Howden Re

Into the Cyberverse

April 2025

Executive summary

Howden Re's inaugural cyber reinsurance report, 'Reframing cyber risk', called on carriers to evaluate their cyber risk tolerances and exposure in order to capitalise on the vast opportunity this market has to offer.

Favourable market conditions, supported by significant rate hardening in 2021 and 2022, have accelerated this process, despite recent rate moderation. Whilst the cyber market continues to mature, numerous positive indicators suggest the class has ample room to grow. For example, reinsurance and retrocession capacity has increased, innovation has diversified reinsurance product offerings and shifting reinsurance buyer behaviour indicates growing confidence in the underlying risk.

Into the Cyberverse builds on last year's thesis by examining the cyber reinsurance market in aggregate, not only to evaluate its efficiency today, but to stress-test its trajectory. By analysing how losses move through the cyber ecosystem, the report explores the efficacy of current reinsurance structures, and where barriers to growth are evident. It also suggests solutions to streamline and support its progression.

Section 1: Visualising the 2025 cyber market ecosystem

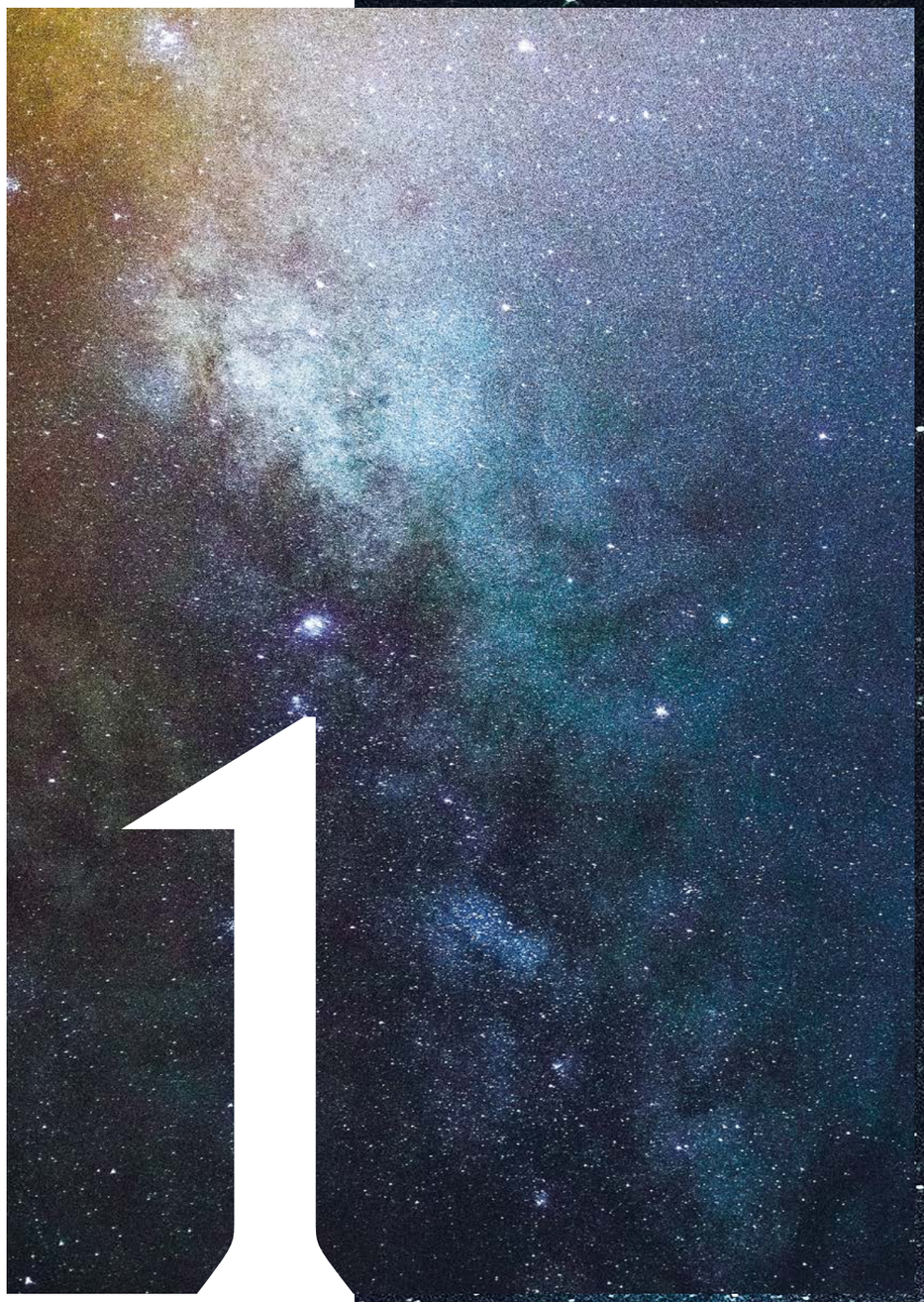
Section 1 provides a visual analysis of how premium flows through the cyber risk transfer market from insurer to retrocessionaire. In contextualising market maturity, it evaluates how the currently saturated reinsurance market offsets an efficient and well-diversified assortment of product offerings. It also illustrates how a decrease in quota share cessions over time has shifted market dynamics, as non-proportional cover becomes more cost effective for targeted tail risk transfer.

Section 2: Who owns the tail?

Looking more specifically at the tail, Section 2 utilises both fully probabilistic and fixed attrition methodologies to evaluate whether reinsurers or insurers, in aggregate, assume the majority of catastrophe losses in the current cyber ecosystem. It further demonstrates that, depending on carriers' individual reinsurance purchasing strategies, some products provide more material benefits than others. In order to understand reinsurance efficiency holistically, it is essential to utilise both perspectives.

Section 3: Back to the future

Takes current trends to the extreme, transforming the cyber market visual from Section 1 into a hypothetical 'future' state, which assumes insurance premium volumes are roughly double current estimates. This scenario makes clear that a more robust retrocession market is essential to support sustainable growth — especially as more losses flow through the ecosystem and more cedents turn to non-proportional cover for tail risk protection. Simultaneously, cyber model advancements are necessary to support model dependent products such as cat bonds, industry loss warranties (ILWs) and retrocession placements, which are all essential for a thriving, mature reinsurance market.



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Visualising the 2025 cyber market ecosystem

As the cyber reinsurance landscape evolves, important questions emerge around how risk is transferred, who ultimately bears it and whether this ecosystem can efficiently and sustainably support future growth.

Figure 1 visualises how premium flows through the cyber market from primary insurer to retrocessionaire. The underlying data represent 62 insurers and roughly US$ 11 billion of cyber gross written premium (GWP), or circa. 70% of total cyber insurance GWP (Howden Re estimates US$15.85 billion in 2025).

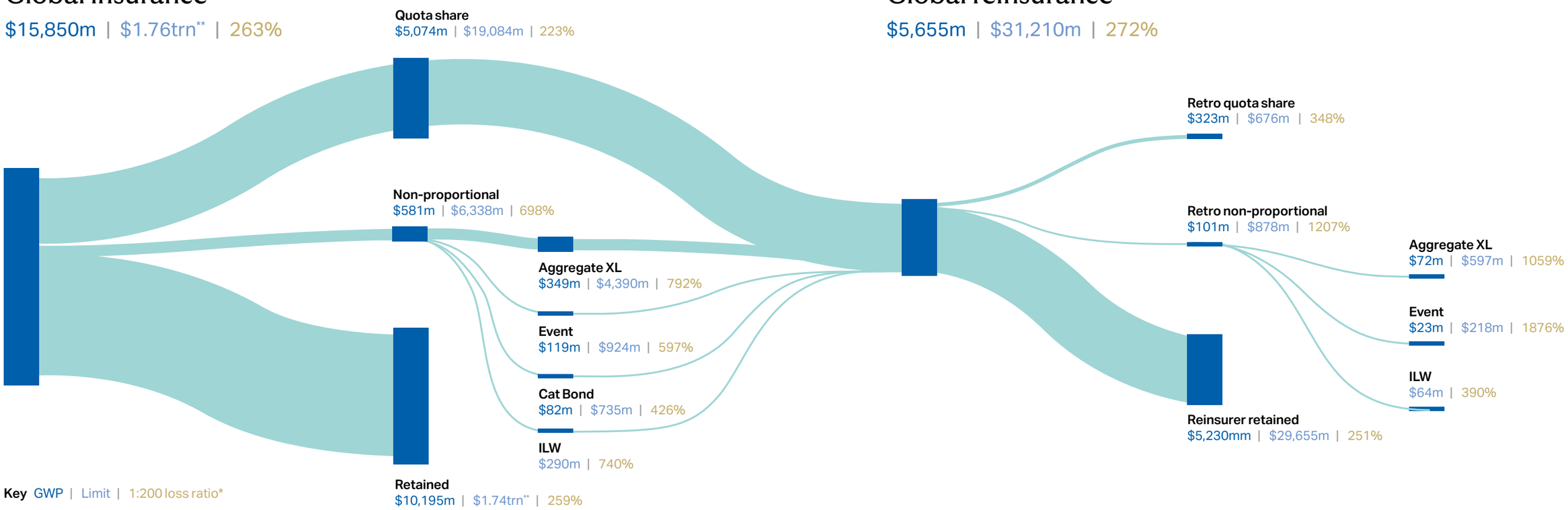
On the reinsurance side, the data include 94 cedents (across insurers and reinsurers) purchasing more than 150 treaties, or 77% of the market, with US$4.66 billion in reinsurance and retrocession premium captured compared with ca. US$6.09 billion of total premium in the global standalone cyber reinsurance and retrocession markets.

The snapshot of the current cyber landscape in **Figure 1** reveals an increasingly sophisticated market with well-diversified reinsurance product offerings, including a more robust non-proportional market. This reflects reinsurers' growing confidence in managing systemic cyber risk, as well as cedents' focus on tail-risk protection and profit retention.

All Howden Re cat modelling analysis in this report uses CyberCube v5.5 and Howden view of risk.

Figure 1

Premium flows across the cyber (re)insurance market.



*Loss ratio at AEP 200yr return period for gross of acquisition costs

** Excludes some endorsement/embedded business which represents a very small proportion of overall premium

36%
of GWP ceded to reinsurers

$5bn
Size of reinsurance QS market (in GWP)

$581m
Size of reinsurance non-proportional market (in GWP)

7%
Retrocession utilisation (% of reinsurer GWP)

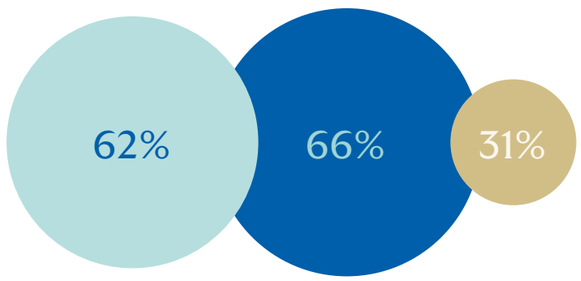
Yet, **Figure 2** also illustrates that the market is still developing. Based on Howden Re estimates, the top five cyber reinsurers command a cumulative GWP market share of 62%, rising to 87% when extended to the top ten. While this concentration suggests experience at the top, it also reveals a lack of balance, which could challenge future growth.

Predictably, competition is intensifying. 62 reinsurers are now actively writing standalone cyber reinsurance — including nine new entrants with business plans totalling US$ 250 million of GWP this year — requiring strategic manoeuvrability to win and retain business. These contrasting datapoints define a burgeoning market still finding its stride.

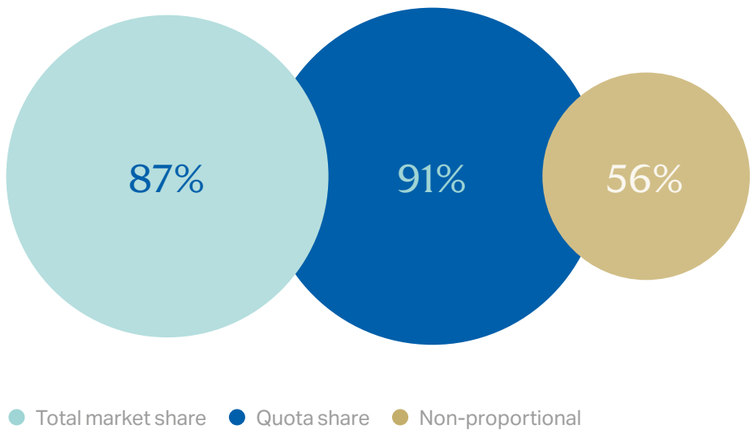
Figure 2

Concentration of cyber reinsurance premium in the top five and top ten reinsurers, by product.

Top five reinsurers



Top ten reinsurers



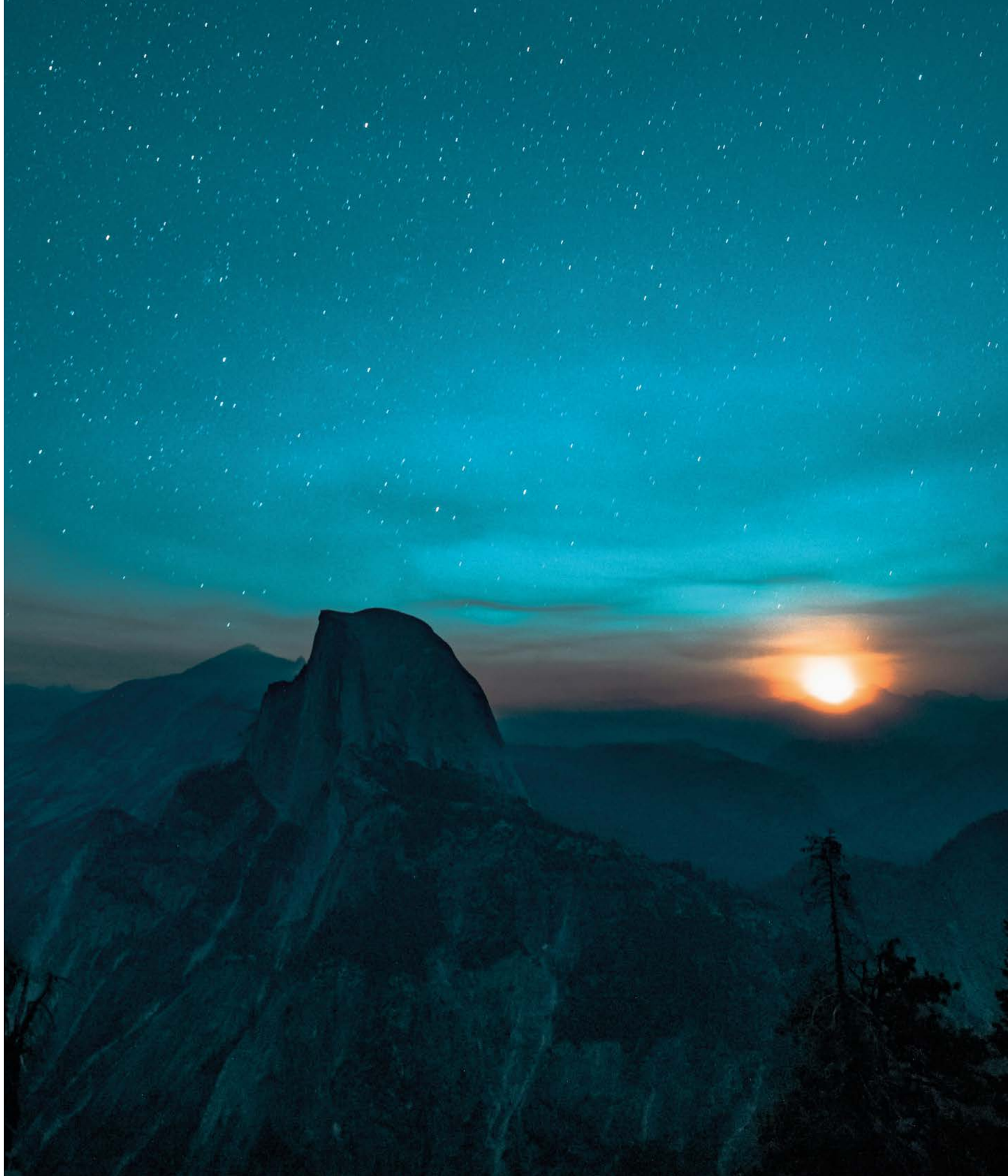
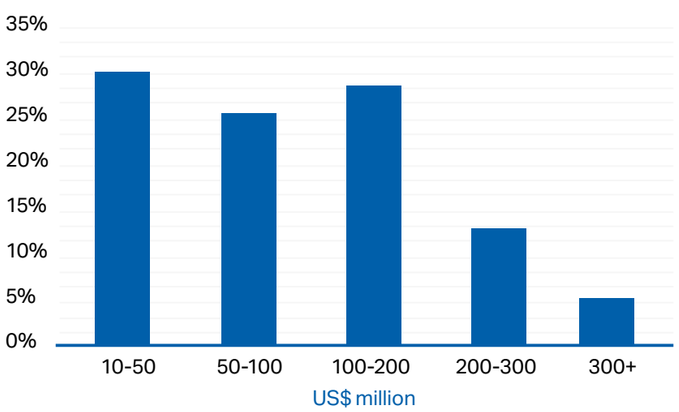


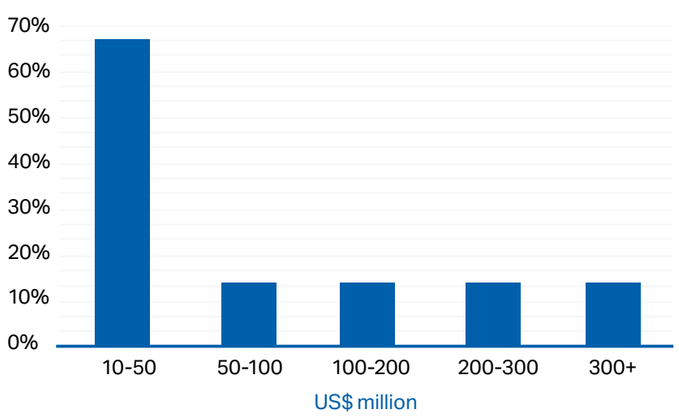
Figure 3

Percent of reinsurance buyers by product and limit purchased.

Reinsurance aggregate XL
Percentage of buyers by limit banding



Reinsurance event and aggregate of event XL
(excluding Cat Bonds and ILWs) percentage of buyers by limit banding



Reviewing cyber risk transfer in aggregate, 36% of the US$15.85 billion of cyber insurance GWP is ceded to reinsurers through proportional and non-proportional structures (32% and 4%, respectively), while 64% is retained by cedents. On the retrocession side, 7% of reinsurance GWP is subsequently ceded to retrocessionaires.

A steady decrease in quota share (QS) cessions over time has shifted the cyber landscape, as more carriers turn to non-proportional products to protect against systemic risk. Although QS remains the dominant form of risk transfer, Howden Re estimates that the average cession has come down from 57% five years ago to 45% today. Note that the 32% figure above accounts for carriers that do not purchase quota share, including some notable carriers that have non-renewed their quota share treaties in recent years.

Reducing QS cessions gained momentum following the dramatic uptick in ransomware, and subsequent rate hardening in 2021 and 2022: Carriers increasingly sought to retain more premium and reduce profit ceded through proportional structures.

At the same time, carriers continued to develop a more refined risk appetite, concentrating their reinsurance spend on tail-risk protection rather than broad-based capital relief. More recently, softening in the non-proportional market has made aggregate excess-of-loss, event based and similar structures more cost effective, further incentivising cedents to use them for targeted tail risk transfer.

As evidence, **Figure 3** illustrates the number of reinsurance buyers by product, revealing more material non-proportional utilisation across the market.

While **Figure 1** provides a comprehensive illustration of how premium flows through the cyber market today, it is difficult to determine through this lens alone the system's efficiency for buyers and sellers of cyber cover. It is imperative to evaluate how volatility and tail losses flow through the ecosystem in order to stress-test the market's maturity and longevity.

Who owns the tail?

Two methodologies to evaluate how tail losses impact (re)insurer performance are fully probabilistic and fixed attrition scenarios.

2

The first offers a theoretical perspective using models to assess losses in more frequent and likely catastrophe scenarios (i.e. 1 to 200-year return periods) and more rare and severe scenarios (i.e. 800 to 1,000-year return periods). The second provides a tangible view showing how losses would materialise if an event of US$ x size occurred within a fixed attritional, or high frequency / low severity, loss environment outside of cat.

Whilst fully probabilistic outputs are often more intuitive as vendor models offer a consistent and widely adopted framework for comparing entities' loss experience and quantifying tail risk, they have limitations. First, they include attritional volatility, allowing for adverse cat years to coincide with adverse attrition years, which may be unrealistic. Second, they emphasise extreme tail-risk, which may be less useful given that events at higher return periods are incredibly rare.

On the other hand, fixed attrition scenarios — used in the latter half of this section — more tangibly represent tail risk by reflecting a selective cat loss range, some indicative of historical cyber events, and others more extreme. Each analysis includes pre-set attrition levels to test effects in both stable and adverse attrition years.

Although neither approach is more effective in measuring how losses move through the tail, each offers different viewpoints, shedding light on how the ecosystem performs in different scenarios. Takeaways will vary depending on priority, or carriers' specific reinsurance purchasing strategies.

To stress test the efficiency of the cyber ecosystem today, it is essential to combine both perspectives to provide a holistic view of tail risk. The following analysis should not be considered a 'tool kit,' per se, rather, a window into the market demonstrating how losses move through the ecosystem. It also illustrates that whilst all reinsurance products are important, structure materially impacts effectiveness.

2.1

Cyber losses through a fully probabilistic lens

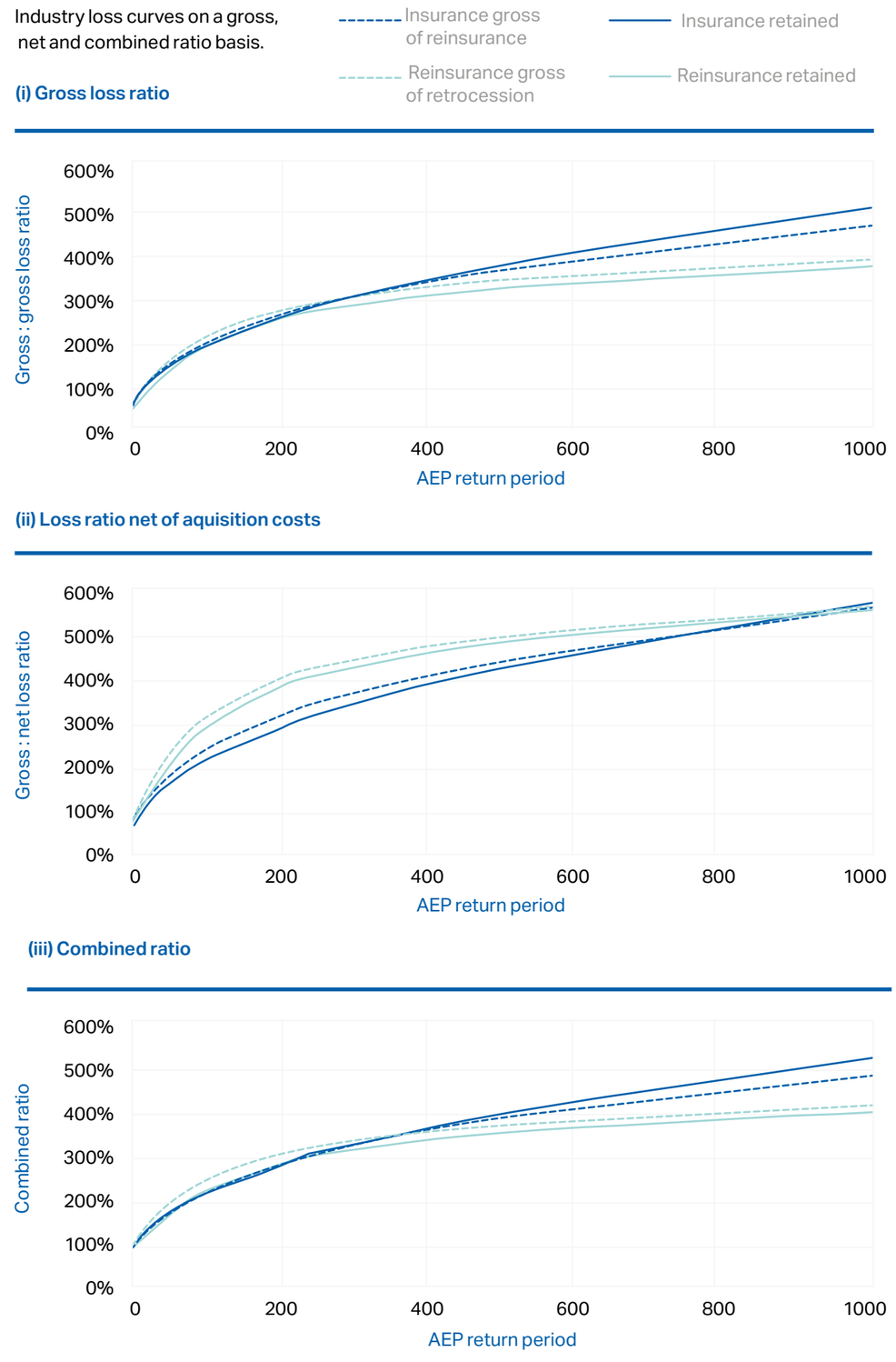
Figure 4 uses aggregate exceedance probability curves to analyse the likelihood that the sum of all losses in a given year exceeds a certain amount through three distinct, yet interconnected perspectives: (i) gross loss ratios, (ii) loss ratios net of acquisition costs, and (iii) (re)insurer profit and loss.

On a gross basis, insurers (net of reinsurance) and reinsurers (net of retrocession) are closely aligned up to the 1-in-200 year return period, essentially assuming losses equally. Beyond this point, non-proportional structures begin to exhaust and quota share caps are approached, resulting in insurers' loss ratios deteriorating more rapidly than reinsurers'.

When acquisition costs are factored in, reinsurers assume losses up to the 1-in-900 year return period reflecting the higher acquisition cost they incur to access premium. Despite this, reinsurers see less deterioration in profitability at higher return periods — evidenced by the combined ratio distribution, which closely mirrors the gross loss ratio curve. This alignment likely reflects reinsurers' structurally lower expense ratios and their ability to earn higher margins through non-proportional covers, which have remained largely loss-free.

Figure 4

Industry loss curves on a gross, net and combined ratio basis.



Whilst the previous charts show full probabilistic outputs up to a 1,000-year return period, **Figure 5** presents a market view of ceded loss ratios by individual product, focussing on quota share, aggregate excess-of-loss and event excess-of-loss (including aggregate of events). The analysis indicates that, on a modelled and aggregated basis, non-proportional structures exhibit lower loss ratios than quota share structures at the mean.

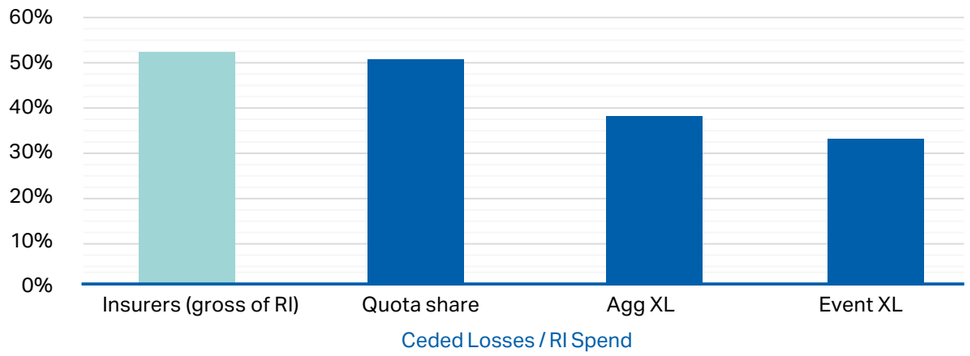
However, the difference is not as pronounced as one might expect. When accounting for acquisition costs, reinsurers can achieve significant margins on non-proportional structures, especially compared with quota share, where reinsurers incur higher access costs.

At the 1-in-200 level, the spread between insurers' gross loss ratios and quota share ceded loss ratios widens, as some quota share treaties begin to exhaust their loss ratio caps. In this scenario, the efficiency of non-proportional structures as dedicated tail protection is clearly evident.

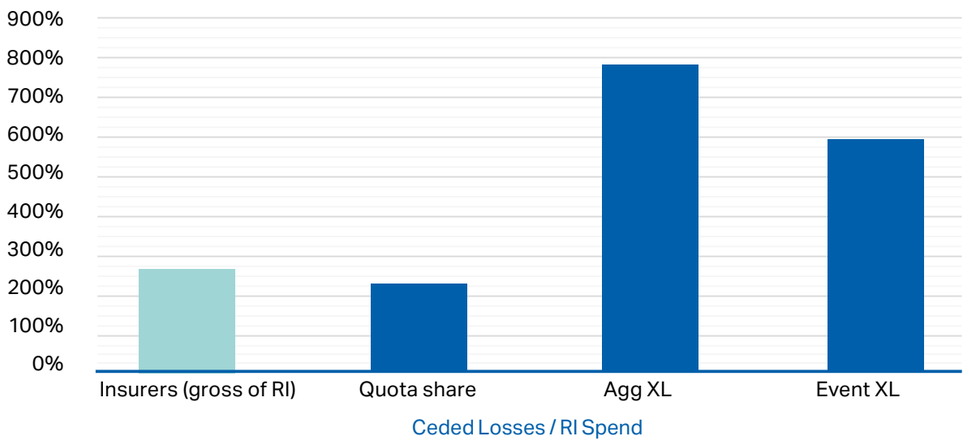
Figure 5

Ceded loss ratio by product.

Mean loss ratio



1:200 AEP loss ratio



2.2 From a fixed attrition perspective

Using a fully probabilistic lens is valuable, but it over-emphasises the extreme tail and includes attritional volatility. It is, therefore, important to contextualise these curves within actual cyber loss experience. While the loss distributions in **Figure 4** characterise the most extreme hypothetical scenarios, events of these magnitudes have not only never happened, they are yet to even come close.

Figure 6 shows industry cat loss ratios for some of the most significant cyber events since 2017.

Using this chart to frame **Figure 4**, if NotPetya and CrowdStrike — the costliest malicious and non-malicious insured cyber events to date — occurred in the same year, it would only correlate to the 1-in-8 year return period in the previous figure.

Therefore a more tangible application, accounting for pre-set attrition levels, refines the view of tail risk by evaluating (re)insurer profitability in specific market loss scenarios — stress testing for spikes in catastrophe losses by varying severity.

Figure 6

Industry cat loss ratios for recent cyber events 2017-2024.

1. NotPetya 7.0%
2. WannaCry 1.5%
3. SolarWinds 1.3%
4. MS Exchange 1.5%
5. Kaseya 1.3%
6. Log4j 1.0%
7. MOVEit 1.9%
8. CrowdStrike 4.0%
9. Change Healthcare 1.7%

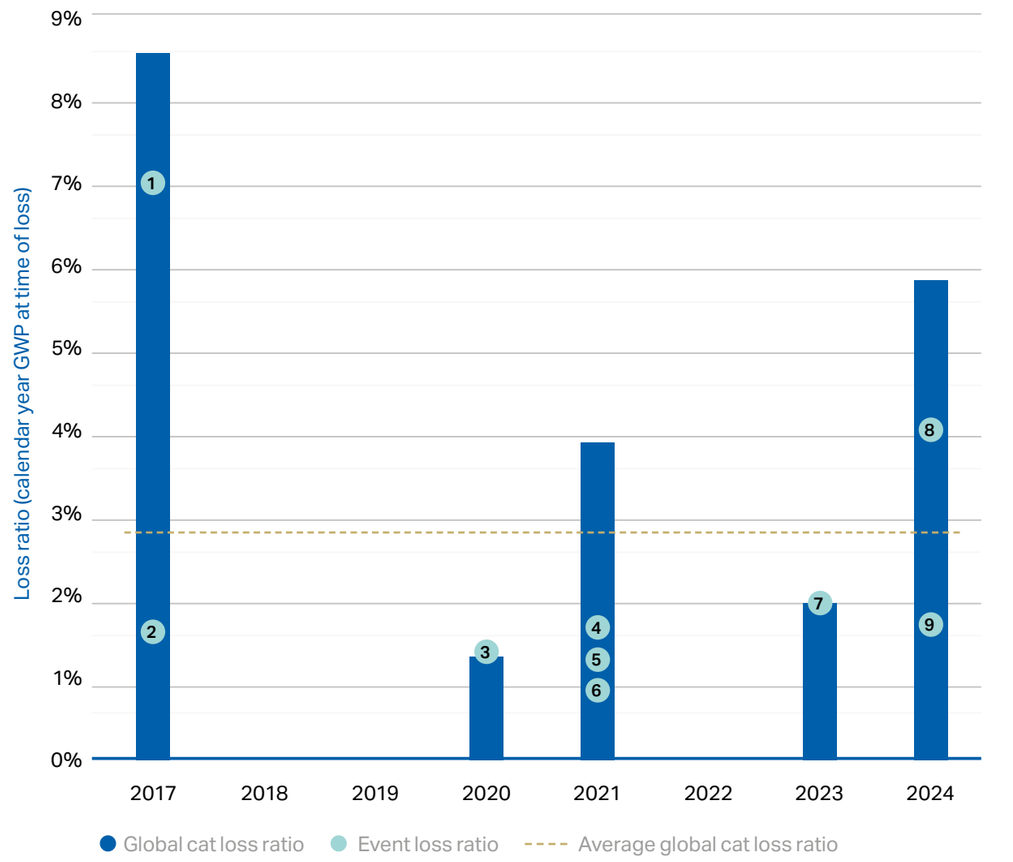
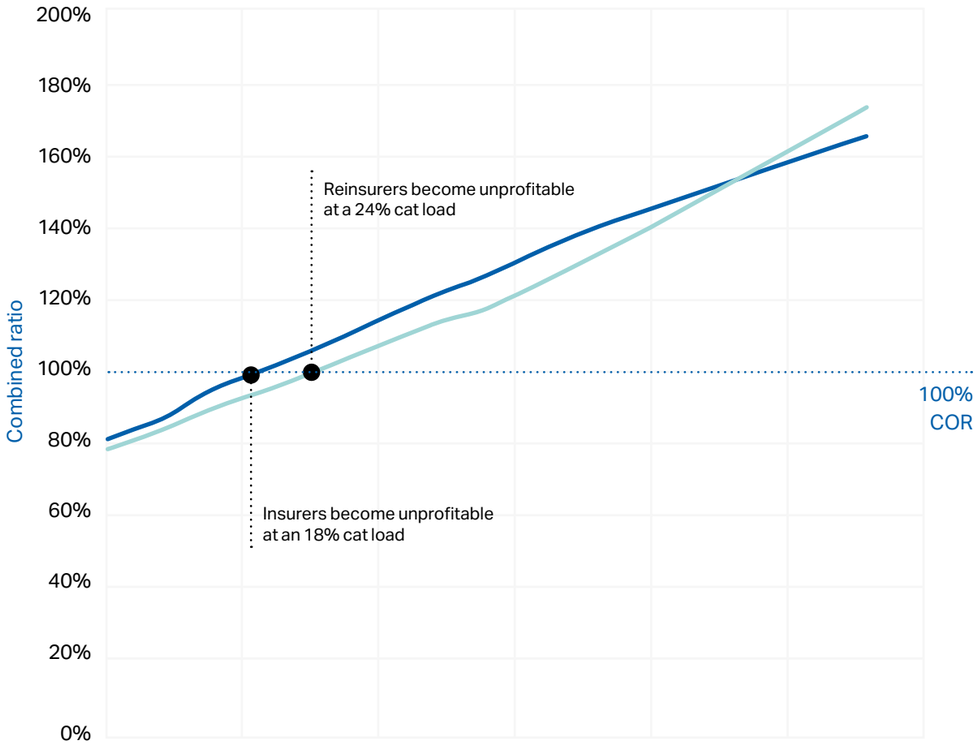


Figure 7

Industry net combined ratios, assuming a 45% and 60% attrition load, compared to aggregate annual cat losses.

Net combined ratio (assuming 45% attrition load) vs aggregate cat loss



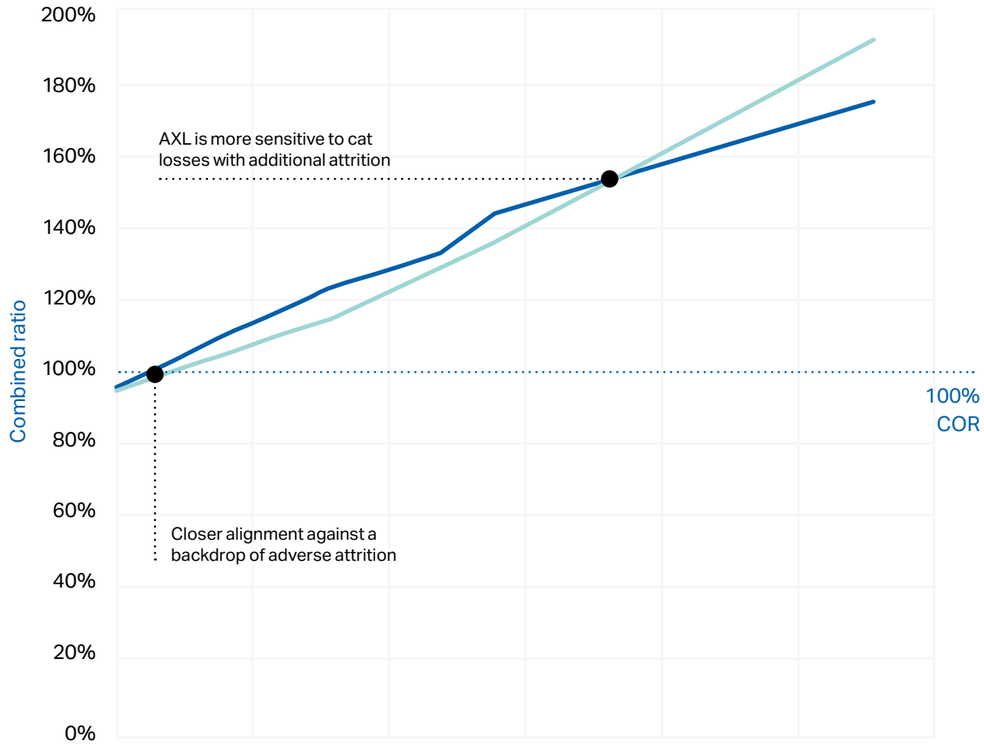
Aggregate cat loss	2.5bn	5.0bn	7.5bn	10.0bn	12.5bn	15.0bn
Cat LR/AEP return period (loss ratio)	16% / 1 in 9	32% / 1 in 15	47% / 1 in23	63% / 1 in 37	79% / 1 in 57	95% / 1 in 78
Total LR (loss ratio including attrition)	61%	77%	92%	108%	124%	140%

Figure 7 considers (re)insurer profitability in the context of two underlying attritional loss scenarios. The first, assumes that attrition is running smoothly at 45%, broadly in line with current market conditions. The second assumes a higher 60% attrition load, which reflects — but is not necessarily equal to — the attrition levels observed during the ransomware-driven loss years of 2019 and 2020.

In the first scenario, reinsurers can remain profitable up to a 24% cat load, compared to insurers who become unprofitable beyond an 18% load. Cedents continue to deteriorate ahead of reinsurers until the extreme loss scenarios. At this point, reinsurer combined ratios deteriorate more rapidly as aggregate excess-of-loss structures, as well as cat bonds and industry loss warranties (ILWs), begin to attach.

Insurer net combined ratio Reinsurer net combined ratio

Net combined ratio (assuming 60% attrition load) vs aggregate cat loss



Aggregate cat loss	2.5bn	5.0bn	7.5bn	10.0bn	12.5bn	15.0bn
Cat LR/AEP return period (loss ratio)	16% / 1 in 9	32% / 1 in 15	47% / 1 in23	63% / 1 in 37	79% / 1 in 57	95% / 1 in 78
Total LR (loss ratio including attrition)	76%	92%	107%	123%	139%	155%

At higher levels of attrition, cedent and reinsurer combined ratios are more closely aligned in the lower return periods, although reinsurers can still take on marginally more risk before they hit a 100% combined ratio. At the same time, reinsurers begin to deteriorate ahead of insurers at a lower loss level than at more stable levels of attrition. This is because aggregate excess-of-loss structures are more sensitive to frequent, low severity losses.

In each chart, the crossover point, where reinsurers' combined ratios surpass insurers', marks the inflection at which reinsurance begins to provide meaningful earnings protection for cedents. Prior to this threshold, cedents retain a disproportionately higher share of the loss burden.

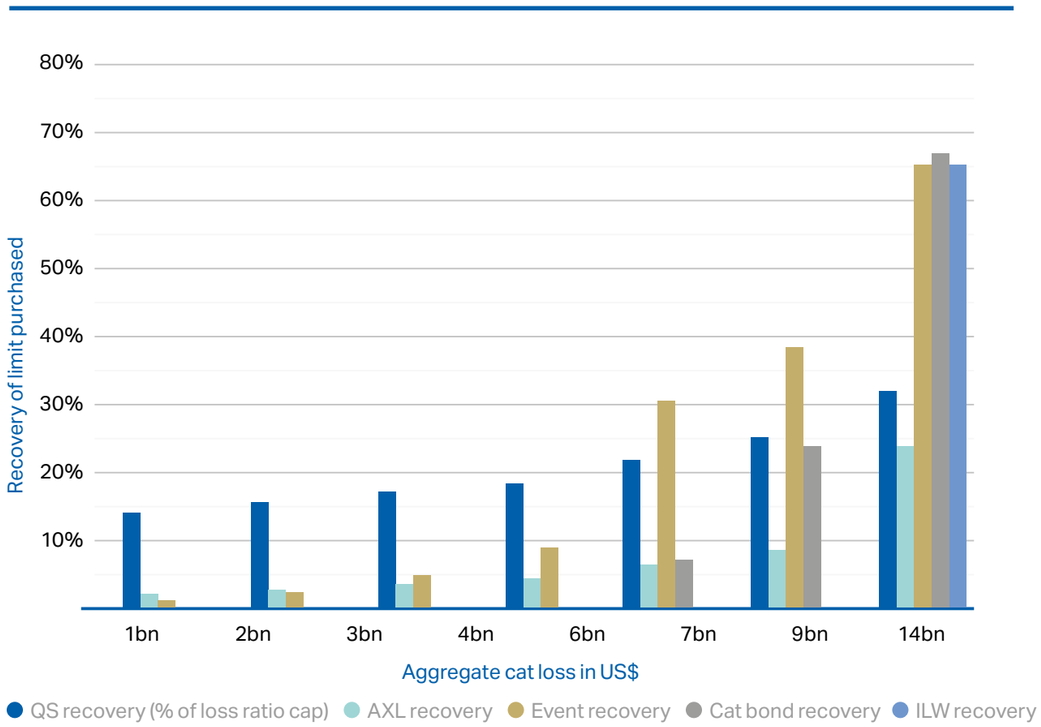
Through this lens alone, reinsurance may not be working as efficiently in the cyber ecosystem as expected. **Figure 8** illustrates that insurers recover only a small percentage of their purchased limit, even in extreme loss scenarios where full, or near full, recoveries would be anticipated. For example, at a US$ 9 billion dollar cat loss, insurers only recover ca. 10% of their aggregate excess-of-loss (AXL) cover in a stable attrition environment. If that same event occurred in an adverse attritional loss year, insurers would still only recover about 15% of their AXL based on this analysis in isolation.

These findings indicate that cedents would benefit from using both fully probabilistic and fixed attrition perspectives to critically evaluate their reinsurance purchasing strategies. **Figure 8** illustrates that if cedents heavily rely on AXL reinsurance to protect against spikes in catastrophe losses, they may not receive the desired benefit from the product. Still, reinsurance is purchased for a variety of reasons, ranging from 'sleep-easy' cover and line size management, to creating headroom within risk tolerance thresholds to facilitate growth, to meeting regulatory and rating agency capital requirements, to minimising volatility and maximising franchise value. The challenge for individual carriers is to align reinsurance structures with strategic objectives.

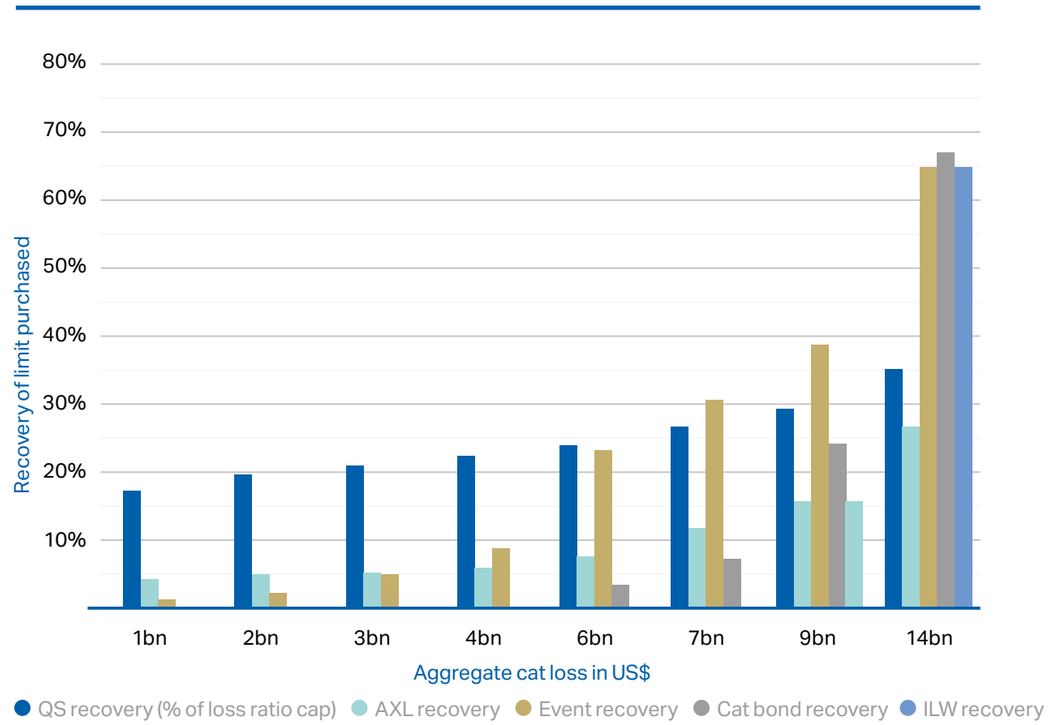
Figure 8

Insurer recoveries by reinsurance product as a percent of limit purchased.

Assuming 45% attrition

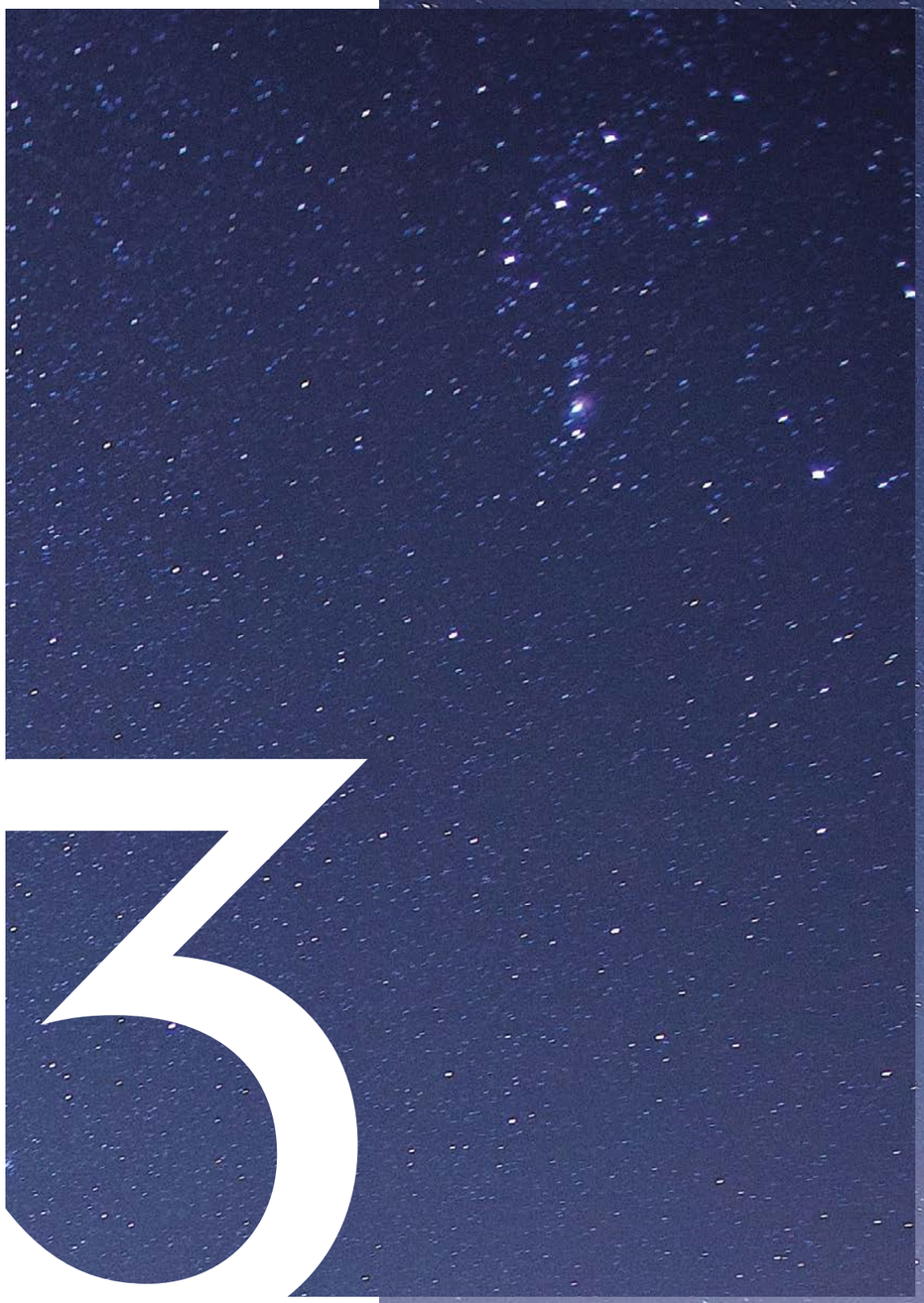


Assuming 60% attrition



In sum, the analyses demonstrate that through a fully probabilistic lens, insurers and reinsurers share the catastrophe burden up to the 1-in-200 year return period. Yet, from a fixed attrition perspective, insurers may not be receiving the intended benefit of some reinsurance products. As the market continues to grow, carriers must be diligent in their reinsurance and retrocession utilisation, particularly as concerted efforts to provide more protection for systemically exposed entities such as small-medium enterprises (SMEs) come to fruition.

As more losses move through the market in future, the rationale for why and how an entity will use its cover becomes ever more critical.



3

Back to the future

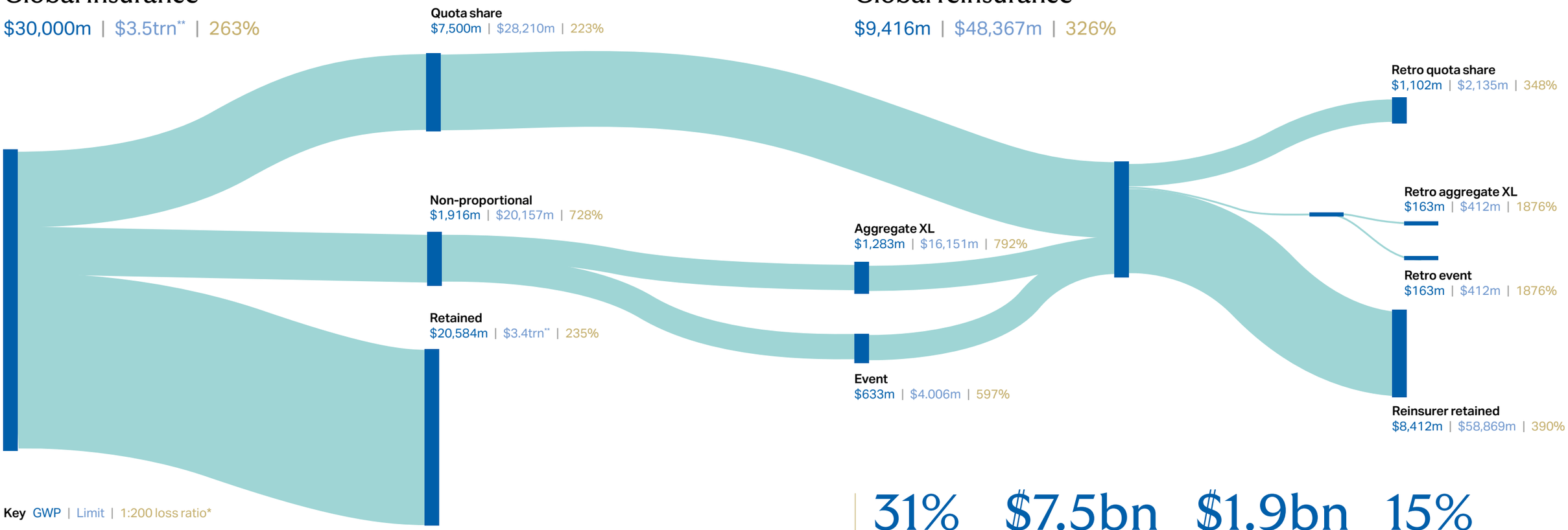
Section 3 offers a hypothetical future view of the cyber (re)insurance landscape, taking current trends to the extreme, to evaluate whether the underlying market can sustainably support growth.

In **Figure 9**, Howden Re has extrapolated current trends in the cyber (re)insurance market to assess a potential future landscape. While not timeline specific, the figure depicts how the market might look if it reached US$ 30 billion in global cyber GWP, or roughly double current volumes. For simplicity, it also assumes that there has been no rate change in underlying or reinsurance pricing.

In this scenario, the QS market would be proportionally smaller, with just 25% of premium ceded, or a 7 percentage point reduction from current levels. In contrast, the non-proportional market would grow steadily, with 6.5% of insurance premium allocated to non-proportional cover compared to 4% today. This is primarily driven by event products, including but not limited to, event excess-of-loss, aggregate of events, cat bonds and ILWs.

Figure 9

Visualising a potential future view of the cyber market ecosystem.



*Loss ratio at AEP 200yr return period, gross of acquisition costs

** Excludes some endorsement/embedded business which represents a very small proportion of overall premium

The most notable difference between the cyber market in **Figure 1** and **Figure 9** is a more developed retrocession market. As losses continue to flow through the ecosystem, reinsurers are expected to rely more heavily on retrocession. In this scenario, the share of reinsurance premium ceded to retro QS increases from 6% to 12%, reflecting reinsurers' efforts to reduce volatility. At the same time, non-proportional retro cover grows as catastrophe losses are more frequently transferred to reinsurers, evidenced by the 1-in-200 year AEP loss ratio of 326%, compared to 272% in **Figure 1**. While retrocession aggregate excess-of-loss grows in-line with reinsurers' portfolios, the retro 'event' market grows more significantly.

Short tail exposure, which is well suited for ILS and alternative capital market transfer, is also likely to become more pronounced as the market matures. Nevertheless, in order for these transfers to originate organically and grow sustainably, the market must become more conversant with innovative products such as 'hard retro' which provides non-proportional cover for underlying non-proportional reinsurance.

31%
of GWP ceded to reinsurers

$7.5bn
Size of reinsurance QS market (in GWP)

$1.9bn
Size of reinsurance non-proportional market (in GWP)

15%
Retrocession utilisation (% of reinsurer GWP)

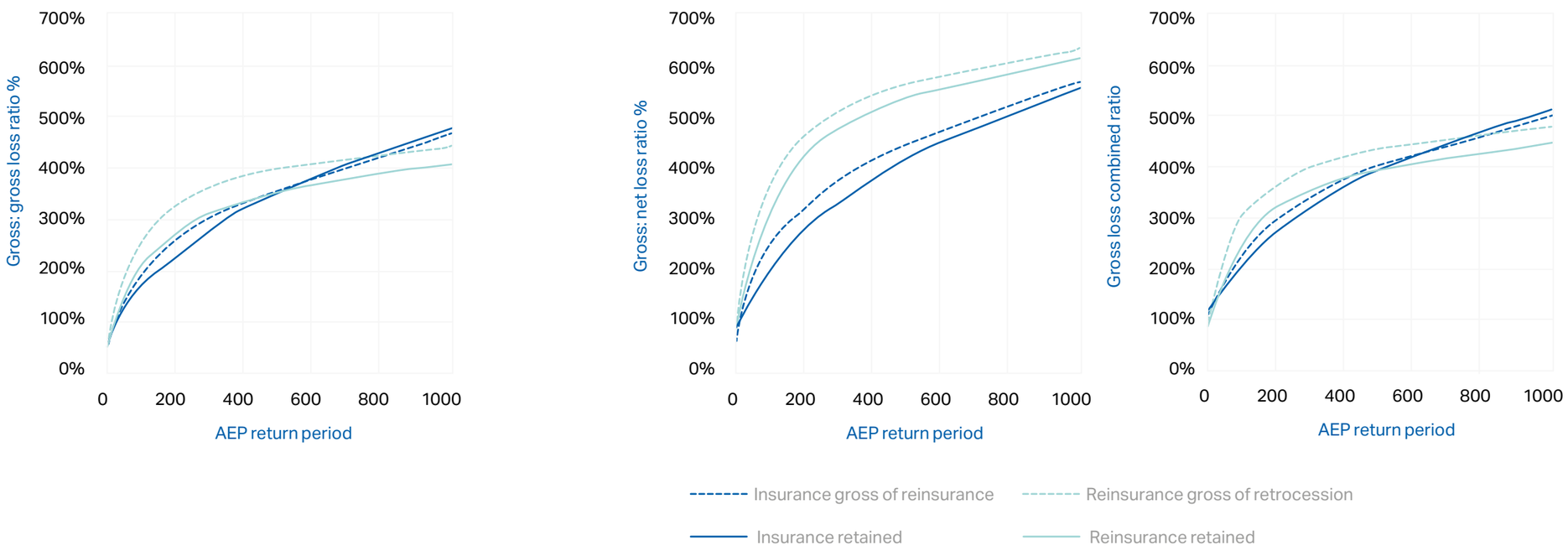
In **Figure 10,** the spread between insurers' and reinsurers' results further illustrates why the cyber retrocession market needs to develop in order to accommodate future growth. Reinsurers can operate at comparatively lower combined ratios in benign cat years as significantly more non-proportional risk sits on their books in this scenario. They also tend to see extreme loss spikes and significant combined ratio deterioration as structures attach. Retrocession quota share and non-proportional protection provide a material benefit to reinsurers across the curve. Yet, as more cat risk is assumed, reinsurers now bear losses up to the 500-year return period on a combined ratio basis compared to the 200-year return period observed in **Figure 4**, Section 2.

Insurers' net 200-year loss ratios improve by 24 points compared to **Figure 4**, whilst simultaneously retaining an additional 4 points of GWP. For reinsurers to achieve a similar result, and, more critically, to support sustainable market growth, it is essential to address gaps in retrocession capacity. Doing so, will enable reinsurers to better manage volatility and profitably accommodate carriers' shifting purchasing behaviour.

> Further challenges must be addressed before a future cyber market, like the one presented in Figure 9, can function efficiently.

Figure 10

Future state industry loss curves on a gross, net and combined ratio basis.



First, as outlined in Section 1, cyber reinsurance premium is concentrated within the top five providers, who cumulatively comprise 62% of the market. Second, retrocession capacity is currently limited, which will hinder growth if unaddressed.

Finally, as cedent buying behaviour shifts, growing accumulation risk will stress reinsurer risk tolerance. **Table 1** outlines these constraints in more detail and offers potential solutions that Howden Re believes are essential for the cyber market to not only evolve, but thrive.

Table 1

Future state challenges and solutions: capacity dynamics and reinsurer risk tolerance.

Challenge	Current trend	Potential solutions
Reinsurance market share is highly concentrated	The top five reinsurers have maintained significant market share over the past 3-5 years. There is evidence that this is shifting slightly, however the top 10 still hold close to 90% of reinsurance premiums. Whilst new capacity is helping to challenge the status-quo, it also softens the market, which can undermine sustainable growth.	Reinsurers need to differentiate themselves – aside from providing additional capacity. Strategic partnerships designed to share knowledge and data, as well as support product development/business plans, will help insurers grow and diversify underlying premium pools, whilst also encouraging insurers to diversify their reinsurance panels.
Retrocession capacity is scarce	Quota share is most frequently used to manage volatility and provide cat protection. Growing appetite among cyber reinsurers to support competitors is driven, in part, by softening market conditions, but also by growing income and gaining market share. When the market shifts, capacity may start to dwindle. AXL is the most popular form of non-proportional retrocession, but long-tail loss exposure challenges alternative capital providers who seek certainty about when capacity can be recycled. To-date, this has only been used to protect quota share portfolios. Howden Re placed the markets' first hard retro structure in 2024, which shows positive momentum towards building a market that allows for alternative capacity provider participation, whilst providing efficient relief for reinsurers with growing non-proportional portfolios.	To create a stable supply of retrocession QS capacity, we need to bring big balance sheet carriers – who are either underweight or not writing cyber – to the table. Offloading cat risk will become an increasingly important focus as the non-proportional market grows. Retrocession event products need to be structured to attract capital markets at scale, accompanied by a willingness to share underlying data to build confidence in the return metrics. Innovation (i.e. hard retro, second event cover or indexed products) is required to build a sustainable and efficient retrocession market to support growth in the underlying market.
Growing accumulation risk will stress reinsurer risk tolerances	Reinsurers are assuming significantly more tail risk as buying behaviour shifts more materially to non-proportional protection. To combat this, many reinsurers are seeking material growth in proportional premium; however, demand for proportional reinsurance, although still significant, is reducing – creating a capacity surplus and soft market conditions.	Investment in data and analytics is needed to ensure risk tolerances are appropriately set and monitored. Not only would this benefit the management of accumulation risk, but it would also facilitate retrocession capacity generation and enhance service offering to clients and prospects. Diversifying exposures and non-proportional attachment points will help to reduce correlation and volatility, but importantly, this needs to be reflected in internal modelling.

A final barrier to future cyber market growth is vendor model sophistication. Unlike other lines of business, cyber lacks both a granular loss history and a predictable underlying risk profile. As a result, cyber reinsurance underwriting is generally less model dependent. Instead, reinsurers have developed their own probabilistic or deterministic scenarios, either to supplement or validate existing models. Yet, this varies by product.

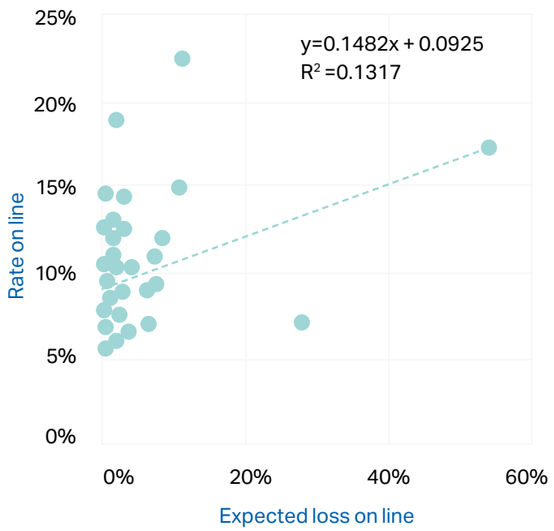
Figure 11, illustrates that for cyber aggregate stop-loss products, expected losses (i.e. loss-on-line) are weakly correlated with pricing (i.e. rate-on-line). This suggests that reinsurance underwriters may focus more on attritional performance or structural considerations, such as the multiple of maximum line deployed above the attachment point, than on modelled losses alone.

However, event-based products exhibit a much stronger correlation between expected losses and priced risk. This is likely because capital providers, particularly in ILS and retrocession markets, often require credible modelled outputs to justify capacity deployment. Cyber event product correlations (as measured by R^2) of 0.96 also closely mirror other model-dependent classes such as property-catastrophe, where the correlations between rate-on-line for Florida hurricanes and Japanese typhoons, for example, are 0.91 and 0.95, respectively.

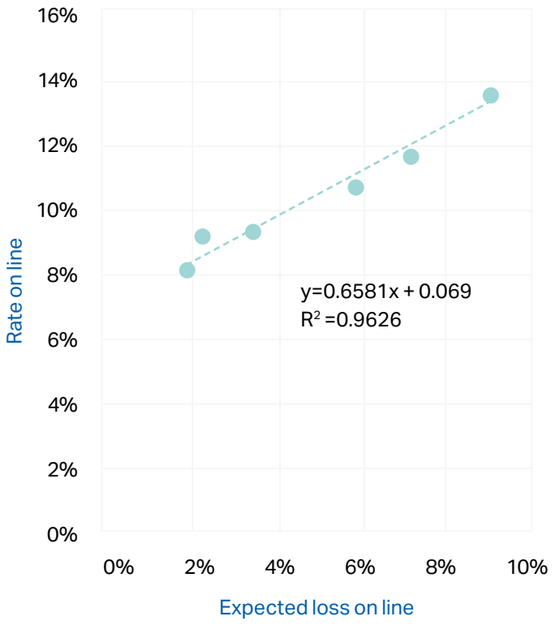
Figure 11

Model performance by product.

Aggregate stop loss



Event and aggregate of event XL



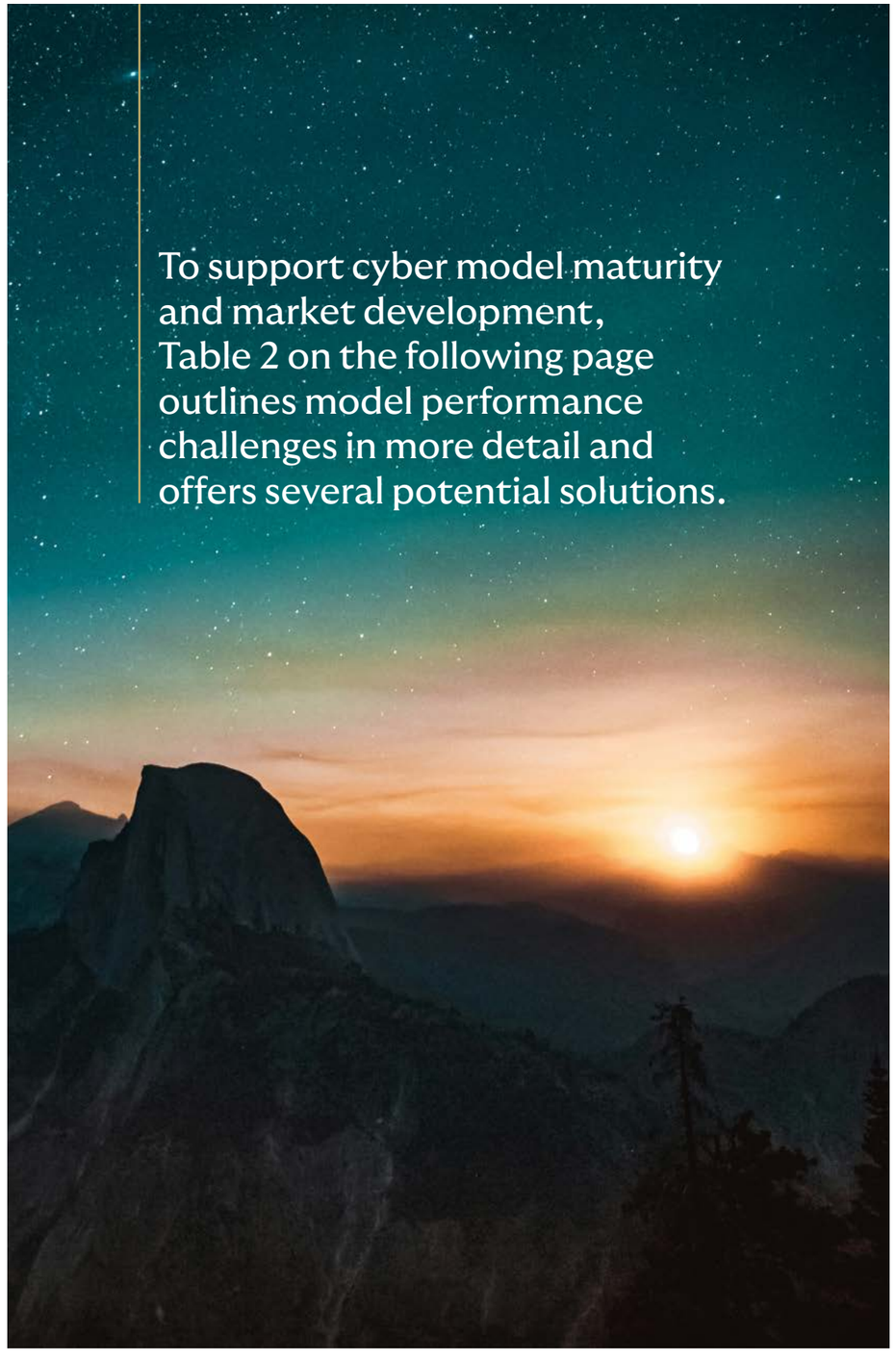


Table 2

Future state challenges and solutions: model stability and performance.

Challenge	Current trend	Potential solutions
Model stability	Major cyber model vendors update their platforms every 12-18 months, with changes varying by ±20% depending on portfolio composition. In contrast, property-catastrophe (cat) peak perils are updated every 3-4 years. Changes typically range from 5-10% and are extensively back-tested to standards like Solvency II. Carriers have substantial model evaluation teams for property-cat, but cyber resources are less established. Cyber modelling also faces more volatility due to its geopolitical and adversarial nature, making it challenging to isolate drivers of change between model updates, as vendors work through these variables.	Given these challenges, many carriers have developed their own probabilistic or deterministic scenarios to replace or validate existing vendor models. This approach allows carriers to control key variables, manage change and integrate knowledge of underlying cyber security controls. Howden Re has extensive experience in helping carriers design and review their scenario catalogues, comparing them to internal industry data to ensure optimal model calibration. Additionally, Howden Re's modelling team can help carriers develop their own risk views, and research where model assumptions are still emerging. Since cyber modelling is not standardised, carriers can gain significant competitive advantages through effective model development and research.
Model performance	Unlike the property catastrophe market, vendor modelling is not currently essential to the cyber transaction process, although its importance is growing and varies by product. As illustrated in **Figure 11**, the relationship between modelled expected losses and pricing is weak for aggregate XL, driven by underlying weaknesses in the attritional modules within vendor models. Reinsurers are therefore more reliant on complex actuarial techniques and volatility assessments, analysing the maximum per risk exposure relative to the attachment point. This is then heavily calibrated with benchmarking to ensure outputs are consistent with competitors. Pricing for event products has a stronger correlation with modelled outputs, as seen in **Figure 11**, often because retrocession and ILS capacity providers are more traditionally model focussed.	As product variety evolves and model heavy products such as event XL, cat bonds, ILWs and retro placements continue to proliferate, modelling will become more important in the reinsurance transaction. However, for this to accelerate, both model stability and geographic diversification need to be addressed. Data capture has matured, so there is now some degree of standardisation, alongside a greater willingness to share exposure data with markets. This will, again, improve model performance. The market needs to find a balance between the standardisation that vendor platforms offer, and the occasional nuances in loss origination that can occur (for example non-malicious systems failure).
Diversification	The overall strategy continues to focus on expanding markets in new regions, such as Europe and A-Pac. Consequently, our consolidated market business plans indicate a shift towards a 50% US and 50% international split by 2030, compared to the current 68% US and 32% international distribution. To achieve this, insurers need to determine the scope of diversification benefits by geography, and identify the point in the tail where these benefits diminish. Currently, the models approach this by examining technology adoption rates by region. However, a more comprehensive approach should consider factors such as revenue regionalisation diurnal patterns, patching cadence, and revenue diversion.	As model vendors provide limited views on geographical diversification in the current platforms, independent research will provide significant benefits in this space. Data augmentation can allow insurers to identify the geographical spread of their insured's global revenues, allowing models to more effectively capture geographically concentrated events. Diurnal analysis of attack origins can also lead to a more robust understanding of how attacks spread and whether different time zones offer any shielding benefit. Identifying cloud redundancy across geographical zones can also demonstrate enhanced resilience and operational continuity during geographically concentrated events. This approach can help insurers better estimate revenue dependency on individual cloud data centres.

Conclusion

The cyber (re)insurance market's future is bright; realising its potential will require deliberate effort including adjustments to purchasing strategies, the use of both event-driven and aggregate analyses and a more diversified market with a greater number of players.

As underwriters take on more exposure, more losses will inevitably flow through the ecosystem. This will create additional demand for retrocession in order to absorb reinsurer volatility, particularly as more insurers seek non-proportional cover to manage tail risk.

Currently, loss transfer to reinsurers is broadly efficient. However, this varies by product type and assessment methodology. Therefore, cedents must critically and holistically evaluate reinsurance purchasing strategies to align with their risk tolerance and broader portfolio objectives.

As accumulation risk continues to rise, reinsurers' risk tolerances will also be further stressed. This means investment in analytics is not just beneficial but essential to understand portfolio dynamics, optimise reinsurance placement and enable retrocession capacity. Greater confidence in model performance and stability will simultaneously support this effort.

The foundation is set for a resilient and scalable cyber future. Whilst the opportunity is clear, the challenge is to seize it.

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