The M^6 Competition
Risk Model – Construction & Application

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The M6 competition and investment decisions

- One of the primary objectives of the M6 competition was to investigate the value of accurate forecasting investment decision making

- Identify practices that would allow investors to **improve the accuracy of their forecasts**, mitigate the uncertainty and bias involved in these forecasts, and exploit their findings to build **robust, profitable portfolios**

- Duathlon approach : participants submit their forecasts regarding the relative performance of a number of tradable assets as well as their investment positions for these assets

The M6 competition and investment decisions

- The investment universe of the M6 competition consisted of two classes of assets:

- 50 stocks from the Standard and Poor's (S&P) 500 index, and
- 50 international exchange-traded funds (ETFs).

- Performance metric $OR = \dfrac{rank(RPS) + rank(IR)}{2}$

- Information ratio defined as the ratio of the portfolio forecasted returns over the forecasted portfolio standard deviation

The M6 competition and investment decisions

- In practise the portfolio choice includes asset selection and weights

$$\frac{\alpha' w}{w \Sigma w}$$

- Higher IR values suggest better investment performance generated per unit risk taken.

- In order to benchmark the performance of the participating teams, an approach where equal long positions are taken for all 100 assets (investment weights of 0.1) was assumed.

Results (Makridakis et al. 2023)

- When it come to RPS, we observe that teams perform either similarly well or significantly worse than the benchmark throughout the competition.

- On the contrary, on the investment challenge there is a notable number of teams that perform either significantly better or significantly worse than the benchmark, with the majority however of the teams reporting lower IR scores in most of the periods.

- Beating the benchmark consistently or consistently was particularly difficult in practice, despite the simple forecasting and investing approaches the benchmark employed

Results (Makridakis et al. 2023)
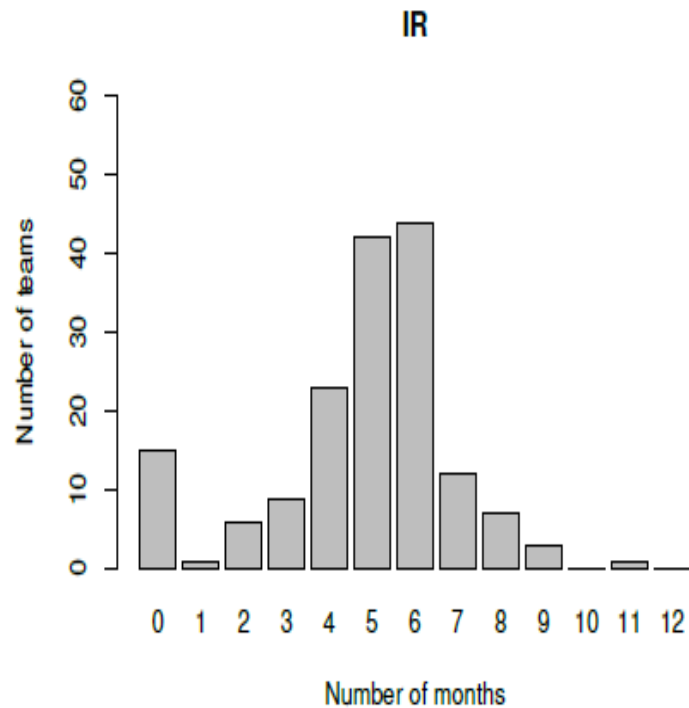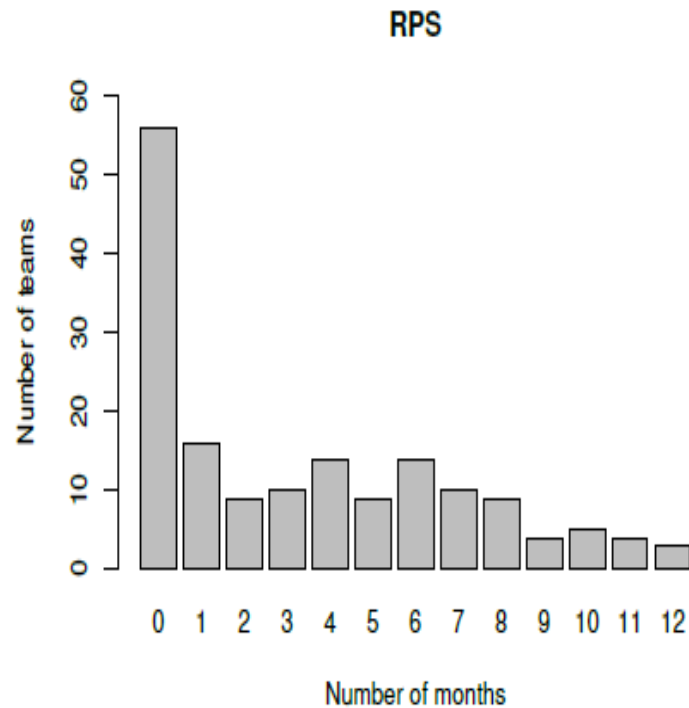
Results (Makridakis et al. 2023)

- The results suggest no link between the ability of teams to accurately forecast individual rankings of assets and their ability to forecast risk adjusted returns on investment

- The findings indicate that most of the teams probably decided to work on the forecasting and investment tracks of the competition individually, using approaches that are barely connected

- They also show that the all the top 10 performing teams have constructed portfolios that are significantly less risky than the benchmark. Moreover, the top 5 teams have effectively managed to maximize their returns given a certain amount of risk, which was either particularly small (around 0.003) or moderate (around 0.008).

Insights

- In order to maximize the IR, participants needed to model or at least make assumptions regarding portfolio risk

- Crucial input is the correlation matrix

- Ross (2023) proses investment risk model to analyze the investment submissions made by participants in the M6 competition

- He shows that participants systematically assumed more risk that could be justified by the accuracy of their forecast

- The risk model is agile and addresses high dimensionality of the correlation matrix combing a DCC approach , with a single factor model on correlation, dimensionality reduction via shrinakge

Insights

Realised ic Decile	Mean ic	IR Achieved	Optimal Portfolio IR – Low Assumed ic	Optimal Portfolio IR - Medium Assumed ic	Optimal Portfolio IR - Medium Assumed ic	
0	-0.34	-0.58	-3.68	-3.66	-3.81	
1	-0.19	-0.42	-2.17	-2.43	-2.59	
2	-0.11	-0.5	-1.56	-1.59	-1.59	
3	-0.06	-0.22	-1.12	-1	-1.04	
4	-0.01	0.56	-0.33	-0.35	-0.3	
5	0.03	0.72	0.41	0.38	0.37	
6	0.07	0.8	1.05	0.99	0.96	
7	0.12	1.31	1.8	1.53	1.62	
8	0.18	1.53	2.61	2.65	2.61	
9	0.31	3.25	3.55	3.72	3.64	

Let's make it easier: CCC

Realised ic Decile	Mean ic	IR Achieved	Optimal Portfolio IR – Low Assumed ic	Optimal Portfolio IR - Medium Assumed ic	Optimal Portfolio IR - Medium Assumed ic	
0	-0.34	-0.58	-3.01	-2.78	-2.66	
1	-0.19	-0.42	-2.01	-1.98	-2.13	
2	-0.11	-0.5	-0.98	-0.67	-1.59	
3	-0.06	-0.22	-1.01	-0.72	-0.96	
4	-0.01	0.56	-0.79	-0.63	-0.65	
5	0.03	0.72	0.57	0.28	0.37	
6	0.07	0.8	0.97	0.89	0.96	
7	0.12	1.31	1.56	1.48	1.62	
8	0.18	1.53	1.89	1.98	2.61	
9	0.31	3.25	3.46	3.36	3.64	

The M6 Competition - Risk based Analysis

Conclusions

- The M6 competition has managed to bring the forecasting community to much broader audience and to stress relevance of forecasting accuracy when used to support investment decision making
- However its results show very little correlation between forecasting accuracy and investment decisions in practice

Implications

1. Rely more on economic loss functions at the outset of the forecasting process

2. Bridge the gap between the academic literature on correlation forecasting and the investment practice which needs to rely on such forecast to estimate risk

Thank you for your attention

Questions?

If you would like to learn more about M6 visit

https://mofc.unic.ac.cy/the-m6-competition/