Stock Market Analysis Report

1. Introduction

1.1 Problem Statement

Stock market prices fluctuate due to various economic, social, and political factors. Investors, analysts, and financial institutions require data-driven insights to make informed decisions. This project aims to analyze historical stock prices to identify trends, correlations, and potential risk factors using Python.

1.2 Objectives

- To collect and analyze historical stock price data for selected companies.
- To compare multiple stocks and identify performance trends.
- To calculate and visualize stock correlations.
- To provide insights into market volatility and investment strategies.
- To analyze the risk vs. return trade-off for better decision-making.

2. Dataset & Methodology

2.1 Data Source

The dataset was obtained from **Yahoo Finance** using the yfinance Python library. The data includes:

- **Stock tickers:** Tesla (TSLA), Apple (AAPL), Amazon (AMZN)
- **Timeframe:** January 2024 – January 2025
- **Features:** Date, Opening Price, Closing Price, Daily Returns, Moving Averages, etc.

2.2 Methodology

1. **Data Collection:** Retrieve historical stock prices using Python's yfinance.
2. **Data Preprocessing:** Clean the dataset, handle missing values, and normalize prices.
3. **Exploratory Data Analysis (EDA):** Visualize trends, calculate correlations, and analyze volatility.
4. **Performance Comparison:** Compare stock performance over time.
5. **Risk Analysis:** Compute daily returns and stock correlations.
6. **Risk vs. Return Analysis:** Evaluate the risk-return profile of each stock.

3. Findings & Visualizations

3.1 Stock Price Trends

- Stock prices were plotted over time to observe overall growth or decline.
- **Tesla (TSLA)** exhibited high volatility compared to **Apple (AAPL)** and **Amazon (AMZN)**.

3.2 Normalized Stock Prices

- Normalization allowed a fair comparison of different stock price movements instead of their absolute prices.
- Apple had a steadier trend; Amazon showed a little fluctuation while Tesla showed larger fluctuations.

3.3 Daily Returns & Volatility

- Tesla had higher daily fluctuations, indicating greater risk.
- Apple and Amazon had more stable daily returns.

3.4 Correlation Analysis

- All correlations between the stocks are around 0.32 - 0.34, which is a weak positive correlation and that means they behave independently.
- This means that the returns of Apple, Amazon, and Tesla move somewhat together but not strongly.
- Since the values are closer to 0 than 1, these stocks are not highly dependent on each other, meaning they provide some level of diversification in a portfolio.
- The correlation matrix between Amazon and Apple.
- AAPL & AMZN = 0.34 → Weak positive correlation
- Tesla had a **lower correlation** with the other two stocks, suggesting independent price movement.
- AAPL & TSLA = 0.33 → Weak positive correlation
- AMZN & TSLA = 0.32 → Weak positive correlation

3.5 Risk vs. Return Analysis

- **Expected Returns:** Tesla had the highest potential gains but also the highest volatility.
- Risk (Volatility): Tesla displayed the most extreme fluctuations, while Apple had the least.

- AAPL (Apple) → Lowest risk (least volatile) but also lowest return.

  AMZN (Amazon) → Moderate risk & moderate return.

  TSLA (Tesla) → Highest risk and highest return.

- **Sharpe Ratio Calculation:** The Sharpe ratio helps measure risk-adjusted returns. A higher ratio suggests better compensation for risk taken - Apple and Amazon have a higher Sharpe Ratio than TSLA, suggesting they provide better returns per unit of risk.

- **Key Insight:** Investors seeking stability may prefer Apple or Amazon, while risk-tolerant investors might consider Tesla for potential higher returns.

4. Conclusion & Recommendations

- **Conservative Investor (Low Risk, Stable Returns) → AAPL (Apple)**

Apple has the lowest volatility (risk), making it a safe investment. If you prioritize stability over high returns, Apple is a solid choice. It's ideal for Long-term investors, retirees, or those seeking reliable returns.

- **Balanced Investor (Moderate Risk, Moderate Return) → AMZN (Amazon)**

Amazon offers a good balance between risk and return. If you're comfortable with some level of risk but still want relatively stable growth. It's ideal for Growth investors looking for steady appreciation without extreme volatility.

- **Aggressive Investor (High Risk, High Return) → TSLA (Tesla)**

Tesla has the highest expected return but also the highest volatility. If you have a high-risk tolerance and can handle big price swings. It's ideal for Risk-takers, traders, and those looking for high growth potential.

Portfolio Strategy Recommendations

- If you prefer safety → Invest more in AAPL and AMZN (low to moderate risk).
- If you seek high returns → Allocate a portion to TSLA, but balance it with safer stocks.
- Diversification is key → Holding a mix of all three stocks can spread risk while capturing growth.

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