

Equity Analysis Report: MSFT, AAPL, TSLA, META

By: Adrian Pawlowski

1. Volatility Analysis

Daily Volatility (2020–2024):

Daily Volatility:

Ticker

AAPL 0.020578

META 0.029676

MSFT 0.019931

TSLA 0.042188

Annualized Volatility (2020-2024):

Annualized Volatility:

Ticker

AAPL 0.326661

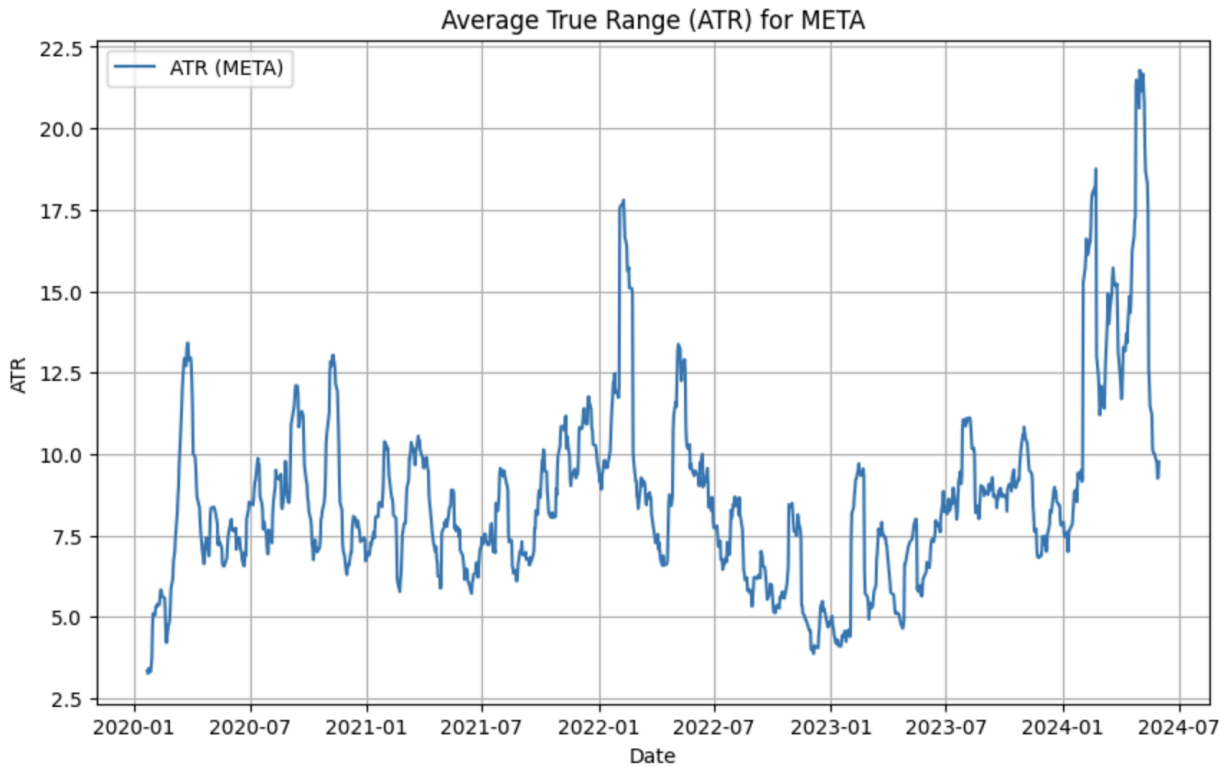
META 0.471095

MSFT 0.316395

TSLA 0.669707

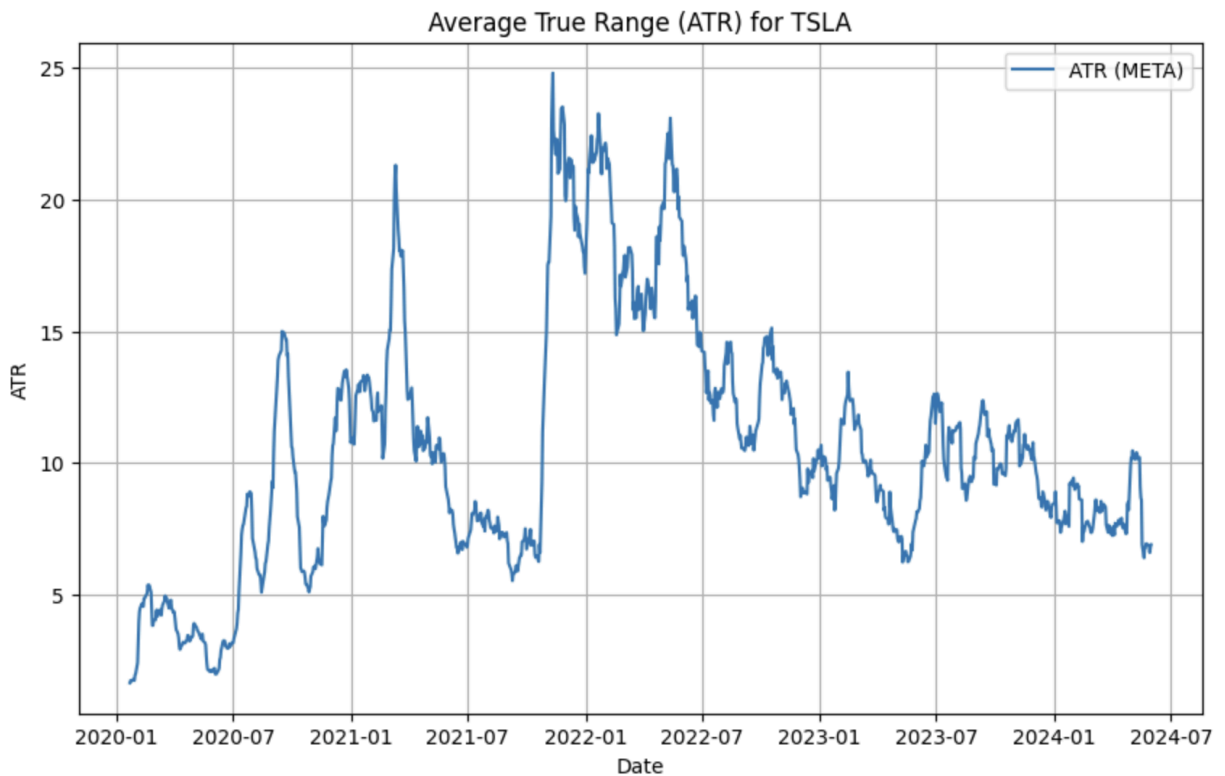
- TSLA is the most volatile, offering more trading opportunities for short-term and high-frequency strategies, but it also comes with higher risk.
- META has medium volatility, which allows for more balanced medium-term strategies.
- AAPL and MSFT show lower volatility, making them more stable for long-term trend-following models but less suitable for frequent trades.

2. ATR (Average True Range) Analysis



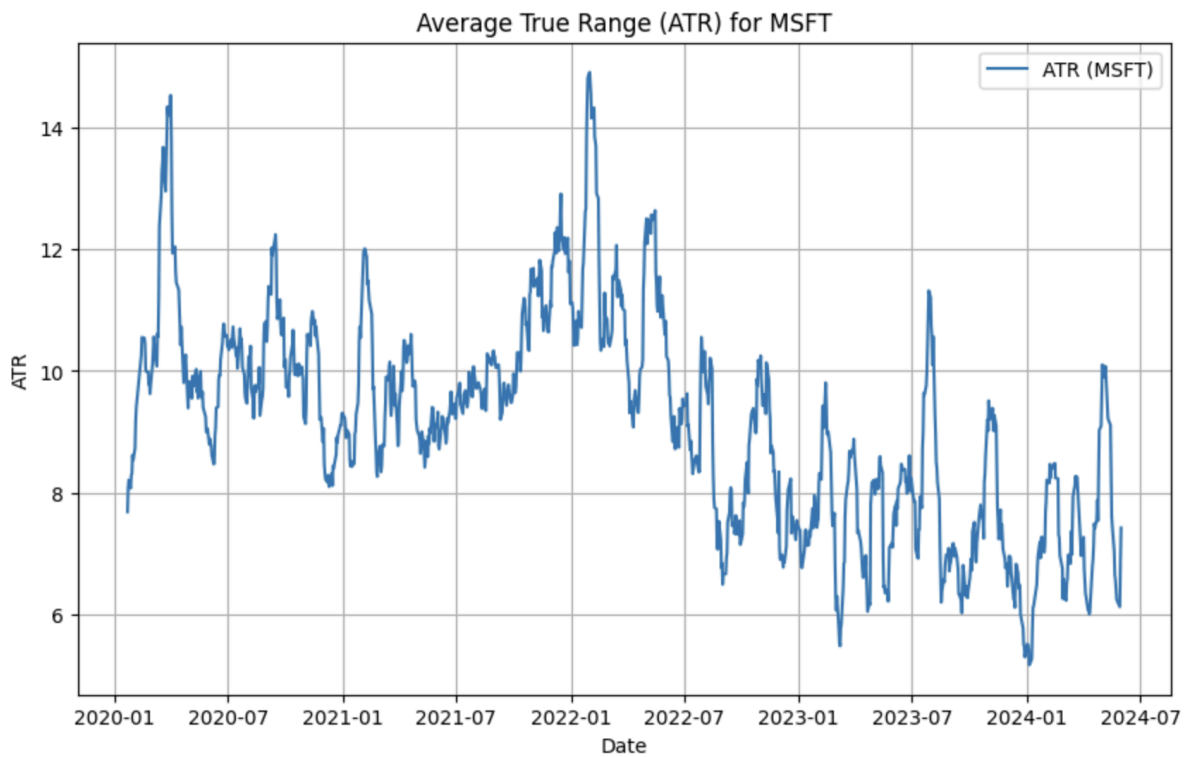
ATR for META:

- META's ATR spikes in 2022 (reaching above 20), indicating strong volatility. Its ATR has decreased in 2023, reflecting more stability.
- Best For: Suitable for medium-term strategies, where volatility is needed but not at extreme levels.



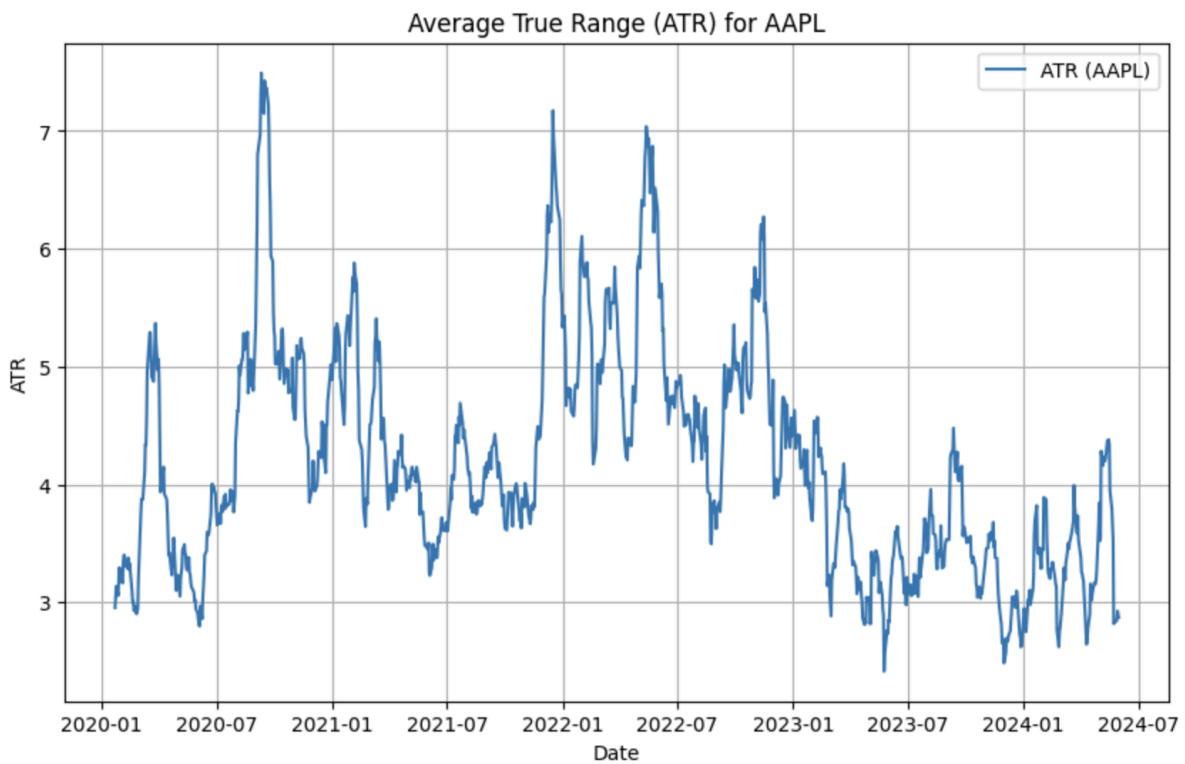
ATR for TSLA:

- TSLA's ATR shows the highest volatility, with frequent spikes in 2021 and 2022 (above 20), perfect for short-term trading and high-frequency strategies. Recent ATR values in 2023 and 2024 are lower but still volatile.
- Best For: Ideal for high-frequency trading and momentum strategies due to high price fluctuations and liquidity.



ATR for MSFT:

- MSFT's ATR remains stable and lower than TSLA and META, hovering between 6 and 12 for the most part. This suggests smoother price movements with less volatility.
- Best For: Best suited for long-term trend-following strategies that prioritize stability and predictability over frequent trading opportunities.



ATR for AAPL:

- AAPL's ATR remains low (between 3 and 7), reflecting its stable nature and lower volatility compared to TSLA and META.
- Best For: Long-term strategies that prioritize low risk and steady returns.

3. Sharpe Ratio (Risk-Adjusted Returns)

Sharpe Ratios:

Sharpe Ratio

META: 0.3647692594800539

AAPL: 0.6427506190543599

TSLA: 0.604035700801285

MSFT: 0.6789334768404169

- MSFT and AAPL offer the best risk-adjusted returns for low-risk strategies.
- TSLA offers good returns with more high risk and high reward, suitable for short-term, high-frequency trading.
- META has the lowest Sharpe Ratio, indicating that its returns are not as attractive on a risk-adjusted basis.

4. Correlation with S&P 500

Correlation Coefficients:

Correlation with S&P 500

META: 0.6191205901119352

AAPL: 0.8056153420093529

TSLA: 0.5084599776843712

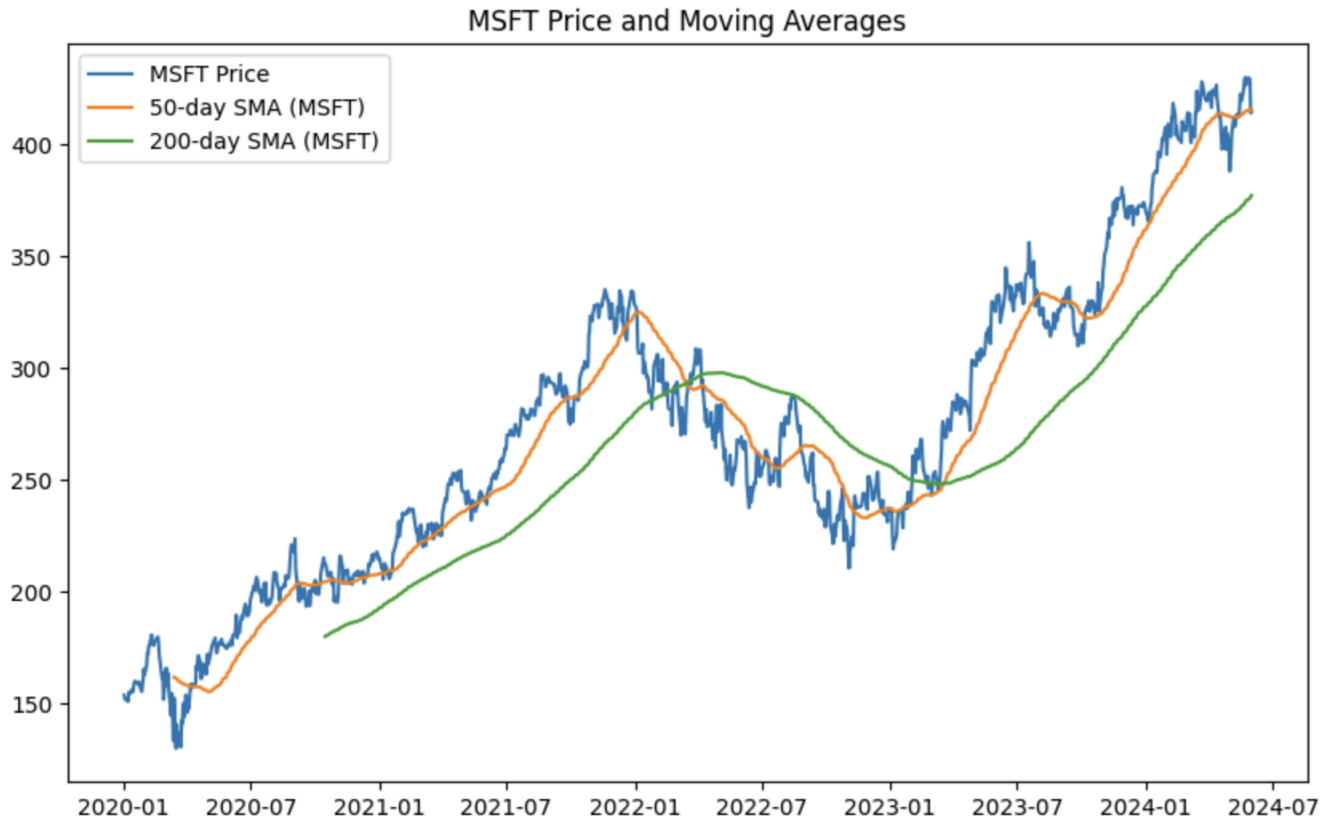
MSFT: 0.8272830547967636

- MSFT and AAPL are highly correlated with the S&P 500, meaning they perform well in market-following strategies but may not offer enough independence for short-term trading.
- META has moderate correlation, meaning its price movements are partly driven by company-specific factors.
- TSLA has the lowest correlation, making it better suited for diversification and independent strategies that rely on sentiment and momentum rather than overall market trends.

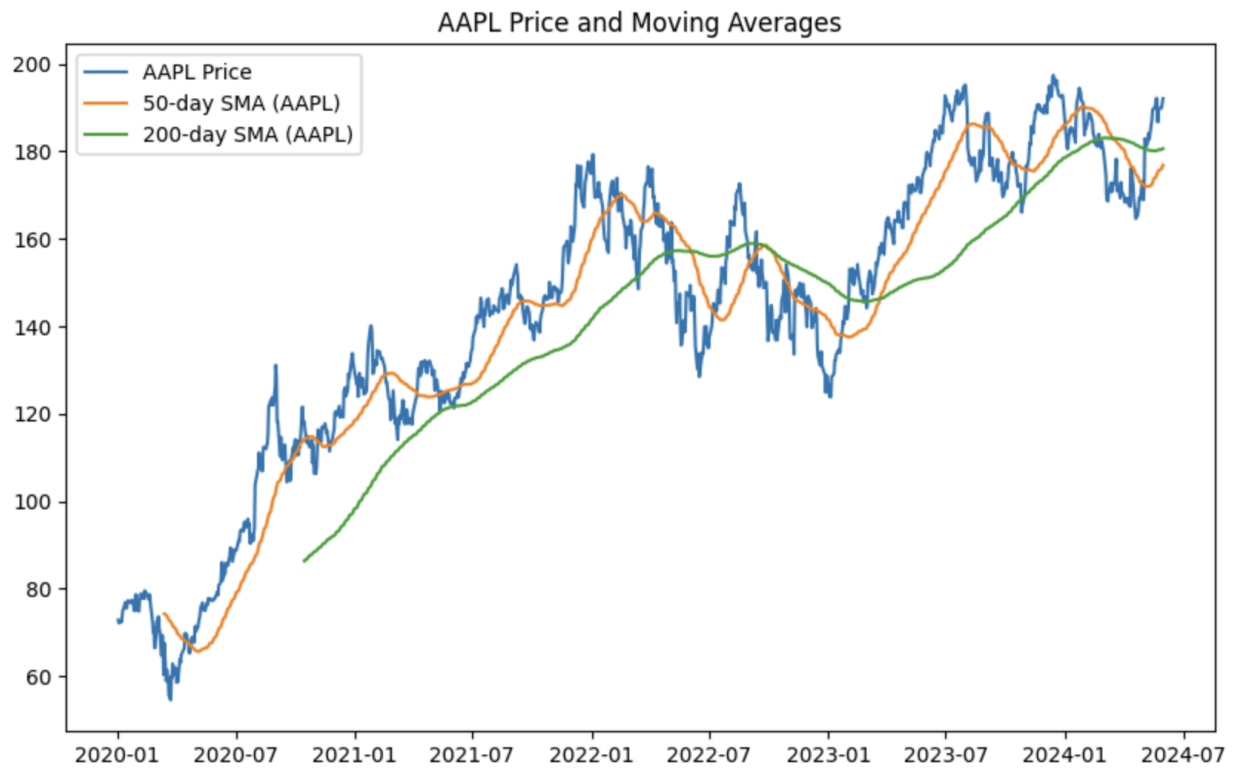
5. Moving Averages (SMA Crossovers)

Moving Averages & Crossovers:

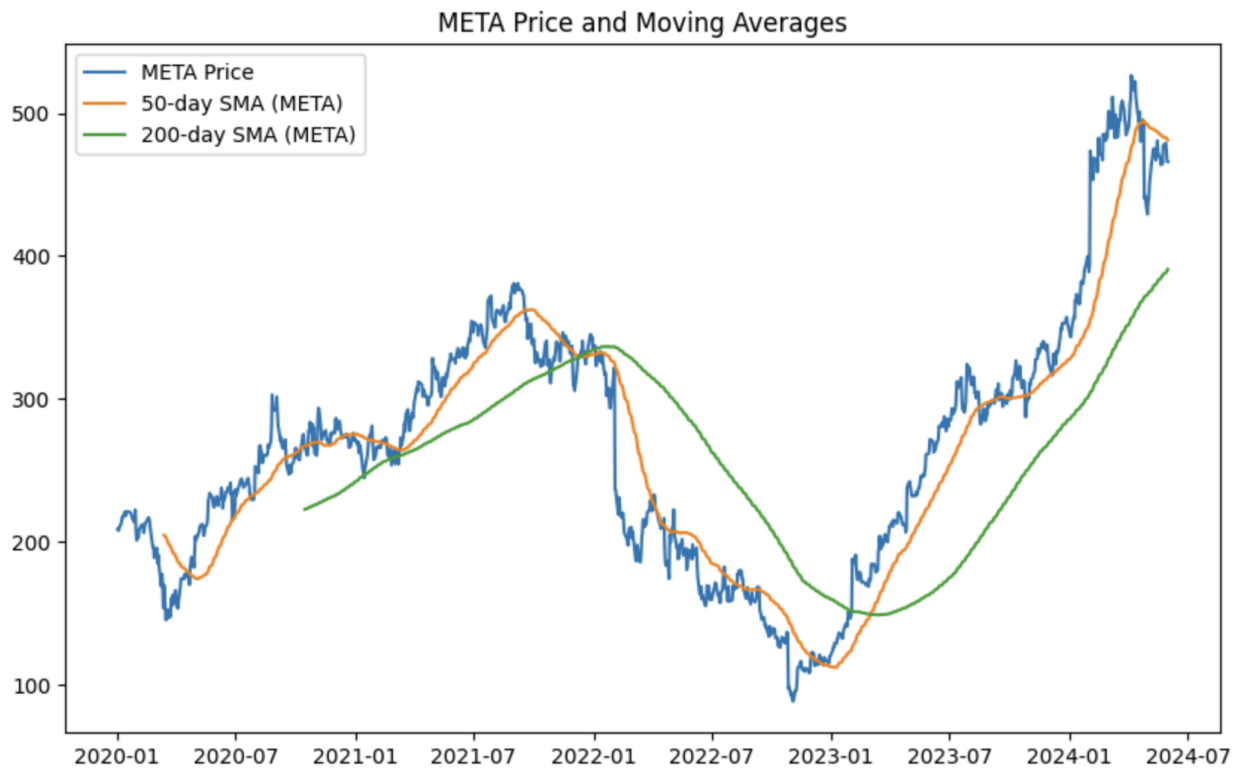
- MSFT: Smooth, predictable trends with fewer crossovers, making it ideal for long-term growth strategies.



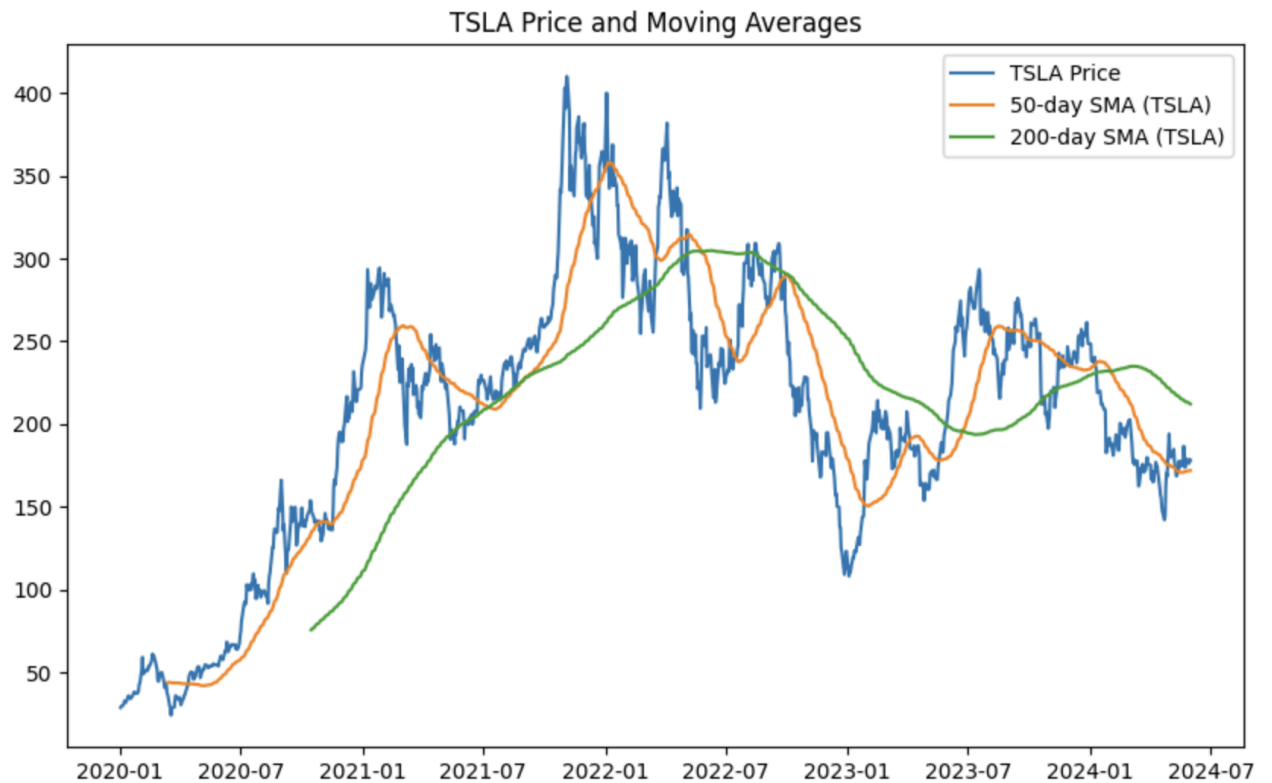
- AAPL: Similar to MSFT, AAPL's consistent upward movement reflects its stable nature.



- META: META shows more frequent crossovers, signaling higher volatility and suitability for medium-term trend-following strategies.



- TSLA: Frequent Golden Cross/Death Cross patterns, indicating frequent opportunities for momentum trading.



- MSFT and AAPL are stable and reliable, but they may not offer enough trading opportunities for shorter-term strategies.
- TSLA and META are more volatile and reactive to crossovers, meaning they offer more potential for momentum trading strategies and short-term trades.

6. Daily Trading Volume

Average Daily Trading Volume:

Ticker

AAPL 9.532827e+07

META 2.450466e+07

MSFT 2.978542e+07

TSLA 1.299979e+08

Average Dollar Volume (Liquidity in \$):

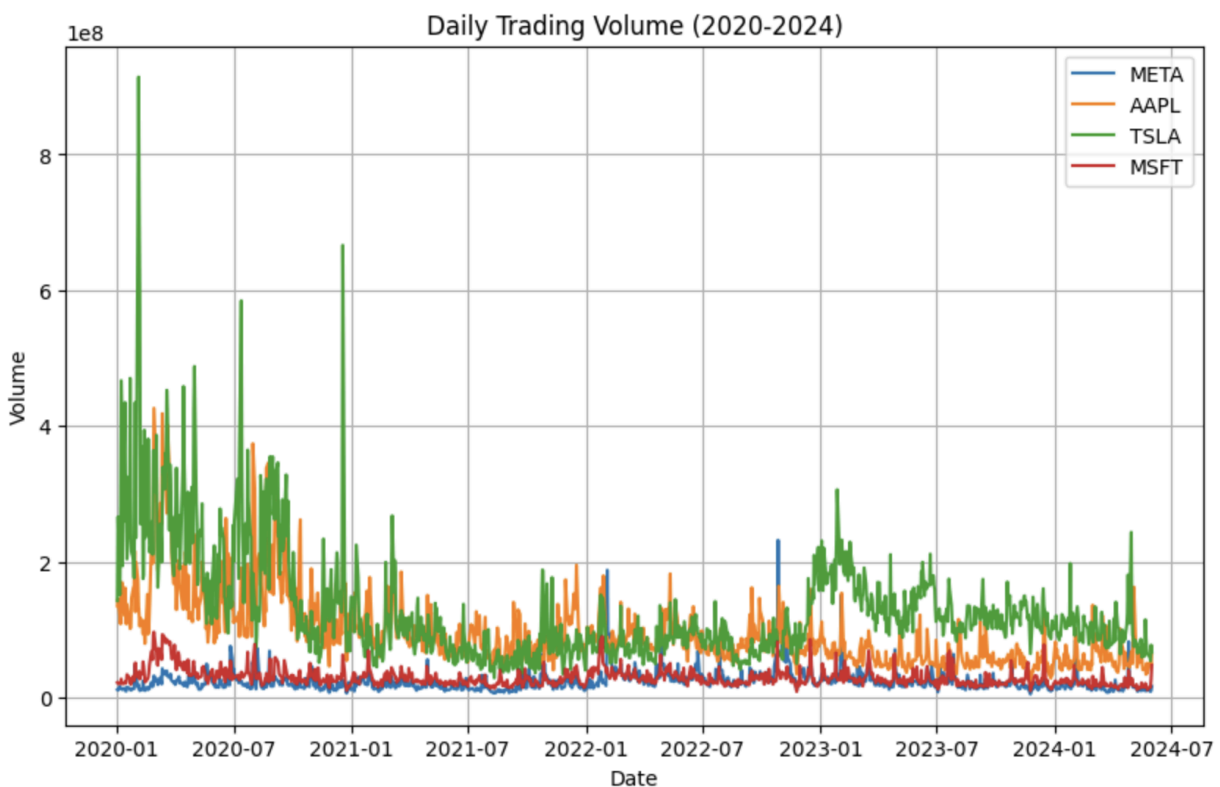
Ticker

AAPL 1.239848e+10

META 6.018862e+09

MSFT 7.731404e+09

TSLA 2.256111e+10



Daily Trading Volume (2020–2024):

- TSLA: Highest trading volume, offering high liquidity for frequent trades.
- AAPL: Consistently high volume, providing liquidity for both long- and short-term strategies.
- MSFT: Lower volume but still liquid enough for long-term, conservative strategies.

- META: Lowest volume, indicating it may face more slippage in high-frequency trading.
- TSLA's high liquidity makes it the most suitable for high-frequency trading and momentum-based strategies.
- AAPL and MSFT offer steady liquidity, ideal for long-term strategies but less suited for frequent trades.
- META's lower liquidity makes it better for long-term strategies than high-frequency trading.

7. Algorithm-Specific Analysis

1. LSTM (Long Short-Term Memory Networks):

- Best For: Time-series forecasting and pattern recognition in financial markets.
- Stock Preference: LSTM works best with highly volatile stocks that exhibit frequent price swings, giving the model more data to identify short-term patterns.
- TSLA is the ideal candidate for LSTM because its frequent price fluctuations allow the model to learn from more data points, improving prediction accuracy for short-term movements. MSFT and AAPL are less volatile, meaning the model may have fewer trading opportunities.

2. Reinforcement Learning (RL):

- Best For: Learning optimal trading strategies by interacting with the market and maximizing cumulative returns.
- Stock Preference: RL thrives in environments with frequent market feedback, allowing the model to learn quickly.
- TSLA's high volatility and frequent price changes make it perfect for reinforcement learning. The model can take advantage of frequent feedback and adjust its strategy based on a wide range of market conditions. MSFT may be too stable, offering fewer chances to learn from market shifts.

3. XGBoost:

- Best For: Classifying buy/sell/hold signals based on multiple technical and sentiment-based indicators.
- Stock Preference: XGBoost is highly effective when it has access to frequent data points, such as technical indicators and sentiment shifts.
- TSLA fits well with XGBoost due to its high liquidity, frequent news events, and public sentiment shifts. Tesla's volatile nature means that XGBoost can capitalize on many trading signals throughout the day. MSFT and AAPL may not provide as many signal opportunities due to lower volatility.

4. Sentiment Analysis:

- Best For: Leveraging news and social media to gauge market sentiment and integrate this into trading decisions.
- Stock Preference: Stocks highly influenced by news events and public sentiment are ideal for sentiment-based strategies.
- TSLA is far more reactive to news and social media sentiment, especially with CEO-driven narratives (like Elon Musk's tweets). This makes Tesla the perfect candidate for sentiment-driven algorithms. MSFT and AAPL are more stable, and META has some sentiment impact but not to the same level as TSLA.

8. Final Summary of Each Stock

META:

- Best Use: Medium-term strategies or sentiment-driven trading.
- Not Ideal For: High-frequency strategies due to lower liquidity and lower risk-adjusted returns.

AAPL:

- Best Use: Long-term trend-following or mean reversion strategies.
- Not Ideal For: Short-term trading due to low volatility.

TSLA:

- Best Use: Short-term, high-frequency trading, momentum strategies, LSTM, reinforcement learning, XGBoost, and sentiment analysis.
- Ideal For: TSLA's volatility, frequent price swings, high liquidity, and sensitivity to sentiment make it the best choice for algorithms.

MSFT:

- Best Use: Long-term trend-following or macro-based strategies.
- Not Ideal For: High-frequency trading or short-term strategies due to lower volatility and fewer price swings.

Final Decision: Tesla (TSLA)

- **High Volatility:** Provides frequent trading opportunities for LSTM, reinforcement learning, and XGBoost, enabling the models to learn from a variety of market conditions.
- **Sentiment Reactivity:** TSLA's price is highly sensitive to public sentiment and news, making it perfect for sentiment analysis-based strategies.
- **Frequent Returns:** The stock's price fluctuations and liquidity allow for the frequent, short-term trades