

Erdos Quant Finance Mini Projects

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Mini Project 1: Portfolio Returns

I built a portfolio out of ['NVDA', 'META', 'GOOG', 'AAPL', 'AMZN'] over a 2 year period by minimizing volatility with some constraints:

- Skewness: 0.281
- Excess Kurtosis: 8.776
- Non-annualized Mean: 0.00083
- Median: 0.0019

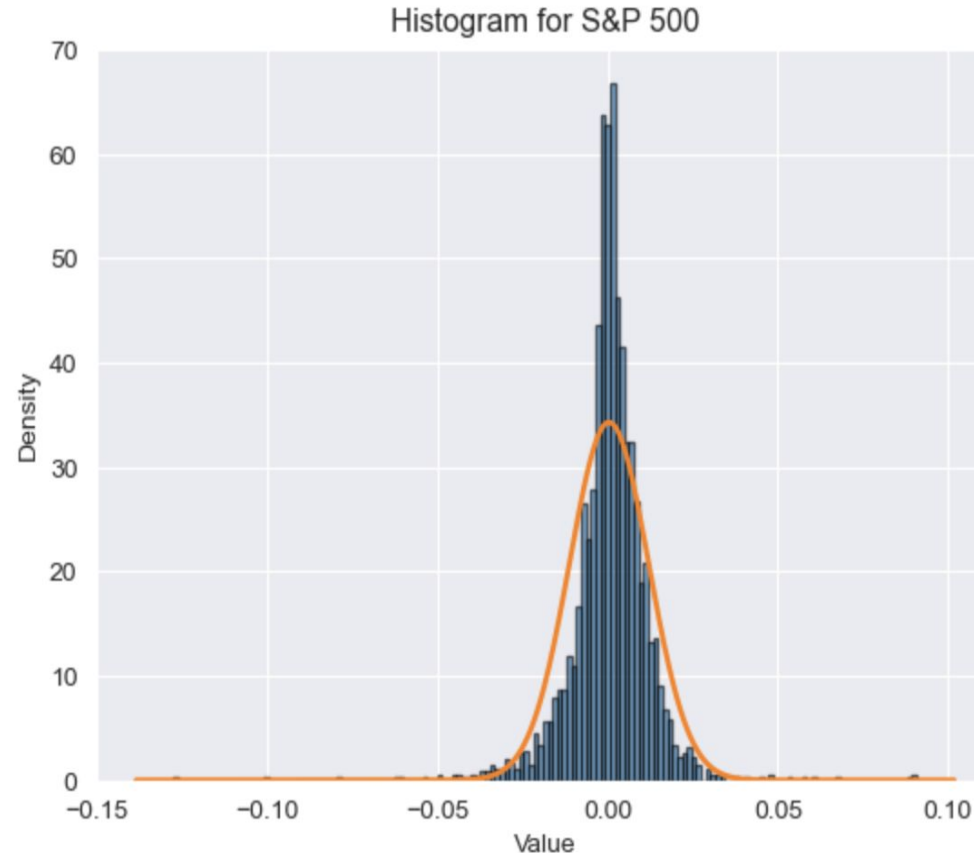
I did something similarly with just 'NVDA' and 'META' since they're the highest performing stocks in that period:

- Skewness: 0.824
- Excess Kurtosis: 9.2666
- Non-annualized Mean: 0.0021
- Median: 0.0021

Mini Project 2: Normality of Log Returns

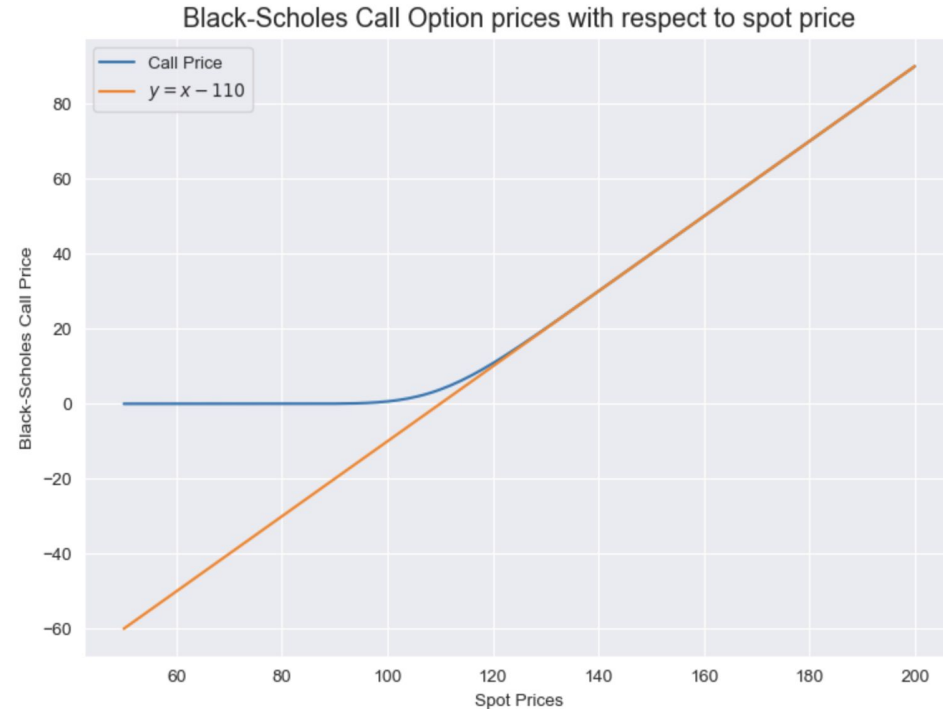
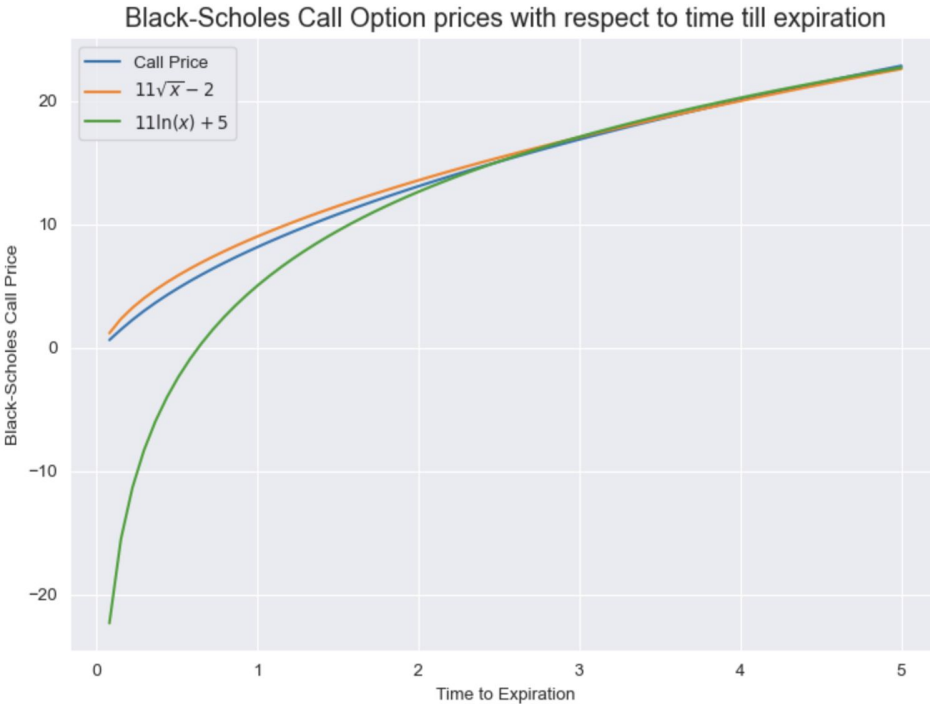
While the histograms for log returns sometime appear normal, hypothesis testing for quantities related to higher moments like skewness or kurtosis shows these are not quite normal. Tests used:

- Shapiro-Wilk: test for general departures (skew, kurtosis, shape)
- Jarque–Bera: tests for skewness and kurtosis
- D'Agostino–Pearson K^2 : joint skew-kurtosis, more power than JB



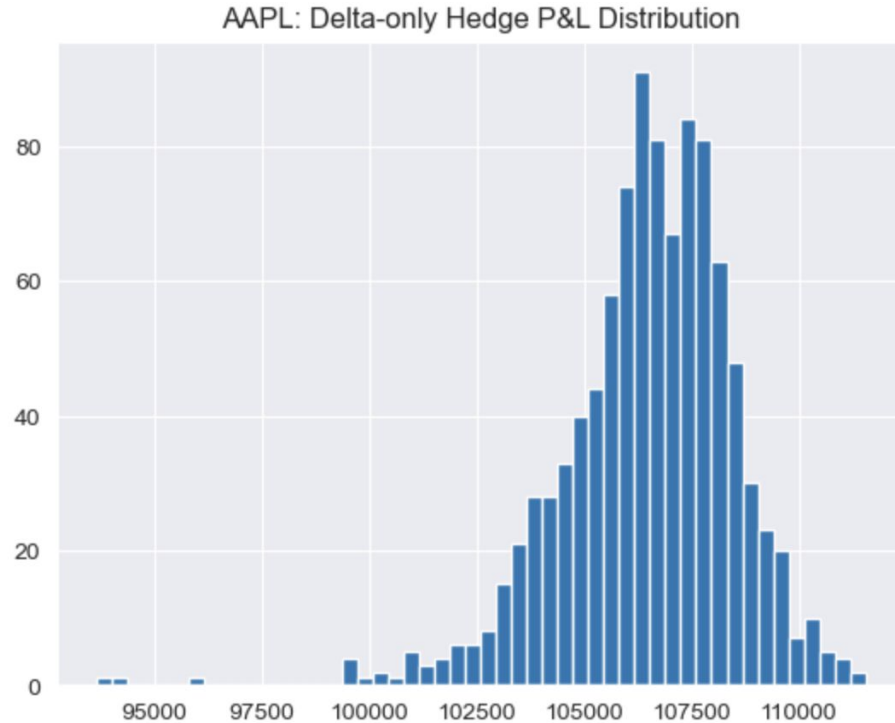
Mini Project 3: Rates of Change of Black-Scholes Options

Call prices plotted alongside some other graphs for comparison



Mini Project 4: Non-constant Volatility

Using GARCH(1,1) to model non-constant volatility, I implemented a delta hedging strategy and simulated it on a large number of paths generated by the GARCH model.



Thank you!