Winning Strategies: Predicting relative performance

Markus Gesmann

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Staying ahead of the competition

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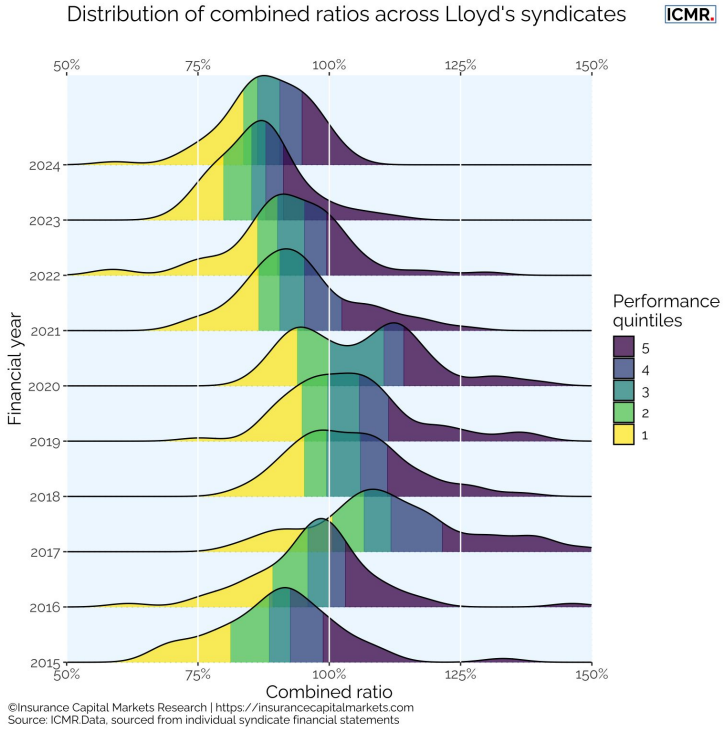
Relative performance outlasts absolute results



Average annual combined ratio performance quintile transition frequencies of Lloyd's syndicates over the period 2015 - 2024

From/To	1st	2nd	3rd	4th	5th
1st	49.6%	20.9%	13.9%	8.7%	7.0%
2nd	22.3%	29.5%	23.2%	13.4%	11.6%
3rd	11.5%	19.5%	29.2%	24.8%	15.0%
4th	9.0%	13.5%	25.2%	27.0%	25.2%
5th	6.1%	13.9%	9.6%	26.1%	44.3%

Source: Lloyd's 2025 Insights Report. *Insurance Capital Markets Research and Lloyd's Market Association.* 9 April 2025. Retrieved from https://insurancecapitalmarkets.com/lloydsmarket2025/

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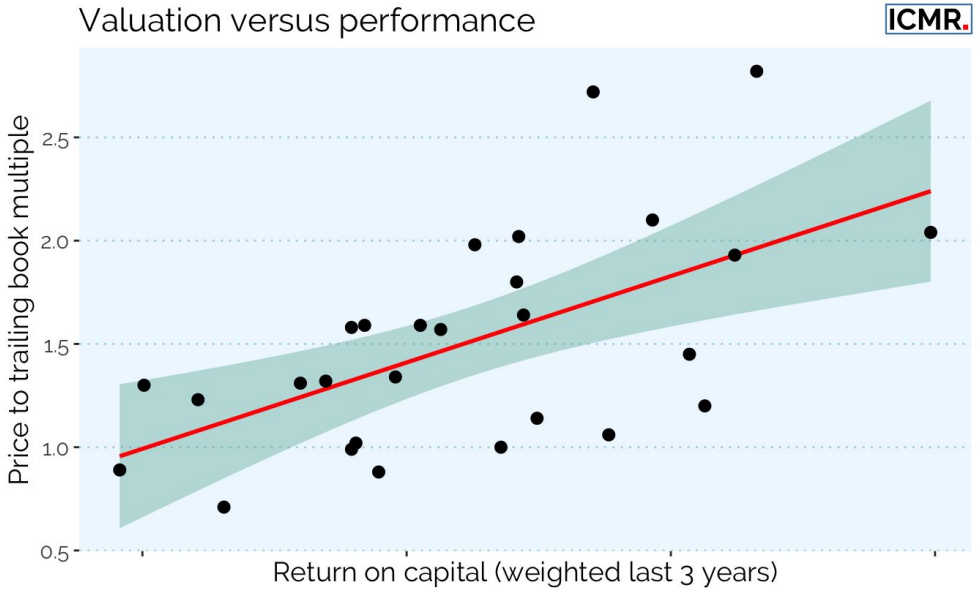
Higher relative performance creates value



Source: Companies' financial statements, stock data as at 2024-08-20.
Universe: 8766.T, ACGL, AIG, AXS, BEZ.L, BRK-B, CB, CINF, CNA, CRE, CS.PA, EG, ESGR, FFH.TO, HIG, HNR1.DE, HSX.L, HUW, LRE.L, MKL, MUV2.DE, QBE.AX, RNR, SCR.PA, SPNT, TRV, WRB, WTM

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Predicting the winners is about predicting the rank performance of peers

- Plackett (1975) and Luce (1959) developed models for rank data
- Probability of 'winning' is described by an 'ability' parameter α

$$P(Y_j) = \frac{\exp(\alpha_j)}{\sum_{i=1}^{J} \exp(\alpha_i)}$$

- Joint probability structure for all ranks:

$$P(Y_1 > Y_2 \cdots > Y_J) = \prod_{j=1}^{J} \frac{\exp(\alpha_j)}{\sum_{k=1}^{J} \exp(\alpha_k)}$$

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Example: Generate data for 6 teams

	Team 1	Team 2	Team 3	Team 4	Team 5	Team 6
ability	1	1.3	1.8	-0.1	0	1.2
probability	15.4%	20.8%	34.3%	5.1%	5.7%	18.8%

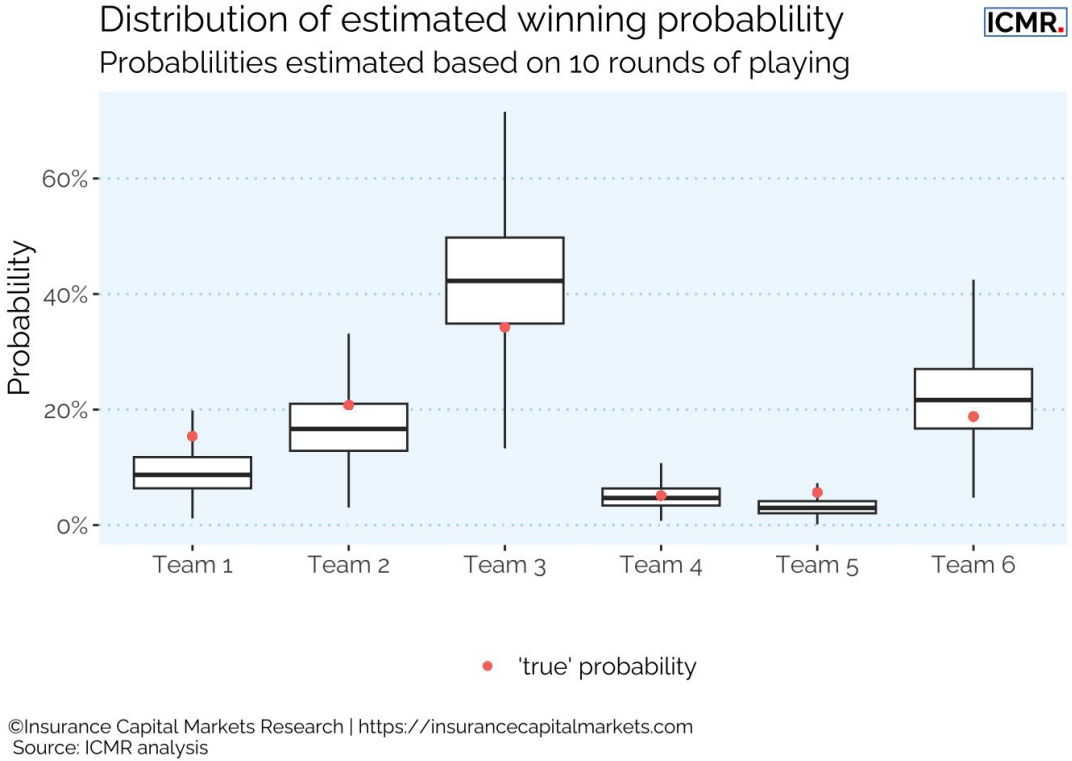
Sampled outcomes from 10 rounds of playing with known winning probabilities of 6 Teams

	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Round 1	Team 3	Team 6	Team 1	Team 2	Team 5	Team 4
Round 2	Team 6	Team 2	Team 4	Team 3	Team 5	Team 1
Round 3	Team 1	Team 6	Team 3	Team 2	Team 4	Team 5
Round 4	Team 1	Team 3	Team 6	Team 2	Team 5	Team 4
Round 5	Team 2	Team 3	Team 5	Team 6	Team 4	Team 1
Round 6	Team 1	Team 3	Team 6	Team 4	Team 2	Team 5
Round 7	Team 3	Team 4	Team 2	Team 6	Team 1	Team 5
Round 8	Team 6	Team 3	Team 2	Team 1	Team 4	Team 5
Round 9	Team 2	Team 3	Team 1	Team 4	Team 6	Team 5
Round 10	Team 3	Team 6	Team 2	Team 5	Team 1	Team 4

Posterior predictive simulations

Use Plackett-Luce model to recover the parameters for the data generating process

Teams 1, 2 & 5 abilities slightly under-estimated, but within credible intervals



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Estimated rank probabilities based on sample of 10

Estimated probabilities to achieve certain rank performance by team

	Team 1	Team 2	Team 3	Team 4	Team 5	Team 6
Rank 1	10.1%	17.0%	42.2%	5.4%	3.3%	22.0%
Rank 2	12.5%	20.9%	29.7%	7.5%	4.9%	24.4%
Rank 3	17.3%	24.2%	16.4%	10.9%	7.3%	23.9%
Rank 4	24.2%	20.0%	8.5%	17.1%	12.2%	18.0%
Rank 5	23.0%	13.2%	2.5%	29.1%	23.0%	9.2%
Rank 6	12.9%	4.6%	0.7%	30.0%	49.3%	2.4%

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Extension to the model

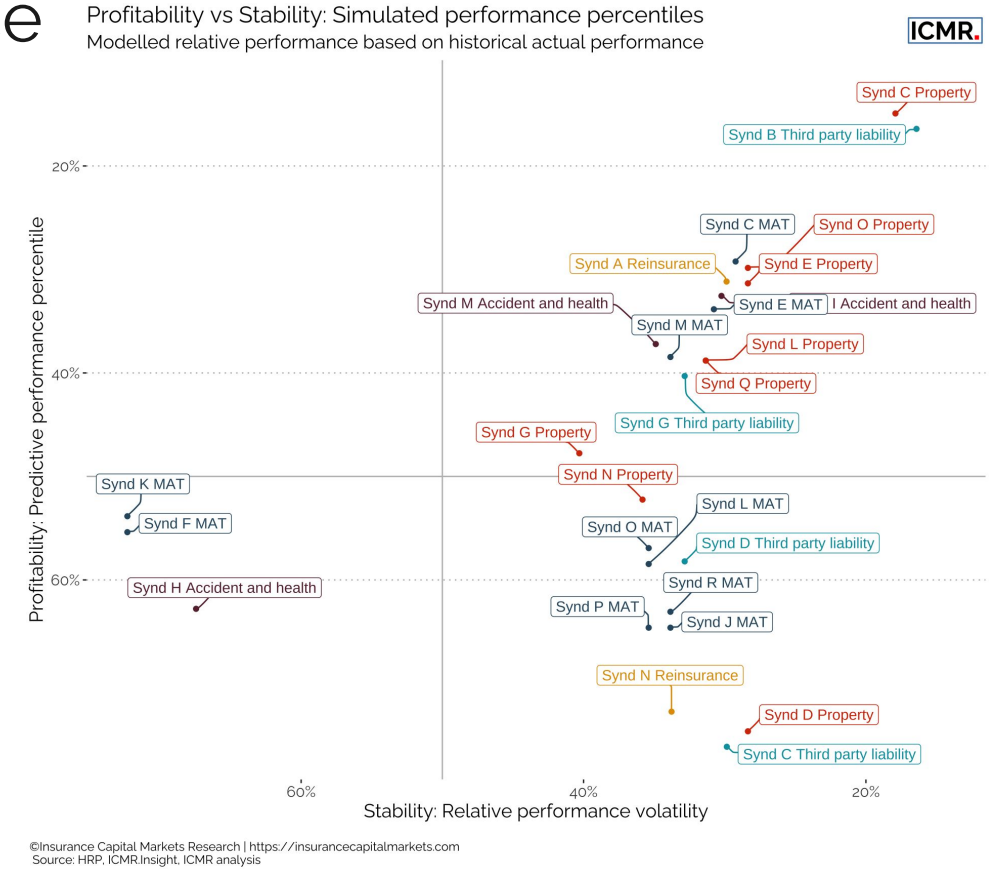
- Introduce additional parameters, e.g.
  - noise parameter σ to allow for weighting, e.g. heats vs finals

$$P(Y_1 > Y_2 > \cdots > Y_J) = \prod_{j=1}^{J} \frac{\exp\left(\beta_i / \sigma_{[k]}\right)}{\sum_{i=1}^{J} \exp\left(\beta_j / \sigma_{[k]}\right)}$$

Application in insurance

Model rank performance of underwriting performance by entity and class of business

Identify consistent top-performers for follow-only strategies



Source: HRP, ICMR.Insight, ICMR analysis

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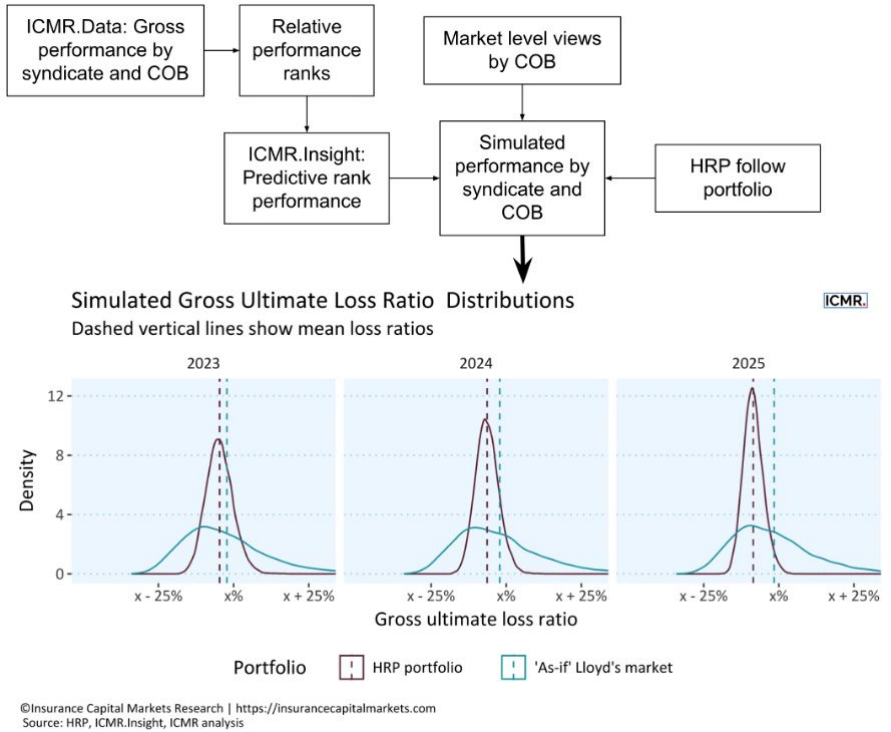
The Winning Strategy - Improving absolute results

Combining modelled rank performance with prospective market level assumption allows us to take the step from relative to absolute performance



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Conclusions

- Valuation, portfolio constructions and cycle management all rely on insight into relative peer performance
- Models like Plackett-Luce can provide insight into rank performance (ICMR.Insight)
- Needed / helpful:
  - Quality peer performance data (ICMR.Data)
  - Probabilistic programming to take advantage of priors and hierarchical structures (Stan, PyMC)

References

Luce, R. Duncan. 1959. *Individual Choice Behavior: A Theoretical Analysis*. New York: Wiley.

Plackett, Robert L. 1975. “The Analysis of Permutations.” *Appl. Statist* 24 (2): 193–202. https://doi.org/10.2307/2346567.

Contact

Markus has spent over 20 years in both insurance and capital markets. He is the former head of analysis at Lloyd's, where he set up a market wide analytical performance and price monitoring framework. Markus was head of pricing at an ILS joint venture with Lehman Brothers and Vario Partners, structuring innovative risk transfer solutions into capital markets.

Markus is an expert in modelling non-life insurance portfolios and probabilistic programming, and an Honorary Visiting Fellow at Bayes Business School, City St George's, University of London.

E: markus@insurancecapitalmarkets.com

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