

Winning Portfolio Strategies

Using innovative AI models to predict relative performance



Insurance Capital Markets Research
& Hampden Risk Partners

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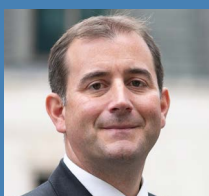
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Introduction

The Lloyd's of London market is a globally significant hub for specialty (re)insurance, operating within a complex and dynamic environment. Accurately predicting underwriting performance is crucial for stakeholders, but traditional methods often fall short. This white paper explores a paradigm shift: predicting relative performance. It highlights how Hampden Risk Partners (HRP), a dynamic intelligent follow-only syndicate, has leveraged the expertise and advanced analytics of Insurance Capital Markets Research (ICMR) to review the prospective performance potential of its underwritten portfolio, drawing inspiration from sophisticated AI-driven tools used in sports analytics.

About Hampden Risk Partners (HRP)

Hampden Risk Partners (HRP) Syndicate 2689 is a highly specialised intelligent follow-only syndicate in the Lloyd's market. Since 2023, HRP has focused on supporting and collaborating with accomplished underwriters at Lloyd's. Their distinctive approach involves backing underwriters with an impressive track record of outperformance, providing them with capacity to access greater market opportunities and improved terms, rather than building internal underwriting teams.

This non-competing intelligent follow-only model attracts top-performing syndicates seeking strategic partnerships. HRP employs a disciplined partner selection process, combining quantitative and qualitative assessments to optimise its portfolio.

About Insurance Capital Markets Research (ICMR)

Insurance Capital Markets Research (ICMR) is a quantitative research firm dedicated to delivering innovative solutions for the complex challenges in the global specialty (re)insurance industry. ICMR specialise in providing data, in-depth analysis and prospective modelling of Lloyd's syndicate portfolios, empowering strategies like follow-only approaches and investment funds.

As an associate member of the Lloyd's Market Association, ICMR is recognised as the leading independent Lloyd's quantitative analyst. ICMR was founded in early 2020 by the former heads of research and analysis of Lloyd's, and launched the RISX Equity Index in 2021 as an investment benchmark.



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The Shift to Relative Performance Analysis in Lloyd's

The unique characteristics and complexities of the Lloyd's market present distinct challenges for performance analysis. While traditional methods often focus on historical absolute performance figures, these can be heavily influenced by market cycles, making it difficult to truly distinguish outperformers from the rest. Absolute metrics may inflate performance across the board in a soft market or make even well-managed syndicates appear to underperform in a challenging market.

Recognising this limitation, the focus is shifting to understanding relative performance – how a syndicate performs compared to its peer group. In a dynamic market, understanding who is truly outperforming or underperforming their direct competitors provides a more stable and insightful indicator of underlying capabilities and strategic effectiveness. Relative performance enables more accurate benchmarking, helps identify genuine competitive advantages and offers a clearer picture of long-term sustainability, independent of broader market fluctuations.

Although the theories have been around for some time – indeed, the founders of ICMR introduced this concept at Lloyd's while heading up its internal analytics and research function – having access to relevant performance data outside of Lloyd's internal reporting and the wide availability of probabilistic programming languages is new.

The winning mindset

The relative performance of underwriting teams, or indeed entire syndicates when benchmarked against their competitors, displays a far greater degree of consistency than their absolute loss ratio performance. This observation is logical, considering the enduring collaborative relationships and size of substantial renewal books. This is exactly what can be observed in sports as well. The positions of sports teams in league tables can vary throughout the year, but at the end of the season it is more often than not the same teams occupying the top of the leaderboard.

The principle of predicting relative performance, crucial for determining winners in sports, is directly applicable to the Lloyd's market. ICMR has curated gross underwriting performance data by syndicate and class of business and developed an innovative AI-powered model, inspired by techniques used in sports analytics, to predict the relative loss ratio performance of Lloyd's syndicates. The underlying Bayesian AI model is specifically based on models used in sports analytics to predict relative performance, such as the Plackett-Luce model, which is designed for predicting the rank performance of peers. The appendix gives an overview of the methodology.

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The core of ICMR's model involves:



- **Comprehensive Data Ingestion:** Gathering and integrating a wide range of publicly available data, including historical syndicate gross underwriting performance by line of business, premium volumes, expense ratios and relevant macroeconomic indicators.



- **Intelligent Feature Engineering:** AI algorithms identify and engineer key features from the raw data that are predictive of relative loss ratio performance, going beyond simple historical averages.



- **Probabilistic Programming:** Sophisticated probabilistic programming algorithms, trained on years of Lloyd's market data, identify complex patterns and predict future relative loss ratio performance. These algorithms continuously learn and adapt with new data, enhancing accuracy.



- **Correlation Analysis:** The model intelligently learns the rank correlation of syndicates underwriting similar lines of business, helping to understand the diversification across syndicates, a crucial aspect of portfolio management.

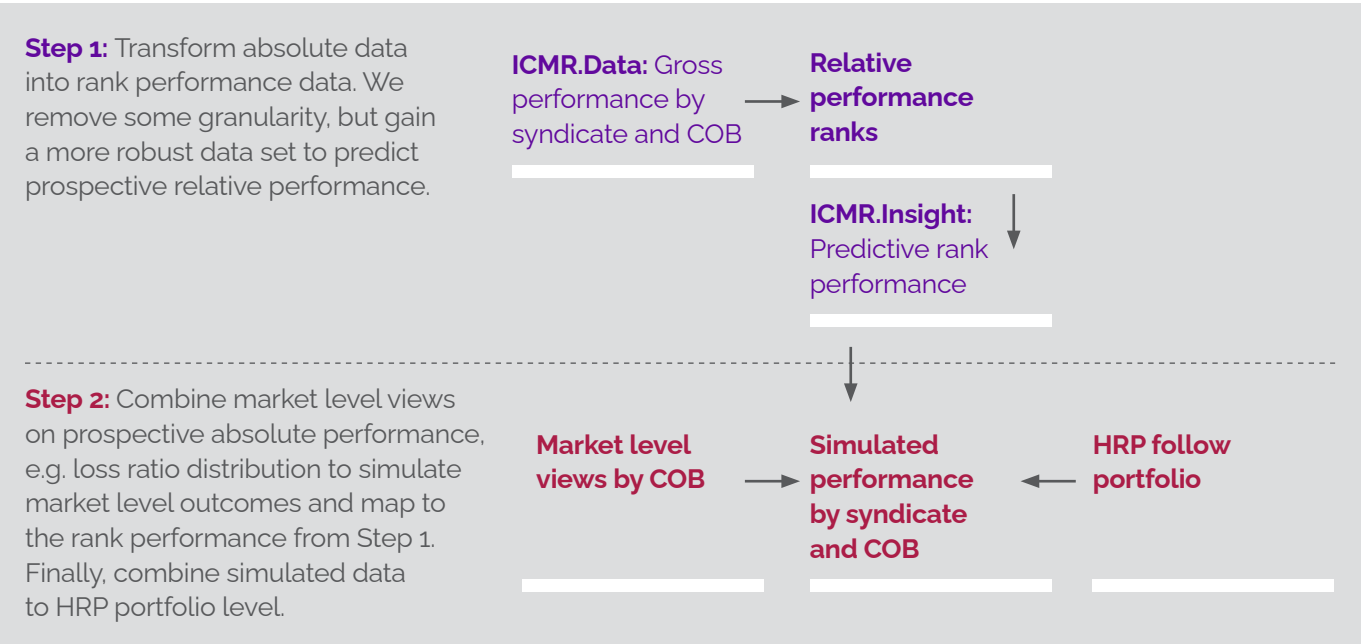


- **Forward Looking Performance:** Forward looking relative performance can be overlaid with absolute performance at a market level to gain greater insight into the distribution of forward looking individual syndicate performance.

The model's premise is that each peer has an 'ability' parameter, allowing the calculation of the probability of 'winning' or achieving a certain rank, i.e. relative performance. This model can be refined by including additional parameters, such as a noise parameter, to give more weight to recent performance or performance in significant event loss years.



Illustration of ICMR modelling workflow



Limitations of the Modelling Approach

While syndicate-level performance data by line of business offers valuable insights, it's important to acknowledge certain limitations:

Data Reconciliation and Mapping: Although total performance figures align with audited statements, the detailed breakdown by business line in the notes is unaudited. Furthermore, the process of mapping internal underwriting classifications to standardised reporting categories can involve necessary compromises, particularly for syndicates

operating within highly specialised niches. However, the significant annual renewal rates (c.70% for many) provide considerable consistency within a syndicate's portfolio, allowing peer comparisons to indicate the relative performance of their chosen niche.

Reporting Basis: Historical underwriting performance data used is reported on a GAAP calendar year basis, not the underwriting year basis more directly relevant to insurance cycles. However, it's worth noting that GAAP performance has historically proven to be a reliable leading indicator of underwriting year results over a longer timeframe (as illustrated in Figure 1), and relative GAAP performance is strongly indicative of relative underwriting year performance.

Lloyd's pro-forma pre-tax results

Underwriting year result

GAAP result excl. investment on FAL

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Source: Lloyd's Annual Reports

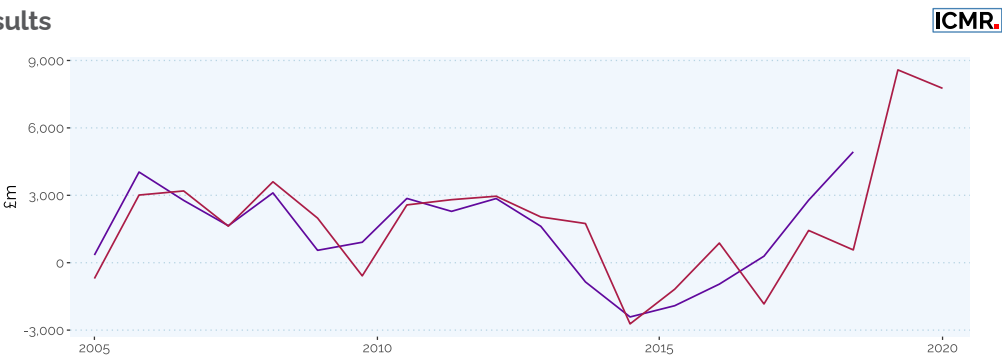


Figure 1: Lloyd's pro-forma pre-tax and underwriting year results over the past 20 years. Comparing calendar year GAAP results with the year of account results, the mismatch for 2022 (where the calendar year GAAP result booked the full mark-to-market investment losses) shows that the underlying underwriting result was still highly positive.

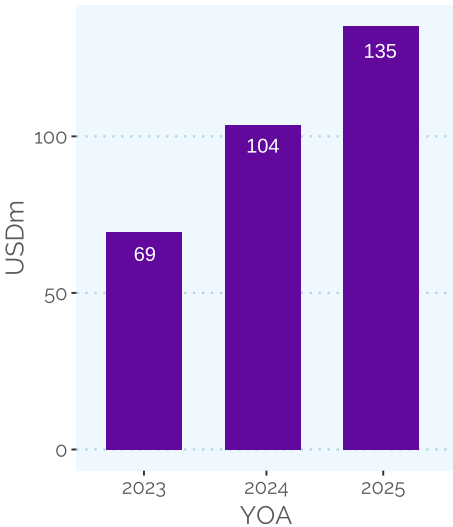
ICMR's Analysis of the HRP Portfolio Performance Potential

HRP commissioned ICMR to review the underwriting performance potential of its follow-only strategy implemented for Lloyd's syndicate 2689. The analysis involved reviewing the impact of the changes to the portfolio since current management took over for the 2023 year of account, adopting its new follow-only business model. Over the past three years the strategy doubled its premium volume and increased the number of syndicates followed from 11 to 18, while the business mix remained fairly consistent.

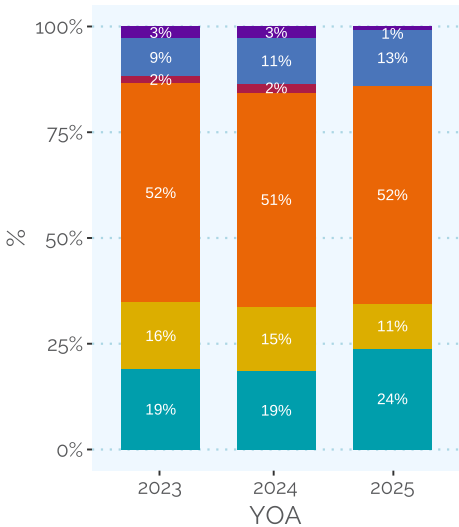
Improving risk reward profile

Using its predictive relative performance model, ICMR simulated the performance for all syndicates participating in the same classes as HRP 2689 and market level. These simulations were then aggregated according to HRP's business mix to construct a statistical peer group representing a notional Lloyd's market portfolio with a similar business mix. This notional portfolio serves as the benchmark against which the HRP portfolio is compared to evaluate its portfolio selection quality.

Gross written premium



Gross written premium split



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Source: HRP, ICMR analysis

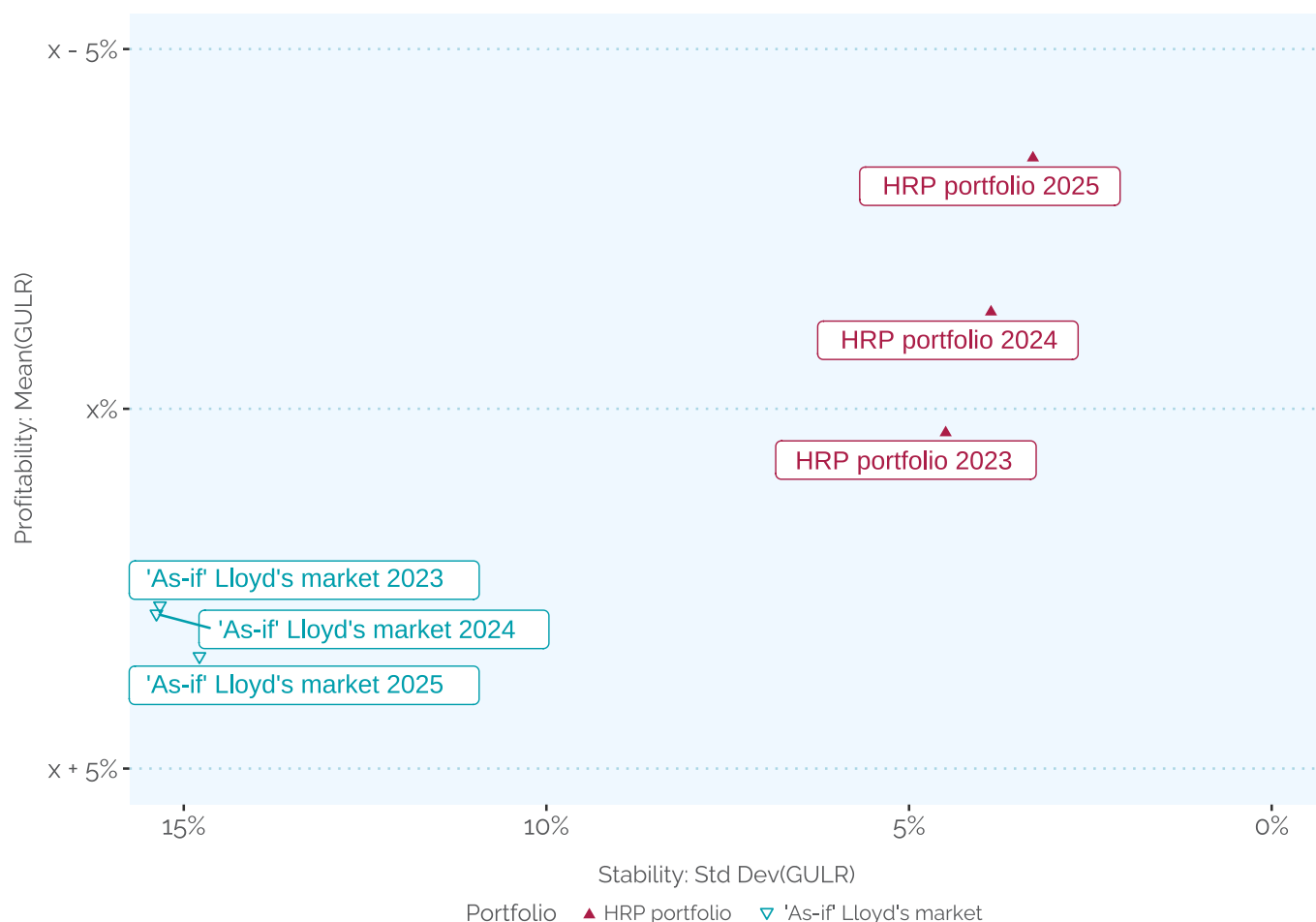
Figure 2: HRP 2689 GWP is expected to double from YOA 2023 - 2025, while the class of business mix remains largely unchanged

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Profitability vs Stability: Simulated gross ultimate loss ratios

Modelled based on predictive relative performance and expected market level absolute performance



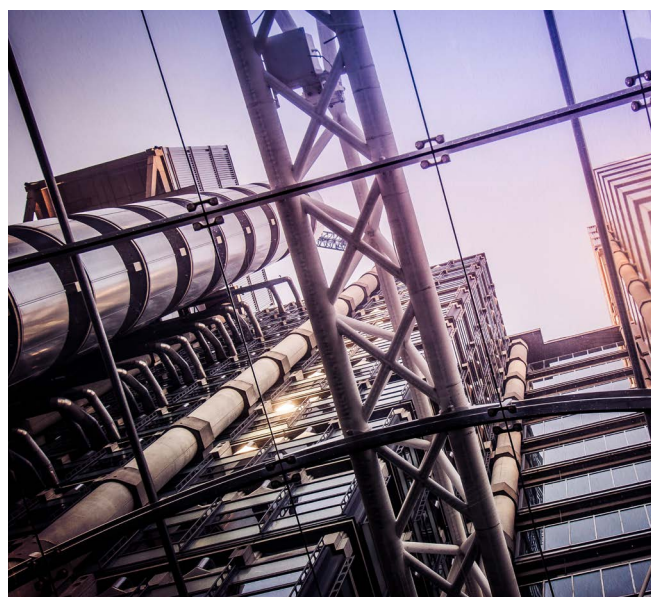
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Source: HRP, ICMR Insight, ICMR analysis

Figure 3: HRP 268g prospective performance is expected to improve and outperform the Lloyd's market with a similar business mix.

ICMR's analysis shows that the notional HRP portfolio, when compared against the equivalent notional Lloyd's market portfolio with a similar business mix, is consistently expected to outperform.

Furthermore, the evolution of the portfolio is incrementally improving its potential reward whilst at the same time reducing its volatility. The HRP strategy appears to be successfully targeting its growth with counterparties of proven quality at the same time as improving diversification benefit.

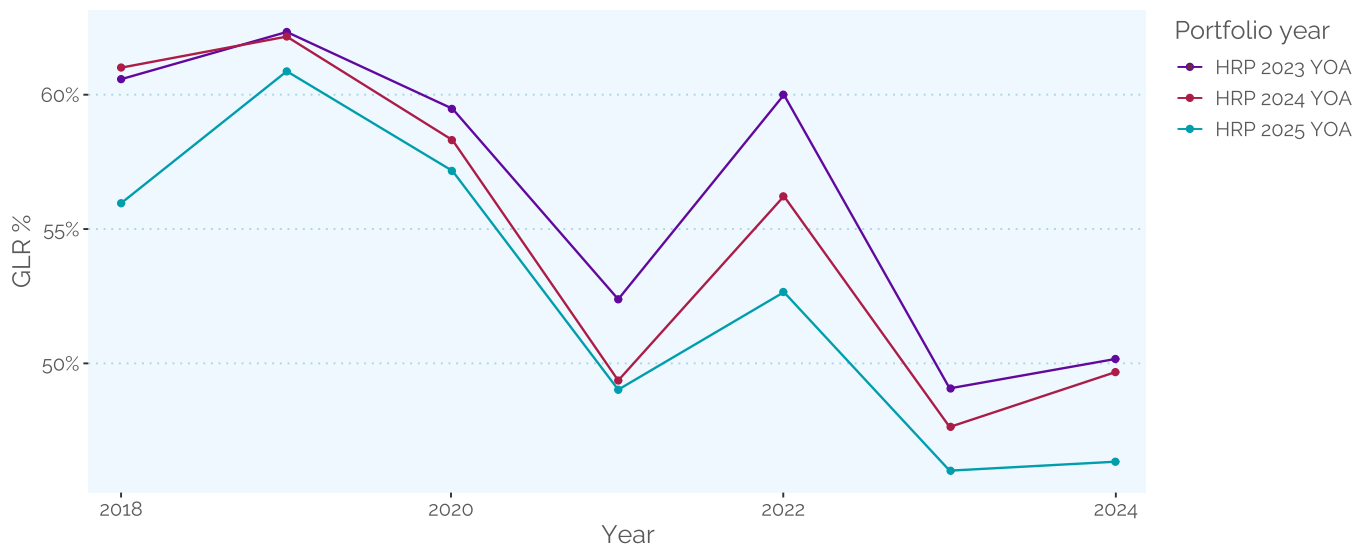


Historical track record

The improving predictive performance is driven by the improving historical track record of the portfolio underwritten over the past three years.

Historical 'as-if' gross loss ratio track record

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Source: HRP, ICMR analysis

Figure 4: As-if track record of business underwritten by HRP since 2023 YOA

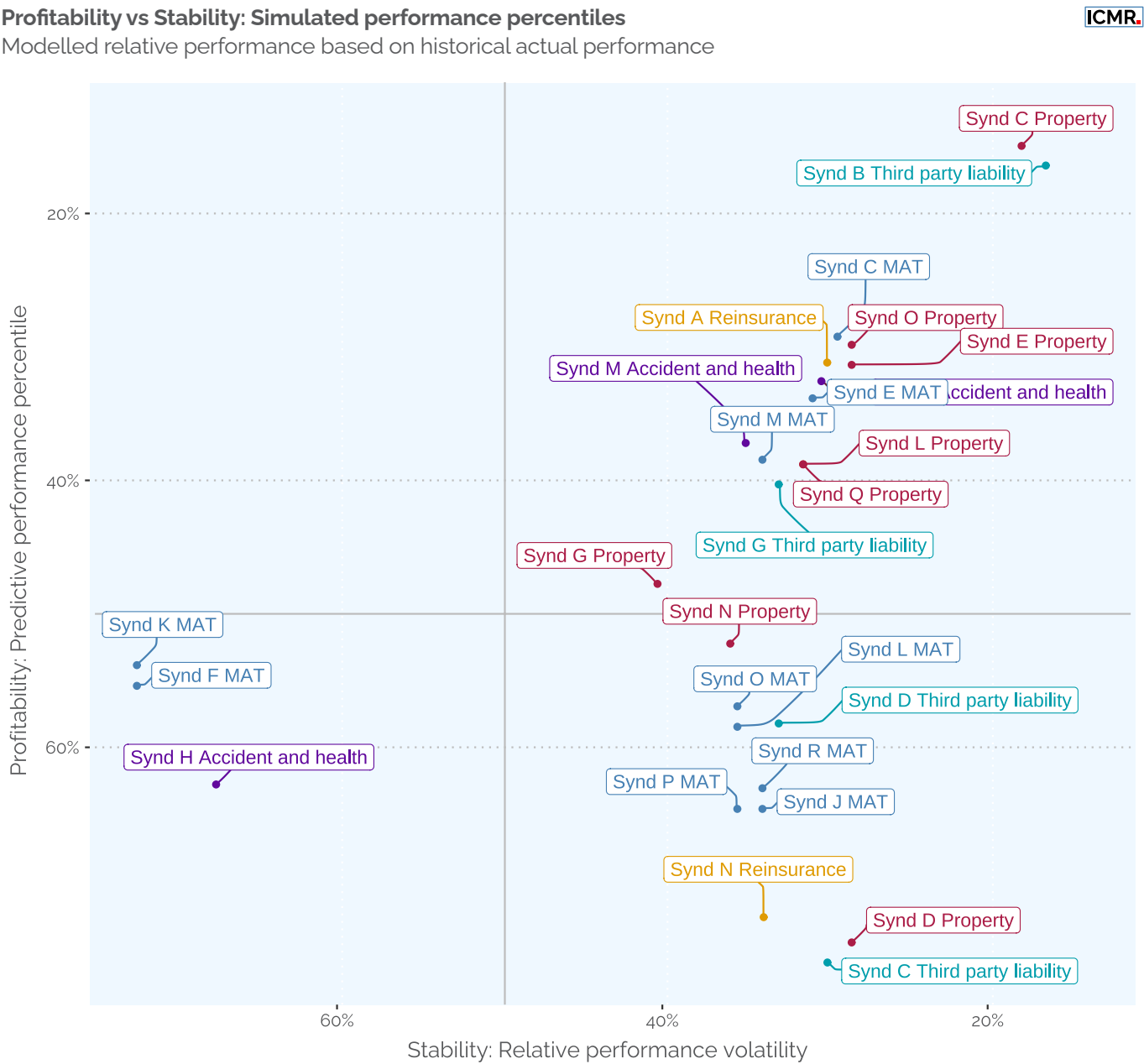
The historical 'as-if' track record of the business underwritten by HRP since the 2023 year of account demonstrates improved underwriting quality.



Class of Business Analysis

Reviewing the model output at a class of business level reveals the drivers of the expected performance. The following chart exhibits the predicted performance percentile for the syndicates and classes followed by HRP.

The optimal scenario involves strong relative performance coupled with consistent delivery of that performance, i.e. top right quadrant. HRP's portfolio is heavily weighted (70% of premiums) towards investments exhibiting these characteristics.



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Source: HRP, ICMR Insight, ICMR analysis

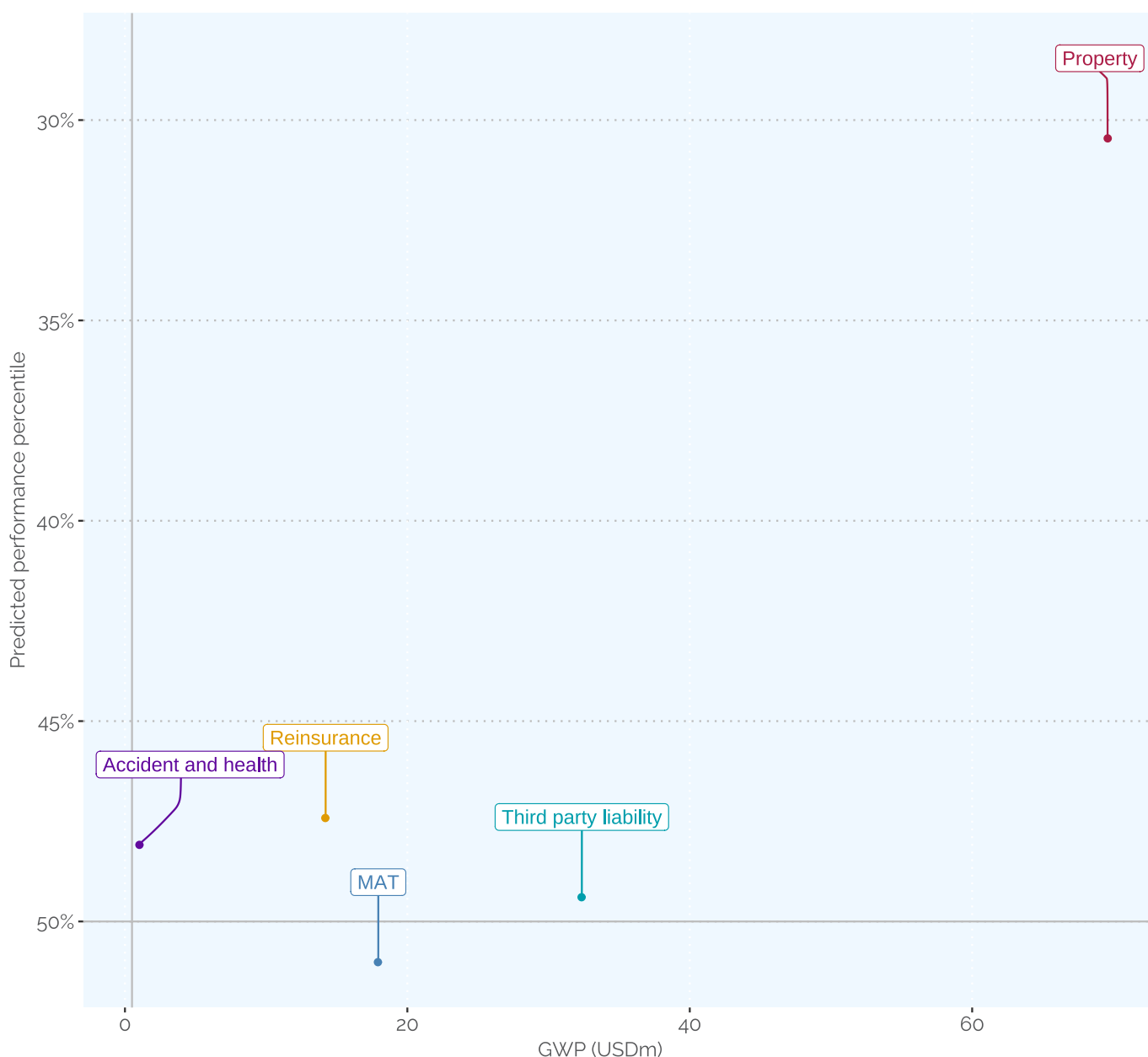
Figure 5: Chart shows the predictive relative performance and stability of the syndicates and lines of business followed by HRP for the 2025 YOA.

The bottom left quadrant (4% of the HRP portfolio) represents syndicates and classes of business with vague predictions due to limited historical data. The bottom right quadrant (26% of premiums) indicates consistent performance, typically from high-quality syndicates, profitable in the current market despite not being predicted to outperform.

Aggregating the simulation to a class of business level demonstrates that except for MAT (Marine, Aviation & Transportation) all classes are expected to achieve a performance percentile better than 50%, i.e. top or second quartile gross underwriting performance, with the HRP property book being the 'star' performer.

Simulated performance percentiles vs GWP

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Source: HRP, ICMR Insight, ICMR analysis

Figure 6: Chart shows the predictive relative performance against the planned gross written premiums for the 2025 YOA.

The Winning Strategy - Improving absolute results

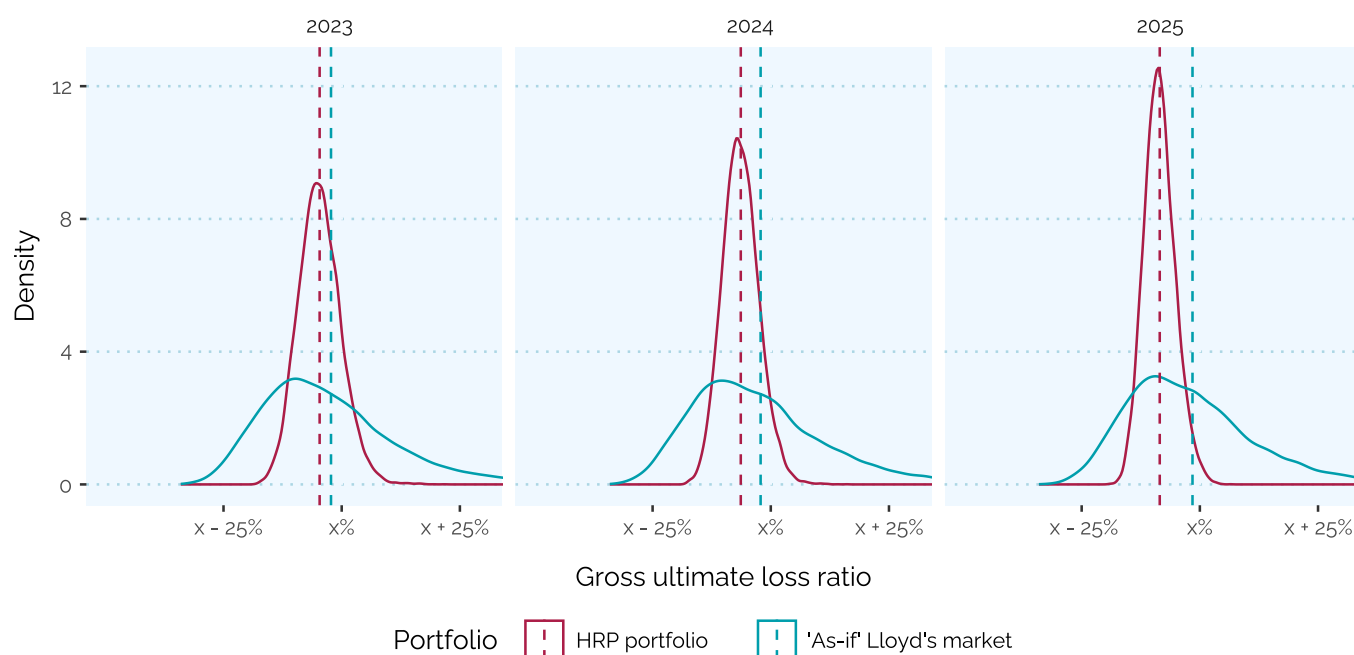
The ultimate purpose of this relative performance analysis is to demonstrate improved underwriting outcomes. This can be achieved by overlaying the relative model with absolute market level perspectives to produce a full market distribution of outcomes, and HRP's tracking against that.

Figure 7 illustrates that the notional HRP portfolio exhibits lower volatility, and a reduced mean loss ratio compared to the equivalent notional 'As-if' Lloyd's market portfolio.

Simulated Gross Ultimate Loss Ratio Distributions

Dashed vertical lines show mean loss ratios

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Source: HRP, ICMR Insight, ICMR analysis

Figure 7: HRP 2689 prospective performance is expected to improve and outperform the Lloyd's market with a similar business mix.



This analysis evidences the HRP management's track record in successfully building its portfolio with counterparties of proven quality, so improving underwriting outcomes over time. In addition, it is also improving the diversification benefit with the narrowing of its own distribution.

Strategic Advantages for HRP

Predicting relative performance using ICMR's AI-powered model offers significant strategic advantages for Hampden Risk Partners.



- **Enhanced Underwriting Strategy:** By identifying consistently outperforming syndicates and lines of business, HRP can refine its risk selection and identify opportunities for profitable growth.



- **More Effective Investor Communications:** Providing a sophisticated and predictive view of future performance enhances transparency and builds confidence with investors.



- **Optimised Capital Allocation:** The analysis helps identify syndicates with a high probability of sustained relative outperformance, supporting informed decisions about capital deployment.



- **Competitive Advantage:** A deeper, data-driven understanding of the relative performance landscape allows HRP to anticipate market shifts, identify emerging threats and opportunities and gain a significant competitive edge in the highly competitive Lloyd's market.



- **Improved Syndicate Management:** HRP gains objective, data-driven insights into its performance relative to peers, aiding performance evaluation, target setting and resource allocation.

The analysis by ICMR directly supports HRP's strategy by demonstrating that its approach is successfully targeting growth with quality counterparties, while simultaneously reducing volatility and improving potential reward.

Conclusion

Reliance on traditional absolute performance metrics in the Lloyd's market provides an incomplete picture. By shifting the focus to relative performance and leveraging the power of AI, a new era of predictive insights is unlocked.

Hampden Risk Partners, through its collaboration with ICMR and the application of an AI-powered model, has gained a more stable, insightful and valuable approach to understanding and forecasting portfolio performance.

ICMR's analysis provides clear evidence that HRP's strategic approach is resulting in a portfolio with superior expected performance and lower volatility compared to a relevant market benchmark. For Hampden Risk Partners, embracing the prediction of relative performance is not just an analytical exercise – it is a winning strategy.

Learn more about how the ICMR AI-powered relative performance prediction model can transform your strategic decision-making. Contact ICMR today for a consultation.

Appendix: Methodology

The Science of Winning

Predicting the winner is about predicting the rank performance of peers.

A model for predicting ranks is the so-called Plackett-Luce model (Plackett (1975), Luce (1959)). Its basic premise is that for each peer Y_i , with $i = 1, \dots, n$, there is a parameter α_i , describing its 'ability' and hence it allows us to calculate the probability of winning:

$$P(Y_i) = \frac{\exp(\alpha_i)}{\sum_{k=1}^n \exp(\alpha_k)}$$

The use of the exponential function is to ensure the ability parameter α_i is mapped to a positive number, even for negative abilities. The sum in the denominator ensures the probabilities of winning across all peers sums to one, like good probabilities should.

The Plackett-Luce model also allows to model the joint structure of all the ranks and not just the probability of getting first. The likelihood of the order $1, \dots, n$ is:

$$P(Y_1 > Y_2 > \dots > Y_n) = \prod_{i=1}^n \frac{\exp(\alpha_i)}{\sum_{k=1}^n \exp(\alpha_k)}$$

We further refine the model by including additional parameters, such as a noise parameter σ , for example to take account of more recent performance getting more weight than prior performance, or performance in a year with major loss activity being more indicative of the 'true' underlying 'ability' compared to a year with benign loss activity. As a result the 'ability' parameter changes to $\frac{\alpha_i}{\sigma}$.

In the case of dividing the historical data into m subsets with decreasing indicative performance, we have:

$$\sigma_1 = 1 \leq \sigma_2 \leq \dots \leq \sigma_m.$$

Example

Suppose we have 6 teams with the following known ability scores and derived 'true' probabilities of winning:

	Team 1	Team 2	Team 3	Team 4	Team 5	Team 6
ability	1.0	1.3	1.8	-0.1	0.0	1.2
probability	15.4%	20.8%	34.3%	5.1%	5.7%	18.8%

However, observable to us is only the outcome of 10 rounds. The following table shows the rank performance (league table) of the six teams across these 10 rounds. Team 3 won the first round and came fourth in the second round, which was won by Team 6.

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

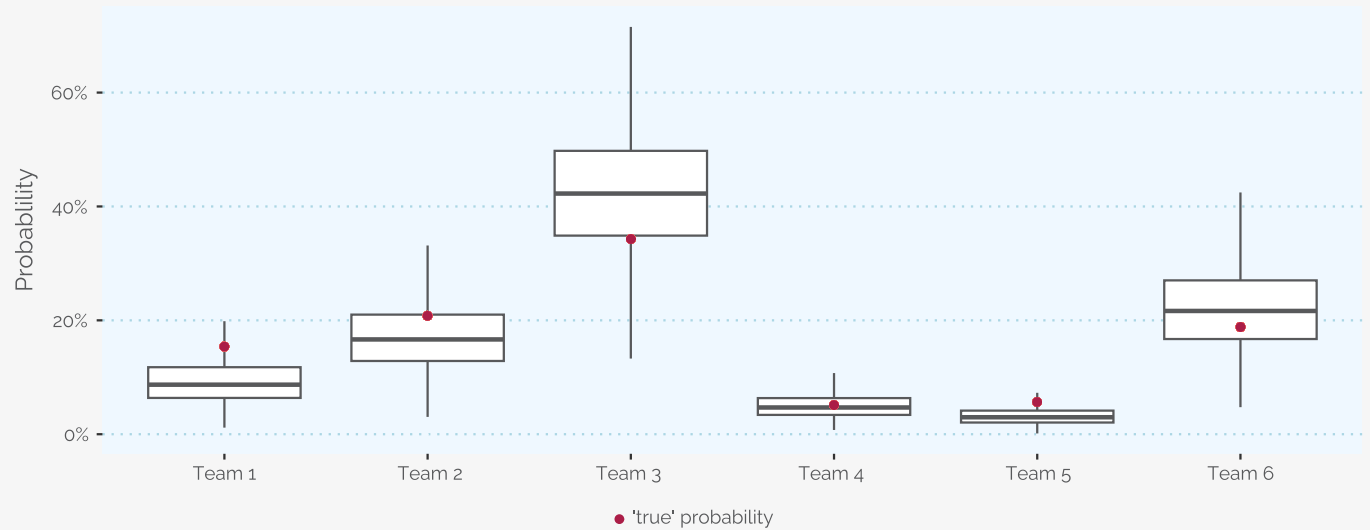
	Rank 1	Rank 2	Rank 3	Rank 4	Rank 5	Rank 6
Round 1	Team 3	Team 6	Team 1	Team 2	Team 5	Team 4
Round 2	Team 6	Team 2	Team 4	Team 3	Team 5	Team 1
Round 3	Team 1	Team 6	Team 3	Team 2	Team 4	Team 5
Round 4	Team 1	Team 3	Team 6	Team 2	Team 5	Team 4
Round 5	Team 2	Team 3	Team 5	Team 6	Team 4	Team 1
Round 6	Team 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

Using the Plackett-Luce model we can estimate the winning probabilities based on the observed data, i.e. the outcomes of the 10 rounds of playing. In this example we treat the information from each round as equally credible and don't introduce an additional noise parameter σ .

Distribution of estimated winning probability

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Probabilities estimated based on 10 rounds of playing



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Source: ICMR analysis

Figure 8: Simulated winning probabilities by team after 10 rounds of playing compared to 'true' probability.

Figure 8 shows the estimated winning probabilities for each team, but instead of showing a point estimate, the box-whisker plot shows distribution of the posterior probabilities for each team.

The box illustrates the 50% credible interval, which means we expect the 'true' probability (highlighted in

orange) to sit within this box with a likelihood of 50%, which it does for 3 out of the 6 teams. The model clearly identified Team 3 as the most able team, followed by Team 6, Team 2, Team 1, Team 4 and Team 5. However, based on the true underlying ability scores Team 2 is better than Team 6, and Team 5 is better than Team 4.

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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