Stock Market Analysis

Alvaro, Filip, Johanna, Mark, Victor

Project overview

Project Overview

Stock Waves: Navigating Tech and Finance Dynamics in a changing World?

Topic Selection:

- Focus: Impact of COVID-19 & Inflation
- Sectors: Tech vs. Financial Companies
- Purpose: Analyze stock volatility trends

Dataset & Hypothesis:

- Source: Yahoo Finance (5 Years of Data)
- Hypothesis: Tech stocks show different volatility patterns compared to financial stocks during crises.

Data Process:

- Cleaning: Normalized columns and values for accuracy
- Techniques: Ensured consistent data across all datasets

Project Overview

Hypothesis 1

Tech companies exhibit higher stock price volatility, resulting in more pronounced price movements compared to their financial counterparts.

Hypothesis 2

Economic catalysts, such as interest rate adjustments or inflation updates, trigger substantial fluctuations in stock prices.

Data wrangling and cleaning

Data Wrangling and Cleaning

- **Challenges:**
  - Different data sources, formatting data to use same functions
  - Different approaches by team members
  - Issue with calculating monthly returns

- **APIs and Web Scraping:**
  - Python yfinance library

- **Solutions:**
  - Building global functions (functions.py)
  - Pair programming / group discussions / agile methodology

Exploratory Data Analysis

Exploratory Data Analysis

- **Discuss the exploratory data analysis methods you used:**
    - Statistics
        - Adjusted close price, trading volume, returns
        - Mean, standard deviation
    - Plotting
        - Libraries used: plotly, matplotlib, histogram, candlestick

Returns
Daily, monthly, and annual.
Reflects Volatility.

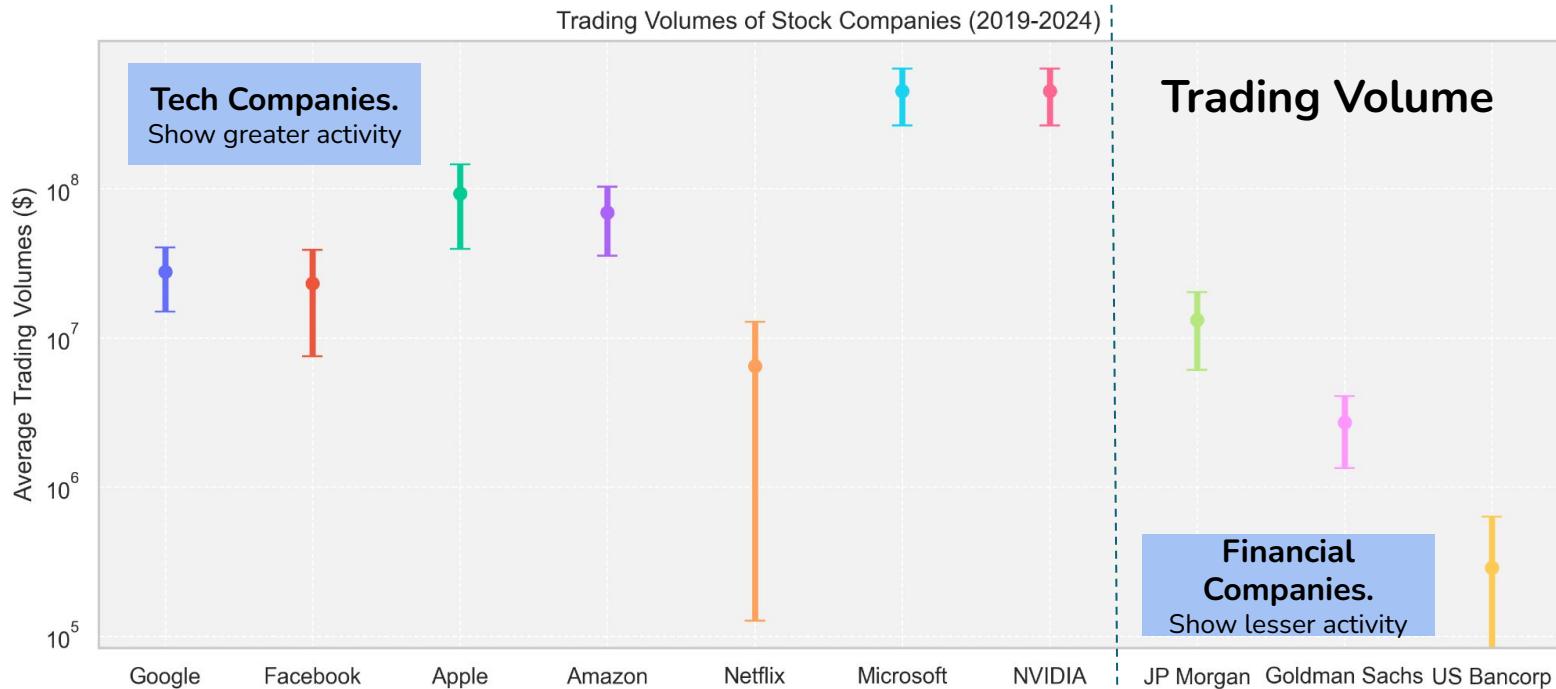**Trading Volume**
Level of interest and activity surrounding the stock.
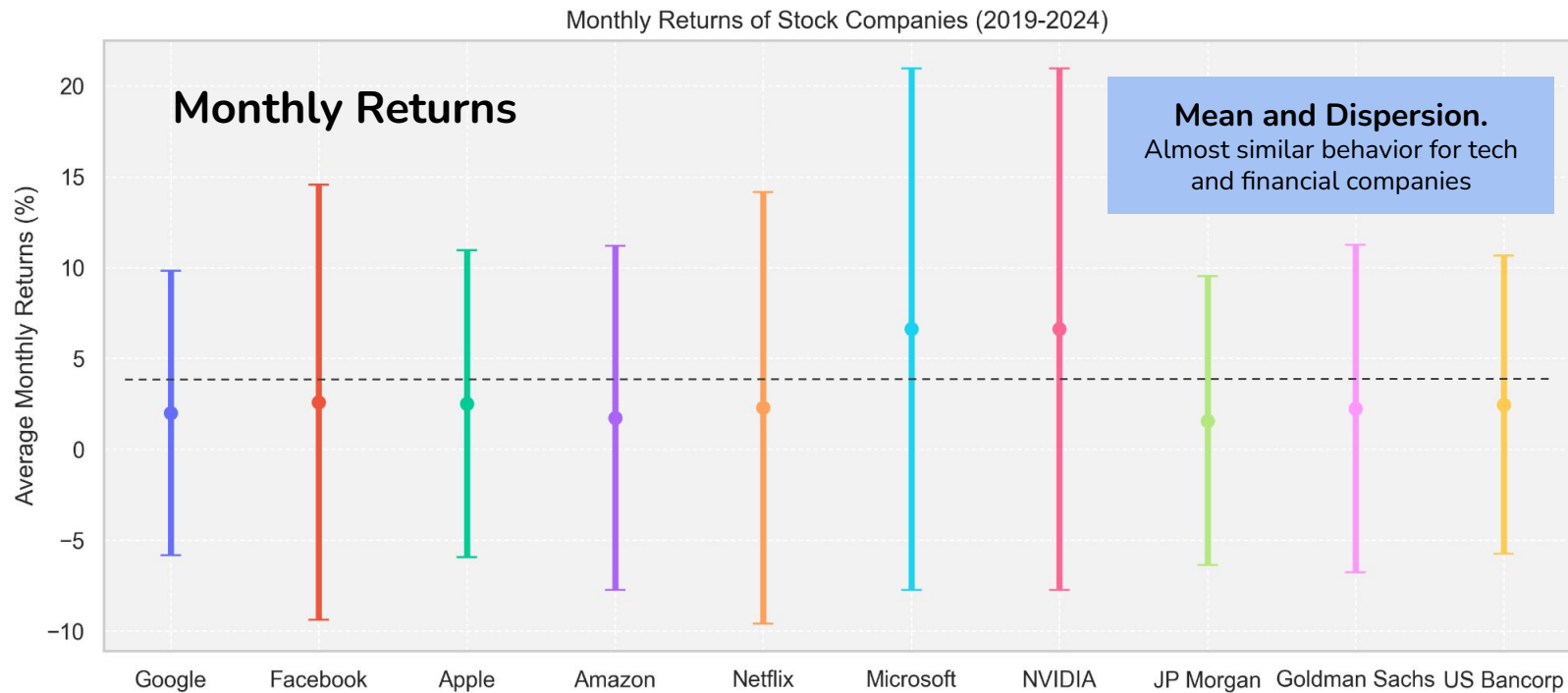**Reflects Interest.**

Adjusted Close Price
Price adjusted to corporate actions at the end of the day.
**Reflects Performance.**

Exploratory Data Analysis

Trading Volumes of Stock Companies (2019-2024)

Tech Companies.
Show greater activity

Trading Volume

Average Trading Volumes ($)

Financial Companies.
Show lesser activity

Google   Facebook   Apple   Amazon   Netflix   Microsoft   NVIDIA   JP Morgan   Goldman Sachs   US Bancorp

Exploratory Data Analysis

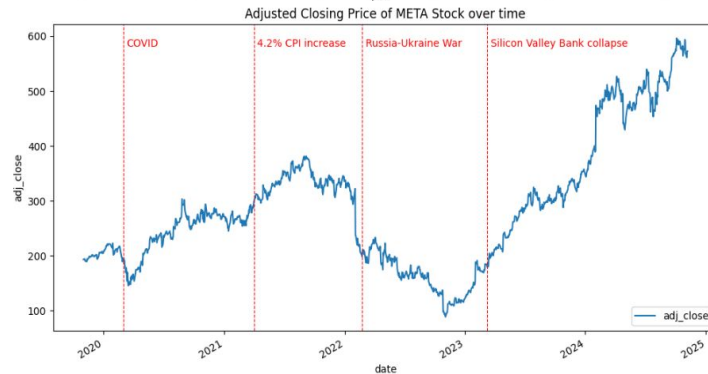Monthly Returns of Stock Companies (2019-2024)

Exploratory Data Analysis

Global Events.
Have a short-term
impact on stock prices

FINANCIAL COMPANIES
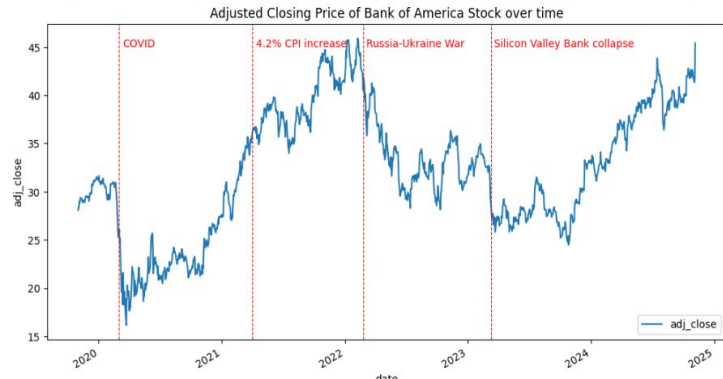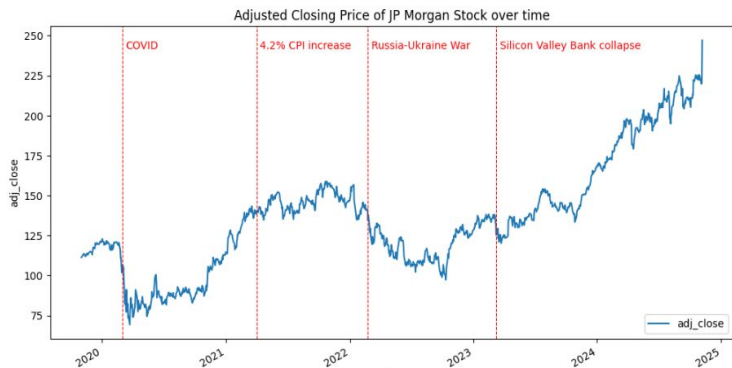
TECH COMPANIES

DEMO

Teamwork and project management

Workflow plan

Initial Plan: Started with Trello for task tracking (used informally).

GitHub Workflow:

- Blocked direct pushes to main
- Required pull request (PR) approvals
- Slack notifications for open PRs

Adjustments Made: Added code reviews for PRs

Team collaboration

What Worked Well:

- Clear roles and responsibilities for each member
- Actively helping each other with tasks and challenges as they arose

Areas for Improvement:

- **Communication:** Improve updates on progress and dependencies to avoid duplicates
- **Solution:** Focus on refactoring common functions to a shared global file

Risk management

Low-Risk Project: Minimal data-related risks

Solution Focused: Clearly defined and achievable hypothesis

Obstacles and learnings

Major obstacles

GitHub

- Branches, merging, conflicts ...

Stock Market

- Gained foundational knowledge to better approach the project
- Research terminology to better make sense of datasets

Collaboration

- Investigating multiple sources and agreeing on which one to use
- Ticket planning
- Backlog at the beginning of the week/sprint (agile lesson missing)

Results and conclusion

Conclusion and Insights

Hypothesis 1
The price movements of both sectors behave in a comparable manner, contradicting the expectation of greater volatility in tech companies stocks as suggested by the hypothesis.

Hypothesis 2
Major economic events like the COVID-19 pandemic or significant interest rate decisions results from investor uncertainty and fear, which in turn increases market volatility as prices fluctuate more widely.

Conclusion and Insights

Main learnings and surprising insights:

- Stock market learning
- Better with Git and GitHub
- Communication was better than first mini project
- Plotting and visualizing data

Potential implications of your findings:

- Both **tech and financial** stocks exhibit **similar volatility,** especially during major economic events, suggesting that **economic factors** *such as investors uncertainty* **have stronger market influence than sector-specific characteristics**.

Predictive models 🔮

Prophet: Time Series Forecasting

Forecasting tool for time series data

Based on an additive model with non-linear trends

Prophet: Time Series Forecasting

Features

- **Seasonality:** Captures yearly, weekly, and daily patterns
- **Holiday Effects:** Adjusts for holiday impacts

Robustness

- Handles missing data and trend shifts
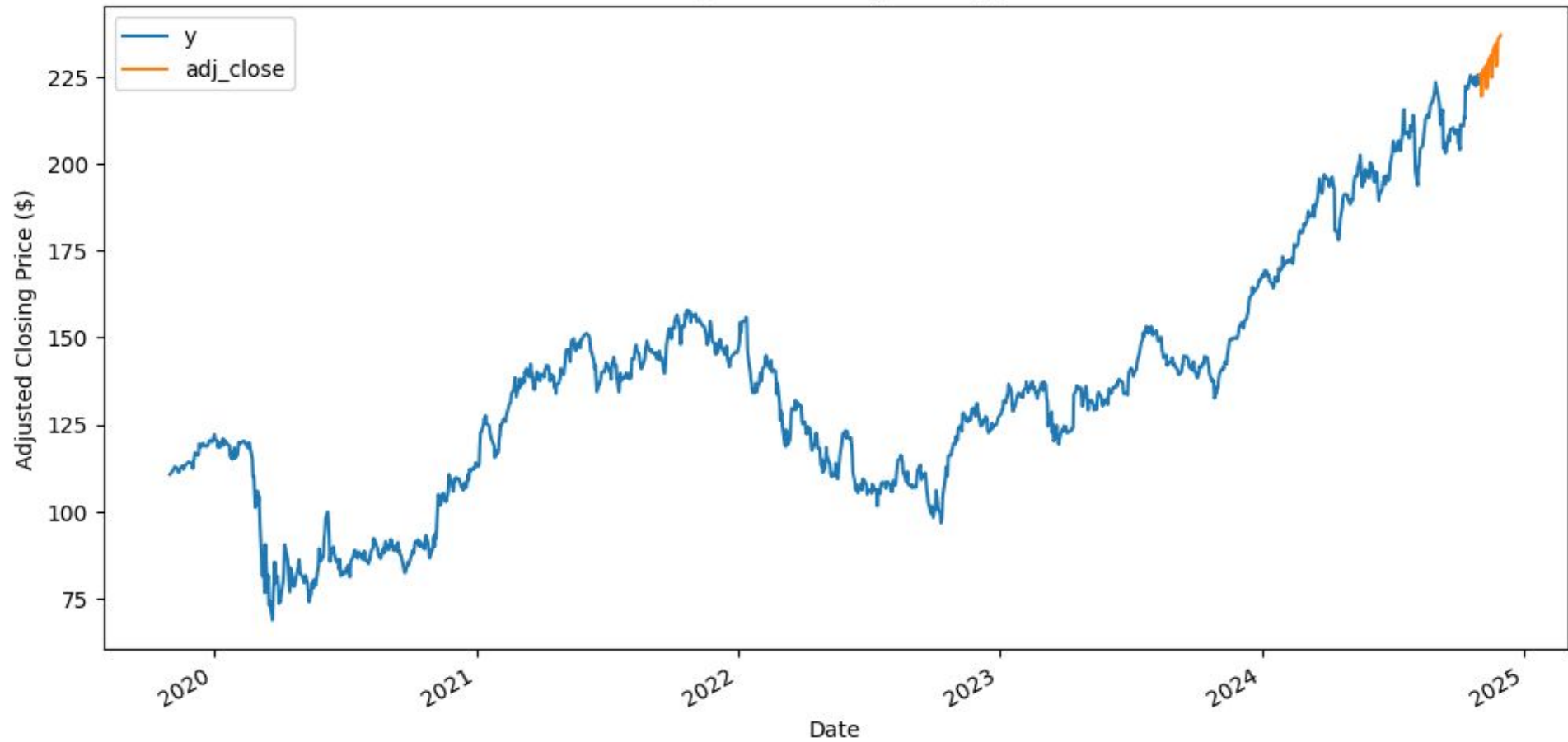- Manages outliers effectively

Prophet: Time Series Forecasting

Best Use Cases

- Time series with strong seasonal effects
- Data with several seasons of historical records

Adjusted Closing Price ($)

Thank you!