



MEME STOCKS

Are they worth investing?



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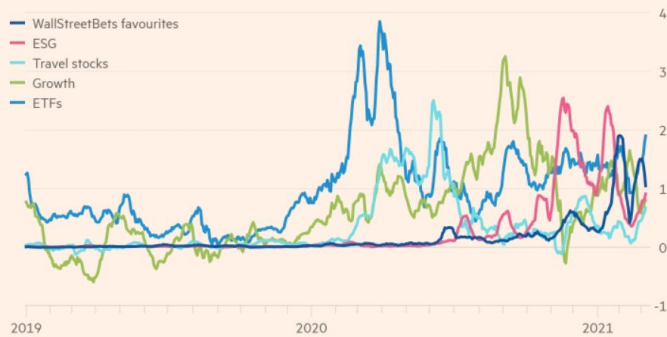


Overview

- In 2021 with the height of the COVID pandemic, many more retail investors entered into the marketplace. Especially with the ease of investing through applications such as Robinhood, there was a surge in new investors. At the time, 'meme-stocks' became a social phenomenon.
- Factors
 - Pandemic
 - commission-free trading (Robinhood), trade fraction of shares, improved user interfaces and connection speeds
 - cheaper and easier access to leverage
 - growth of social media.

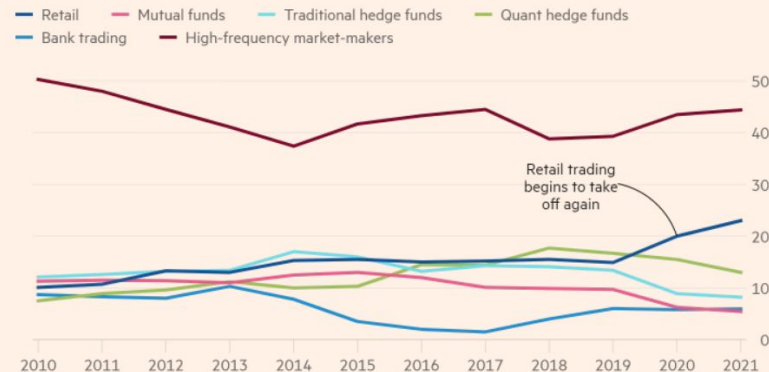
Retail trading themes have fluctuated

10-day rolling net purchases of US stocks by retail investors (\$bn)



Source: Vanda Research

Market share of overall US equity trading volumes (%)



What is a meme stock?

“Shares of a company that have gained a cult-like following online and through social media platforms.”
-Investopedia

SEC regarding \$GME

- (1) large price moves
- (2) large volume changes
- (3) large short interest
- (4) frequent Reddit mentions
- (5) significant coverage in the mainstream media.



Hypothesis

- Are meme-stocks worth investing in?
- Use of Fintech - Using sophisticated analytical techniques to measure the risk / return potential of a portfolio of 'meme' stocks
- Client: New investors



Project Description

- **Description:**
 - We want to analyze whether a portfolio of meme-stocks are worth investing compared to other common investment portfolios using financial analysis, and Alpaca database.
- **Portfolios**
 - meme-stock portfolio - \$GME, \$AMC, \$BB, \$TSLA, \$BBBY, \$HOOD, \$PLTR, \$NOK, \$SPCE
 - S&P500 (\$SPY)
 - US Bond ETF(\$AGG)
 - Four largest stocks - \$AAPL, \$MSFT, \$GOOG, \$AMZN.
- **Analysis**
 - returns, beta analysis, sharpe ratio, Monte Carlo Simulation.
- **Packages used**
 - Pandas
 - numpy
 - Pathlib
 - HVPlot
 - MCSimulation
 - alpaca_trade_api



Elon Musk ✓
@elonmusk



Gamestonk!!

Data Collection, Cleanup & Exploration

- **Data source:** Alpaca
 - Real-time data, stock price history, free source
- **Collection, exploration, and cleanup process.**
 - Created a Python function to leverage the Alpaca API to build a Pandas Dataframe (both single index and multi index)
 - Used Alpaca API and pulled in 5 years of price history for 'meme' stocks, S&P 500, bond market index, and portfolio of the four largest stocks (AAPL, MSFT, GOOG, AMZN)
 - Isolated closing prices and calculating daily returns - visualizing and comparing the portfolio cumulative returns, standard deviations, Sharpe ratios, betas, and Monte Carlo simulations

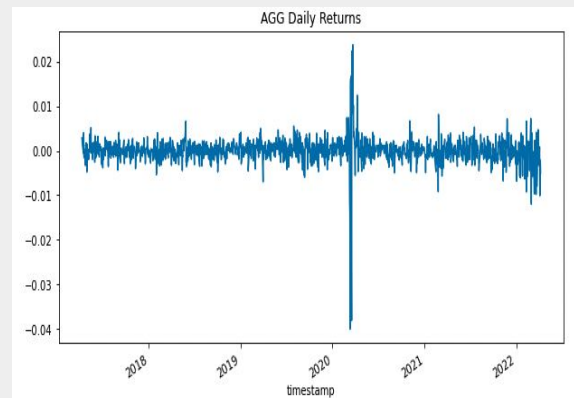
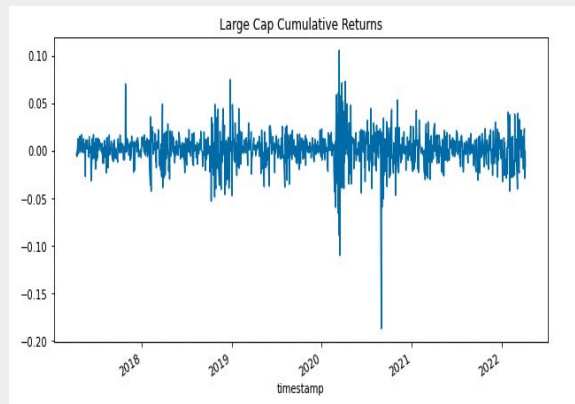
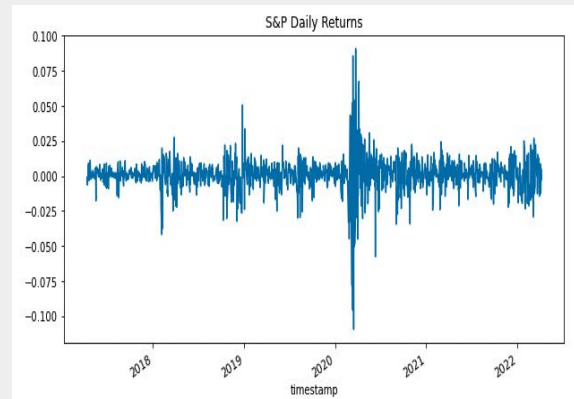
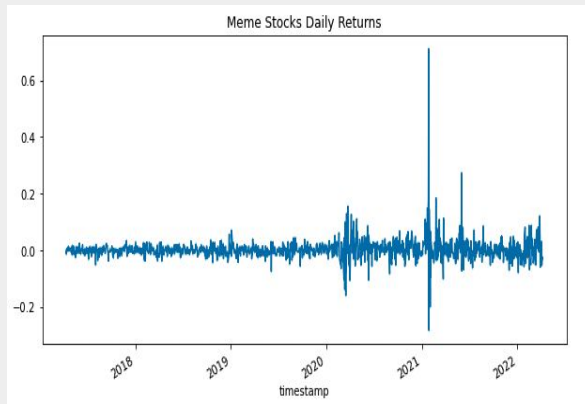
```
def alpaca_multi_index_df(tickers, tf, start, end, rows):
    stock_prices_multi_index_df = pd.DataFrame()
    count = 0
    for ticker in tickers:
        alpaca_prices = alpaca.get_bars(ticker, tf, start=start, end=end, limit=rows).df
        column_names = [(ticker, x) for x in alpaca_prices.columns]
        alpaca_prices.columns = pd.MultiIndex.from_tuples(column_names)
        count = count + 1
        if count == 1:
            stock_prices_multi_index_df = alpaca_prices
        else:
            stock_prices_multi_index_df = pd.merge(stock_prices_multi_index_df, alpaca_prices, how = 'outer', left_index=True, right_index=True)
    return stock_prices_multi_index_df
```

RESULTS

Quantitative Analysis

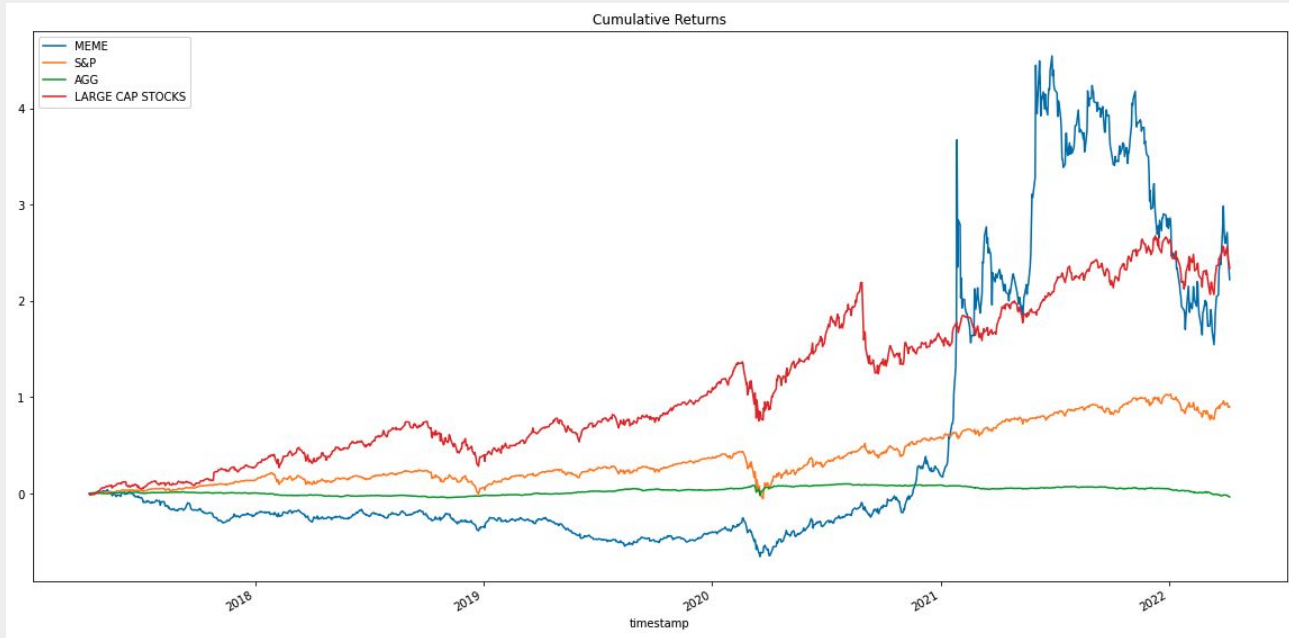
Daily Returns

- By August 17th:
 - S&P 500 up 27%
- February 2021:
 - Retail trading volume up 9 million average daily trades (S&P Global Market Intelligence)
- Meme stocks short interest
 - GameStop : 142%
 - AMC: 60%
 - (S3 Partners Data)



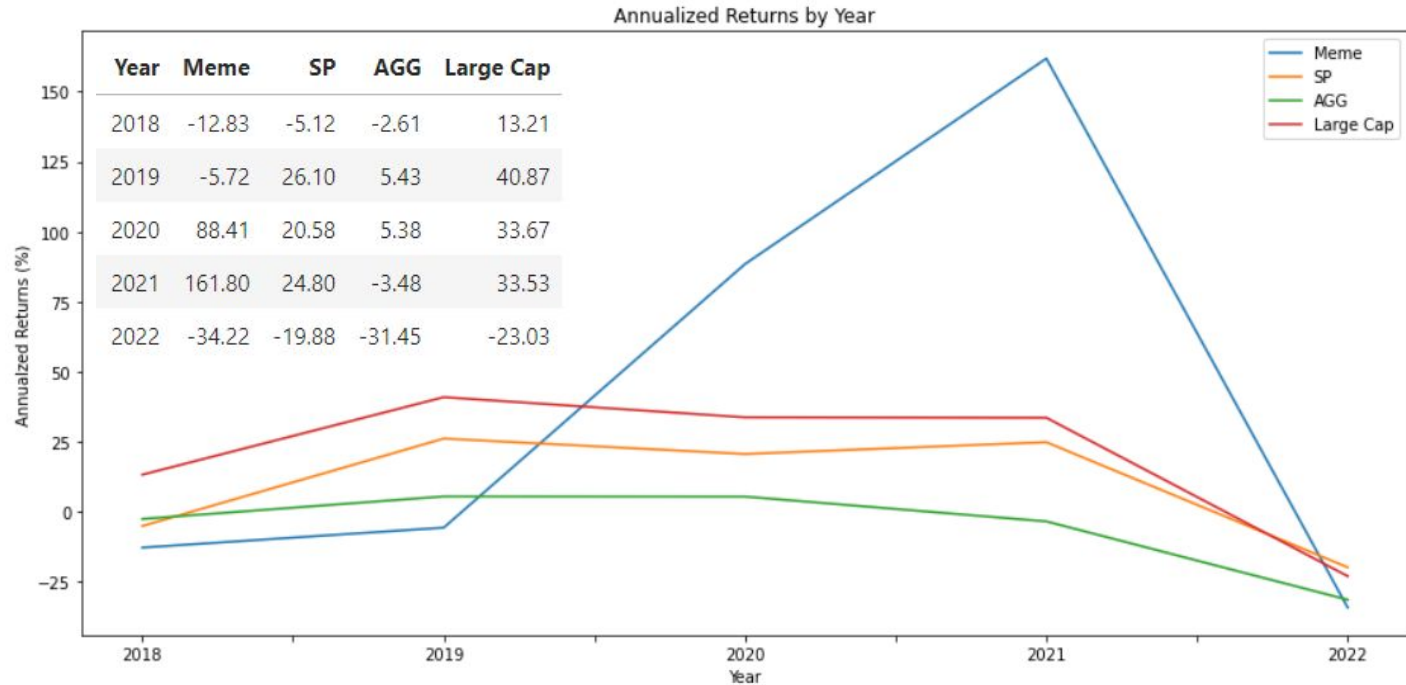
Cumulative returns

```
cumulative_returns = (1 + daily_returns).cumprod()
```



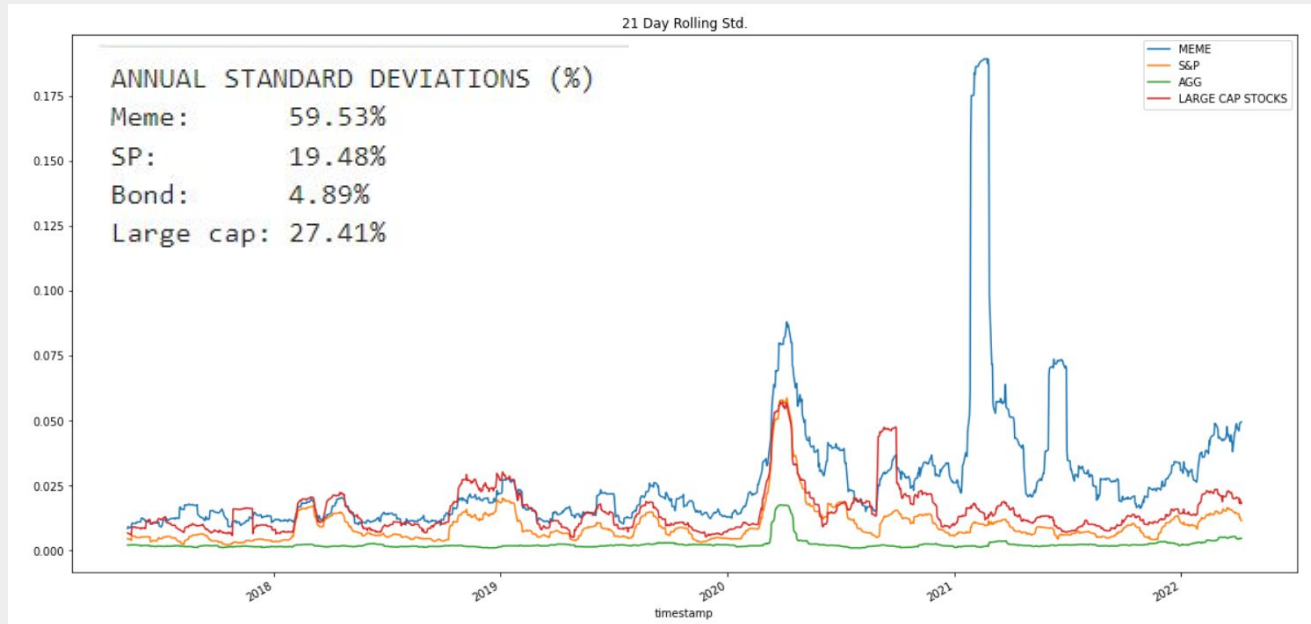
Annualized Returns

`annual_average_returns_memestock = dailyreturns_df.mean() * trading_days`



Annual Standard Deviations

`annual_standard_deviation_memestock = dailyreturns_df.std() * np.sqrt(trading_days)`

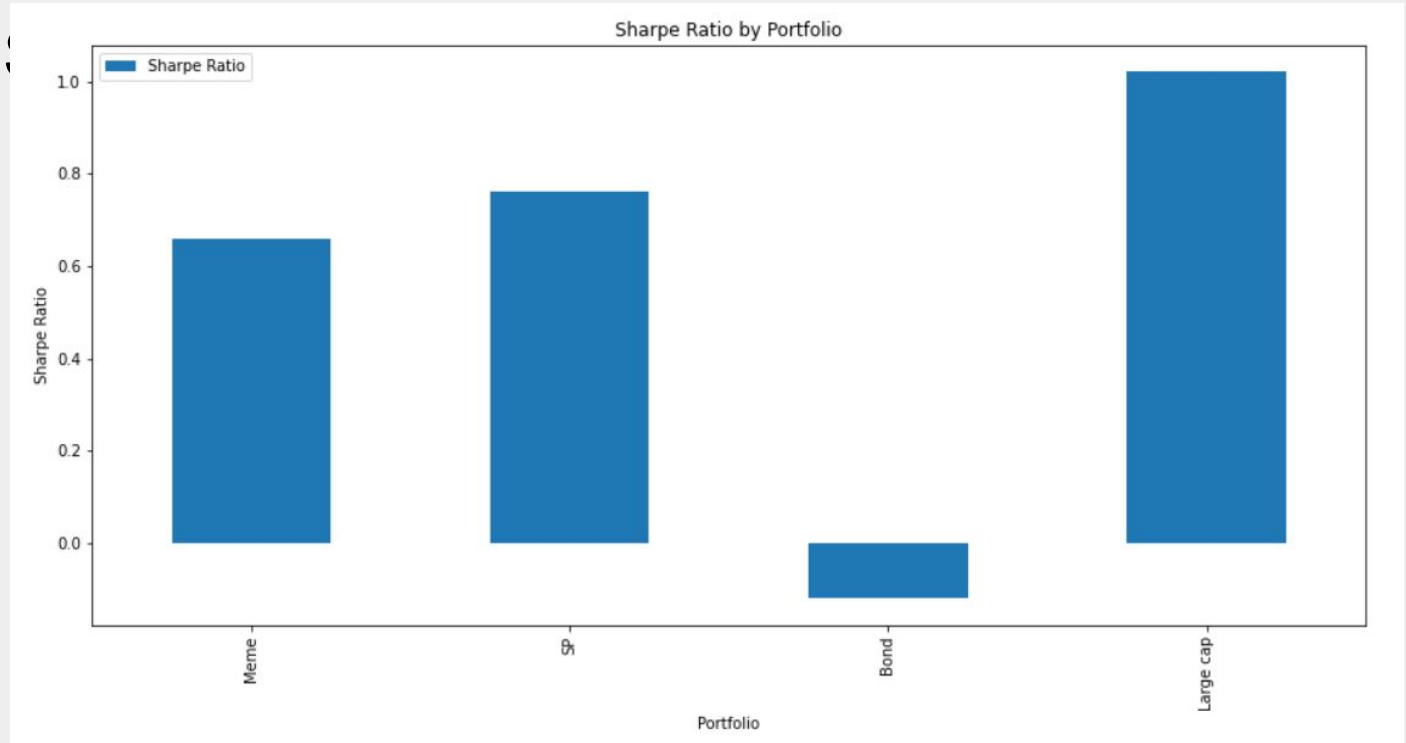


Analyze the Risk

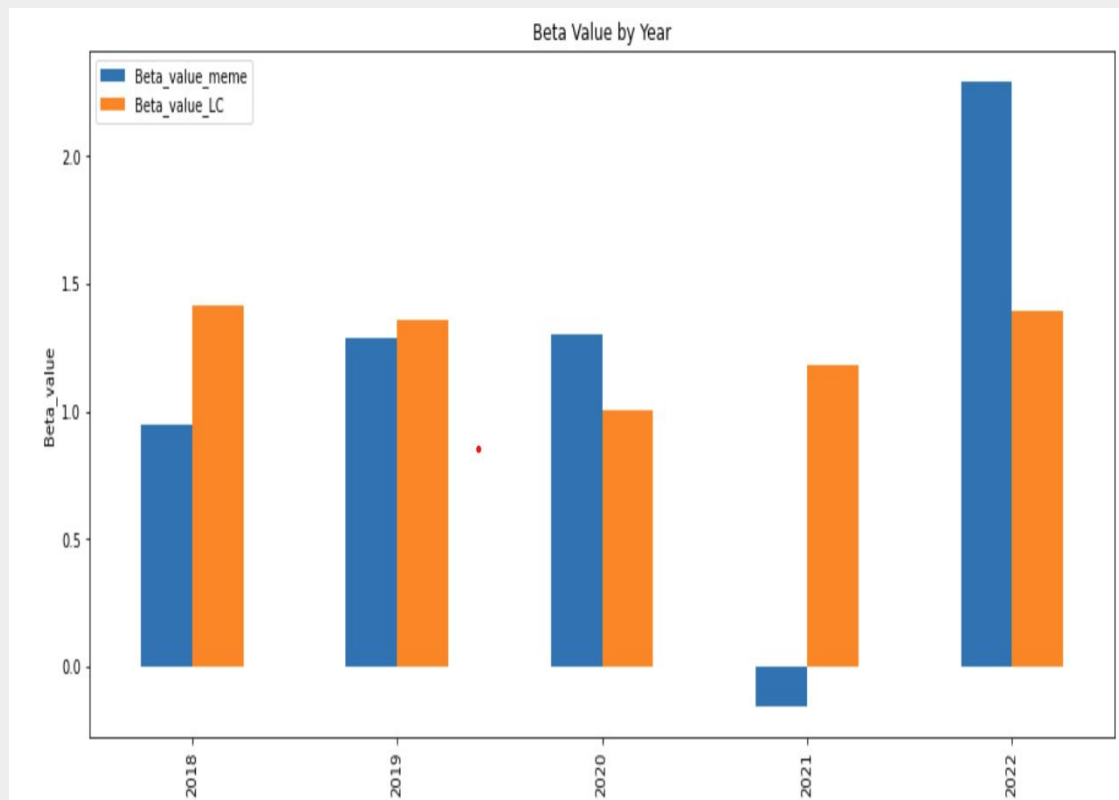
Sharpe Ratio

Sharpe ratio helps investors understand the potential return on an investment. It's a metric that helps quantify both the risk (annual standard deviation) and the potential reward of a particular investment.

Portfolio	Sharpe Ratio
Meme	0.66
SP	0.76
Bond	-0.12
Large cap	1.02



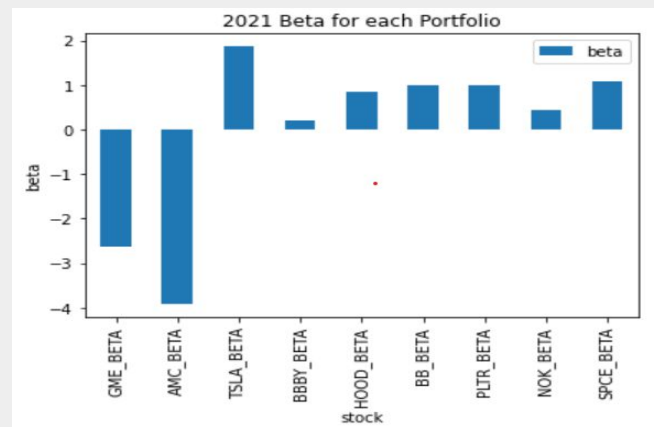
Beta Analysis



Calculation:

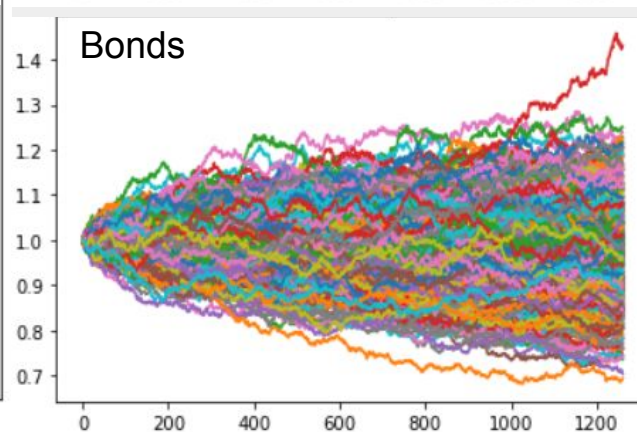
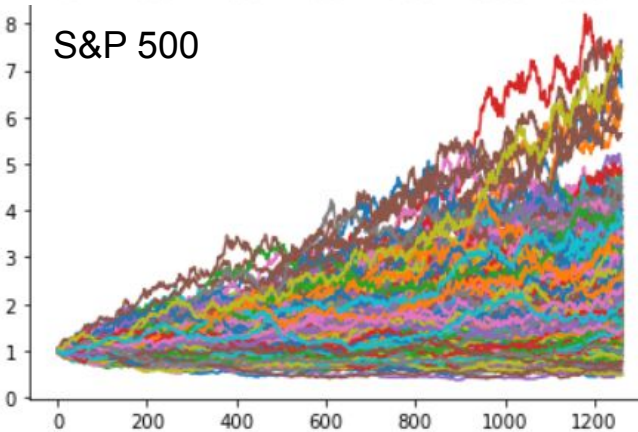
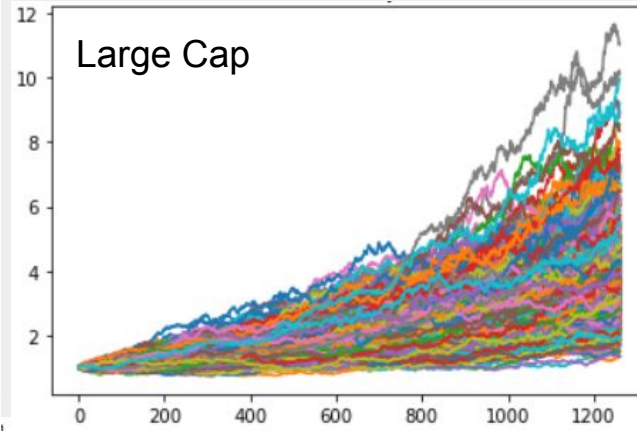
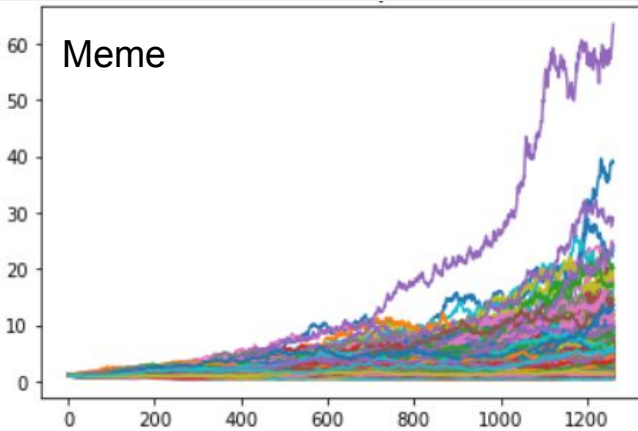
$$\frac{\text{Covariance (meme_portfolio, S\&P 500)}}{\text{Variance(S\&P 500)}}$$

- **2021 shows negative beta value**
- **2022 jumps back to relatively high volatility**



Risk-Return Projections

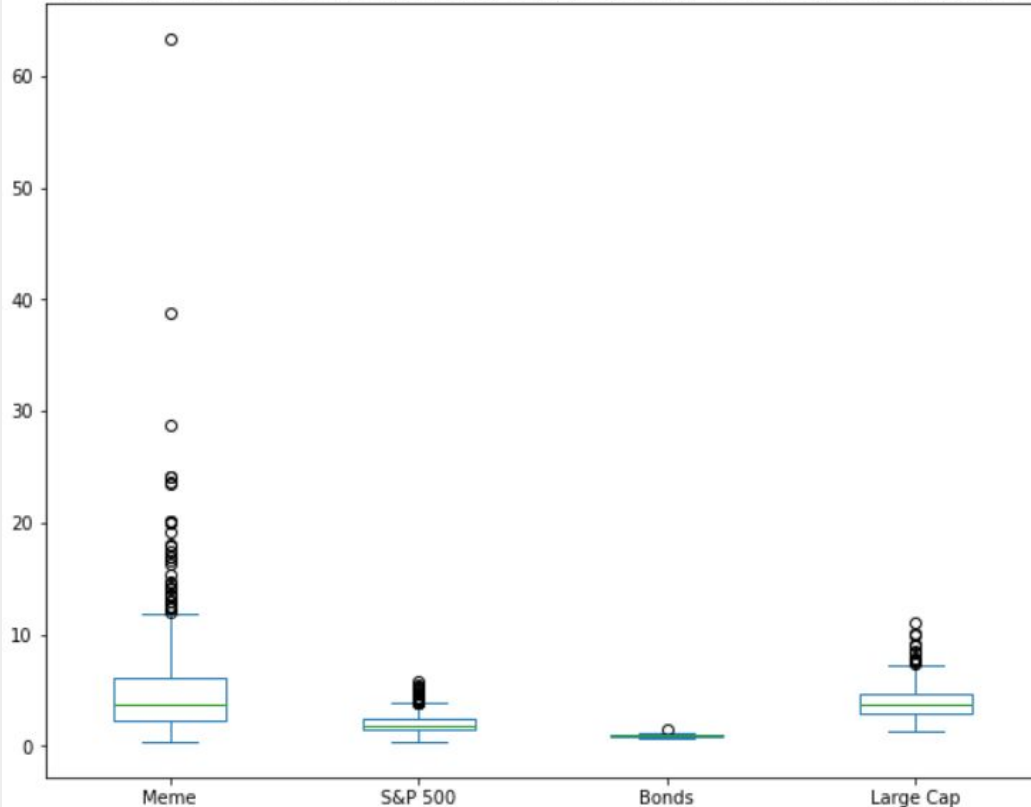
Monte Carlo - 5-Year Price History



- Ran a 5-year Monte Carlo simulation based on 5 years of price history data
- Only a few of the 'meme' stock scenarios resulted in massive gains

Monte Carlo Distribution - 5-year Price History

5-Year Portfolio Returns Distribution (5 years of price history) - Monte Carlo Simulations (500)



The portfolio of 'meme' stocks show the highest ceiling, but also the lowest floor, for potential returns over a 5 year period

There is a 95% chance the return will be between:

Meme stock portfolio return range is: 70.3% - 1774.0%

Large Cap portfolio return range is: 178.9% - 730.6%

S&P 500 return range is: 80.6% - 419.9%

Bond market return range is: 76.8% - 119.0%

Meme stock portfolio average return is: 509.7%

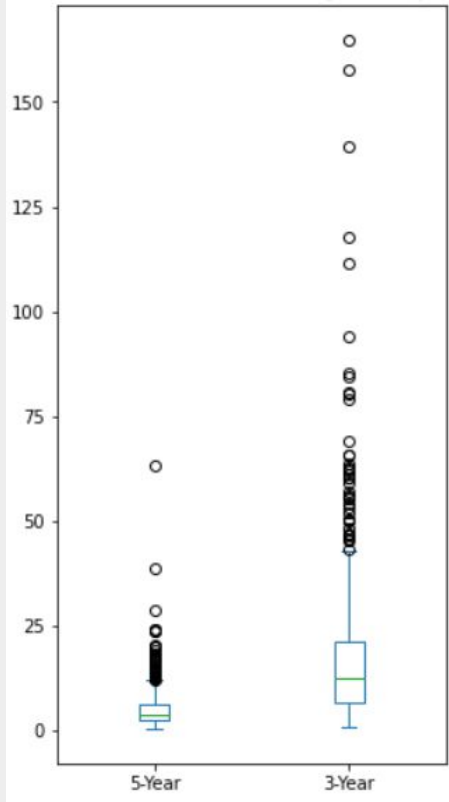
Large Cap portfolio average return is: 397.6%

S&P 500 average return is: 203.0%

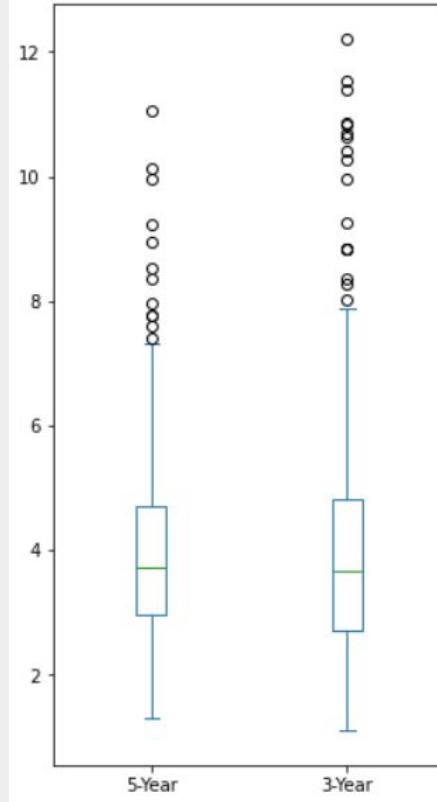
Bond market average return is: 96.8%

Monte Carlo - Price History Sensitivity

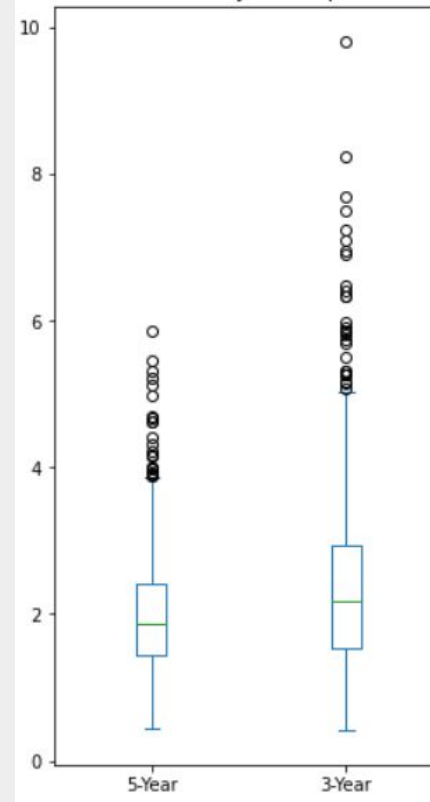
Meme



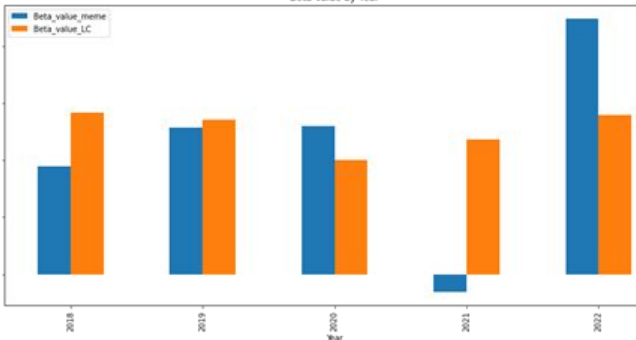
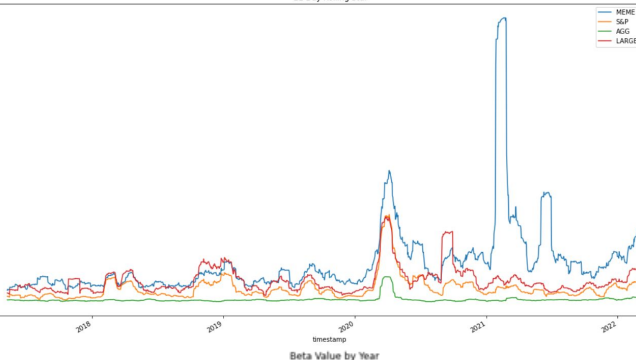
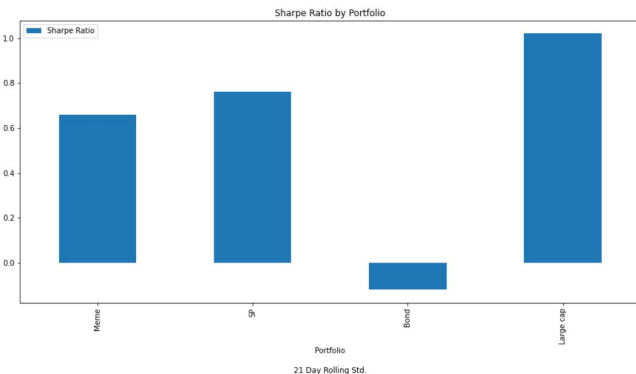
Large Cap



S&P 500



Shifting from a 5 to 3 year price history more than doubled the 'meme' stock scenario returns

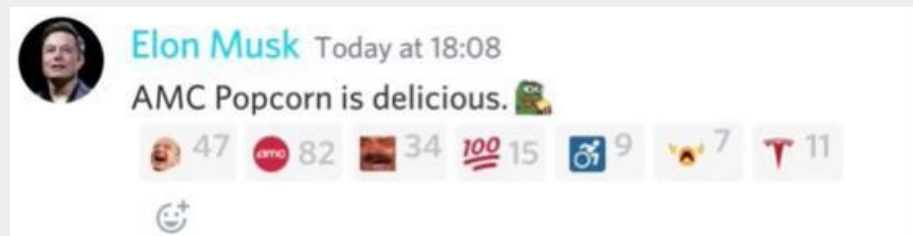


Conclusion

- **Risk in Relation to Return**
 - Sharpe ratio reflects high risk for Meme stocks, but the potential reward is greater with the Large cap portfolio
- **Are Meme Stocks worth investing?**
 - Standard Deviation shows high returns, but also highly volatile
 - Depends on whether you're investing, trading, or preserving capital
- **How do Meme Stocks perform relative to the overall Market?**
 - BETA function reflects movement in the same direction as market and an increase over market by 2% in 2022.
- **How will Meme stocks perform in the future?**
 - Monte Carlo Simulations project continued volatility with these stocks and while there could be a high reward gained, the loss potential is equal.

Next Steps

- Correlations
 - Reddit mentions with price movements
 - Trends vs stock prices
 - Celebrities
 - Eg) Elon Musk
 - Earnings releases



Rank	Company(Ticker)	Total Mentions	Sentiment
1	AMC Entertainment(AMC)	10,760	16.6%
2	GameStop(GME)	9,492	15.3%
3	S&P500(SPY)	2,642	8.2%
4	Virgin Galactic Holdings(SPCE)	2,186	17.1%
5	BlackBerry(BB)	1,456	29.4%
6	Tesla(TSLA)	1,384	15.8%
7	Lordstown Motors(RIDE)	1,150	21.2%
8	Ford(F)	941	23.5%
9	Palantir(PLTR)	873	18.5%
10	Coinbase(COIN)	752	16.1%

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Questions?