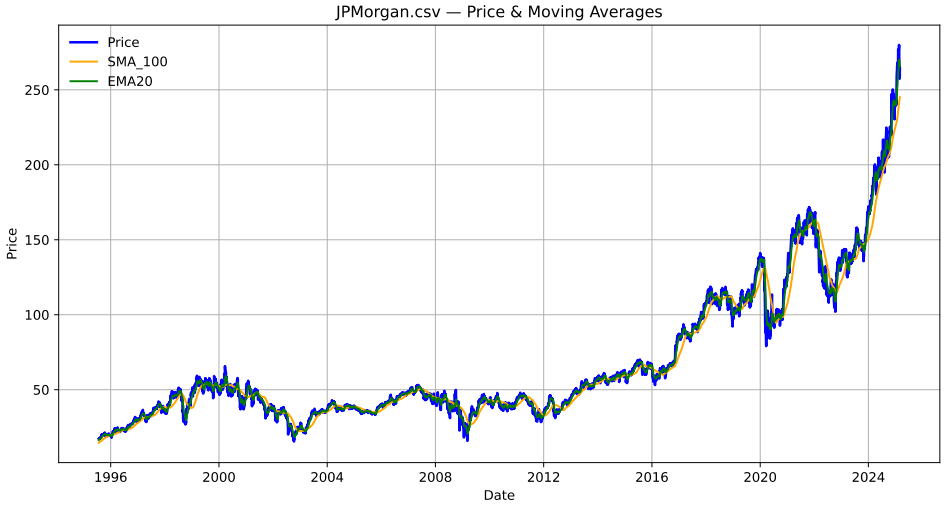
Future improvements

- Exploring partial position scaling instead of full exits.
- Incorporating shorter-term yield spreads for financial stocks.

Final Thought

- Merging macroeconomic signals with technical indicators can improve systematic trading, but refinement is key for maximizing returns.

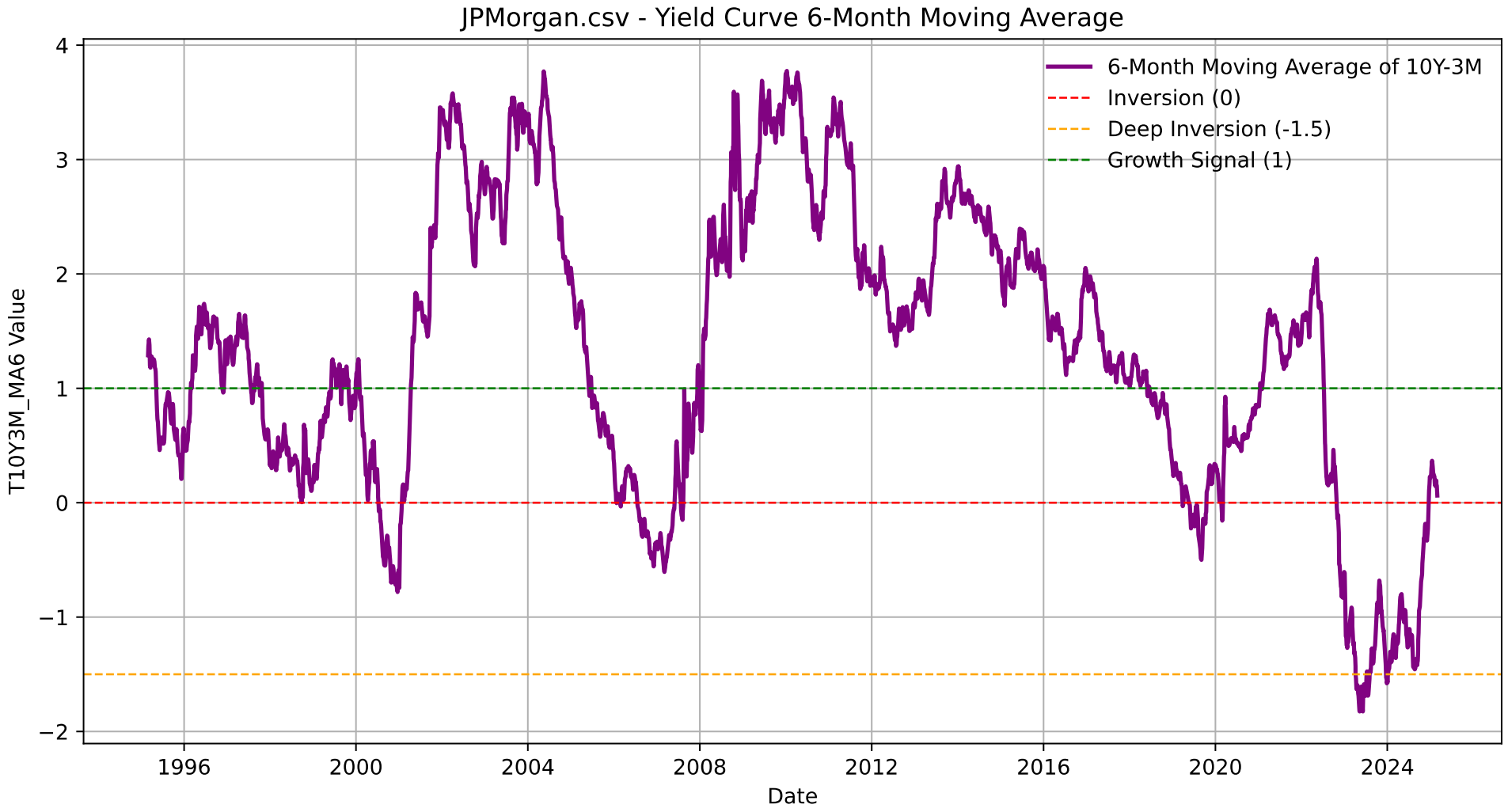




Thank You

Appendix

Appendix 1: Yield Curve 6-Month Moving Average



Appendix 2: Price & Moving Averages Across Assets

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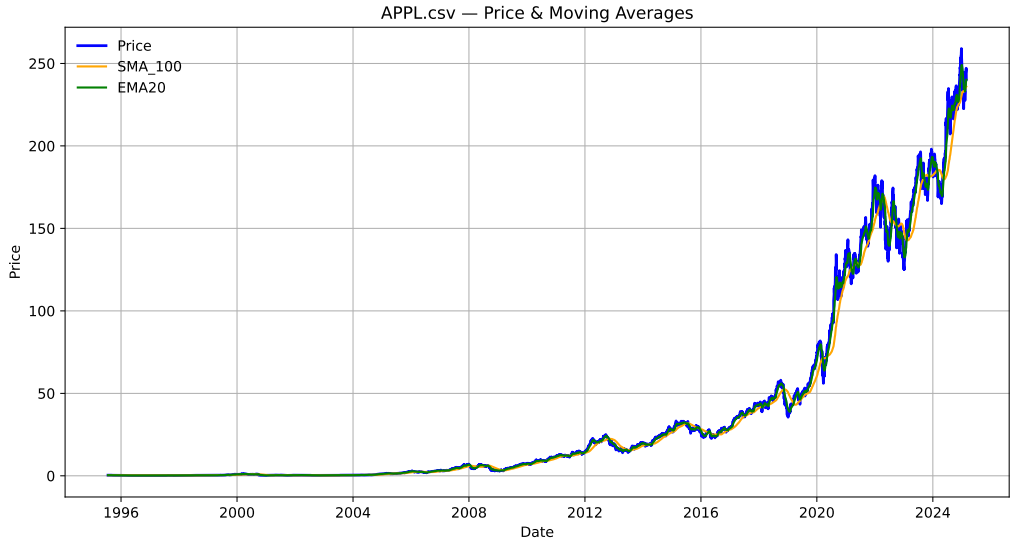
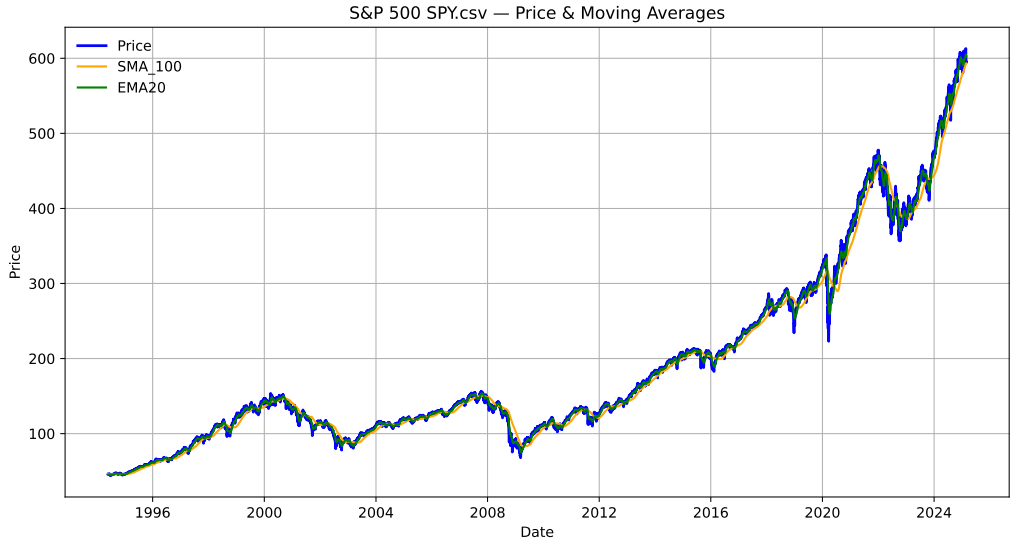
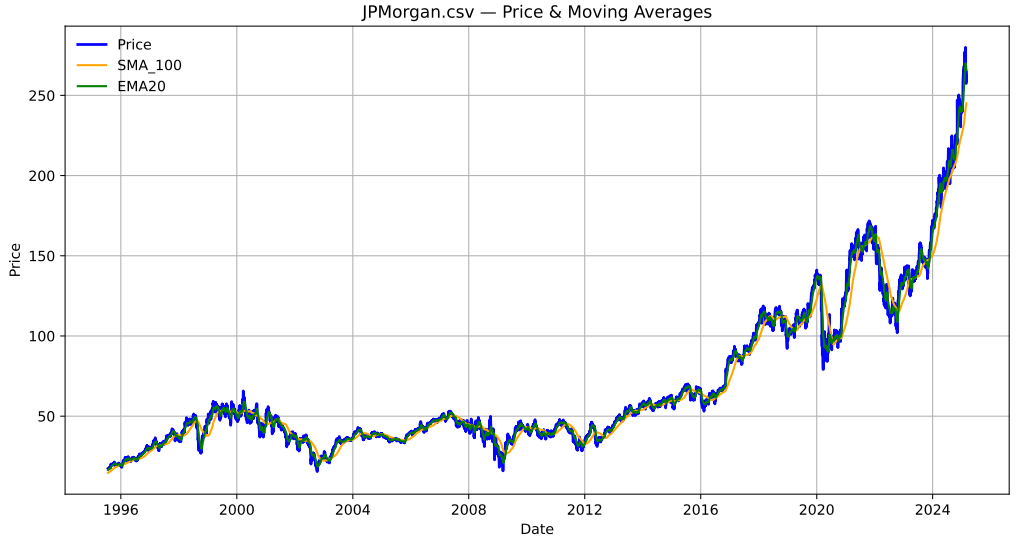
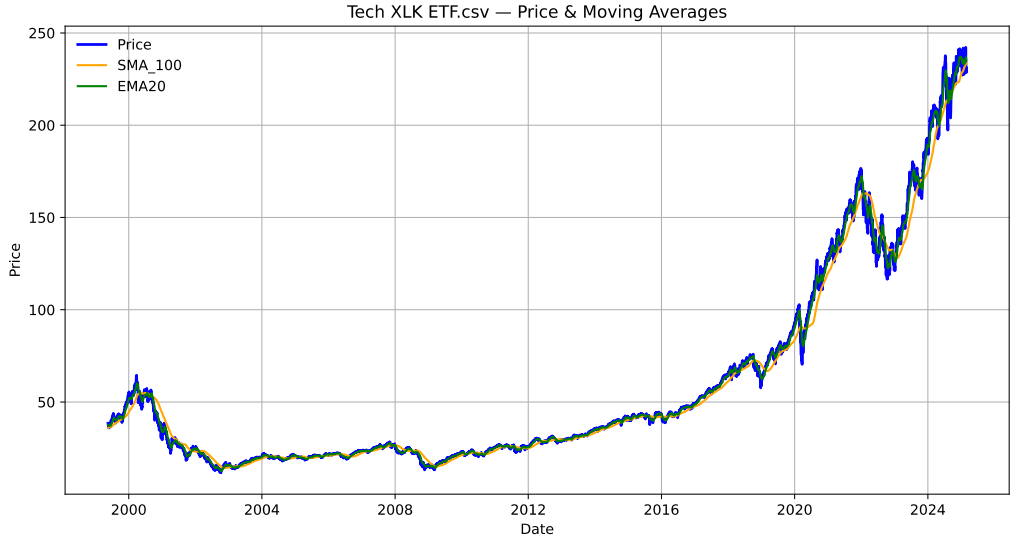
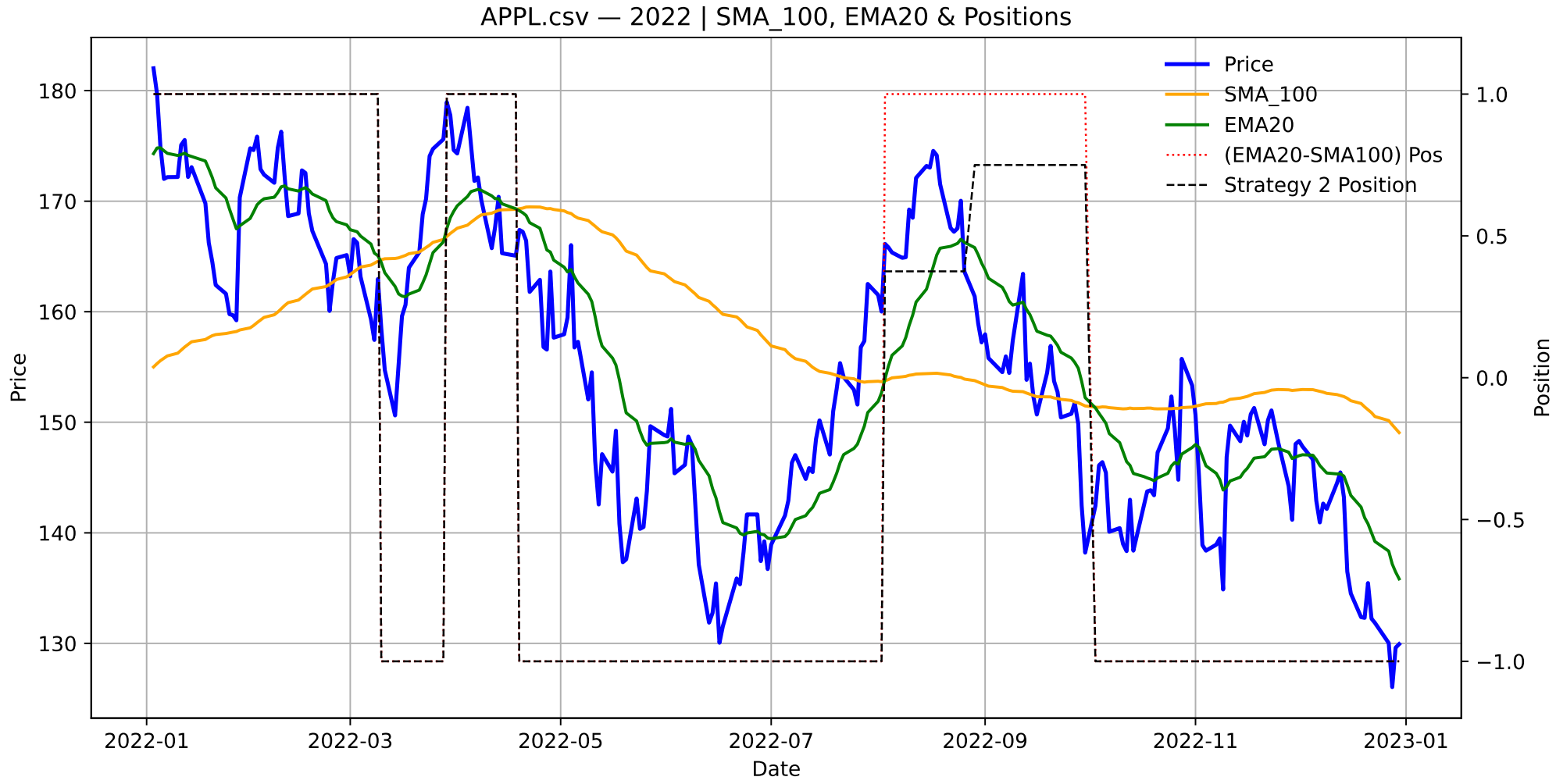




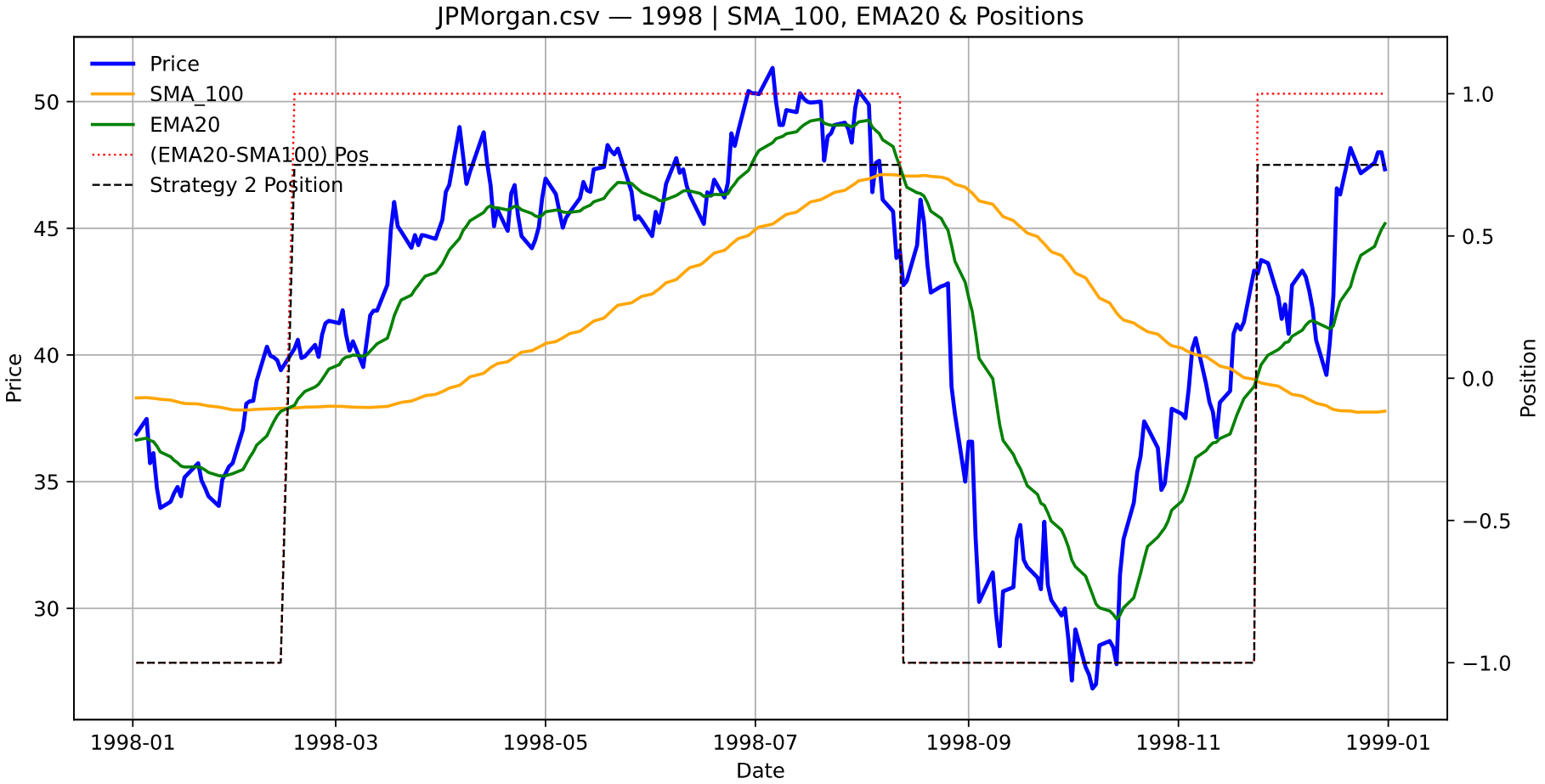




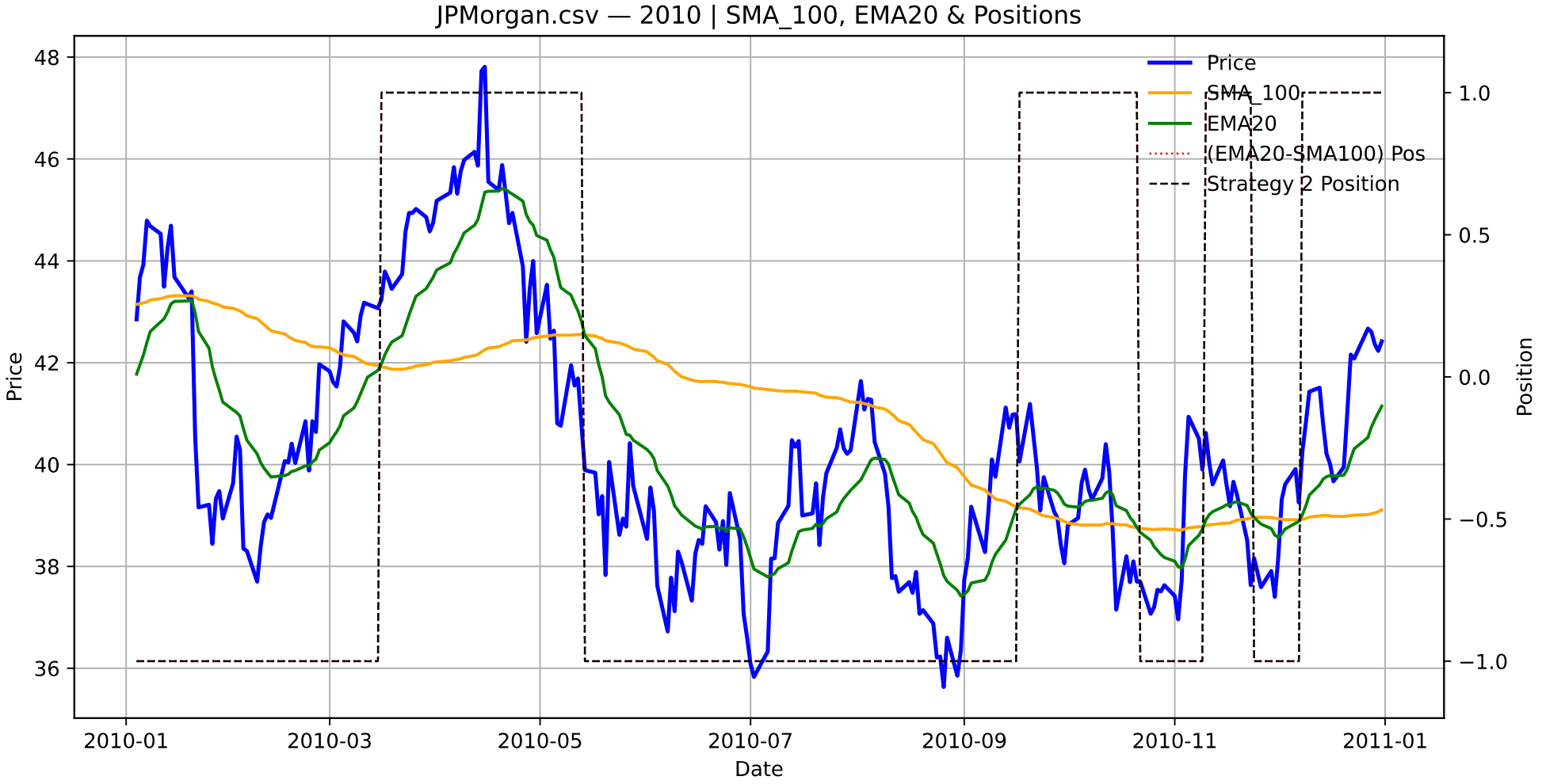
Appendix 3: Apple 2022 - Moving Averages & Positions



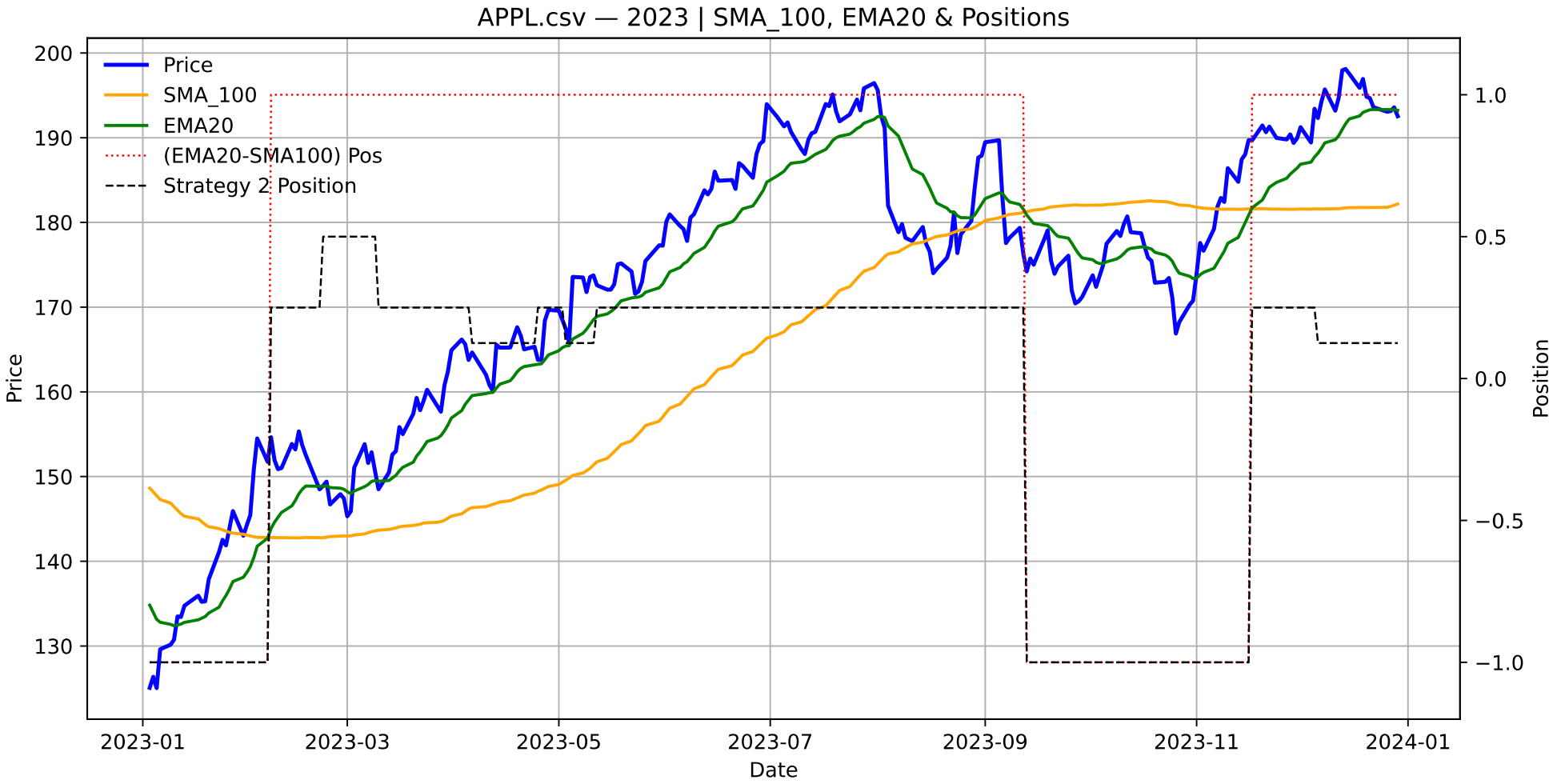
Appendix 4: JPMorgan 1998 - Moving Averages & Positions



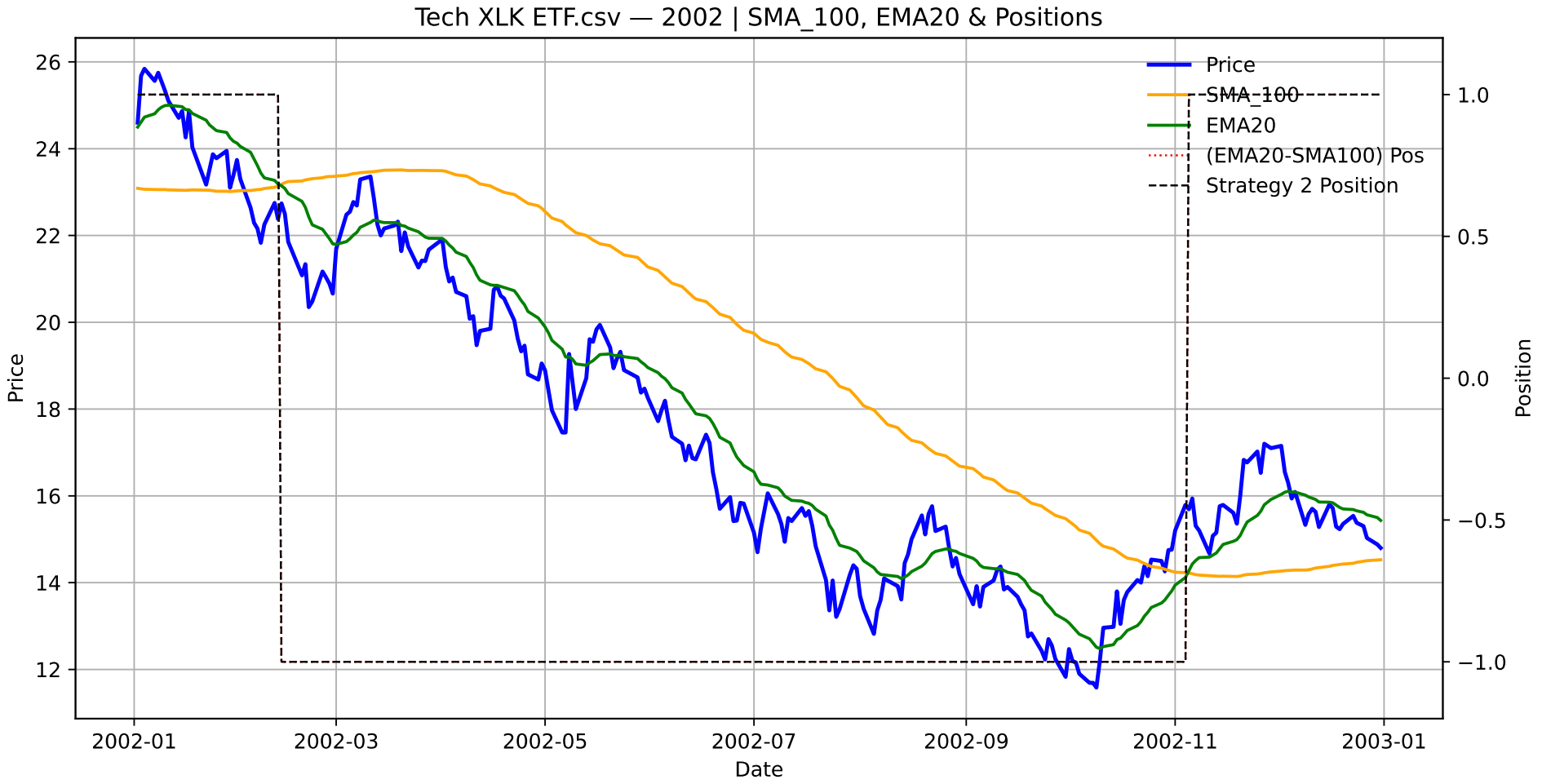
Appendix 5: JPMorgan 2010 - Moving Averages & Positions



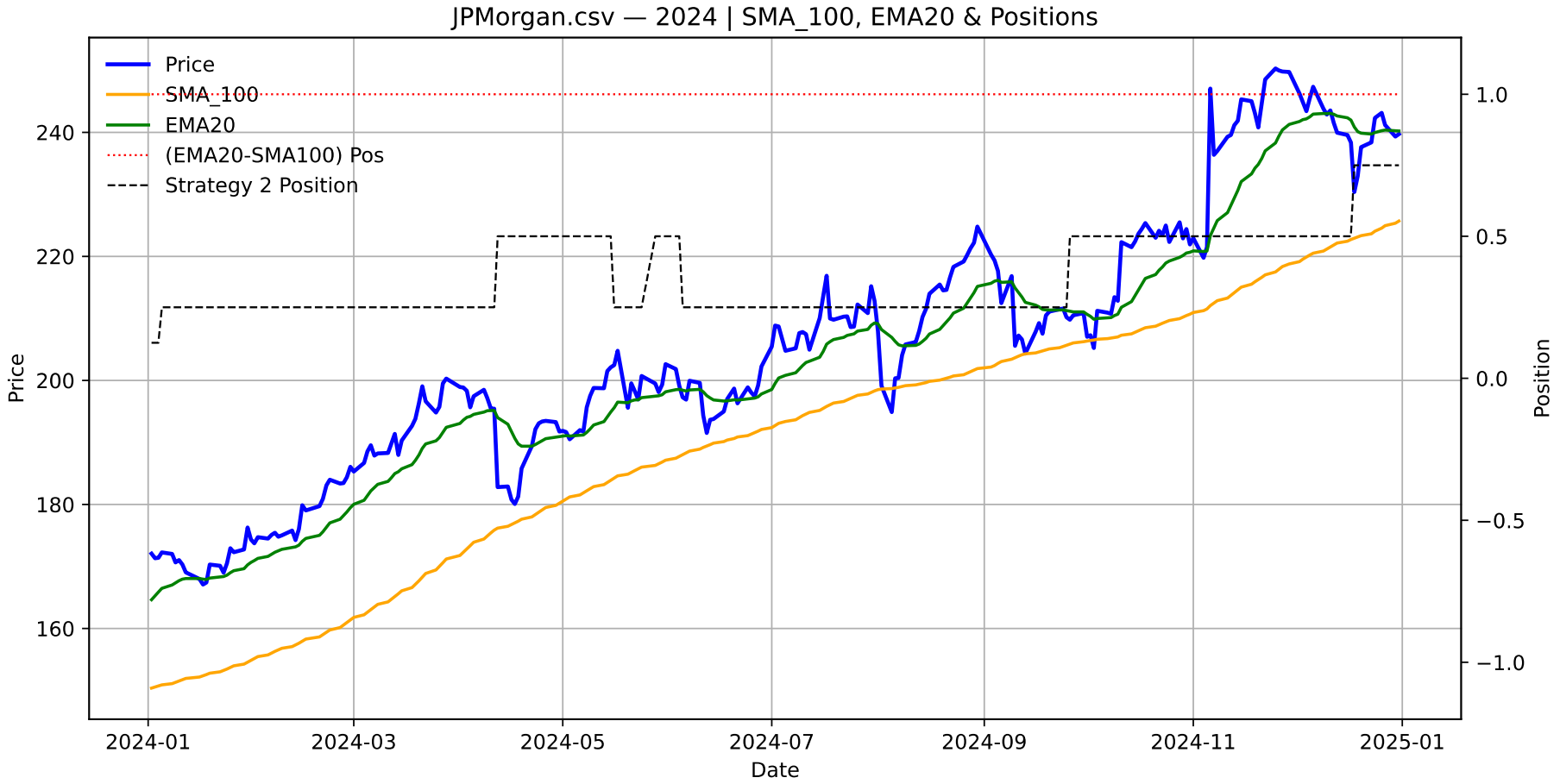
Appendix 6: Apple 2023 - Moving Averages & Positions



Appendix 7: Tech XLK ETF 2002 - Moving Averages & Positions



Appendix 8: JPMorgan 2024 - Moving Averages & Positions



Appendix 9: Impact of Yield Curves & Interest Rates on Tech vs. Financial Stocks

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Factor	Tech Stocks (Growth Stocks)	Financial Stocks (Banks & Lenders)
Rising Interest Rates	❌ Negative Impact – Higher discount rates reduce future cash flow value, leading to lower valuations.	✅ Positive Impact – Higher rates increase net interest margins (NIM), improving bank profitability.
Falling Interest Rates	✅ Positive Impact – Lower discount rates boost valuations and make growth stocks more attractive.	❌ Negative Impact – Lower rates compress NIM, reducing lending profits.
Steep Yield Curve (10Y - 3M Positive & Rising)	✅ Positive – Indicates economic expansion, which fuels growth and investment in tech.	✅ Very Positive – Banks can borrow short-term and lend long-term at higher margins, increasing profits.
Flattening Yield Curve (10Y - 3M Declining, but Still Positive)	⚠️ Mixed Impact – If rates are stable, tech may benefit. If rates are rising, valuation pressure increases.	⚠️ Slightly Negative – A flattening curve signals potential slowdown in loan demand or economic uncertainty.
Inverted Yield Curve (10Y - 3M Negative)	❌ Negative – Signals recession risk, reducing risk appetite for growth stocks. Investors rotate into defensive assets.	❌ Very Negative – Recession fears lead to reduced lending, higher default risks, and lower bank profits.
Yield Curve Steepening (From Inverted to Positive Slope)	✅ Positive – Signals recovery and potential rate cuts, which benefit growth stocks.	✅ Very Positive – Expanding loan demand and improving economic outlook boost financials.
Rapidly Declining Yield Curve (30-Day Rate of Change Negative)	❌ Negative – Indicates worsening economic conditions, hurting risk appetite.	❌ Negative – Often a sign of financial stress or tightening credit conditions, reducing bank lending.

Access Link to Research Paper

Estrella, A., & Mishkin, F. S. (1996). The yield curve as a predictor of U.S. recessions. Current Issues in Economics and Finance, 2(7), 1-7. Federal Reserve Bank of New York.

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Bahl, J. (2015). Study of predictive power of moving averages as a tool of technical analysis. Journal for Studies in Management and Planning, 1(2), 103-114. SSRN.

https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3037580