```
# ============================================================
#  Multi-Agent Financial Analysis System (Extended Agents)
#  - Adds TechnicalAgent, RiskAgent, PortfolioAgent, OptimizerAgent
#  - Keeps our existing agents intact and working
# ============================================================

# --- 1. Imports and Setup ----------------------------------
import yfinance as yf
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from datetime import datetime, timedelta, timezone
import nltk
from nltk.corpus import stopwords
from nltk.tokenize import word_tokenize
from textblob import TextBlob
import requests, json, re
from typing import Dict, Any, List, Optional

# Download tokenizer resources once per runtime (safe to call repeatedly)
nltk.download('punkt')
nltk.download('punkt_tab')
nltk.download('stopwords')

# Helper - UTC timestamp (timezone-aware)
def utc_now_iso():
    """Return current UTC time in ISO format (no deprecation)."""
    return datetime.now(timezone.utc).isoformat()

# --- 2. Existing Agents (unchanged semantics, with small robustness fixes) ---

class FinancialsAgent:
    """Fetches key company metrics and plots price trends."""
    def act(self, ticker: str) -> Dict[str, Any]:
        t_obj = yf.Ticker(ticker)
        info = t_obj.info if hasattr(t_obj, "info") else {}
        # Get last 1 year of daily data
        data = yf.download(ticker, period="1y", auto_adjust=True, progress=False)
        if data.empty:
            print(f"[FinancialsAgent] Warning: No price data for {ticker}")
            return {"type": "financials", "latest_price": None, "marketCap": info.get("marketCap")}
        # Plot price
        plt.figure(figsize=(10,4))
        plt.plot(data.index, data['Close'])
        plt.title(f"{ticker} Close Price")
        plt.xlabel("Date")
        plt.ylabel("Close")
        plt.grid(True)
        plt.show()
        return {
            "type": "financials",
            "latest_price": float(data['Close'].iloc[-1]),
            "marketCap": info.get("marketCap"),
            "trailingPE": info.get("trailingPE"),
            "forwardPE": info.get("forwardPE"),
            "dividendYield": info.get("dividendYield"),
            "beta": info.get("beta"),
            "price_df": data  # include df for downstream agents
        }

class NewsAgent:
    """Fetches recent news headlines and performs sentiment using TextBlob."""
    def act(self, ticker: str) -> Dict[str, Any]:
        # Using Google News RSS (no API key required)
        url = f"https://news.google.com/rss/search?q={ticker}+stock"
        try:
            resp = requests.get(url, timeout=10)
            titles = re.findall(r"<title>(.*?)</title>", resp.text)
        except Exception as e:
            print(f"[NewsAgent] error fetching news for {ticker}: {e}")
            titles = []
        processed = []
        # Skip the RSS feed header titles[0..1] and limit to five items if available
        for t in titles[2:7]:
            sent = TextBlob(t).sentiment.polarity
            cat = "earnings" if "earn" in t.lower() else "other"
```

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            processed.append({"headline": t, "sentiment": round(sent,4), "category": cat})
        return {"type": "news", "data": processed}

# --- 3. New Agent: TechnicalAgent ----------------------------------
class TechnicalAgent:
    """Calculates basic technical indicators: SMA (20,50), EMA(20), RSI(14)."""
    def rsi(self, series: pd.Series, period: int = 14) -> pd.Series:
        delta = series.diff()
        up = delta.clip(lower=0)
        down = -1 * delta.clip(upper=0)
        ma_up = up.ewm(com=period-1, adjust=False).mean()
        ma_down = down.ewm(com=period-1, adjust=False).mean()
        rs = ma_up / ma_down
        return 100 - (100 / (1 + rs))

    def act(self, price_df: pd.DataFrame) -> Dict[str, Any]:
        if price_df is None or price_df.empty:
            return {"type": "technical", "indicators": {}}
        df = price_df.copy()
        df['SMA20'] = df['Close'].rolling(window=20).mean()
        df['SMA50'] = df['Close'].rolling(window=50).mean()
        df['EMA20'] = df['Close'].ewm(span=20, adjust=False).mean()
        df['RSI14'] = self.rsi(df['Close'], period=14)
        # Latest indicator snapshot
        last = df.iloc[-1].to_dict()
        indicators = {
            "SMA20": last.get('SMA20'),
            "SMA50": last.get('SMA50'),
            "EMA20": last.get('EMA20'),
            "RSI14": last.get('RSI14'),
            "close": last.get('Close')
        }
        # Plot Close with SMA overlays
        plt.figure(figsize=(10,4))
        plt.plot(df.index, df['Close'], label='Close')
        plt.plot(df.index, df['SMA20'], label='SMA20', alpha=0.8)
        plt.plot(df.index, df['SMA50'], label='SMA50', alpha=0.8)
        plt.title("Price with SMA20 & SMA50")
        plt.legend()
        plt.grid(True)
        plt.show()
        return {"type": "technical", "indicators": indicators, "df": df}

# --- 4. New Agent: RiskAgent ---------------------------------
class RiskAgent:
    """Computes risk metrics: volatility (annualized), max drawdown, simple VaR."""
    def act(self, price_df: pd.DataFrame) -> Dict[str, Any]:
        if price_df is None or price_df.empty:
            return {"type": "risk", "metrics": {}}
        df = price_df.copy()
        df['ret'] = df['Close'].pct_change().fillna(0)
        vol_annual = df['ret'].std() * np.sqrt(252)  # annualized volatility
        # max drawdown
        cum = (1 + df['ret']).cumprod()
        running_max = cum.cummax()
        drawdown = (cum - running_max) / running_max
        max_dd = drawdown.min()
        # 95% historical VaR (simple)
        var95 = df['ret'].quantile(0.05)
        metrics = {
            "vol_annual": float(vol_annual),
            "max_drawdown": float(max_dd),
            "var95": float(var95)
        }
        # Plot rolling volatility (30d)
        df['vol30'] = df['ret'].rolling(window=30).std() * np.sqrt(252)
        plt.figure(figsize=(10,3))
        plt.plot(df.index, df['vol30'])
        plt.title("30-day Rolling Volatility (annualized)")
        plt.grid(True)
        plt.show()
        return {"type": "risk", "metrics": metrics, "df": df}

# --- 5. PortfolioAgent ----------------------------------------
class PortfolioAgent:
    """Simple portfolio sizing & hypothetical allocation suggestions.
       - Suggests a notional allocation based on risk and trend signals.
    """
```

```
    def act(self, ticker: str, technical: Dict[str, Any], risk: Dict[str, Any],
            latest_price: Optional[float], capital: float = 100000.0) -> Dict[str, Any]:
        # Default safe outputs
        if latest_price is None:
            return {"type": "portfolio", "recommendation": "no_data", "size": 0}
        # Heuristic: if trend is up (SMA20 > SMA50) and RSI < 70 and var moderate -> allocate more
        sma20 = technical.get('SMA20')
        sma50 = technical.get('SMA50')
        rsi = technical.get('RSI14')
        vol = risk.get('vol_annual', 0)
        # base allocation percent
        alloc_pct = 0.02  # 2% default
        if sma20 and sma50 and sma20 > sma50 and (rsi is None or rsi < 70):
            # trend is positive
            alloc_pct = 0.05
        if vol and vol > 1.0:  # very risky (edge case)
            alloc_pct = max(0.005, alloc_pct * 0.5)
        # position sizing
        notional = capital * alloc_pct
        shares = int(notional / latest_price) if latest_price > 0 else 0
        rec = {
            "allocation_pct": round(alloc_pct * 100, 3),
            "notional": round(notional, 2),
            "shares": shares,
            "price": latest_price,
            "rationale": f"Trend {'up' if sma20 and sma50 and sma20>sma50 else 'neutral/down'}, volatility {vol:.3f}"
        }
        return {"type": "portfolio", "recommendation": rec}

# --- 6. Existing EvaluatorAgent (expanded) --------------------
class EvaluatorAgent:
    """Assesses sentiment balance, technical signals, risk — returns score and notes."""
    def evaluate(self,
                 news_data: List[Dict[str, Any]],
                 technical: Dict[str, Any],
                 risk: Dict[str, Any],
                 financials: Dict[str, Any]) -> Dict[str, Any]:
        notes = []
        score = 50  # neutral baseline
        # NEWS: average polarity
        news_sentiments = [n['sentiment'] for n in (news_data or [])]
        avg_news = np.mean(news_sentiments) if news_sentiments else 0.0
        if avg_news > 0.05:
            score += 20
            notes.append("News sentiment positive")
        elif avg_news < -0.05:
            score -= 15
            notes.append("News sentiment negative")
        else:
            notes.append("News sentiment neutral")

        # TECHNICAL: trend and RSI
        sma20 = technical.get('SMA20')
        sma50 = technical.get('SMA50')
        rsi = technical.get('RSI14')
        if sma20 and sma50 and sma20 > sma50:
            score += 10
            notes.append("Short-term trend above medium-term (SMA20 > SMA50)")
        else:
            notes.append("No confirmed short-term uptrend")
        if rsi is not None:
            if rsi > 70:
                score -= 10
                notes.append(f"RSI high ({rsi:.1f}) - possible overbought")
            elif rsi < 30:
                score += 5
                notes.append(f"RSI low ({rsi:.1f}) - possible oversold")

        # RISK: penalize for high vol or deep drawdown
        vol = risk.get('vol_annual', 0)
        max_dd = risk.get('max_drawdown', 0)
        if vol > 0.6:  # threshold heuristic
            score -= 10
            notes.append(f"High volatility ({vol:.2f})")
        if max_dd and abs(max_dd) > 0.5:
            score -= 15
            notes.append(f"Large historical drawdown ({max_dd:.2f})")
```

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        # FINANCIALS: prefer reasonable forward PE if exists
        fpe = financials.get('forwardPE')
        if fpe is not None:
            if fpe < 20:
                score += 5
                notes.append("Forward PE attractive")
            elif fpe > 50:
                score -= 5
                notes.append("Forward PE elevated")

        # clamp score between 0 and 100
        score = max(0, min(100, int(score)))
        conclusion = "Positive" if score >= 65 else ("Neutral" if score >= 40 else "Negative")
        return {"score": score, "conclusion": conclusion, "notes": notes, "avg_news": float(avg_news)}

# --- 7. New Agent: OptimizerAgent ---------------------------------
class OptimizerAgent:
    """Simple optimizer that adjusts portfolio allocation or suggests defensive actions
       based on evaluator feedback. Returns refined recommendation string.
    """
    def act(self, portfolio_rec: Dict[str, Any], evaluator_feedback: Dict[str, Any]) -> Dict[str, Any]:
        rec = portfolio_rec.copy()
        score = evaluator_feedback.get('score', 50)
        notes = evaluator_feedback.get('notes', [])
        # If negative sentiment & high risk => reduce allocation
        alloc_pct = rec.get('allocation_pct', 0)
        if score < 40:
            new_alloc_pct = max(0.0, alloc_pct * 0.3)
            reason = "Reduce: evaluator indicates weak outlook"
        elif score < 60:
            new_alloc_pct = max(0.0, alloc_pct * 0.7)
            reason = "Trim: evaluator indicates neutral/uncertain outlook"
        else:
            new_alloc_pct = alloc_pct
            reason = "Keep allocation"
        # adjust notional & shares
        notional = new_alloc_pct / 100 * 100000.0  # base capital 100k
        shares = int(notional / rec.get('price', 1)) if rec.get('price') else 0
        optimized = {
            "old_allocation_pct": alloc_pct,
            "new_allocation_pct": round(new_alloc_pct, 4),
            "new_notional": round(notional, 2),
            "new_shares": shares,
            "reason": reason,
            "evaluator_notes": notes
        }
        return {"type": "optimized_portfolio", "optimized": optimized}

# --- 8. InvestmentResearchAgent (coordinator) ------------------
class InvestmentResearchAgent:
    """Coordinator combining all agents and returning final report."""
    def __init__(self):
        self.fin_agent = FinancialsAgent()
        self.news_agent = NewsAgent()
        self.tech_agent = TechnicalAgent()
        self.risk_agent = RiskAgent()
        self.port_agent = PortfolioAgent()
        self.eval_agent = EvaluatorAgent()
        self.opt_agent = OptimizerAgent()
        self.memory = {}

    def run_full(self, ticker: str) -> Dict[str, Any]:
        print(f"\n{'='*80}\nRunning full analysis for {ticker} ...")
        results: Dict[str, Any] = {}

        # 1) Financials & Price DF
        fin = self.fin_agent.act(ticker)
        results['financials'] = fin
        price_df = fin.get('price_df')

        # 2) Technical indicators
        tech = self.tech_agent.act(price_df)
        results['technical'] = tech['indicators']

        # 3) Risk metrics
        risk = self.risk_agent.act(price_df)
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        results['risk'] = risk['metrics']

        # 4) News & Sentiment
        news = self.news_agent.act(ticker)
        results['news'] = news['data']

        # 5) Evaluate combined signals
        eval_res = self.eval_agent.evaluate(
            news_data=results['news'],
            technical=results['technical'],
            risk=results['risk'],
            financials=fin
        )
        results['evaluation'] = eval_res

        # 6) Portfolio recommendation (base)
        portfolio_rec = self.port_agent.act(
            ticker,
            technical=results['technical'],
            risk=results['risk'],
            latest_price=fin.get('latest_price'),
            capital=100000.0
        )
        results['portfolio'] = portfolio_rec

        # 7) Optimize portfolio based on evaluator feedback
        optimized = self.opt_agent.act(portfolio_rec.get('recommendation', portfolio_rec), eval_res)
        results['optimized'] = optimized

        # 8) Compose human-readable draft (keeps your original style)
        draft_lines = [
            f"Investment Research Draft for {ticker}",
            f"Generated: {utc_now_iso()}",
            "",
            f"Latest price: {fin.get('latest_price'):.2f}" if fin.get('latest_price') is not None else "Latest price: N/A",
            "",
            "Key Financials:"
        ]
        for k in ['marketCap','trailingPE','forwardPE','dividendYield','beta']:
            draft_lines.append(f"- {k}: {fin.get(k)}")
        draft_lines.append("\nTechnical indicators:")
        for k,v in results['technical'].items():
            draft_lines.append(f"- {k}: {v}")
        draft_lines.append("\nRisk metrics:")
        for k,v in results['risk'].items():
            draft_lines.append(f"- {k}: {v}")
        draft_lines.append("\nRecent News Highlights:")
        for a in results['news']:
            draft_lines.append(f"- [{a['category']}] {a['headline']} (sentiment={a['sentiment']})")
        draft_lines.append(f"\nEvaluator Conclusion: {eval_res['conclusion']} (score={eval_res['score']})")
        draft_lines.append("\nEvaluator Notes:")
        for n in eval_res['notes']:
            draft_lines.append(f"- {n}")
        draft_lines.append("\nPortfolio Recommendation (base):")
        rec = portfolio_rec.get('recommendation')
        draft_lines.append(json.dumps(rec, indent=2))
        draft_lines.append("\nOptimized Allocation:")
        draft_lines.append(json.dumps(optimized.get('optimized'), indent=2))

        draft = "\n".join(draft_lines)
        results['draft'] = draft

        # 9) Memory store (keeps short summary)
        self.memory[ticker] = {"timestamp": utc_now_iso(), "conclusion": eval_res['conclusion'], "score": eval_res['score']}
        print("\n--- FINAL REPORT ---\n")
        print(draft)
        print(f"\nMemory entries for {ticker}: {len(self.memory)}")
        return results

# --- 9. Run analysis for multiple tickers ----------------------
tickers = ["AAPL","TSLA","GOOG","NVDA","INTC","MSFT"]
ira = InvestmentResearchAgent()
all_results = {}
for t in tickers:
    try:
        all_results[t] = ira.run_full(t)
    except Exception as e:
        print(f"[Main] Error analyzing {t}: {e}")
```
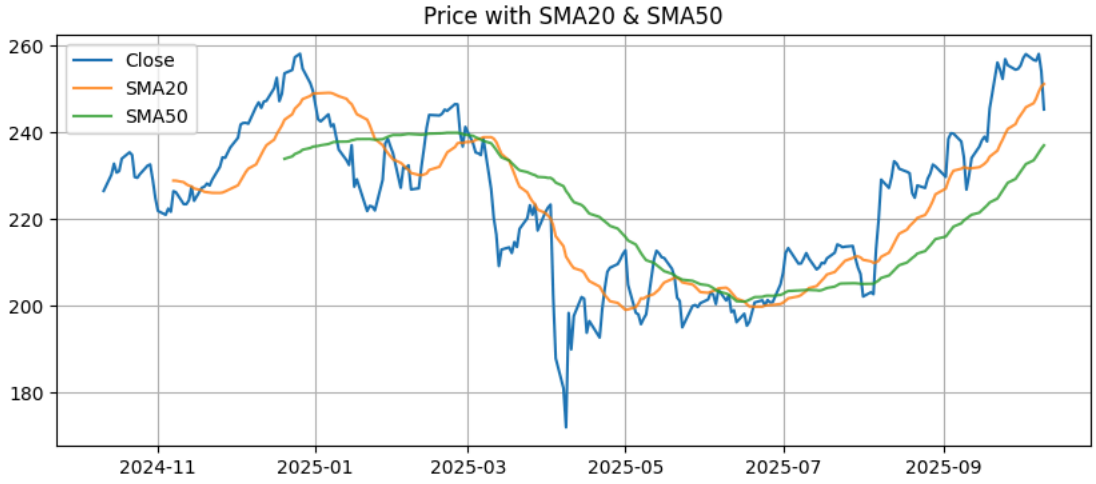
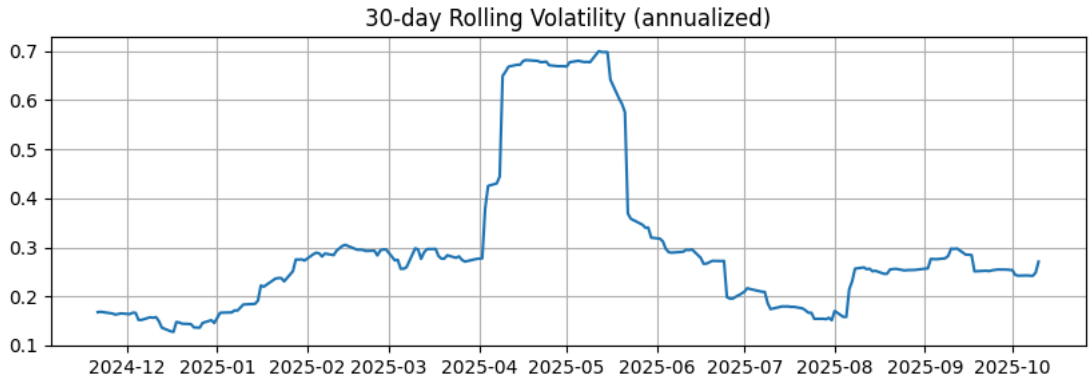

```
        print(f"  [ERROR] Error analyzing {t}: {e}")
        all_results[t] = {"error": str(e)}

# --- 10. Summary DataFrame ----------------------------------
summary = pd.DataFrame({
    t: {
        "latest_price": all_results[t]['financials'].get('latest_price') if 'financials' in all_results[t] else None,
        "eval_score": all_results[t]['evaluation'].get('score') if 'evaluation' in all_results[t] else None,
        "conclusion": all_results[t]['evaluation'].get('conclusion') if 'evaluation' in all_results[t] else None,
        "suggested_alloc_pct": (all_results[t]['portfolio']['recommendation']['allocation_pct']
                                if 'portfolio' in all_results[t] and all_results[t]['portfolio']['recommendation'] != "no_data"
                                else None)
    }
    for t in tickers
}).T

print("\n=== Summary of All Analyses ===")
display(summary)
```

```
[nltk_data] Downloading package punkt to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt.zip.
[nltk_data] Downloading package punkt_tab to /root/nltk_data...
[nltk_data]   Unzipping tokenizers/punkt_tab.zip.
[nltk_data] Downloading package stopwords to /root/nltk_data...
[nltk_data]   Unzipping corpora/stopwords.zip.

================================================================================
Running full analysis for AAPL ...
```


```
/tmp/ipython-input-2770327721.py:52: FutureWarning: Calling float on a single element Series is deprecated and will raise a TypeErr
  "latest_price": float(data['Close'].iloc[-1]),
```

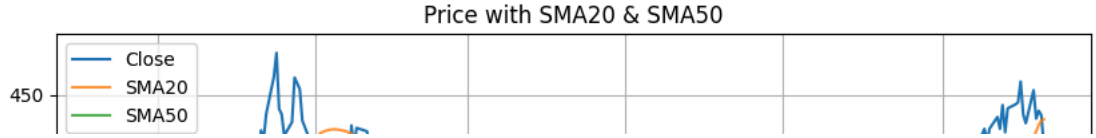


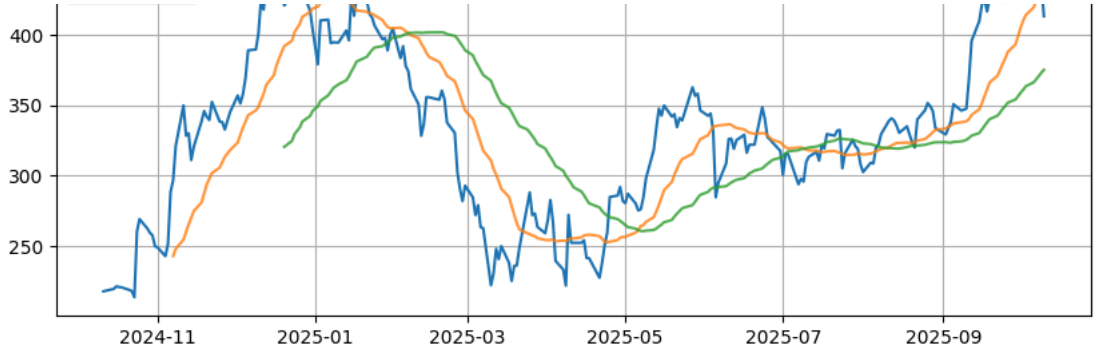


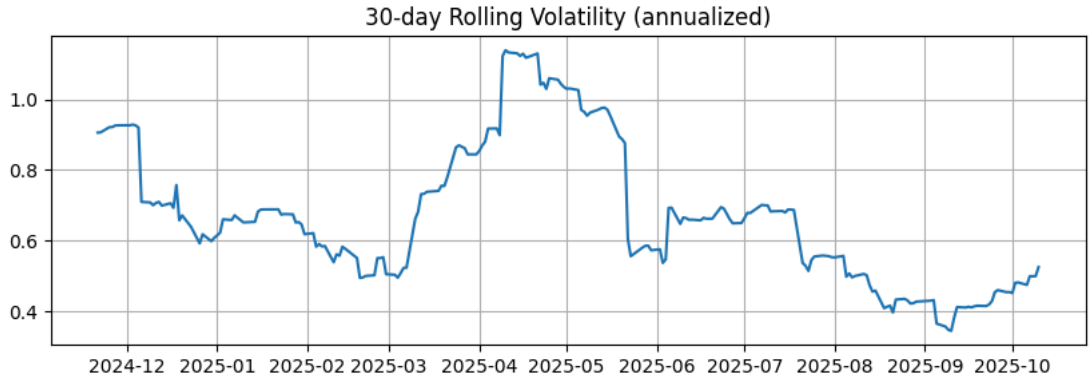

```
--- FINAL REPORT ---

Investment Research Draft for AAPL
Generated: 2025-10-10T20:22:05.287452+00:00

Latest price: 245.27

Key Financials:
- marketCap: 3639902470144
- trailingPE: 37.275078
- forwardPE: 29.515041
```

```
- dividendYield: 0.41
- beta: 1.094

Technical indicators:
- SMA20: None
- SMA50: None
- EMA20: None
- RSI14: None
- close: None

Risk metrics:
- vol_annual: 0.3248254586559436
- max_drawdown: -0.33360522080703586
- var95: -0.03210482146642558

Recent News Highlights:
- [other] Apple Inc. (AAPL) Stock Price, News, Quote &amp;amp; History - Yahoo Finance (sentiment=0.0)
- [other] Should You Buy Apple Stock Before Oct. 30? - The Motley Fool (sentiment=0.6)
- [other] Apple (NASDAQ: AAPL) Stock Price Prediction and Forecast 2025-2030 (Oct 2025) - 24/7 Wall St. (sentiment=0.0)
- [other] Analyst Says Apple (AAPL) Is Going to Make a New All-Time High - Yahoo Finance (sentiment=0.1482)
- [other] Apple Inc. Stock (AAPL) Opinions on iPhone 16 Preorders and Analyst Downgrades - Quiver Quantitative (sentiment=0.0)

Evaluator Conclusion: Positive (score=70)

Evaluator Notes:
- News sentiment positive
- No confirmed short-term uptrend

Portfolio Recommendation (base):
{
  "allocation_pct": 2.0,
  "notional": 2000.0,
  "shares": 8,
  "price": 245.27000427246094,
  "rationale": "Trend neutral/down, volatility 0.325"
}

Optimized Allocation:
{
  "old_allocation_pct": 2.0,
  "new_allocation_pct": 2.0,
  "new_notional": 2000.0,
  "new_shares": 8,
  "reason": "Keep allocation",
  "evaluator_notes": [
    "News sentiment positive",
    "No confirmed short-term uptrend"
  ]
}

Memory entries for AAPL: 1

================================================================================
Running full analysis for TSLA ...
```


```
/tmp/ipython-input-2770327721.py:52: FutureWarning: Calling float on a single element Series is deprecated and will raise a TypeErr
  "latest_price": float(data['Close'].iloc[-1]),
```



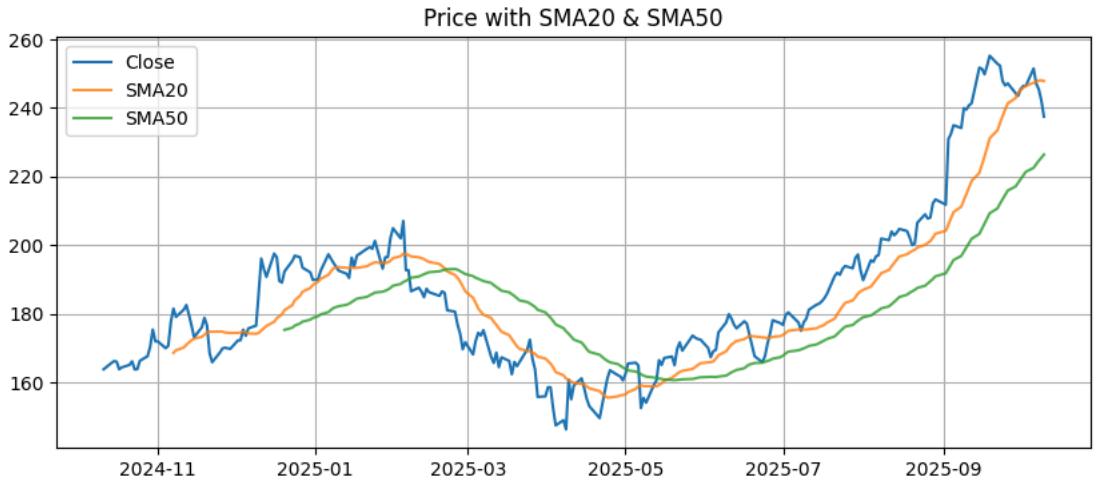


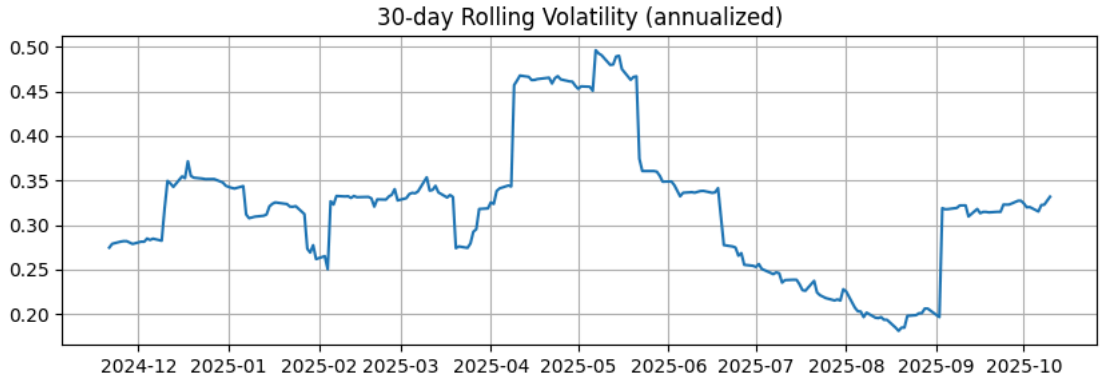



```
--- FINAL REPORT ---

Investment Research Draft for TSLA
Generated: 2025-10-10T20:22:07.880197+00:00

Latest price: 413.49

Key Financials:
- marketCap: 1374916706304
- trailingPE: 243.2294
- forwardPE: 127.62037
- dividendYield: None
- beta: 2.086

Technical indicators:
- SMA20: None
- SMA50: None
- EMA20: None
- RSI14: None
- close: None

Risk metrics:
- vol_annual: 0.7077031080423287
- max_drawdown: -0.5376568011858524
- var95: -0.056837875321660236

Recent News Highlights:
- [other] Tesla analysts are expecting the stock to go Plaid Mode soon - Teslarati (sentiment=0.0)
- [other] Tesla Stock Is on Edge as Reviews Land, Edmunds Says the New Model Y ‘Is the Big Surprise’ - TipRanks (sentiment=0.0682)
- [other] Why I’m Dumping Tesla Stock (NASDAQ:TSLA) - Seeking Alpha (sentiment=0.0)
- [other] Tesla Stock (TSLA) Slides as Traffic Light Dodging Cars Face New Safety Probe - TipRanks (sentiment=0.2682)
- [other] Jim Cramer Makes Bold Statement About Tesla (TSLA) CEO Elon Musk - Yahoo Finance (sentiment=0.3333)

Evaluator Conclusion: Neutral (score=40)

Evaluator Notes:
- News sentiment positive
- No confirmed short-term uptrend
- High volatility (0.71)
- Large historical drawdown (-0.54)
- Forward PE elevated

Portfolio Recommendation (base):
{
  "allocation_pct": 2.0,
  "notional": 2000.0,
  "shares": 4,
  "price": 413.489990234375,
  "rationale": "Trend neutral/down, volatility 0.708"
}
```

```
Optimized Allocation:
{
  "old_allocation_pct": 2.0,
  "new_allocation_pct": 1.4,
  "new_notional": 1400.0,
  "new_shares": 3,
  "reason": "Trim: evaluator indicates neutral/uncertain outlook",
  "evaluator_notes": [
    "News sentiment positive",
    "No confirmed short-term uptrend",
    "High volatility (0.71)",
    "Large historical drawdown (-0.54)",
    "Forward PE elevated"
  ]
}

Memory entries for TSLA: 2

================================================================================
Running full analysis for GOOG ...
```

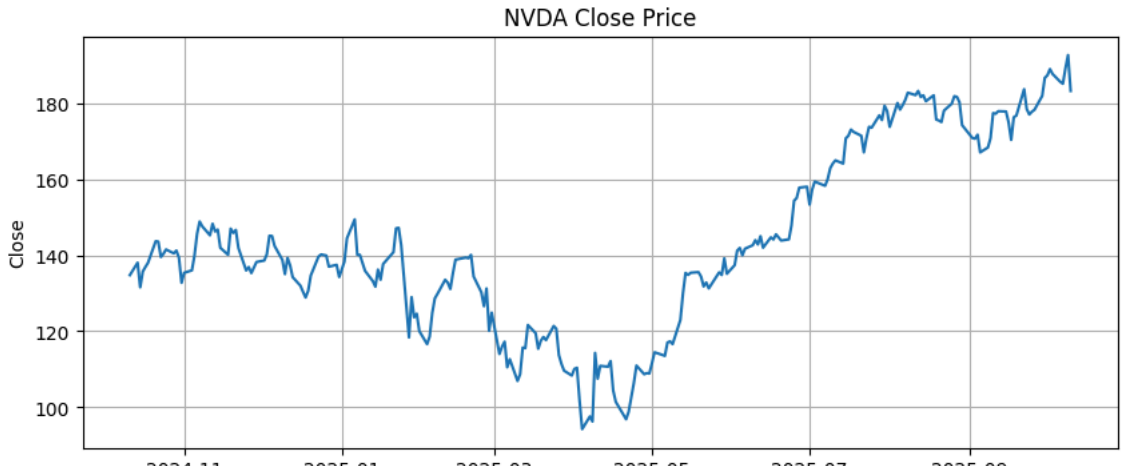

```
/tmp/ipython-input-2770327721.py:52: FutureWarning: Calling float on a single element Series is deprecated and will raise a TypeErr
  "latest_price": float(data['Close'].iloc[-1]),
```



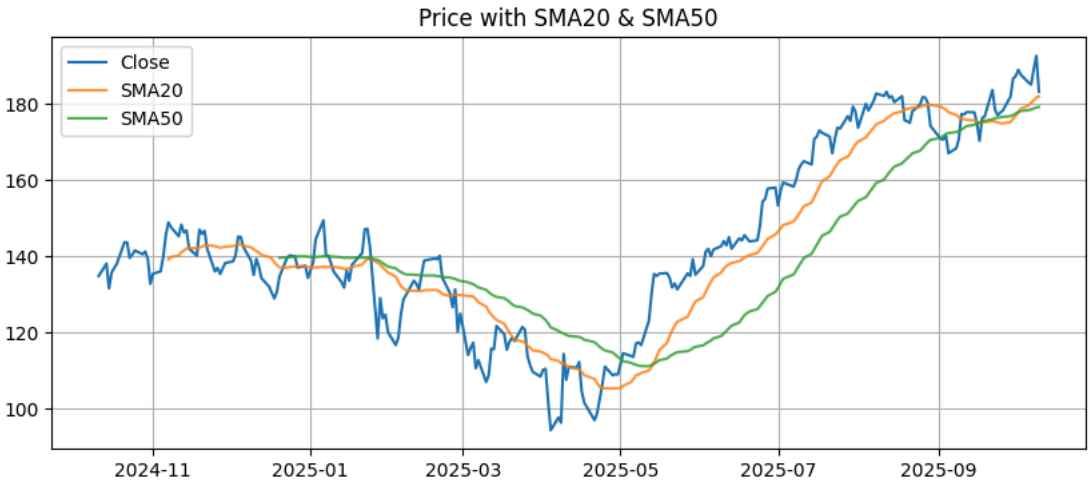


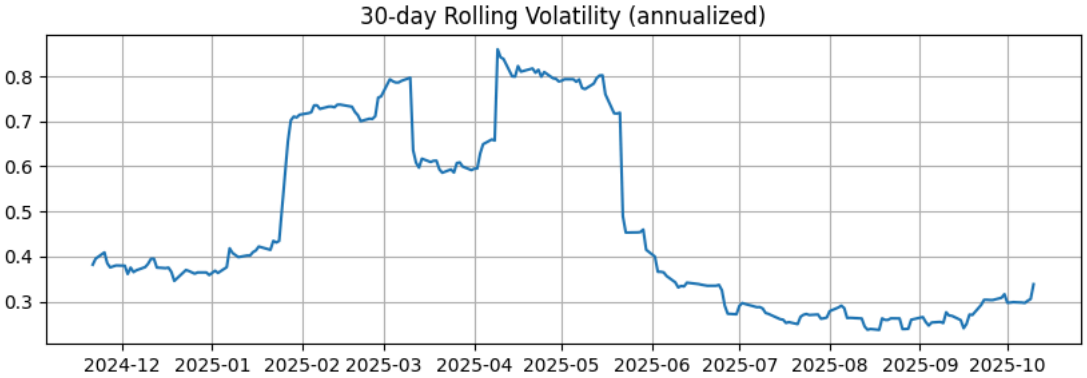

```
--- FINAL REPORT ---
```

```
Investment Research Draft for GOOG
Generated: 2025-10-10T20:22:09.982303+00:00

Latest price: 237.49

Key Financials:
- marketCap: 2867760726016
- trailingPE: 25.345785
- forwardPE: 26.535196
- dividendYield: 0.35
- beta: 1.0

Technical indicators:
- SMA20: None
- SMA50: None
- EMA20: None
- RSI14: None
- close: None

Risk metrics:
- vol_annual: 0.3182983506098752
- max_drawdown: -0.29350060555515917
- var95: -0.02975463849184449

Recent News Highlights:
- [other] Google Launches Gemini Enterprise As Tech Giants Race To Offer AI Agents - Investor's Business Daily (sentiment=0.0)
- [other] Alphabet’s stock could soar if Google’s Gemini AI gets a TikTok-style makeover - MarketWatch (sentiment=0.0)
- [other] Google's stock is up 70%: Can the rally last? - Yahoo Finance (sentiment=0.0)
- [other] Alphabet: Undervalued Mag-7 Stock Hiding In Plain Sight (NASDAQ:GOOG) - Seeking Alpha (sentiment=-0.2143)
- [other] Is Alphabet Stock Still a Buy Below $250? - The Motley Fool (sentiment=0.6)

Evaluator Conclusion: Positive (score=70)

Evaluator Notes:
- News sentiment positive
- No confirmed short-term uptrend

Portfolio Recommendation (base):
{
  "allocation_pct": 2.0,
  "notional": 2000.0,
  "shares": 8,
  "price": 237.49000549316406,
  "rationale": "Trend neutral/down, volatility 0.318"
}

Optimized Allocation:
{
  "old_allocation_pct": 2.0,
  "new_allocation_pct": 2.0,
  "new_notional": 2000.0,
  "new_shares": 8,
  "reason": "Keep allocation",
  "evaluator_notes": [
    "News sentiment positive",
    "No confirmed short-term uptrend"
  ]
}

Memory entries for GOOG: 3

================================================================================
Running full analysis for NVDA ...
```




```
/tmp/ipython-input-2770327721.py:52: FutureWarning: Calling float on a single element Series is deprecated and will raise a TypeErr
  "latest_price": float(data['Close'].iloc[-1]),
```

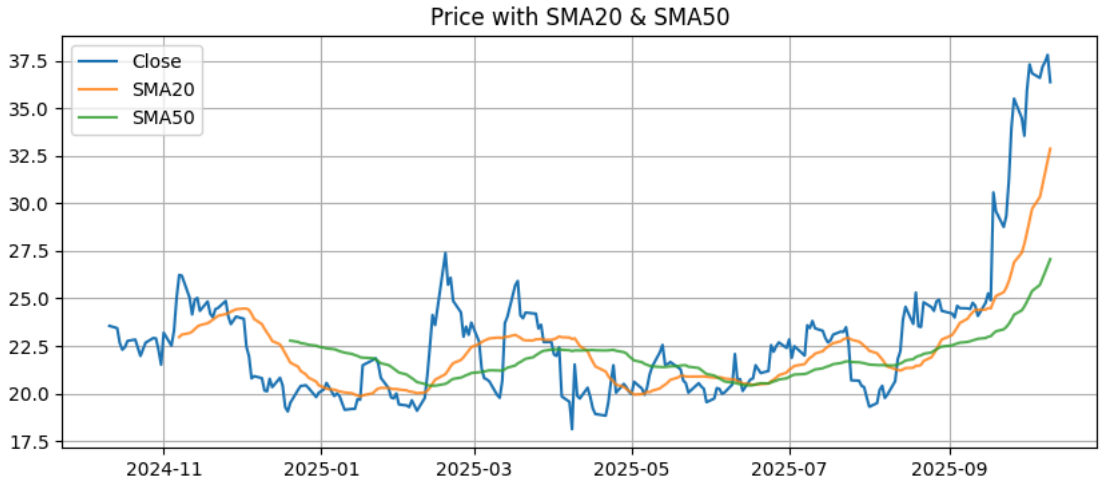


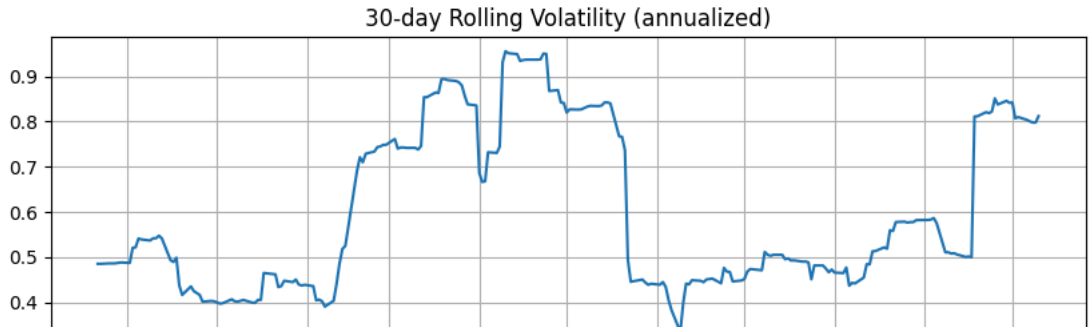


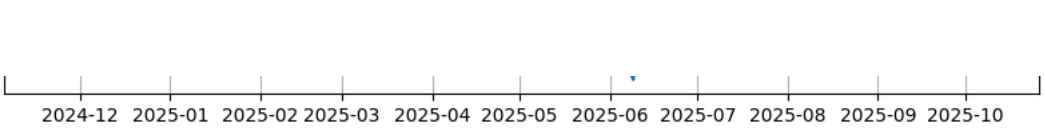

```
--- FINAL REPORT ---

Investment Research Draft for NVDA
Generated: 2025-10-10T20:22:11.874497+00:00

Latest price: 183.16

Key Financials:
- marketCap: 4459396595712
- trailingPE: 52.33143
- forwardPE: 44.456314
- dividendYield: 0.02
- beta: 2.123

Technical indicators:
- SMA20: None
- SMA50: None
- EMA20: None
- RSI14: None
- close: None

Risk metrics:
- vol_annual: 0.4956907224762314
- max_drawdown: -0.3688102669914984
- var95: -0.04705952469839477

Recent News Highlights:
- [other] AMD &amp;amp; Nvidia (NVDA) Stocks Fall on Senate AI Export Bill - TipRanks (sentiment=0.0)
- [other] Nvidia Stock Spikes To Record High On UAE Trade Approval - Investor's Business Daily (sentiment=0.08)
- [other] Why Nvidia (NVDA) Stock Is Trading Lower Today - Yahoo Finance (sentiment=0.0)
- [other] Prediction: This Unstoppable Stock Will Join Nvidia, Microsoft, Apple, and Alphabet in the $3 Trillion Club Before 2028 -
- [other] NVDA: Nvidia Stock Breaks New Record After Cantor Hikes Price Target to $300 - Yahoo Finance (sentiment=0.1364)

Evaluator Conclusion: Positive (score=70)

Evaluator Notes:
- News sentiment positive
- No confirmed short-term uptrend

Portfolio Recommendation (base):
{
```

```
  "allocation_pct": 2.0,
  "notional": 2000.0,
  "shares": 10,
  "price": 183.16000366210938,
  "rationale": "Trend neutral/down, volatility 0.496"
}

Optimized Allocation:
{
  "old_allocation_pct": 2.0,
  "new_allocation_pct": 2.0,
  "new_notional": 2000.0,
  "new_shares": 10,
  "reason": "Keep allocation",
  "evaluator_notes": [
    "News sentiment positive",
    "No confirmed short-term uptrend"
  ]
}

Memory entries for NVDA: 4

================================================================================
Running full analysis for INTC ...
```


```
/tmp/ipython-input-2770327721.py:52: FutureWarning: Calling float on a single element Series is deprecated and will raise a TypeErr
  "latest_price": float(data['Close'].iloc[-1]),
```








```
--- FINAL REPORT ---

Investment Research Draft for INTC
Generated: 2025-10-10T20:22:13.734235+00:00

Latest price: 36.37

Key Financials:
- marketCap: 173020004352
- trailingPE: None
- forwardPE: 37.494843
- dividendYield: None
- beta: 1.33

Technical indicators:
- SMA20: None
- SMA50: None
- EMA20: None
- RSI14: None
- close: None

Risk metrics:
- vol_annual: 0.6305276798853632
- max_drawdown: -0.3380796069817177
- var95: -0.05278583669672623

Recent News Highlights:
- [other] Intel Stock Falls After Downgrade. Why This Analyst Is Worried After Nvidia, SoftBank Deals - Barron's (sentiment=0.0)
- [other] Intel unveils Core Ultra series 3 chip in major test for ailing chipmaker - Yahoo Finance (sentiment=0.0625)
- [other] Keeping Track of the Soaring "White House" Stocks: INTC, LAC, MP, TMQ - Nasdaq (sentiment=0.0)
- [other] Intel 18A: First U.S.-made 2nm-class node powers Panther Lake Core Ultra 3, shipping this year - Stock Titan (sentiment=0
- [other] Nvidia CEO Jensen Huang Says Intel Spent 33 Years 'Trying To Kill Us' But Now Calls The Chip Rival A Partner: 'We're Love

Evaluator Conclusion: Neutral (score=40)

Evaluator Notes:
- News sentiment neutral
- No confirmed short-term uptrend
- High volatility (0.63)

Portfolio Recommendation (base):
{
  "allocation_pct": 2.0,
  "notional": 2000.0,
  "shares": 54,
  "price": 36.369998931884766,
  "rationale": "Trend neutral/down, volatility 0.631"
}

Optimized Allocation:
{
  "old_allocation_pct": 2.0,
  "new_allocation_pct": 1.4,
  "new_notional": 1400.0,
  "new_shares": 38,
  "reason": "Trim: evaluator indicates neutral/uncertain outlook",
  "evaluator_notes": [
    "News sentiment neutral",
    "No confirmed short-term uptrend",
    "High volatility (0.63)"
  ]
}

Memory entries for INTC: 5

================================================================================
Running full analysis for MSFT ...
```