Project Title:
Macro–Micro Risk Analysis: Using Web APIs and Financial Data to Predict Market Trends and Stock Drawdown Risk

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■ What problem are you trying to solve?

Financial markets are influenced simultaneously by **macro-economic conditions** and **firm-level fundamentals**.
This project aims to answer two connected questions:

1. **How do macro-economic indicators (GDP, CPI, FEDFUNDS, etc.) correlate with major stock indices such as the NASDAQ?**
2. **Can company-level financial metrics (ROA, EPS, debt ratios) predict which stocks are more likely to suffer extreme drawdowns during volatile market periods?**

The project goal is to build a **macro-to-micro risk analysis framework** that uses real-world data to understand how macro trends shape market performance, and how firm financial structure determines stock vulnerability.

■ How will you collect data and from where?

This project will rely on **web APIs**, not downloaded files, meeting course requirements.

(1) Macro-economic data — FRED API

I will collect the following economic indicators directly using the FRED API:

- GDP
- CPIAUCSL (Inflation)
- FEDFUNDS (Federal Funds Rate)…

These will be retrieved with automated API calls using Python requests.

(2) Market data — Yahoo Finance API

Using yfinance, I will retrieve:

- NASDAQ index historical close prices
- All NASDAQ constituent stocks
- For each stock: financial metrics
- Historical price series to compute quarterly maximum drawdown

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■ What analysis will you do and what visualizations will you create?

Macro Analysis

- Clean and merge FRED time-series
- Compute correlation between macro indicators and NASDAQ trends
- Visualizations:
    - Time-series subplots for effective macro indicators vs NASDAQ

    - Correlation heatmap

Micro (Stock-Level) Analysis

- Calculate each stock's **quarterly maximum drawdown**
- Build a classification label: risk_mark = 1 if drawdown > threshold
- Use financial indicators , such as:
    - ROE
    - EPS
    - ROE …
- Apply models:
    - Logistic Regression (baseline)
    - Random Forest
    - XGBoost
- Evaluate using:
    - Confusion Matrix
    - Classification Report
    - ROC Curve & AUC Comparison

Visualizations:

- Multi-model ROC comparison
- Feature importance (Random Forest / XGBoost)

Expected Outcome

The project will produce an integrated **Macro → Market → Firm Risk** analysis pipeline that demonstrates:

- Macro conditions shape market trends
- Firm financial structure determines vulnerability during downturns
- Tree-based models outperform linear models, indicating nonlinear relationships in stock risk.