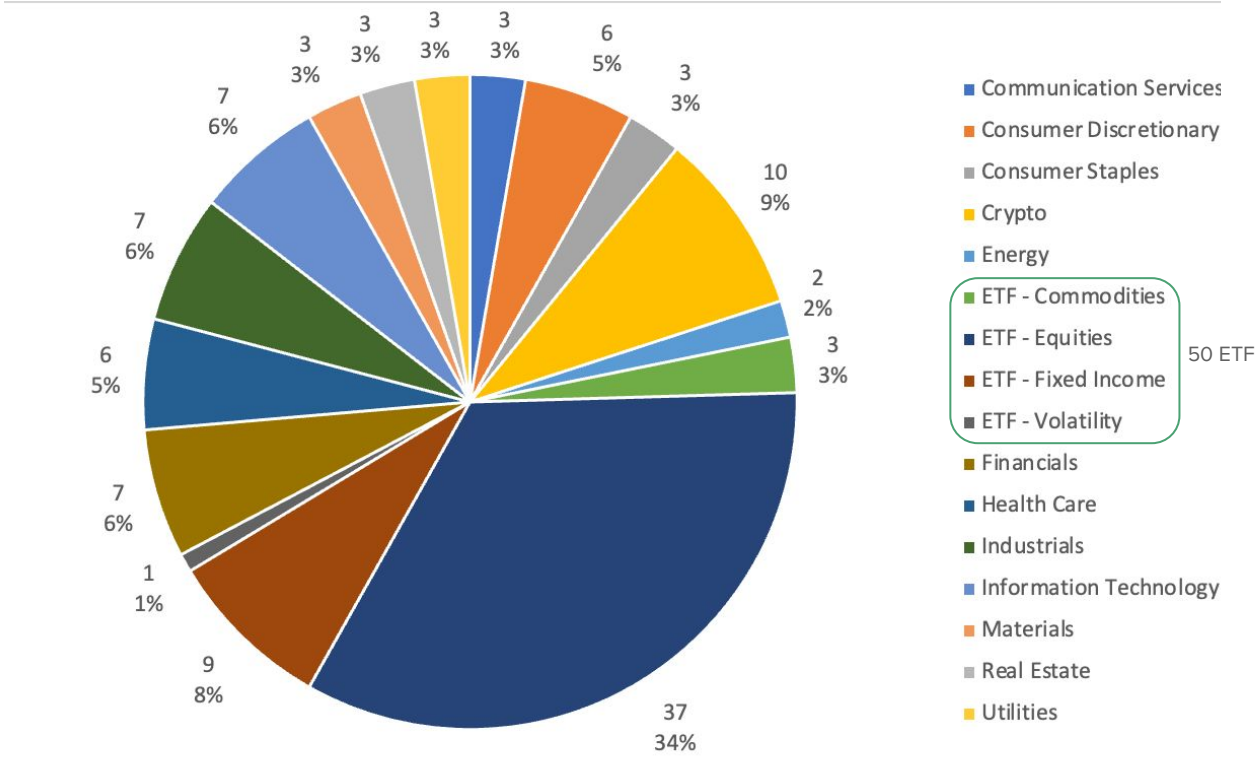
DDMIF_Final : Strategy Review

Group: Uhcakip
Members: Ziyu Tang, Quan Cao, Baoyi Zhu, Tong Chen, Jiewan Yang

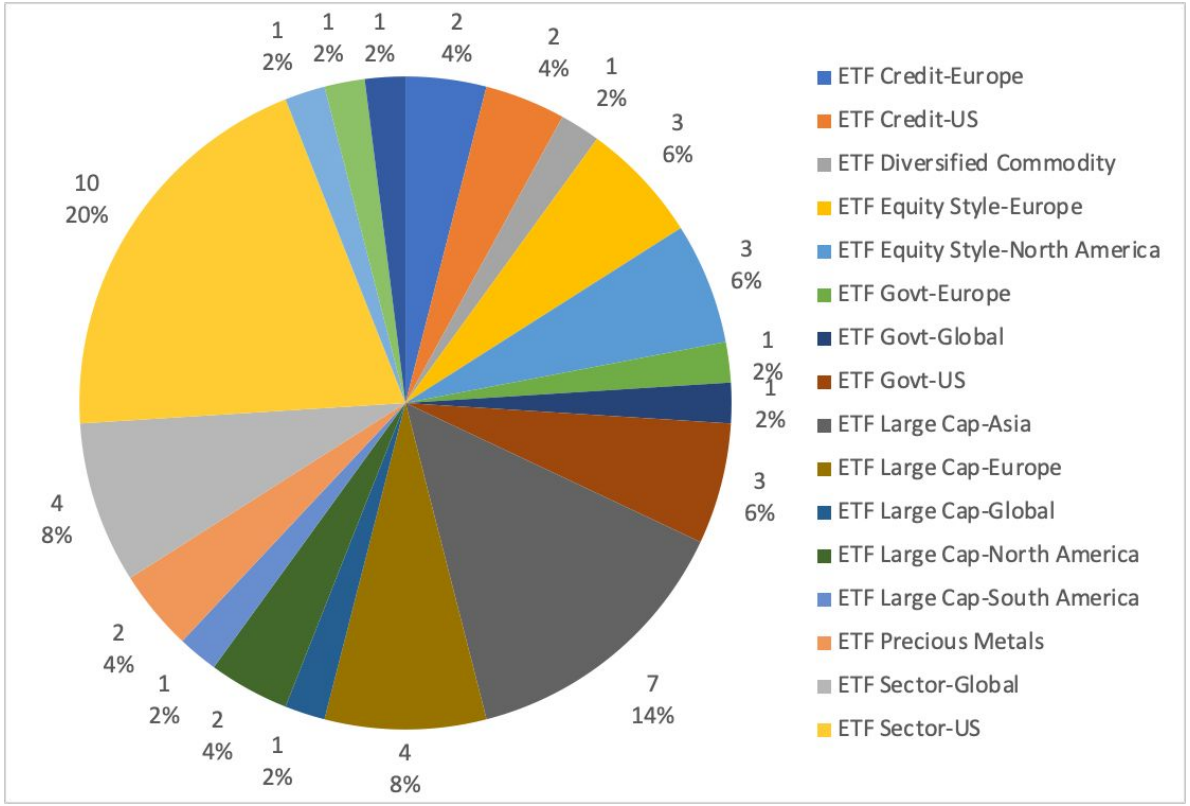
Framework:

1. Introduction
2. Overall portfolio performance
3. Breakdown into our strategies
4. Fun parts of our portfolio
5. Summary

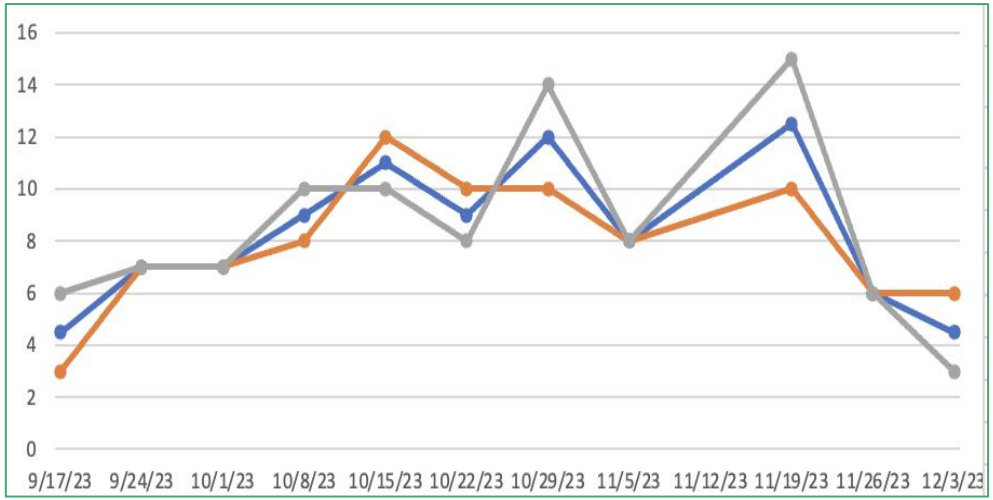
Universe - 110 assets

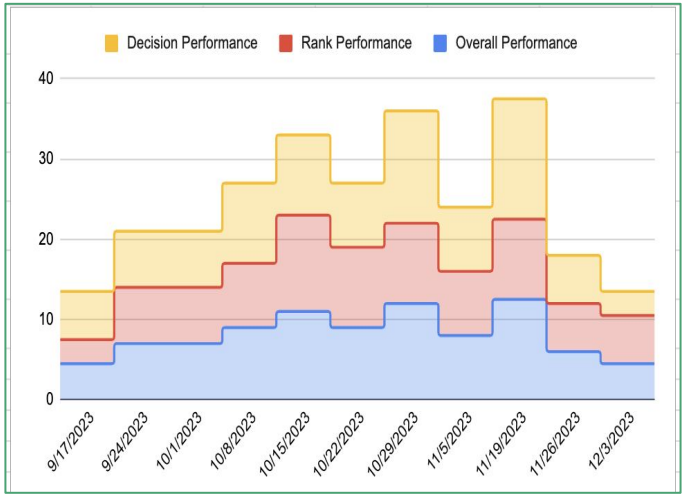


ETF Equities - 45% of Universe



II. Overall Portfolios Performance





	9/17/23	9/24/23	10/1/23	10/8/23	10/15/23	10/22/23	10/29/23	11/5/23	11/19/23	11/26/23	12/3/23
Overall Performance	4.5	7	7	9	11	9	12	8	12.5	6	4.5
Rank Performance	3	7	7	8	12	10	10	8	10	6	6
Decision Performance	6	7	7	10	10	8	14	8	15	6	3

Test this week's strategy by using last week's data:

	group_name	forecast_performance	decision_performance	forecasts_rank	decisions_rank	overall_rank
0	SP500	0.109976	8.144776	2.0	5.0	3.5
1	EW_LONG	0.16	10.644184	6.0	2.0	4.0
2	UHCAKIP	0.16	10.124099	6.0	3.0	4.5
3	GAMBLING	0.106469	5.172579	1.0	8.0	4.5
4	4SIGMA	0.12	5.2772	3.0	7.0	5.0
5	HIREUS	0.166429	12.467355	10.0	1.0	5.5
6	JAYSTREET	0.152587	-4.065978	4.0	12.0	8.0
7	DYF	0.186453	8.437688	12.0	4.0	8.0
8	MSG	0.161569	4.805087	7.0	9.0	8.0
9	HELLO_WORLD	0.173731	5.759857	11.0	6.0	8.5
10	ALPHA	0.152688	-5.128328	5.0	13.0	9.0
11	RANDOM	0.165008	2.517779	9.0	10.0	9.5
12	LAMM	0.16159	0.002227	8.0	11.0	9.5

III. Portfolios Structure

Number	Portfolio due	Strategy applied to ranking	Strategy applied to decisions	Overall performance
1	9/17/2023	Random	Random	4.5
2	9/24/2023	Random	Normal distribution	7.0
3	10/1/2023	Random	Linear Regression	7.0
4	10/8/2023	Random	Technical+Fundamental	9.0

III. Portfolios Structure

Number	Portfolio due	Strategy applied to ranking	Strategy applied to decisions	Overall performance
5	10/15/2023	Technical factors	Turnover reverse	11.0
6	10/22/2023	Random	Volatility reverse	9.0
7	10/29/2023	Decision-Based	Subjective selection	12.0
8	11/5/2023	Random	Momentum	8.0

III. Portfolios Structure

Number	Portfolio due	Strategy applied to **ranking**	Strategy applied to **decisions**	Overall performance
9	11/19/2023	Technical factors	MVE portfolio	12.5
10	11/26/2023	Fundamental + optimization	Machine Learning	6
11	12/3/2023	Equal weights	Risk Parity	4.5

Oct 1 Ridge Linear Regression - Why Use

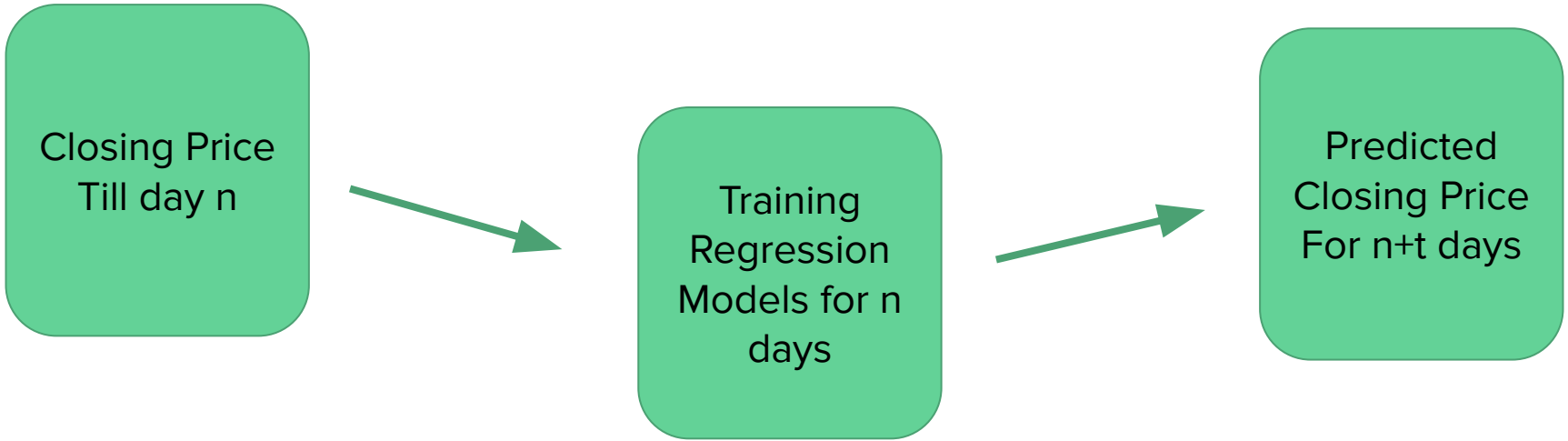
Linear Regression:

Easily be unstable when coefficients are getting larger.

Ridge Linear Regression:

Avoid the problem of predictor's collinearity by adding additional cost

Oct 1 Ridge Linear Regression - Framework 1



Oct 1 Ridge Linear Regression

L2 Penalty:

- Penalize the model based on the sum of the squared coefficient values β
- Minimize the size of coefficients
- Lambda Penalty - controls the weighting of the penalty

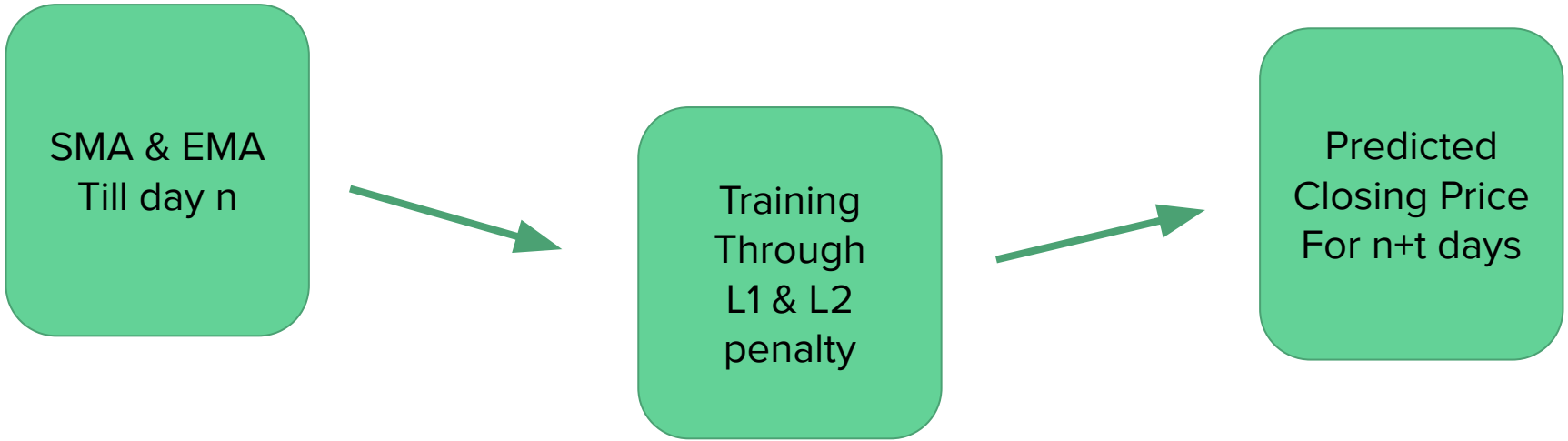
Indicators:

- Simple Moving Average
- Exponential Moving Average

MSE:

- To validate the prediction ability

Oct 1 Ridge Linear Regression - Framework 2



Result

	TICKER	pred_price
0	ABBV	139.130576
1	ACN	325.282652
2	AEP	81.494620
3	AIZ	142.944838
4	ALLE	105.665346
5	AMAT	144.422381
6	AMP	344.692232
7	AMZN	141.269001
8	AVB	171.275693
9	AVY	188.832350

Normalized Return

decision
-0.005980
-0.006164
0.006237
-0.041740
-0.001036

Oct 8 Strategy Technical + Fundamental

Weighted decision after applying different methodology to technical and fundamental data

- Technical data: calculate beta value for decision
- Fundamental data
  - Select multiple fundamental attributes of a company
  - Use random forest regressor calculate predicted price
  - Use difference between predicted price and actual price to calculate decision
- Assign 0.5:0.5 weight to the different decisions

Nov 5 Strategy: Momentum

Calculate price returns for each stock over previous week

Set the benchmark return (s&p 500)

Calculate momentum score: individual return - benchmark return

Select positive momentum score stocks

- Standardize it to ensure sum of the decision = 1

Oct 15 & Oct 22 Reverse effect

- Calculated the excess turnover/volatility of each stock.
- Set a threshold and compared it with the excess turnover/volatility of each stock.
- For those stocks whose excess turnover/volatility lesses the threshold, stay the same; for those stocks whose excess turnover/volatility surpasses the threshold, we reverse its sign by multiplying -1.
- Standardization
- **The idea aims to exploit potential market reversals or anomalies that deviate from the usual expectations.**
- For the ranking, we chose RSI to balance the reverse effect.

$$RSI_{\text{step one}} = 100 - \left[\frac{100}{1+\frac{\text{Average gain}}{\text{Average loss}}}\right]$$

Nov 19 MVE + Tech

- Calculated the covariance matrix.
- Maximize the expected return for a given level of risk or minimize risk for a specified level of expected return.
- Plot the efficient frontier, which represents the set of optimal portfolios.
- Identify the tangency portfolio.

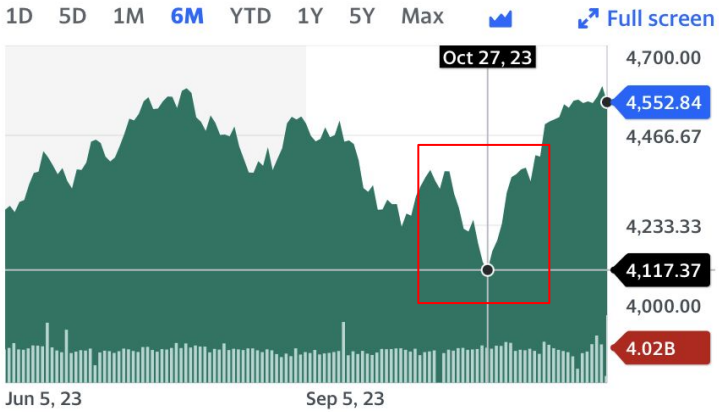
- For the rank, we combined RSI (risk strength index) with random strategy.

Overall, not working well...

- Assumption didn't hold, etc.

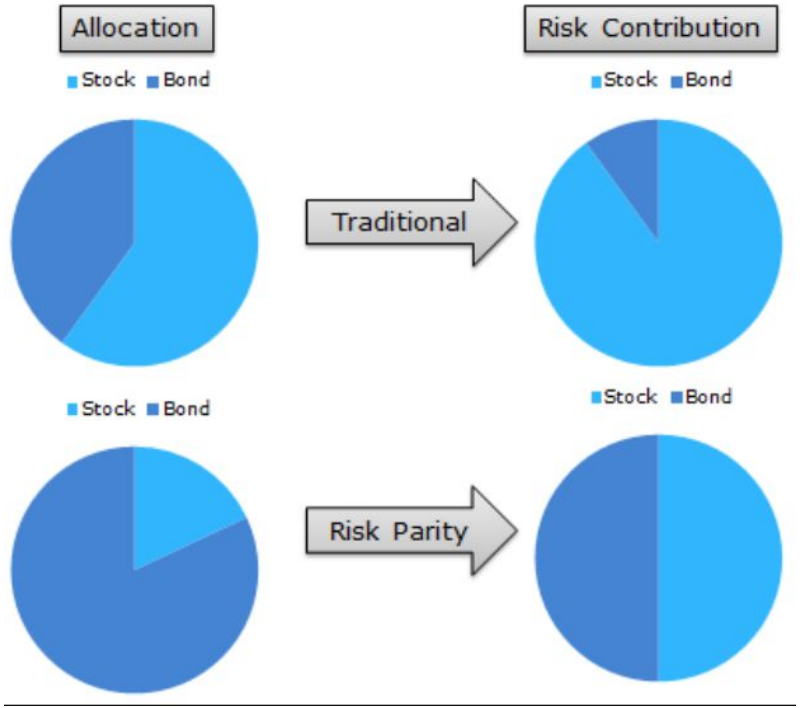
Oct 29 Strategy: Subjective Selection

- Market reaches **phasal low**, lack of market confidence;
- **Earnings Release**: Subjectively selected 5 stocks with earnings surprise (reported earnings more than consensus estimates).
- **Bitcoin** in upward momentum, **Gold** is an alternative for downward market pressure
- **Short** the rest of the investment universe with equal weights.



Dec 3 Strategy: Risk Parity

- Traditional allocation: 60% Equity, 40% Fixed Income. Inequivalent Risk Contribution.
- Risk Parity: capital allocation to ensure equal risk contribution for each security.
- Benefit: safter during recession, risk diversification;
- Limitation: market timing, increased cash allocation, sensitive to correlation



Dec 3 Strategy: Risk Parity

- Data used: closing price for every ticker from 2023-01-01 to 2023-12-01, a **daily log-return** is calculated based on closing prices.
- Risk: Portfolio Volatility is determined by the return covariance matrix and weights.

$$\sigma_p^2 = W^t * Covariance\ Matrix * W$$

- Marginal Risk Contribution: Dot product of weights and covariance matrix divided by the portfolio volatility (percentage of risk contribution)
- Target: **equal risk contribution** across all tickers

	ABBV	ACN	ADA-USD	AEP	AIZ	ALLE
ABBV	0.000163	0.000007	-0.000022	0.000040	0.000035	-0.000004
ACN	0.000007	0.000202	0.000108	0.000034	0.000062	0.000112
ADA-USD	-0.000022	0.000108	0.001572	0.000036	0.000009	0.000115
AEP	0.000040	0.000034	0.000036	0.000175	0.000037	0.000047
AIZ	0.000035	0.000062	0.000009	0.000037	0.000315	0.000083

Nov 26 Strategy

	Methodology		
Ranking:	**Optimization + fundamental factor**	**Fundamental factors**	**Optimization threshold**
Rank 1		Price to equity ratio	25
Rank 2		Price to cash flow	10
Rank 3		Price to book value	0.8
Rank 4		Debt to equity ratio	1.5
Rank 5		Price to sales ratio	1.5
Decision	Random forecast: predict price -> calculate the percentage change -> weight		

III. Reverse

Uhcakip

Pikachu

	group_name	mean_forecast	mean_decision	forecasts_rank	decisions_rank	overall_rank
0	EW_LONG	0.160000	6.119650	4.0	2.0	3.0
1	SP500	0.133970	3.027431	1.0	8.0	4.5
2	HIREUS	0.162895	3.629035	5.0	6.0	5.5
3	GAMBLING	0.144686	2.705927	2.0	10.0	6.0
4	UHCAKIPCT	0.183835	10.124099	13.0	1.0	7.0
5	UHCAKIPZIYU	0.174224	4.460735	11.0	5.0	8.0
6	HELLO_WORLD	0.184591	5.399520	14.0	3.0	8.5
7	JAYSTREET	0.158699	-5.097778	3.0	17.0	10.0
8	4SIGMA	0.217930	4.697089	16.0	4.0	10.0
9	RANDOM	0.172858	0.818478	10.0	12.0	11.0
10	MEDALLION	0.171858	-0.677937	8.0	15.0	11.5
11	PIKACHU	0.170917	-0.737002	7.0	16.0	11.5
12	ALPHA	0.188541	2.831275	15.0	9.0	12.0
13	UHCAKIPBY	0.166182	-8.055181	6.0	19.0	12.5
14	LAMM	0.182170	0.216732	12.0	13.0	12.5
15	CITADELSPINOFFS	0.236956	3.060047	19.0	7.0	13.0
16	UHCAKIP	0.171929	-6.304314	9.0	18.0	13.5
17	DYF	0.221980	2.466174	17.0	11.0	14.0
18	MSG	0.222321	-0.437691	18.0	14.0	16.0

IV. Summary

- Don’t believe the theoretical knowledge
- Shorting is very risky
- Hedging the risk is necessary
- Timing is important
    - Subjective selection case