

2022

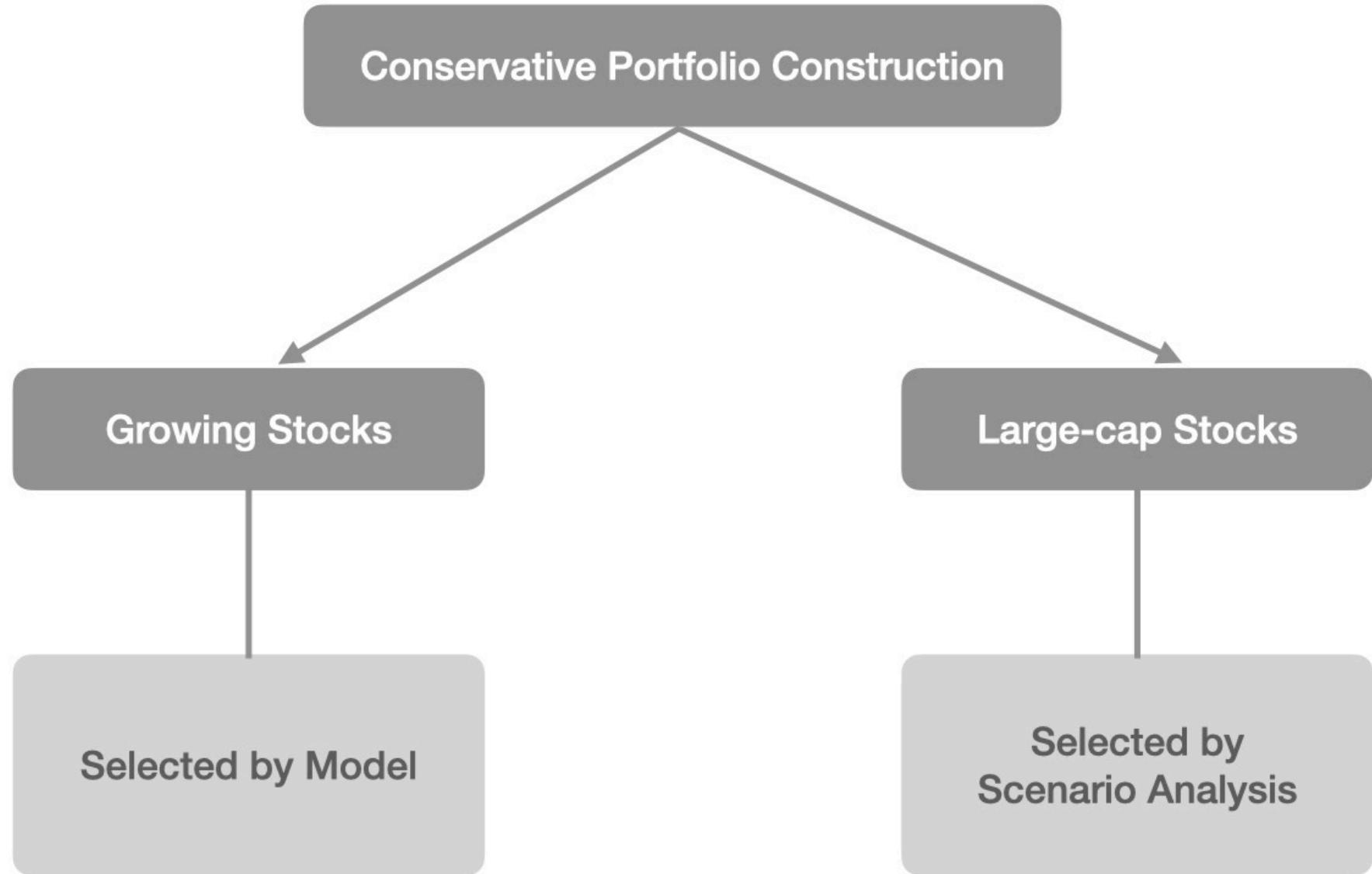
PORTFOLIO
INTERPRETATION

Zhen Shen & Ning Xu

Portfolio Overview:

- 6 Month Investment
- Initial Fund: £300,000
- Receive: £410,990
- Expected Return: 87.68%
(Annualized Monthly Return)
- Risk Rate: 21.58%

Stocks	CSCO	QCOM	AMAT	LRCX	KLAC	LMT
Weights(%)	0.95	1.35	5.94	12.74	14.64	1.96
Stocks	TSLA	AAPL	CI	REGN	PFE	BX
Weights(%)	9.62	8.29	2.28	13.79	2.1	10.6
Stocks	HII	NVDA	SQ	AMCR	MS	
Weights(%)	0.69	14.6	0.08	0.32	0.05	



STOCKS SELECTION

U.S.

S&P 500

Industry

XGBoost

Stochastic Simulation



War in Ukraine

World scenario

- Pandemic
 - War
- ➡ A stable market is needed

Why U.S. stock market?

- Market scenario
 - Largest Economy
 - Absorb capital worldwide



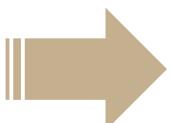
Capacity

- 80%~85% of market capitalization



Reasonable establish method

- A multi-dimensional criteria
- Proper industrial weighting



Viewed as market portfolio

Choose less correlated industries can diversify risk.

Table 1 – Correlation Analysis

	Consumer Staples	Consumer Discretionary	Energy	Financials	Health-Care	Industrials	Information Technology	Materials	Real Estate	Communication Services	Utilities	Overall
Consumer Staples	1	0.825948352	0.803812053	0.758929608	0.84306807	0.838403217	0.821037065	0.789596135	0.749730146	0.811327071	0.815905829	0.879531243
Consumer Discretionary	0.825948352	1	0.875480464	0.882583767	0.840330535	0.938802974	0.911031912	0.888599359	0.894979076	0.773647166	0.785404611	0.958655375
Energy	0.803812053	0.875480464	1	0.859842468	0.842365224	0.90839511	0.84513993	0.902284659	0.822065932	0.764198266	0.839680635	0.938663019
Financials	0.758929608	0.882583767	0.859842468	1	0.790502634	0.896222584	0.841165737	0.873209758	0.883661708	0.738000176	0.772924251	0.937475069
Health-Care	0.84306807	0.840330535	0.842365224	0.790502634	1	0.852168544	0.848599162	0.801971895	0.753409551	0.776845588	0.804116774	0.902868658
Industrials	0.838403217	0.938802974	0.90839511	0.896222584	0.852168544	1	0.901144552	0.918647909	0.874430223	0.779386878	0.81700894	0.969039162
Information Technology	0.821037065	0.911031912	0.84513993	0.841165737	0.848599162	0.901144552	1	0.83631739	0.811452672	0.754776399	0.793361499	0.945684732
Materials	0.789596135	0.888599359	0.902284659	0.873209758	0.801971895	0.918647909	0.83631739	1	0.853707445	0.749118742	0.768952507	0.926970202
Real Estate	0.749730146	0.894979076	0.822065932	0.883661708	0.753409551	0.874430223	0.811452672	0.853707445	1	0.718232156	0.772477471	0.894079736
Communication Services	0.811327071	0.773647166	0.764198266	0.738000176	0.776845588	0.779386878	0.754776399	0.749118742	0.718232156	1	0.754573978	0.822970168
Utilities	0.815905829	0.785404611	0.839680635	0.772924251	0.804116774	0.81700894	0.793361499	0.768952507	0.772477471	0.754573978	1	0.860427666
Overall	0.879531243	0.958655375	0.938663019	0.937475069	0.902868658	0.969039162	0.945684732	0.926970202	0.894079736	0.822970168	0.860427666	1

Industrial	Stock amount
Technology	6~9
Health	3~4
Industry	2 ~ 3
Finance	2
Energy	1



Based on the weights of each industry in S&P500, and taking into the consideration of the current hot topics, we decide to invest:

Industrial	Stock amount
Technology	6~9
Health	3~4
Industry	2 ~ 3
Finance	2
Energy	1



Select Growing Stocks

Models Introduction

Industry

S&P 500

U.S.



Select High Fair Value Stocks

- Using the P/B ratio to estimate fair value.



Method:

- Classify stocks by XGBoost
- Predict P/B by Stochastic Simulation
- Estimate Fair Value



- **Improve strategy performance**

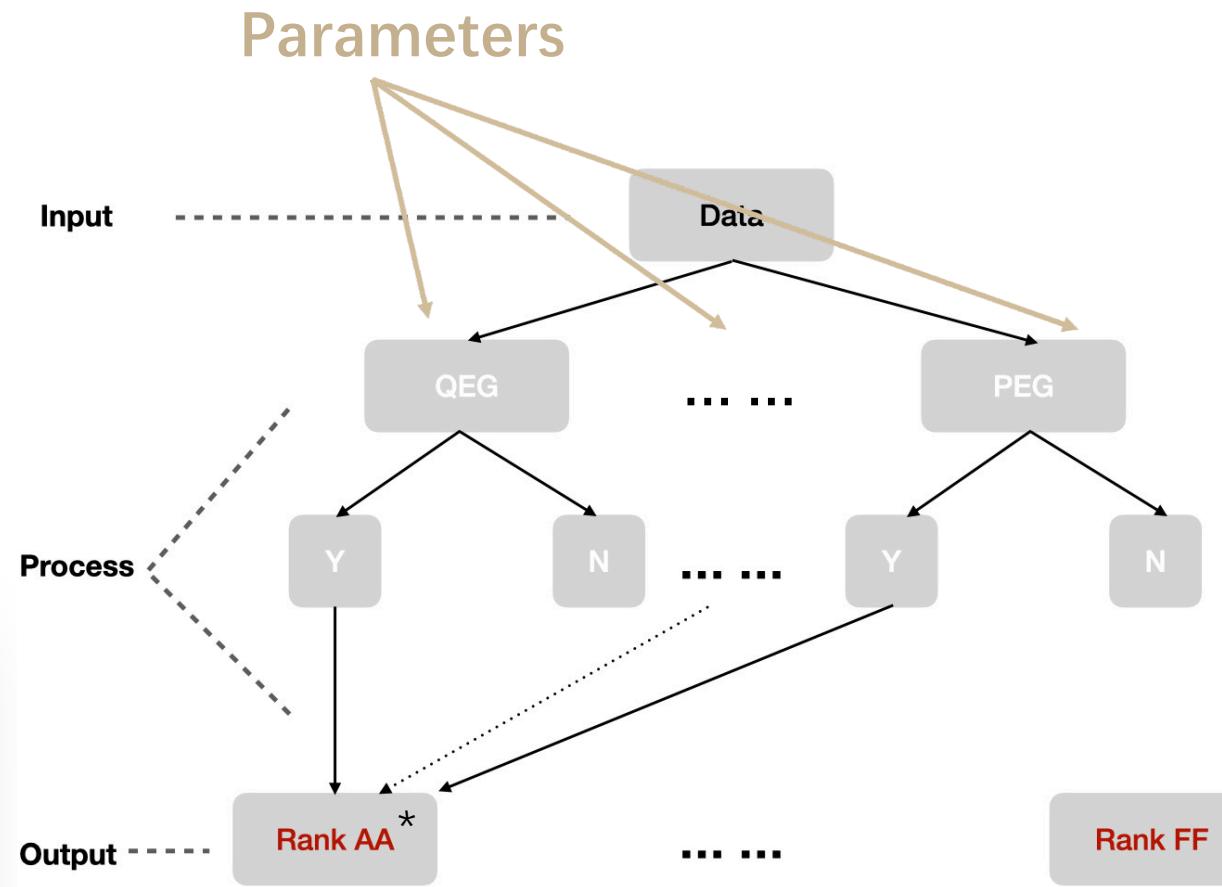
A composite 'value' factor of three indicators - P/B, projected next period return on assets and share price/cash flow - can significantly improve strategy performance.*

- **Stable**

P/B comes from the Balance Sheet, which usually keep unchanged over a long period time and is therefore more stable.

Part of XGBoost Model

Selection criteria
based on models
trained on training
set data



* The stock with high rank are more likely to have high P/B ratio in 6 months.

XGBoost
Industry
S&P 500
U.S.

PARAMETERS

- ROE (Return on Equity)
- Net profit margin
- Payout ratio
- TADY (Trailing Annual Dividend Yield)
- QEG (Quarterly Earning Growth)
- PEG (Price /Earnings to Growth)
- Market Capitalization
- Beta

ROE / Dupont Decomposition / Profitability / Efficiency		Valuation / Payout	
	Details		Details
ROE	Return on Equity	Earnings yield	Trailing EPS / Price
Net Margin	Net Profit Margin	Forward earnings yield	1 / (12-month forward PE)
Asset turnover	Asset Turnover	Dividend yield	Trailing DPS/ Price
Gearing	Total Assets / Equity	Forward dividend yield	12-month forward dividend yield
ROA	Return on Assets	Sales yield	Trailing Sales / Price
ROC	EBIT / Capital employed	Forward sales yield	12-month forward sales yield
ROE FY1	Return on Equity FY1	Shareholder yield	(Total Dividends + net Repurchases + net changes in Debt) / Market Cap
Gross-Profit-to-Assets	Gross profit / Total Assets	Cash flow yield	Trailing cash flow per share / price
Cash-Flow-to-Assets	Free Cash Flow / Total Assets	Sales to EV	Sales or Operating Revenue / Enterprise Value
CFROI	Cash Flow Return on Investment	EBITDA to EV	EBITDA to Enterprise Value
Positive Earnings	Dummy variable: 1 = positive last reported EPS, 0 otherwise	Payout ratio	Dividend per share / Earnings per share
		Dividend payer	Dummy variable: 1 = positive last reported DPS, 0 otherwise
Growth / Sentiment		Quality / Risk	
Forecast EPS growth	Details Forecast Earnings growth from FY1 to FY2	Earnings Certainty	Details - [ABS(EPS FY1 Std Dev / EPS FY1) + ABS(EPS FY2 Std Dev / EPS FY2)]
Forecast DPS growth	Forecast 1-year growth in Dividends	ROE volatility	5 year standard deviation in ROE
EPS long-term growth	EPS long-term growth	Accruals	Change in Net Operating Assets / Average Assets
Recommendation change 1M	- (1-month change in Analyst recommendation) (1=Strong Buy, 5=Strong Sell)	Realized Volatility 90D	Historical volatility (past 90 days)
Earnings momentum	Average of 1M and 3M changes in FY1 and FY2 earnings estimates	Beta	MSCI Country Beta
Momentum	Details 1M price momentum 12M minus 1M price momentum	Market Cap ADV 1M	Investible Market Cap Average daily value traded (past 20 days)

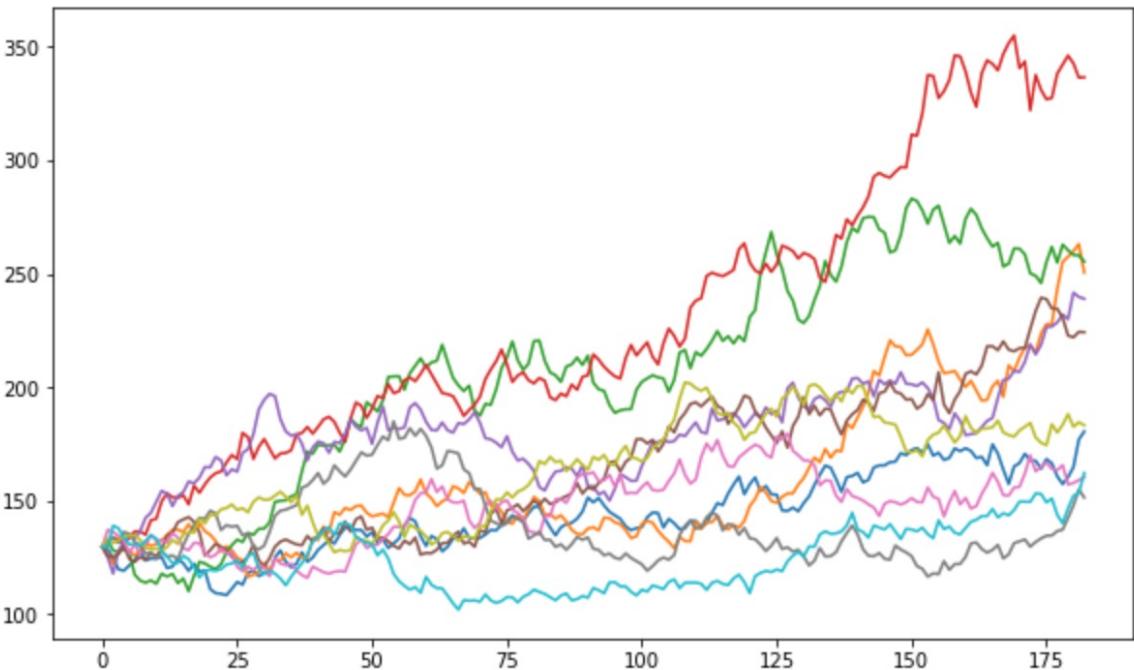
Source: J.P. Morgan Quantitative and Derivatives Strategy

Predict P/B ratio



Predict the stocks' 6 months later price by stochastic simulation technology, and calculate the P/B ratio by formula.

$$P/B \text{ Ratio} = \frac{\text{Market Price per Share}}{\text{Book Value per Share}}$$



Stochastic Simulation

XGBoost

Industry

S&P 500

U.S.

Estimate Fair Value

$$S_{j,t} = \frac{E[PB_{j,t+1}] - PB_{j,t}}{\sigma_{j,t}}$$

- σ is standard deviation of past 6 months
- $E[PB_{j,t+1}]$ is the predicted P/B ratio of stock j 6 months later
- $PB_{j,t}$ is current P/B ratio of stock j

If $S_{j,t} > 0$, we consider it as underpriced, and vise versa.

We take

- The top ranked required amount of underpriced stock(s) from each industry.

Selected stocks

```
'CSCO': 1.5139661278952878,  
'QCOM': 42.09050564486221,  
'AMAT': 1.2727751109420455,  
'LRCX': 31.53716662813669,  
'KLAC': 25.940433705716824,  
'TSLA': 181.83440153887932,  
'AAPL': 20.8509037920584,  
'CI': 1.3954518941734841,  
'REGN': 0.6349289938334013,  
'NVDA': 25.351328543677248,  
'AMCR': 0.547638243957509,  
'MS': 4.875493076478618
```

Stochastic Simulation

XGBoost

Industry

S&P 500

U.S.



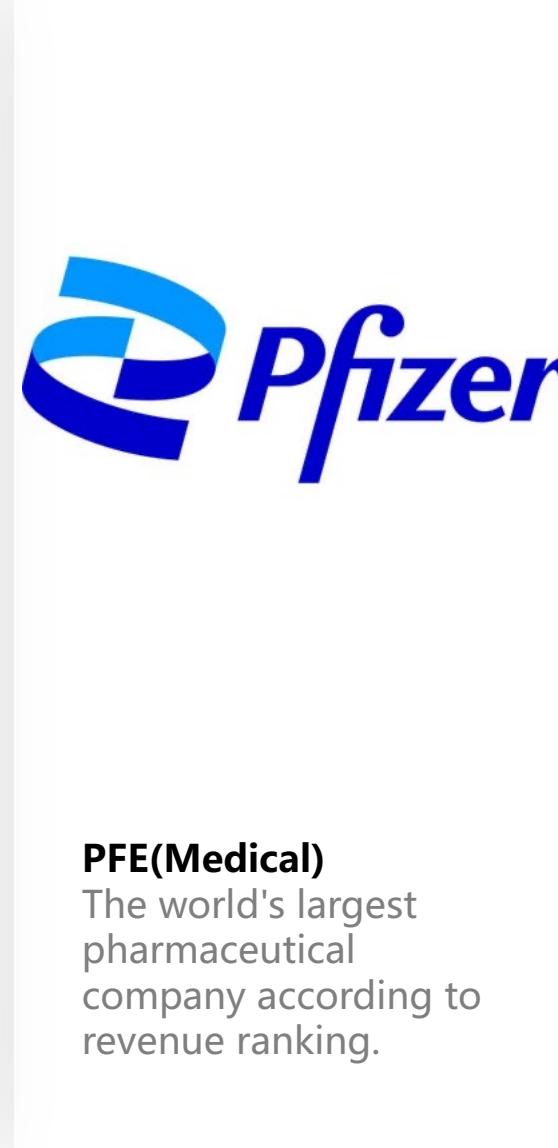
HII (Industry)

The U.S. largest military shipbuilding company.



LMT(Industry)

The majority of LMT business is with the U.S. Department of Defense and U.S. federal government agencies.



PFE(Medical)

The world's largest pharmaceutical company according to revenue ranking.

Select
Large-cap
Stocks

Portfolio Optimization

- Sharpe Ratio:

$$= \frac{E[r_p] - r_f}{\sigma_p}$$

- CAPM

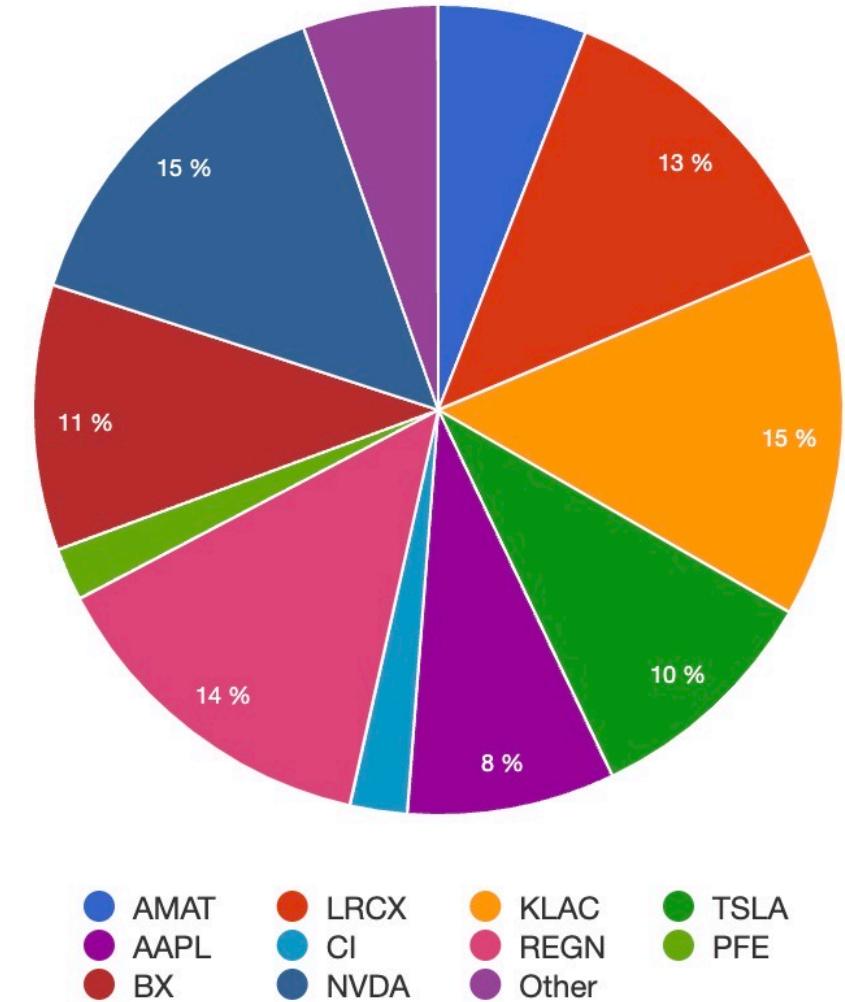
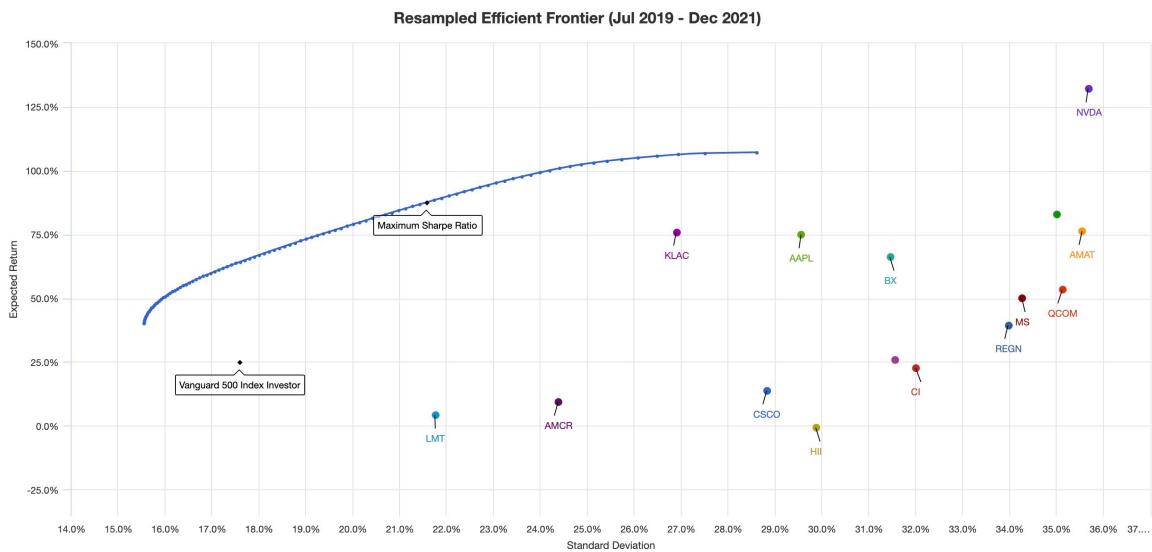
$$E[r_p] = r_f + \beta(E[r_m] - r_f)$$

# Asset	Expected Return	Standard Deviation
1 Cisco Systems, Inc. (CSCO)	13.67%	28.83%
2 QUALCOMM Incorporated (QCOM)	53.37%	35.13%
3 Applied Materials, Inc. (AMAT)	76.26%	35.54%
4 Lam Research Corporation (LRCX)	82.84%	35.01%
5 KLA Corp (KLAC)	75.75%	26.90%
6 Lockheed Martin Corporation (LMT)	4.17%	21.76%
7 Tesla Inc (TSLA)	346.09%	80.59%
8 Apple Inc. (AAPL)	74.92%	29.55%
9 Cigna Holding Co (CI)	22.58%	32.00%
10 Regeneron Pharmaceuticals, Inc. (REGN)	39.27%	33.98%
11 Pfizer, Inc. (PFE)	25.80%	31.56%
12 Blackstone Inc (BX)	66.18%	31.46%
13 Huntington Ingalls Industries, Inc. (HII)	-0.75%	29.88%
14 NVIDIA Corporation (NVDA)	132.12%	35.68%
15 Square, Inc. (SQ)	61.89%	57.94%
16 Morgan Stanley (MS)	49.98%	34.26%
17 Amcor plc (AMCR)	9.30%	24.38%

Ticker	CSCO	QCOM	AMAT	LRCX	KLAC	LMT	TSLA	AAPL	CI	REGN	PFE	BX	HII	NVDA	SQ	MS	AMCR
CSCO	1.00	0.14	0.57	0.41	0.51	0.39	0.08	0.31	0.58	0.00	0.52	0.41	0.60	-0.05	0.20	0.56	0.64
QCOM	0.14	1.00	0.34	0.52	0.46	0.26	0.44	0.68	0.07	-0.06	0.63	0.28	-0.10	0.47	0.28	0.31	0.28
AMAT	0.57	0.34	1.00	0.82	0.78	0.28	0.21	0.23	0.56	-0.09	0.27	0.44	0.50	0.14	0.49	0.72	0.43
LRCX	0.41	0.52	0.82	1.00	0.69	0.24	0.19	0.33	0.31	-0.25	0.34	0.30	0.32	0.13	0.37	0.56	0.20
KLAC	0.51	0.46	0.78	0.69	1.00	0.27	0.29	0.39	0.45	-0.24	0.27	0.46	0.29	0.11	0.29	0.59	0.30
LMT	0.39	0.26	0.28	0.24	0.27	1.00	0.29	0.40	0.33	-0.29	0.45	0.36	0.54	0.00	0.21	0.44	0.53
TSLA	0.08	0.44	0.21	0.19	0.29	0.29	1.00	0.72	0.22	-0.08	0.17	0.37	0.03	0.41	0.65	0.47	0.36
AAPL	0.31	0.68	0.23	0.33	0.39	0.40	0.72	1.00	0.22	-0.00	0.43	0.37	0.13	0.45	0.48	0.51	0.51
CI	0.58	0.07	0.56	0.31	0.45	0.33	0.22	0.22	1.00	0.07	0.28	0.31	0.58	-0.13	0.15	0.50	0.43
REGN	0.00	-0.06	-0.09	-0.25	-0.24	-0.29	-0.08	-0.00	0.07	1.00	0.07	-0.07	-0.16	0.42	0.11	-0.13	0.11
PFE	0.52	0.63	0.27	0.34	0.27	0.45	0.17	0.43	0.28	0.07	1.00	0.31	0.27	0.28	0.04	0.26	0.41
BX	0.41	0.28	0.44	0.30	0.46	0.36	0.37	0.37	0.31	-0.07	0.31	1.00	0.50	0.26	0.43	0.68	0.48
HII	0.60	-0.10	0.50	0.32	0.29	0.54	0.03	0.13	0.58	-0.16	0.27	0.50	1.00	-0.19	0.18	0.63	0.56
NVDA	-0.05	0.47	0.14	0.13	0.11	0.00	0.41	0.45	-0.13	0.42	0.28	0.26	-0.19	1.00	0.38	0.19	0.27
SQ	0.20	0.28	0.49	0.37	0.29	0.21	0.65	0.48	0.15	0.11	0.04	0.43	0.18	0.38	1.00	0.66	0.49
MS	0.56	0.31	0.72	0.56	0.59	0.44	0.47	0.51	0.50	-0.13	0.26	0.68	0.63	0.19	0.66	1.00	0.74
AMCR	0.64	0.28	0.43	0.20	0.30	0.53	0.36	0.51	0.43	0.11	0.41	0.48	0.56	0.27	0.49	0.74	1.00

Optimal Portfolio

- By maximize the Sharpe ratio(=2.97)



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Weights(%)	9.62	8.29	2.28	13.79	2.1	10.6
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Performance

Expected Return 87.68%

Standard Deviation 21.58%

Best Year 91.28%

Worst Year 42.54%

Maximum Drawdown ⓘ -8.41%

Historical Value-at-Risk (5%) -5.10%

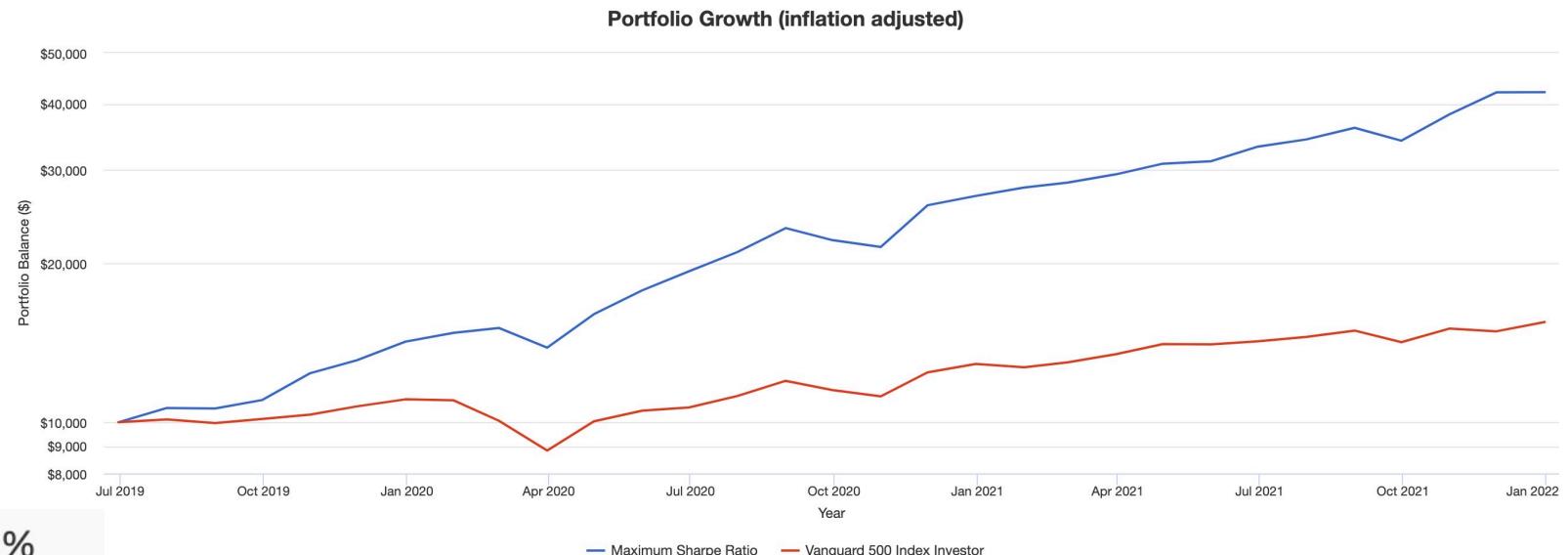
Arithmetic Mean (monthly) 5.36%

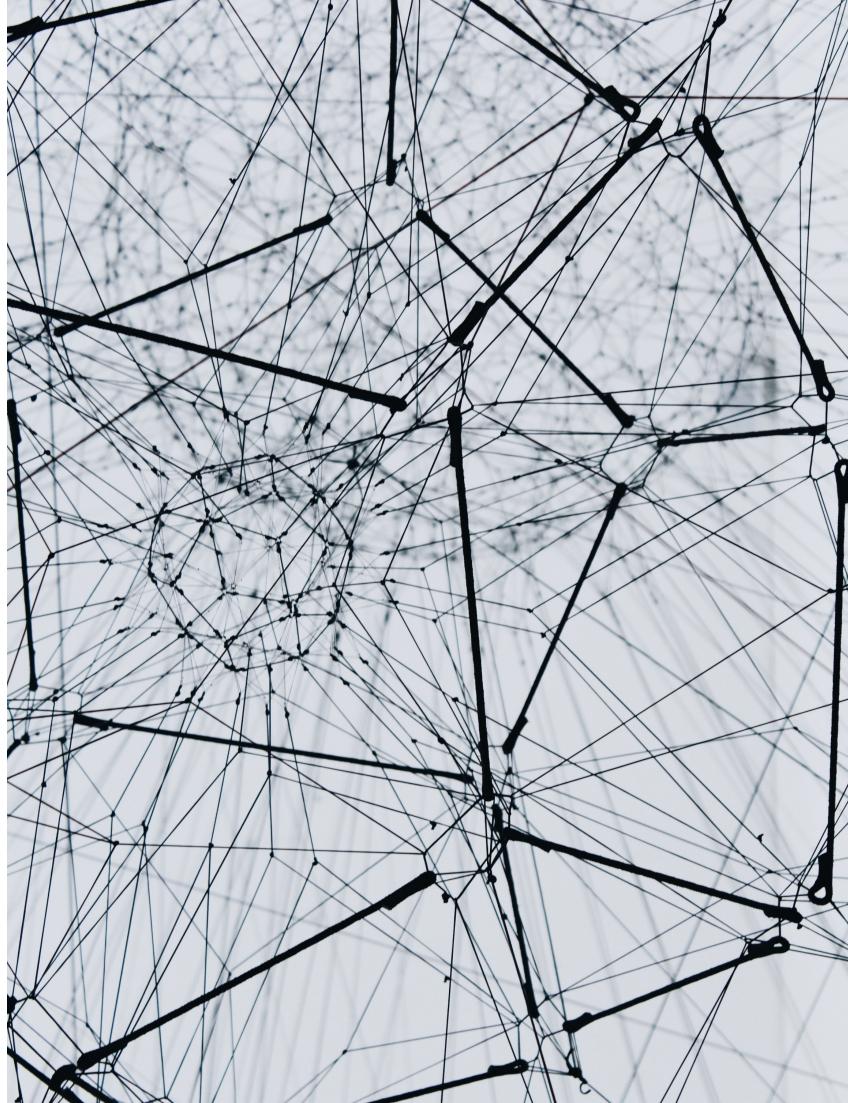
Arithmetic Mean (annualized) 87.21%

Geometric Mean (monthly) 5.19%

Geometric Mean (annualized) 83.47%

Standard Deviation (monthly) 6.19%





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Limitations

- Only stocks in S&P 500
- CAPM is not perfect
 - *CAPM is capital pricing model*
Assume all investors:
 - Rational
 - Have same expectation
 - Can borrow at same rate
- Modelling inaccuracy
- Selection subjective
- Currency risks

Question Time

Expected Return	87.68%
Standard Deviation	21.58%

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THANK YOU