




Subway to Rolls Royce

with



Luke, Nishi, Pratyush, Priyank, Swarnim





We pledge on our honor that we have not given nor received any unauthorized assistance on this assignment to/from other groups.



- Luke, Nishi, Pratyush, Priyank, Swarnim



Instruments available

- Equities
 - AMZN, APPL, ATT, INTC, GE, SPY
- Fixed Income
 - BOND
- Commodities
 - GOLD, SILVER
- Currency Pair
 - AUD-USD, EUR-USD

Framework to creating an Optimal Portfolio

Market Trends

It is important to follow market *mood* which gets easily influenced by technology, politics and even celebs.

Choosing a correct strategy

- ✓ Benchmark
- ✓ Moving Average
- ✓ Bollinger Bands

Efficient Frontier

Compare portfolios obtained by looking at Summary Statistics

CHOOSING INSTRUMENTS FOR OUR PORTFOLIO

Correlation matrix and Sharpe Ratio

Choosing
Equity

	AAPL	AMZN	GE	ATT	INTC	SPY
AAPL	100.00%	32.93%	34.06%	24.46%	46.96%	49.33%
AMZN	32.93%	100.00%	29.65%	18.20%	38.33%	46.56%
GE	34.06%	29.65%	100.00%	38.30%	42.49%	69.63%
ATT	24.46%	18.20%	38.30%	100.00%	32.68%	56.38%
INTC	46.96%	38.33%	42.49%	32.68%	100.00%	64.15%
SPY	49.33%	46.56%	69.63%	56.38%	64.15%	100.00%

	AAPL	AMZN	ATT	AUD	BOND	EUR	GE	GOLD	INTC	SILVER	SPY
Sharpe Ratio	0.475834	0.304578	-0.110222	0.02953	0.331122	0.070168	-0.334616	0.459479	0.018933	0.19036	0.148482

Correlation matrix and Sharpe Ratio

Choosing
Commodity

	SILVER	GOLD
AAPL	5.48%	-2.98%
AMZN	2.53%	-3.72%
GE	5.28%	-5.09%
ATT	4.88%	-2.19%
INTC	5.03%	-3.45%
SPY	14.84%	-1.44%
BOND	6.21%	16.32%

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Correlation matrix and Sharpe Ratio

Choosing
Currency Pair

	AUD	EUR
AAPL	17.80%	-0.05%
AMZN	16.01%	0.03%
GE	27.27%	6.51%
ATT	23.57%	6.56%
INTC	21.83%	-0.37%
SPY	43.83%	11.20%
BOND	-2.58%	13.83%
SILVER	40.93%	35.67%
GOLD	33.39%	38.63%

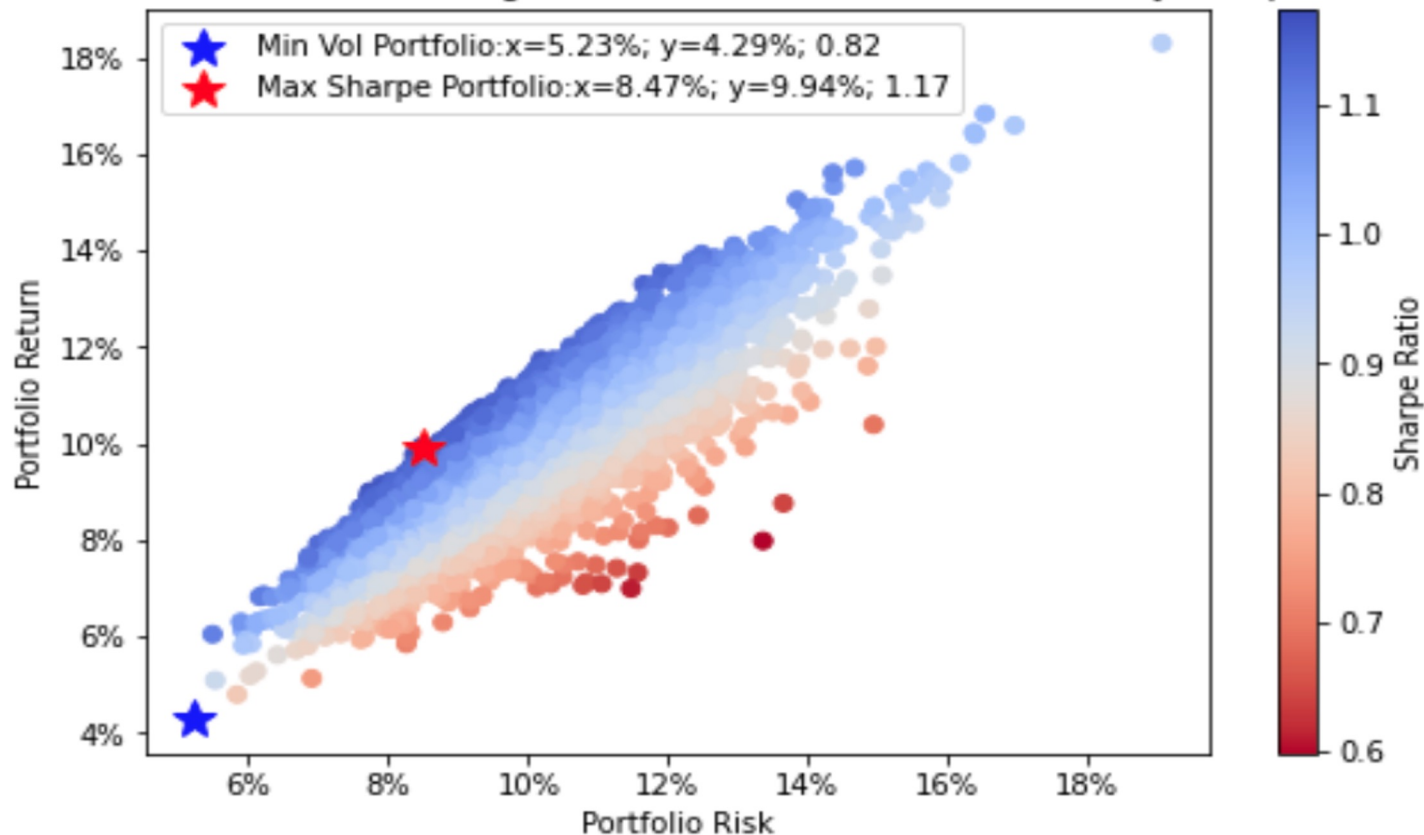
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Our Strategy

- We observed that no single strategy yields high results on investment and therefore we have used all the three strategies in a mixed and matched manner to obtain the best Sharpe ratio for better returns.
- We have used **Bollinger Bands** for **INTC**
- **Flat Moving Average** Crossover for **AAPL, AMZN, Gold, SPY**
- **Short Moving Average** Crossover for **EUR, GE** for better Sharpe ratio
- Individual instrument for **BOND** i.e. **No strategy**

Efficient Frontier - Our Portfolio

Return vs Risk for Different weights of 8 Instruments Color Coded by Sharpe Ratio



Minimum Volatility Portfolio

	BOND	AAPL	AMAZON	INTC	GE	SPY	GOLD	EUR
Weight	31.17%	2.23%	0.01%	5.47%	1.86%	10.68%	16.59%	31.99%

Min Vol Port	
Average Annual Return	4.29%
Annual Risk	5.23%
Sharpe Ratio	0.819681
maxDD	-10.43%
Success Ratio	53.96%

Maximum Sharpe Portfolio

	BOND	AAPL	AMAZON	INTC	GE	SPY	GOLD	EUR
Weight	22.77%	20.14%	6.67%	6.88%	6.39%	3.39%	23.68%	10.09%

Max Sharpe Port	
Average Annual Return	9.94%
Annual Risk	8.47%
Sharpe Ratio	1.173954
maxDD	-20.91%
Success Ratio	54.69%

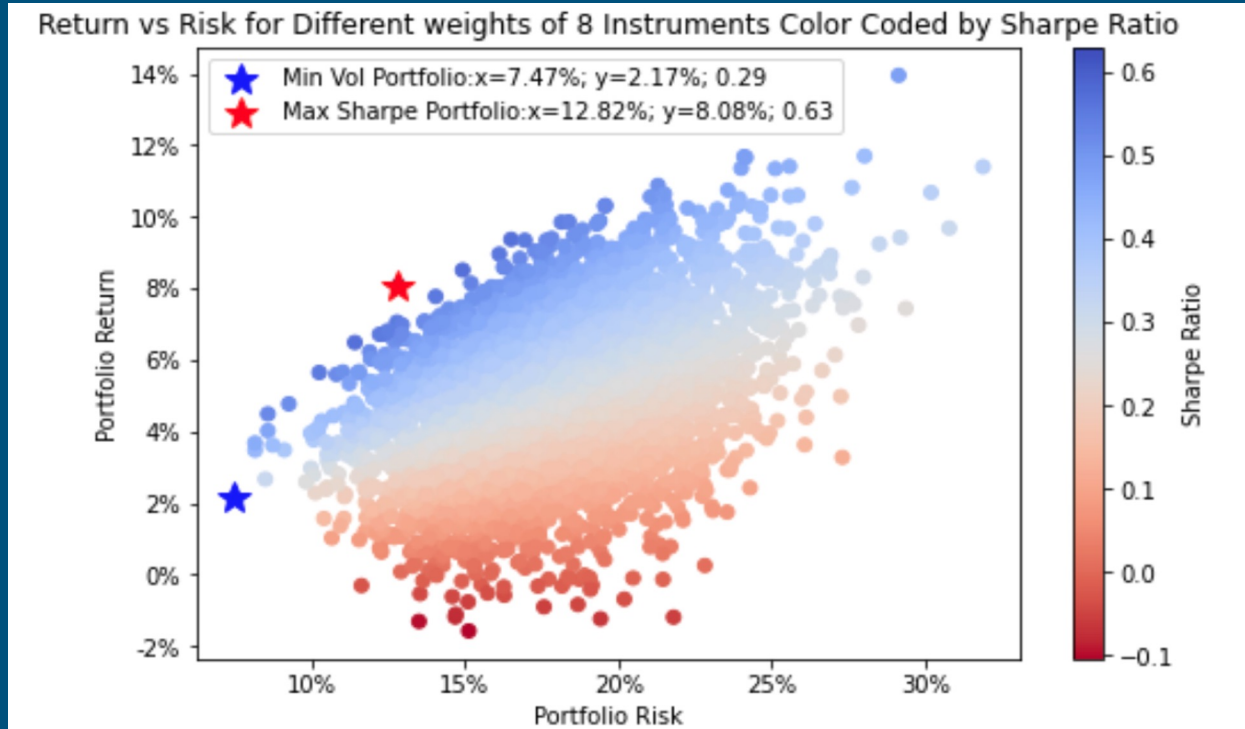
Equal Weighted Portfolio

	BOND	AAPL	AMAZON	INTC	GE	SPY	GOLD	EUR	Equal-wt Port
Average Annual Return	0.84%	23.82%	20.08%	8.23%	10.46%	6.28%	8.05%	2.63%	10.05%
Annual Risk	3.74%	28.35%	33.23%	24.96%	30.86%	11.49%	14.53%	10.02%	9.20%
Sharpe Ratio	0.224273	0.840178	0.604247	0.329661	0.338990	0.546872	0.553872	0.262210	1.092588
maxDD	-14.21%	-82.96%	-97.20%	-45.75%	-173.72%	-20.70%	-35.22%	-32.00%	-15.40%
Success Ratio	52.33%	65.08%	65.98%	74.58%	51.91%	68.90%	67.76%	51.46%	54.25%

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Is the Beta good?

Efficient Frontier - Benchmark



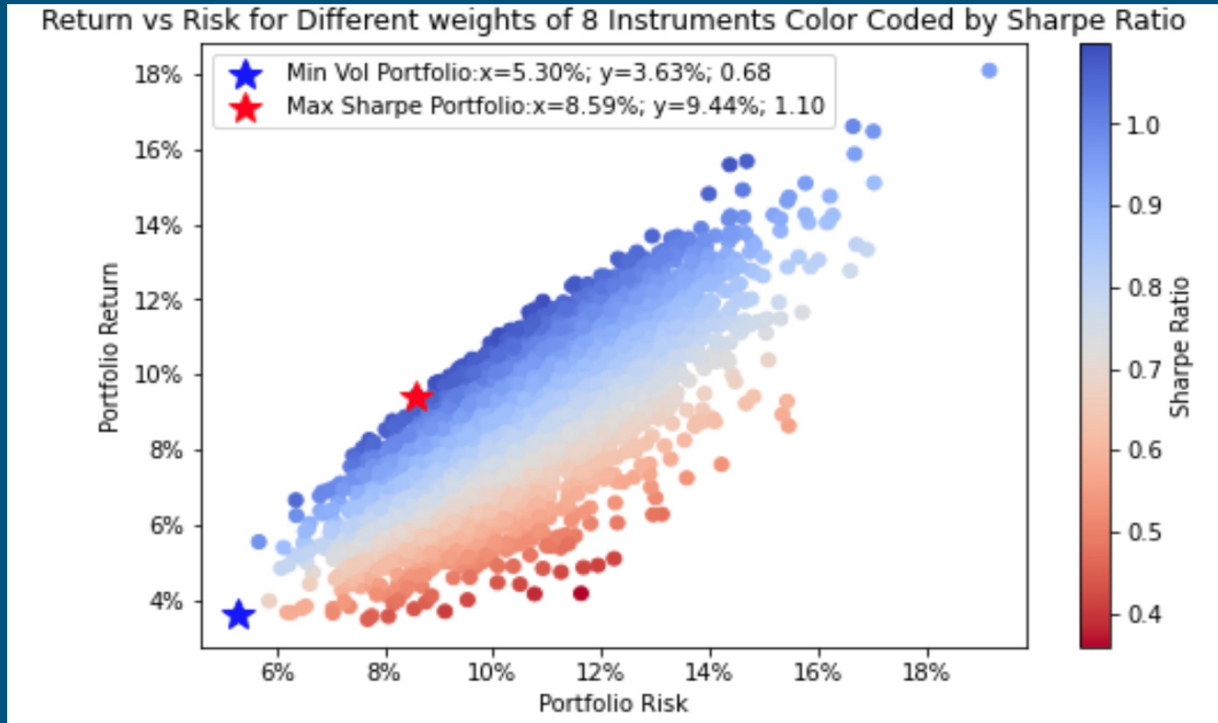
Maximum
Sharpe
Portfolio

	AAPL	AMZN	EUR	BOND	GE	GOLD	INTC	SPY
Weight	22.77%	20.14%	6.67%	6.88%	6.39%	3.39%	23.68%	10.09%

Moving Average

- A window range acts as a technical indicator that smooths out price trends by filtering out the noise from random short-term price fluctuations.
- Slow Window - 42 (2 months)
- Fast Window - 260 (1 year)

Efficient Frontier - Moving Average



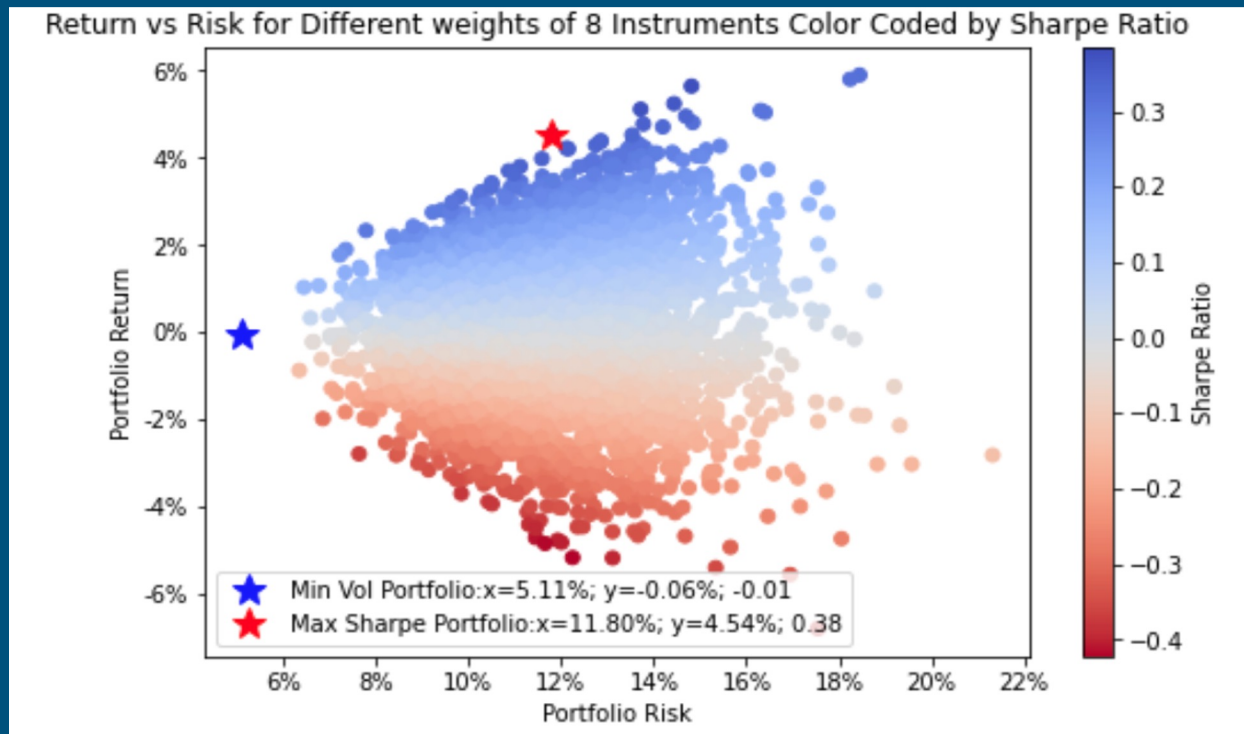
Maximum
Sharpe
Portfolio

	BOND	AAPL	AMAZON	INTC	GE	SPY	GOLD	EUR
Weight	14.72%	15.03%	9.64%	0.85%	8.58%	11.90%	22.25%	17.03%

Bollinger Bands

- There are three lines that compose Bollinger Bands: A simple moving average (middle band) and an upper and lower band.
- The upper and lower bands are typically 2 standard deviations +/- from a 20-day simple moving average (which is the center line), but they can be modified.
- When the price continually touches the upper Bollinger Band, it can indicate an overbought signal while continually touching the lower band indicates an oversold signal.
- Standard 20-Day/ 2-stdev Bollinger Band Strategy

Efficient Frontier - Bollinger Bands



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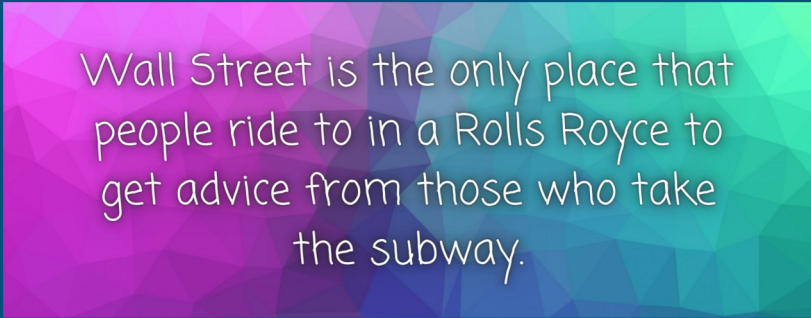
	BOND	AAPL	AMAZON	INTC	GE	SPY	GOLD	EUR
Weight	14.74%	0.74%	15.11%	23.55%	0.11%	22.05%	20.92%	2.77%

Summarizing the Portfolio

	BOND	AAPL	AMAZON	INTC	GE	SPY	GOLD	EUR	Max Sharpe Port
Average Annual Return	0.84%	23.82%	20.08%	8.23%	10.46%	6.28%	8.05%	2.63%	9.94%
Annual Risk	3.74%	28.35%	33.23%	24.96%	30.86%	11.49%	14.53%	10.02%	8.47%
Sharpe Ratio	0.224273	0.840178	0.604247	0.329661	0.338990	0.546872	0.553872	0.262210	1.173954
maxDD	-14.21%	-82.96%	-97.20%	-45.75%	-173.72%	-20.70%	-35.22%	-32.00%	-20.91%
Success Ratio	52.33%	65.08%	65.98%	74.58%	51.91%	68.90%	67.76%	51.46%	54.69%

Thank You

Feel free to ask us any questions you have.



Wall Street is the only place that
people ride to in a Rolls Royce to
get advice from those who take
the subway.