



FLOODS, FIRES AND MORE

WE LOOK AT HOW ILS INVESTORS ARE
MANAGING “SECONDARY PERIL” EXPOSURE
TO REDUCE SURPRISE LOSSES

16 INFLATION & ILS

Rebuild costs are in sharp focus

18 PERIL FOCUS

Consultants advise us on choosing
which insurance risks to target

23 SCOPING WILDFIRES

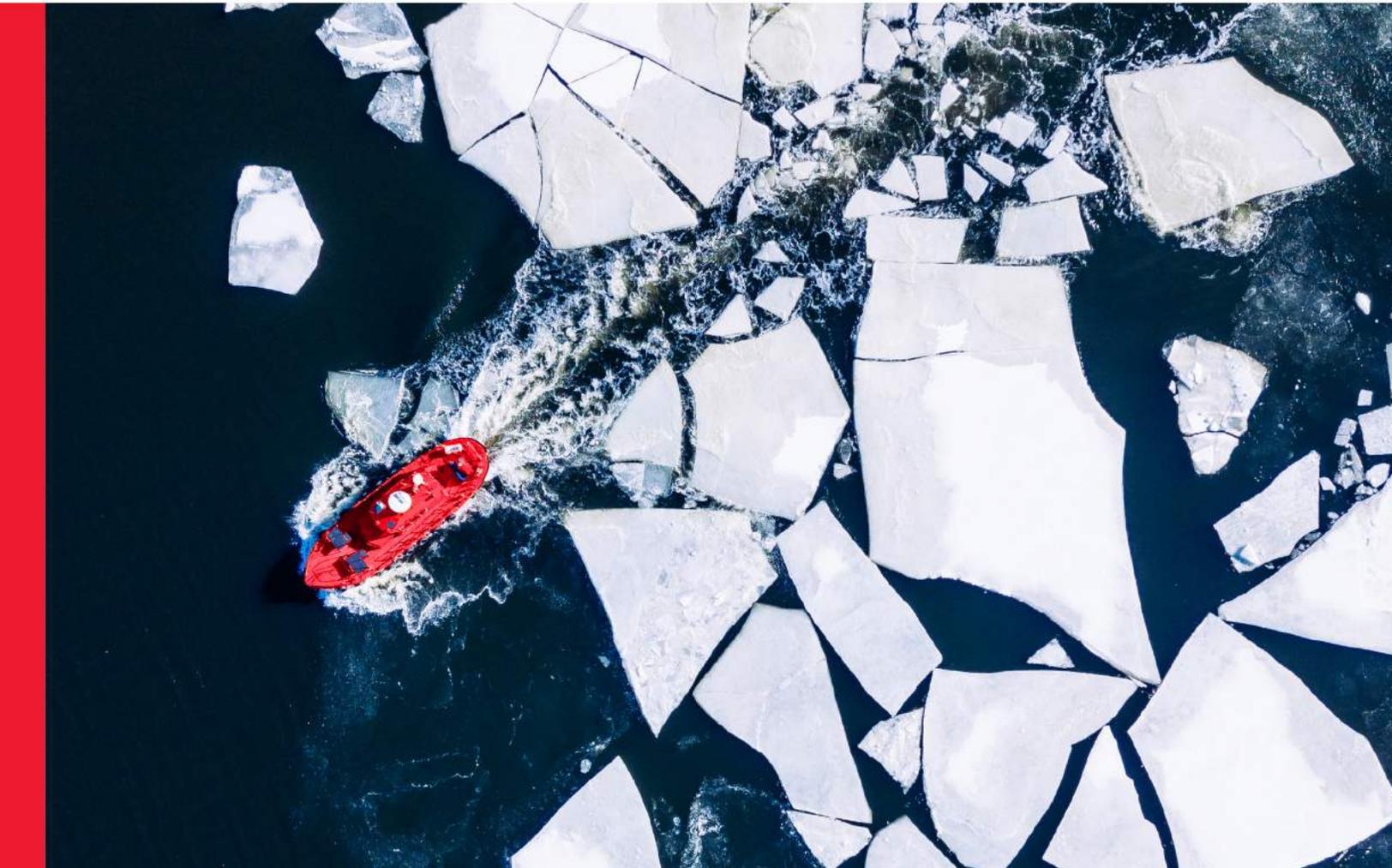
Assessing potential losses in some of
the USA's most vulnerable hotspots



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Perils of ILS reporting

I started writing about the cat reinsurance market in 2010 and for many years the stories my then editor recounted about covering hurricane season seemed like an old-time legend.

As far as I knew, hurricanes were not much more than a weather pattern on NOAA’s website, storms that stayed far out in the ocean or curved away from the American coastline.

Of course, by 2017 I was getting a crash course in how to cover live hurricane events and a glimpse of the “factory line” of storm production that can set in under the right conditions.

In the years that followed, we also saw a different mix of so-called secondary perils, wildfires and storms, alongside the major hurricanes of Harvey, Irma and Maria in 2017.

But while this flip-flop from a generally benign catastrophe phase to a more active one made me much more conscious of the power of disaster losses, having experienced that early phase also reminds me that there is no “new normal” in ILS and a short-term view on the market will always be skewed.

That’s partly why a comment from one of the consultants quoted in our “ask the advisers” feature on p18 resounded with me. Investors puzzling over what kind of ILS perils they want to invest in should be wary of losing the woods for the trees, he warned – because ultimately there is model uncertainty in all insurance risk.

Secondary perils should be quantified and managed, of course – but a freak winter storm or flood loss does not change

the fundamentals of the game.

However, even if you are taking a longer-term view – looking at the past decade’s track record instead of the past five years – this doesn’t mean you are letting the industry off the hook from considering pricing issues for certain kinds of cat risk.

As we released this latest edition of the ILS Investor Guide, London insurance marketplace Lloyd’s had announced a fresh focus on managing volatile risk

across all business lines.

It pointed out that exposure growth, rather than climate change, is much more likely to be the real culprit of cat loss experience outrunning

budgetary expectations in the past five years. Lloyd’s syndicates should expect to be closely held to account on whether they are setting realistic cat loss budgets, its supervisory team announced.

When an organisation like Lloyd’s starts to put increased supervisory focus on a certain issue, you know that this will help catalyse a further reaction across the (re)insurance market – as has been the case in US excess-lines insurance in recent years, for example.

As it coincides with other reinsurers and ILS funds running their ruler over cat pricing assumptions, the underlying market should continue to correct and deliver a better experience for investors.



Fiona Robertson
 Managing Editor,
 Trading Risk

“A short-term view on the market will always be skewed”

Contents

4-7 SECONDARY PERILS

Floods, fire and storms: non-peak risks are increasingly prominent

16-17 INFLATION & ILS

As post-pandemic inflation kicks in, how are exposures changing?

18 ASK THE ADVISERS

Consultants give their take on how to choose which ILS perils to cover

24-27 PRIMER

We unpack ILS jargon and recap key data points



Breaking the binary: How should investors think about secondary perils?

Winter Storm Uri left a trail of destruction in the southern United States in 2021, costing nearly 300 people their lives and causing \$15bn in insured losses.

In the same year, 189 people died and EUR7bn insured losses were incurred after heavy flooding hit Germany, Belgium, and the Netherlands. When wildfires raged in Greece in the latter half of the year, hundreds were made homeless and the insurance industry lost EUR33.7mn.

One may think it strange therefore that, in the ILS industry, these events are given the innocuous label of secondary perils.

They are distinguished from primary perils such as tropical cyclones and earthquakes for being more frequent but less costly. However, the size and proportion of insurance losses due to secondary perils is growing.

What do they cost?

The past couple of years illustrate the variability in secondary-peril loss experience. Swiss Re estimated in its annual Sigma review that secondary perils accounted for over 70% of the total \$89bn natural

catastrophe insured losses in 2020, mainly resulting from severe convective storms and wildfires.

Severe convective storms accounted for \$36.3bn of 2020's insured cat losses, floods \$6.1bn and wildfires \$11.6bn.

In 2021, the share of losses was lower given Hurricane Ida's higher contribution, but absolute claims were similar. Aon's 2021 Weather, Climate and Catastrophe Insight said, secondary perils were responsible for at least \$46.5bn insured losses, nearly 36% of the year's total \$130bn insured losses.

"Taken collectively, secondary perils account for a growing number of losses. They happen more often than primary perils – and in recent years are occurring with increasing frequency," said Swiss Re.

In the past 10 years, severe convective storms have accounted for over half of global insured losses due to secondary perils, while wildfires are the secondary peril which is growing fastest.

Cumulative insured losses from secondary perils since 1970 total \$828bn, versus \$760mn from primary perils.

Within the ILS market, secondary peril losses may influence a wide range of transactions from first-layer reinsurance to retro sidecars, and even into the cat bond market.

Although the total of losses to cat bonds from secondary perils in 2021 is not yet final, Swiss Re estimated that it sits around \$600mn.

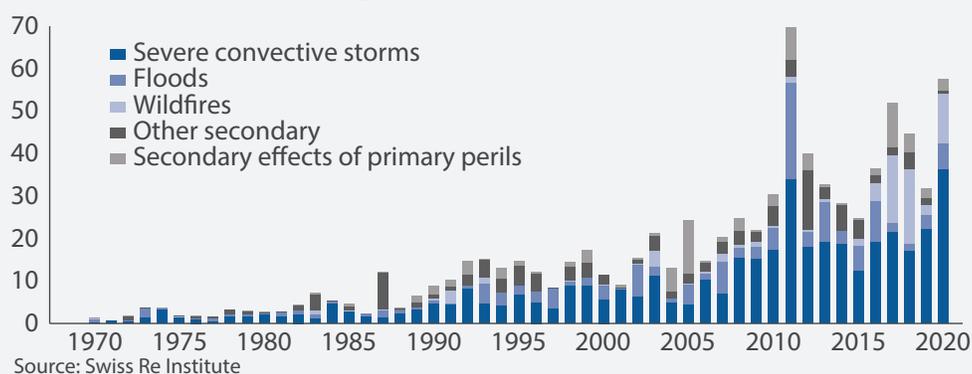
These significant losses mean ILS managers, investors, cedants and modelers alike have had to rethink their approach to secondary perils.

Definitional challenge

The first challenge in dealing with secondary perils is defining them, as they have become something of a nebulous concept.

According to Swiss Re, primary perils are ones which have the highest loss potentials, are well monitored and usually covered by catastrophe models, whereas secondary perils are those which generate small-to-medium losses such as hail, storms and bushfires. Modelling capabilities are often "less mature" and as such they are harder to predict, while their impact and costs are more localised.

Global insured losses from secondary perils by peril type, since 1970 (\$bn, 2020 prices)



However, others diverge from this approach. A recent report by Verisk, *There Are No Secondary Perils*, pointed out that often secondary perils are associated with well-modelled risks, such as how fires and tsunamis can often follow earthquakes. Although modelling for other kinds of secondary perils is more limited, models do exist for them.

Furthermore, “using the descriptor ‘secondary’ implies that these sources of loss are less important than others”, Verisk’s report added.

On the primary and secondary distinction, Dr Ben Fox, a portfolio manager at Hiscox ILS told *Trading Risk* that the industry-wide understanding of secondary perils means that only earthquakes and hurricanes are considered primary and basically everything else is secondary.

“Our view is that this primary/secondary distinction is somewhat crude as we seek to identify, model and price for as broad a range of perils as is practicable,” he said.

Some in the industry are therefore moving to a definition referring to perils and locations which are not currently sufficiently modelled.

“From our perspective, secondary perils should be perils which are not modelled,” said François Divet, head of ILS, structured finance at AXA IM.

“From this standpoint there are a limited number of significant perils

for which we do not have a model... the total cost was below 20% of the total insured losses last year.”

Shifting investor response

Nonetheless, recent losses due to secondary perils have led some investors to become more cautious and seek reinsurance from portfolio managers. While investors may previously have thought their money was covering a small range of infrequent events, recent major secondary-peril events have raised suspicions that more frequent losses are on the horizon.

.....
“We’re seeing another shift as investors are seeking to ensure that the structures, the data, and the modelling are as robust as can be”

“If investors are given the understanding that their capital is supporting a portfolio which will only incur losses if there are extreme primary-peril events, and then there’s a flood in some distant part of the world that impairs returns, they’re going to be concerned, and rightly so,” noted Fox. “We’re incredibly transparent on the composition and drivers of expected performance of our portfolios.”

“We’ve seen a bit of a trend shift from investors,” said Jean-Louis Monnier, head of Retro & ILS Structuring at Swiss Re.

“First, there was a very strong push to diversifying perils in their portfolio. Then a realisation in recent years that these diversifying perils came with additional uncertainty and risks. Now, we’re seeing another shift as investors are seeking to ensure that the structures, the data, and the modeling are as robust as can be.”

However, several industry insiders said they are not seeing a mass migration of investors away from secondary perils. That would severely limit the scope of private catastrophe reinsurance deals available to an investor, as these are typically placed on an all-natural perils basis, versus the named perils involved in the smaller cat bond sector.

Assessing secondary perils can prove difficult due to knock-on factors causing highly unpredictable losses, such as Uri knocking out the Texas power grid and the effects of strong winds affecting power lines and starting wildfires. In response to the wildfire risk, utility companies have started the practice of shutting down in the case of strong winds during the dry season.

But these external influences can prove beneficial to investors. After the series of destructive Californian wildfire losses in 2017-2018, insurers were ultimately able to recover a significant share of their upfront losses from payouts from utility companies such as Pacific Gas and Electric Company, which were found at fault in causing some of the blazes.

These “subrogation” payouts were shared with reinsurers and ILS funds to reduce their losses in turn.

“Structural features can be implemented in the cat bond structure to ensure that investors get the benefit of such subrogation,” noted Monnier.

Continued on page 07

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Continued from page 05

Adaptation

ILS managers have adapted their portfolios in response to secondary peril disasters in recent years.

“There are lots of ways to manage these perils. The first one is to stick to a list of perils and make sure that these perils are modelled,” Axa’s Divet said. “And then you can also decrease the exposure to non-peak perils by putting limits on them.”

Some said they have started to limit their focus to deals which include strict event caps and deductibles, to ensure they are investing in deals that cannot be triggered unexpectedly.

This particularly applies to aggregate deals, as while small secondary-peril events may be unlikely to trigger a per-occurrence structure, aggregate deals accumulate smaller losses which could lead to bonds being triggered.

“Aggregate contracts are more exposed to primary and secondary perils, so if I want to do everything I can to avoid impairment to the results in my funds, the burden of proof to write these has got to be higher,” said a fund manager.

For example, fewer aggregate deals are using franchise deductibles, which cover all losses

from an event once a set threshold has been reached, with a preference for per-event deductibles that mean only the losses above that threshold are covered by the aggregate reinsurance.

“Investors are increasingly able to strengthen the structures of aggregate cat bonds so that they’re less likely to incur losses,” one industry insider pointed out. “Because of that secondary perils may not play as much of a factor as they previously did.”

.....
“Investors are increasingly able to strengthen the structures of aggregate [deals] so that they’re less likely to incur losses. Because of that secondary perils may not play as much of a factor as they previously did”

An example of this shift is USAA’s Residential Re 2021-1, issued in 2021 using an event deductible, which effectively means the portion of the frequency risk coming from losses up to \$50mn would be retained by the sponsor. “That makes the transaction a bit less sensitive to the modeling of frequency and the uncertainty around that,” explained Monnier.

Models

Due to the increased losses coming from secondary perils, there is growing pressure for adequate models to be created and deployed for these risks. ILS firms are developing in-house models, while service provider modelling firms are carefully developing their responses.

“We don’t differentiate between primary and secondary; we rather think of them as a continuum of perils. And, as the climate keeps evolving from natural causes as well as human induced climate change, it makes all the more sense not to think of them as primary and secondary,” said Dr Jayanta Guin, chief research officer at Verisk Extreme Event Solutions.

To fill in gaps in modelling, Verisk has widened the scope of coverage within peak-peril models.

“It is becoming more and more important that all of our models are explicit about recognising a whole range of perils... For example, we introduced our US-wide hurricane model update, which explicitly models floods with very high resolution, 10 metres, throughout the United States.”

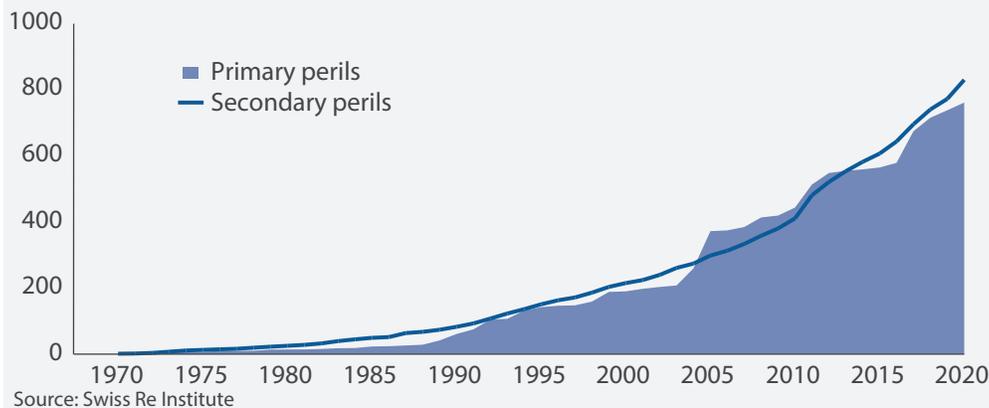
To do this, they look at historical data as well as forward-looking climate model projections.

“It’s not a simple recipe,” he continued. “We might do something different for floods and something completely different for wildfires in the United States or Australia.”

So while the threat of secondary perils is ever-present in the ILS landscape, each component of the industry is moving to adapt and meet the challenge. Investors are asking tough questions, managers adjusting portfolios and service providers tweaking their models.

“Investors recognise they are exposed to a wide range of perils, not just hurricanes and earthquakes, and they want comfort that we understand all the risks we’re underwriting on their behalf,” said Fox.

Cumulative insured losses from primary and secondary perils since 1970 (\$bn, 2020 prices)



Time to shine for Insurance Linked Strategies

Shorter-term geopolitical and financial risks further underscore opportunities for ILS versus other asset classes

Over the last decade the central-bank playbook of ultra-low base rates and ultra-loose quantitative easing during economic shocks has resulted in a **particularly paltry outlook across fixed-income assets** as we exit the pandemic. Traditional **return-seeking assets** have also been drawn into this world of **meagre prospective returns**.

The spread pick-up over government bonds has been lowered by investors' insatiable chase for yield compressing credit spreads, as well as by the effect of credit assets being included in quantitative-easing programs. Furthermore, in the case of equities earnings yields, dividend yields and related future prospective returns all fell through the pandemic. S&P 500 equity price/earnings multiples are at highs last achieved in the financial crisis and tech bubble. They are now the third highest in history. We still await these to return to pre-Covid-19 levels.

There has already been a wholesale shift in the macro-economic backdrop this year, particularly with regards to the inflationary regime. As we emerged from Covid-19, inflation began to rise with the kickstart to the pandemic-stunted economy. **However, higher inflation has now become stickier and more entrenched** and is expected to be longer-lasting. Russia's recent invasion of Ukraine has meant a further increase in the prices of oil, energy and commodities which have significant effects on inflation baskets.

The fast turnaround in inflation has spurred central banks into action and with it projected interest rates. **The Federal Reserve expects to raise interest rates in 2022 and continue this over the next few years.**

However, even here there remains considerable uncertainty with the current volatility seen in fixed-income markets. Meanwhile, quantitative-easing asset purchases are expected to be reduced before holdings then start to be sold.

Rising rates are not usually supportive for fixed-interest assets including corporate bonds, high-yield debt, EMD or for growth-oriented equities. In February 2022 there were falls across these traditional markets. In an environment where interest rates are rising and traditional asset classes falling, **ILS' linkage of returns to floating rates provides a further attractive characteristic.**

Looking longer term, and at the sheer quantum of central-bank stimulus, this effect has at some point much further to run.

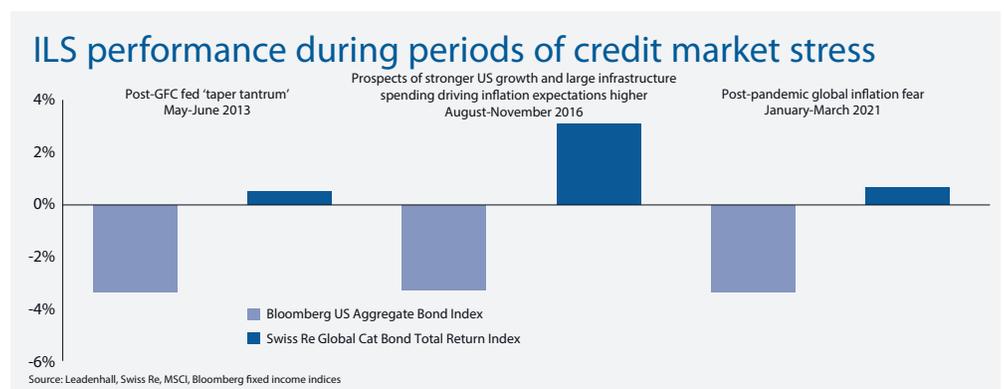
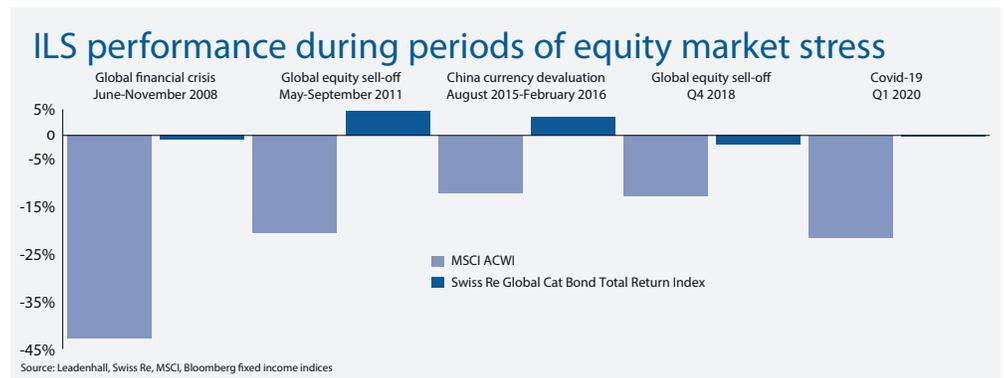
Why insurance-linked strategies?

Non-life

In the **non-life space** there has been a noticeable **increase in the rates of return on offer**, or rate hardening over the last few years, **and tightening of terms and conditions. Primary cat bond issuance has continued to increase** yet again year on year, reaching a record \$12.5bn over 2021. Secondary market spreads have widened, influenced by Hurricane Ida and flood events last year. **Yields and no-loss-net-returns (net of expected costs) look increasingly more attractive.**

Even more attractive dynamics have been seen in reinsurance private placements.

Property catastrophe reinsurance rates continue to increase year on year. The Guy Carpenter Global Property Catastrophe Rate-on-Line Index



increased 10.8% year on year as of 2021 year end with higher rises being seen on heavier loss-impacted areas. **This continues the compounding trend that has been observed from 2017.**

There is broad market consensus that this activity is likely to continue and that **a further hardening in rates is expected at the 1 June and 1 July renewals.**

While the outlook and attractiveness for such a strong diversifying asset class are clear for ILS, **the same cannot be said for the rates of return on offer in other asset classes.** In addition to this, **rising interest rates** that may negatively impact some asset classes **are fully captured by the floating rate nature of ILS.** Also, as shown in the chart, **when traditional equity and credit markets have suffered recent dramatic falls, the ILS market has often held up** due to its diversifying properties.

Life and alternative credit

In the **life and alternative credit space**, opportunities to provide **insurance finance to the highly regulated insurance sector are very compelling.** Managers able to **source and originate funding and risk-transfer solutions used by insurers across the capital structure** (from senior secured debt to hybrid debt/preferred equity, down to common equity) **are very well positioned to offer investors access to a diversifying asset class that has proven to be very resilient during periods of market shocks.**

Why the insurance sectorial approach?

- **Insurance carrier default rates have historically been low for companies rated by credit-rating agencies S&P and Moody's.** This is in part due to not suffering "runs on the bank", in that their primary liabilities are illiquid (some lines, such as

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property carriers exposed to natural catastrophes, are an exception).

- Insurers typically operate in heavily regulated environments where their capital structure and quality are highly governed. They are also monitored by regulators with **capital shortfall risks that are transparent** and provide time to be cured. Therefore, for regulated carriers, **compliance and regulatory solvency ratio are of the utmost importance.**

Ramifications for institutional portfolios

Institutions regularly review their strategic asset allocations, taking stock of the current environment and their own targeted risk-return goals. Unlike an insurer, unregulated institutions do not ordinarily need to hold capital reserves for extreme tail events in isolation.

In a downside market event, the wider institution and business is often able to pick up the mantle. Risk and return are often considered by institutions at around 1-in-20-year risk levels (rather than say at 1-in-200-year which is more common in non-life insurance reserving).

However, the exact risk level can be tailored to the strength of each institution.

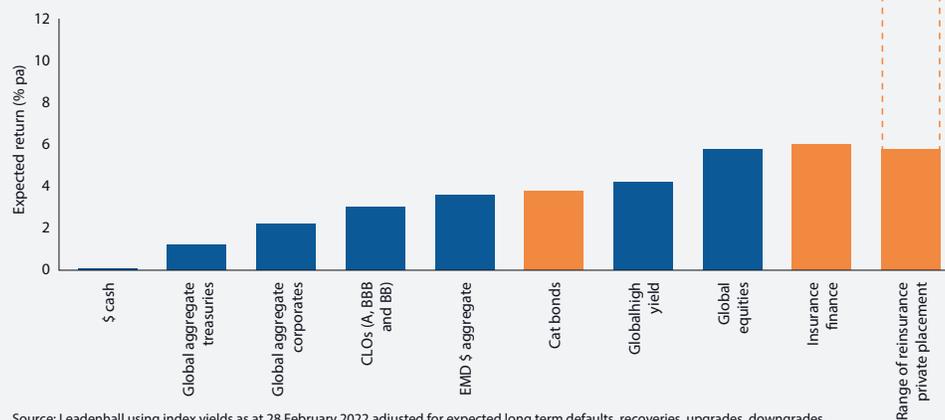
When developing an efficient investment strategy in this context, **ILS across non-life, life and alternative credit strategies compares favourably, particularly in today's economic environment.** The expected-return chart shows the yield of each asset net of expected costs and losses. What can be seen is that, today, **non-life ILS is particularly attractive across asset classes.**

In today's environment the attractive qualities of ILS relative to other assets are increasingly impossible to ignore.

In a world of uncertain rising interest rates and low prospective returns on traditional assets, **ILS provides investors with a ray of optimism.**

With the **yield pick-up in no-loss-net-returns at multi-year highs**, the draw of ILS is increasingly impossible to ignore for institutional investors. This is particularly the case given the **strong diversification ILS has historically shown.** If ILS meets an individual institution's required risk and return needs, it should certainly be considered when **ILS compares so favourably on a relative value basis.**

ILS yields attractive versus wider investment markets



Source: Leadenhall using index yields as at 28 February 2022 adjusted for expected long term defaults, recoveries, upgrades, downgrades, expected losses and fund costs. Palmer Square CLO Debt index used for CLOs. Bloomberg Fixed Income Indices used for liquid bonds. The Effective Fed Funds Rate used for cash. No-loss-net-returns adjusted for margins over expected losses and fund costs for ILS yields. Swiss Re Global Cat Bond Index used for cat bonds (excluding distressed bonds less than 80 in price and over 30% in yield). Leadenhall data used for reinsurance private placements. For equities the MSCI World Index is used: dividend yield plus inflation expectations and expected growth is shown (a dividend discount model)

ILS managers open 2022 with slimmer asset base; growth isolated

Leading ILS managers collectively dropped roughly 6% of their assets under management (AuM) in the second half of 2021, as a combination of catastrophe activity and redemptions resulted in one of the steepest declines for this peer group in the past three years.

The 18 firms with \$2bn or more of AuM collectively managed \$75.9bn as of 1 January, down from \$80.4bn at 1 July last year.

Among the top-tier \$2bn-plus players, it was notable that modest reductions to AuM were quite common. For those which reported decreased AuM, the average drop in assets was around 10%.

The headline figures are a conservative estimate that will underplay the true contraction of live capacity in some cases, due to lagging data and mixed reporting of trapped capital. This contraction has driven rising yields for ongoing investors as ILS managers renewed

their portfolios in the January reinsurance renewal season.

The 1 January decline for this tier came in ahead of 5.5% shed during H1 2020 as Covid-19 bit. However, some winners continued to grow among the group of ILS specialists with more than \$2bn of AuM.

Cat bond specialist Fermat Capital added \$200mn to move into the second spot in the industry leaderboard, in a reflection of the relative popularity of the liquid side of the ILS market in recent times.

In a similar vein, the tally of European UCITS regulated cat bond funds rose to almost \$7bn, from \$6.4bn at mid-2021.

Notably, Bermudian firm Pillar Capital gained \$500mn to reach \$3bn after winning mandates in the past year from investors rotating their ILS providers. Others to pass key milestones included Schrodgers attaining \$4bn to move a couple of rungs up the leaderboard and Scor

Key points

- Widespread reductions averaging 10% for decliners
- A few growth platforms including cat bond specialists

passing the \$3bn threshold.

The challenging fundraising environment was illustrated at the industry's largest name, Nephila, which shed more than \$1bn in the half-year to unwind a short-lived uplift it posted last year.

Among others that were down, LGT posted a rare fall of \$600mn and retro specialist Aeolus is listed at the mid-point of a lower range.

Delayed reporting will not fully reflect the impact of recent redemptions and potential trapped retro capital at some players, notably AlphaCat Managers, whose parent was yet to release Q4 results at time of compilation. As this publication has reported, it lost one major investor last year.

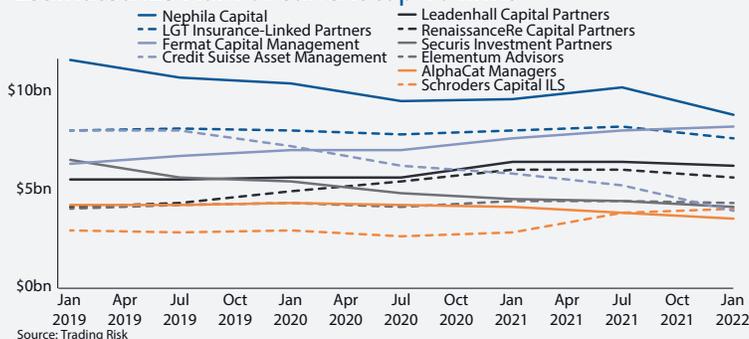
As recent Credit Suisse data was not available, *Trading Risk* applied a 25% discount to prior reported figures, as an estimated reflection of the impact of recent events and the 2020 closures of two of its associated platforms.

Across the full ILS market, collective AuM tracked by this publication dropped back below \$100bn at 1 January, with ILS specialists shrinking by around \$4bn, or 6%, to \$72bn.

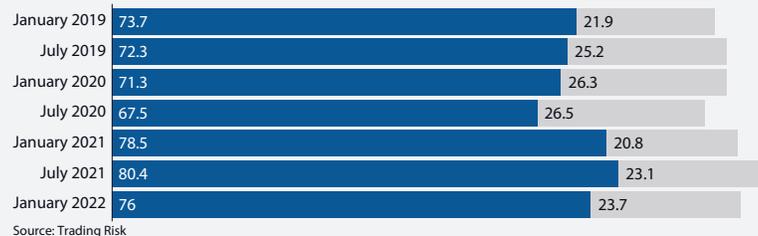
Reinsurer ILS platforms – for which data is patchier – were down around \$500mn in the past six months, reflecting trailing quarter retractions at AlphaCat and a discount applied to AuM at another retro specialist Lancashire Capital Management.

In contrast, Swiss Re, Scor and Aspen added additional capital in the past half year.

Estimated ILS AuM of current top 10 firms



Three quarters of ILS capital (\$mn) is controlled by the top 10



Broader reach in sight for cat bond market after 25-year anniversary

Aon figures show that some \$117bn of cat bonds have been issued in the 25 years since the first ILS securitisation in December 1996, through the George Town Re deal for St Paul's (now part of Travelers).

With \$32bn of cat bonds on risk to start 2022, and a record \$12.5bn issuance year in 2021, Aon Securities CEO Paul Schultz talks us through his view on the past 25 years and changes that could be on the horizon for the maturing ILS market.

How much has the sector changed in its 25-year history?

Clearly there's been substantial changes over the 25 years. If you just look at the sophistication of the ILS funds, they've got larger and developed greater bench strength including conventional underwriting skills.

To date, the focus has been almost exclusively on property cat risk and the ILS market has made good inroads to this segment – it is now a significant component of the overall catastrophe market.

What further evolutions do you expect to see?

The focus on nat-cat risk remains important, but we will see different types of buyers, such as quasi government entities and corporates making more use of the market.

There's going to be a change in the way risk transfer occurs and it's a huge opportunity for the ILS sector.

To date there have been small volumes of other risks such as operational risk or motor insurance done in the cat bond space.

It's also going to be important to put other risks to investors, such as cyber and other types of specialty risk – developing the breadth of market is going to be critical.

“It's also going to be important to put other risks to investors, such as cyber and other types of specialty risk – developing the breadth of market is going to be critical”

What aspects are set to change from an ESG perspective?

We're early on that ESG journey in the ILS space.

Some of the easier issues to tackle will be the way that collateral is invested, it is fairly simple to get ESG compliance on that side. The hardest piece is around disclosure, and how to set up scoring systems.

As we're talking to cedants now, more and more also want to be on this ESG journey. Sponsors want to make progress, but at the moment disclosures are being made without tangible benefit. Investors are supporting sponsors that make additional disclosure. But the question remains at what point is there a meaningful difference in pricing something that is more ESG compliant than other deals.

It's hard for cedants to be able to respond perfectly to every question, but no one will score perfectly. There will be a distribution curve around ESG compliance, but if sponsors don't score perfectly on one question it doesn't mean they can't score well in others.

What are some of the market's achievements in its 25 years?

During its history, the market has provided an important source of capital to (re)insurers, offering diversification from traditional (re)insurance capital and responding to many of the most material catastrophe events, including Hurricane Katrina, the Tohoku earthquake, Hurricane Irma and the more recent Covid-19 pandemic.

As organisations navigate new forms of volatility, Aon Securities has helped them to rethink access to capital, with catastrophe bonds becoming an integral part of the insurance ecosystem.

How can investors remain confident about taking on secondary perils in a broadening market?

There's a fairly significant amount of effort being expended to get smarter, more relevant and analytical frameworks in place to account for climate change.

It's critical that we can articulate a framework to analyse risk so that investors can figure out whether they are meeting their desired targets.

It's going to require a partnership approach. We are trying to be proactive and collaborate with others on this.

Paul Schultz
CEO of Aon
Securities



Cat bond volumes set for third \$10bn+ year

Cat bond volumes are expected to remain strong in 2022 after two consecutive record years. Issuances are anticipated to reach \$10bn, just under 2021's total of \$12bn, according to a survey of broker-dealers conducted by *Trading Risk*.

Maturing deals will remove around \$7.2bn-\$7.5bn from the market, giving room for net growth to the outstanding market of approximately 10%.

H1 is expected to be a busy renewal period, with deals returning to market worth \$1.4bn in Q1 and \$4bn in Q2.

Several ILS managers agreed that the trends which buttressed cat bond growth the previous year would continue to drive growth,

although one expressed doubt that 2022 would best 2021's totals.

One trend was the migration of transactions from the traditional retrocession market, where buyers of cover encountered higher prices and lower availability of cover. They therefore turned to the cat bond market, which had fresh capital to deploy, boosting the cat bond market's predictability relative to collateralised reinsurance or sidecars.

Strong investor demand for liquid ILS products reflects the results of the Eurekahedge ILS Advisers Index, which showed cat bond funds delivering average gains of 2.34% for the year, versus an 0.12% loss for private ILS funds.

Aggregate restructuring

Wariness regarding aggregate risk exposure is expected to continue into 2022. Jean-Louis Monnier, head of retro and ILS structuring at Swiss Re, said aggregate triggers may be narrowed down by focussing on earthquakes or hurricane coverage only, and excluding secondary perils.

Another option is for them to be structured with a material per-event deductible, as USAA introduced in Residential Re 2021-1, which means only losses above a certain threshold count towards aggregate tallies.

Furthermore, larger numbers of corporate sponsors are expected to emerge, the former largely on a single-peril basis, after companies such as Alphabet, Blackstone and Prologis have used the market in the past year.

Aon Securities CEO Paul Schultz said corporate and government sponsors could be a "real catalyst for change" for the cat bond market.

Flat pricing outlook

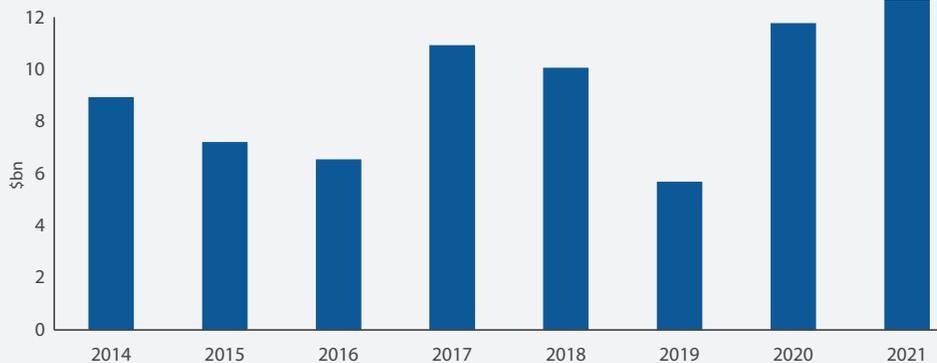
Broker-dealers told *Trading Risk* that prices are expected to stay more or less flat in H1.

Rates softened from January 2021 to September that same year and then stabilised. The volume-weighted average spread by quarter was highest in Q1, at 628 basis points, while Q3 was lowest at 459 basis points, in a quarter that featured a number of low risk-return deals.

Cat bond margins, as demonstrated in the pricing multiples of spread to expected loss, hovered around 2.5x-2.7x for much of the year, rising to 3.7x in Q4.

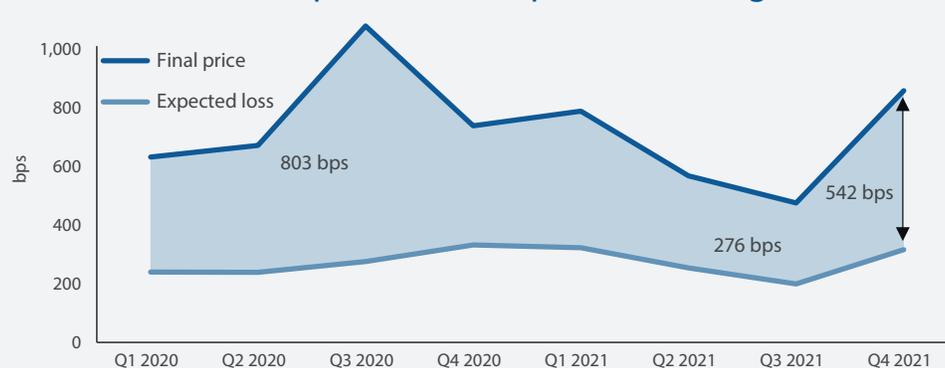
GC Securities managing director Cory Anger said she expected "more stable rates overall," in 2022, while Willis Securities CEO Bill Dubinsky foresaw rates "flat to down on average next year," adding, "but there are a lot of nuances there".

Total 2021 cat bond issuance will exceed \$12bn



Source: Trading Risk

Distance between spreads and expected losses grew in Q4



Source: Trading Risk



Back to ILS basics

Twelve Capital's Florian Steiger – cat bond strategy lead and member of the firm's group management committee – believes fully funded ILS structures are the best way for investors to access the sector

What questions do you currently get asked most often by investors?

The most frequent discussion is around why cat bonds have done so well, unlike quite a few private ILS deals which generated losses. My take is very simple – cat bonds are structurally more appropriate for most investors compared to many other ILS products.

It starts with the tenure – cat bonds might get trapped, but you've had two to three years of premium before that point. If you have a high-risk private ILS product you typically earn premium for a maximum of one year and you have a higher risk of getting trapped for another three years.

That's essentially what has happened frequently in the past five years. ILS managers dealing with trapped capital either need to accept deploying less capital, use fronting or invest into riskier deals to try to maintain returns. The range of performance outcomes from various private ILS strategies has consequently been quite large in recent years.

Do you see fronting as a solution to the trapped collateral problem?

If you have a fronting solution, you need to have a diversified business [to secure leverage]. That requires you to invest in risk which is often not that well modelled and not that well paid. We at Twelve Capital don't want to be in competition with rated reinsurers for that business. We believe fully funded is the sweet spot for ILS product from an investor's perspective.

Do you think there is enough headroom for ILS growth in fully funded structures?

I think there is, yes. The cat bond market has grown significantly in the past years using these structures. Insurance regulation is getting stricter and the need for reinsurance is getting bigger every day, the entire industry is growing.

Does Twelve have any aspirations to run a rated reinsurance balance sheet?

Unlike many cat bond portfolio managers, I do not have a reinsurance background. I always find it interesting culturally when I speak to a reinsurance person how even the language is different.

When they speak of a "buyer", they are referring to the "buyer of protection", when I (or most cat bond fund clients) speak about "the buyer", we are talking about the investor. In the end, a company which is active in ILS needs at some point to decide who is their client. Is it the investor, or is it whoever obtains protection? Do you want to mimic the balance sheet of a reinsurer or be an asset manager?

For us the answer is crystal clear, we want to be an asset manager and our client is the investor. Everything is structured around their needs.

.....
"If you have a fronted solution, you need to invest into diversified business. That means you have to take risk which is often neither well modelled nor that well paid"
.....

How are investors assessing the relative value of cat bond and private ILS strategies?

Investors are not particularly focussing on cat bond spread compression – they're looking at the losses and perceived underperformance they've endured over the past four to five years [from the private ILS space] and people are still exiting that business. In peak perils, cat bond spreads are still quite high and certainly of interest for investors.

Most of them are quite happy to give up a bit of premium for the structural benefits and liquidity. The consequence for us has been substantial inflows into our Twelve Cat Bond UCITS Strategy – it's almost doubled in size during 2021.

How has the investor base developed in recent years?

ILS was a pension-fund asset class initially, but in the past few years it has become open to everyone – single family offices, private banks, fund of funds. It's still institutional-only, but pretty much everybody is looking at cat bonds now.

How do you assess the relative value of pure liquid cat bond strategies as opposed to purely private strategies?

Our philosophy is that cat bonds should be the core of an ILS investment. You could complement this with private ILS deals – we particularly like the retro space these days – to create "cat bond plus" strategies with higher return profiles.

Twelve Capital has brought a new minority shareholder, Swiss bank GKB, on board recently. How will this impact the firm?

On a day-to-day level, there will be no difference in our operations. The strategic investment brings stability to our shareholder base and, together with GKB, we can continue to pursue our growth objectives.

How do you manage exposure to secondary perils?

In the past we've been trying to avoid them outright but our stance might become more nuanced in the future. It's not as obvious to say "no" as it was five years ago as now the models are getting better and spreads are hugely higher. There could be a point where it becomes interesting again, simply due to much better economics compared to recent years.

Hurricane Ida dents ILS gains in 2021

ILS returns averaged a 0.9% gain in 2021, according to the Eurekahedge ILS Advisers index, as performance in the year of Winter Storm Uri, Hurricane Ida and the Storm Bernd floods ranged widely.

The best performer tracked by the index gained nearly 14% for the year, while the worst lost 12%.

The year marked the third consecutive annual gain for the index, but it was not high enough to claw back the index to its pre-Hurricane Irma levels following the loss years of 2017-2018.

The return also fell back from the 2020 gain of 3.5%, when the ILS sector proved resilient to Covid-19's impact despite an active hurricane season.

The gain was achieved in the face of last year's Ida, the second-costliest hurricane in the US according to Aon/Insurance Information Institute data which put the value at \$36bn.

Ida caused less than half Hurricane Katrina's \$90bn loss (in 2021 adjusted dollars), but came in just ahead of the \$33bn adjusted loss from 2017's Irma.

However, some market participants have said they believe Ida's losses may ultimately drop closer to the early \$30bn range, as they weigh up potential for post-event inflation with damage reports that have been more limited than initially expected.

As well as Ida losses impacting US (re)insurance contracts, ILS strategies would also have taken losses from aggregate retro and reinsurance deals exposed to all three of the year's major losses and specific European covers including retro sidecars.

Divergent returns

Variation in returns among funds tracked by the index was higher than in 2020, when the monthly spread of returns averaged 4 points. ILS Advisers data showed the

Key metrics

	%
Annualised return	4.02
Return since inception (2006)	88.59
Sharpe ratio	0.64
% of positive months	85.49

Source: Eurekahedge ILS Advisers

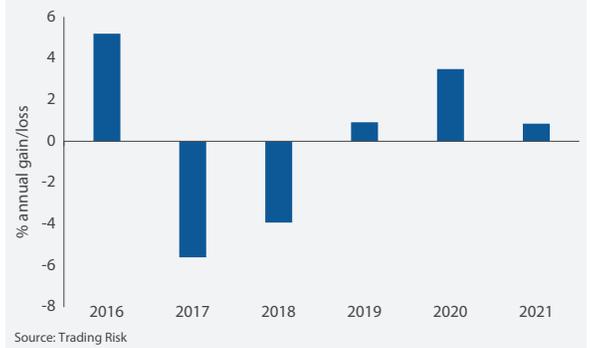
average was 5 points from January to November, with December monthly information not disclosed.

In June the range of performance spiked to 13 points, with Australian and European floods among the noteworthy events. May, August and September also featured abnormally high divergence in gains of 7-8 points amid Ida's protracted shift from Louisiana to the US northeast.

Once again, given the lower-risk skew of the cat bond market, pure cat bond strategies had a better year than funds that also invest in private ILS instruments. The cat bond funds gained 2.3% in 2021, versus an 0.1% loss among private ILS strategies. This compared to a more even 3.3% and 3.7% return in 2020, respectively.

For the year ahead, a major point for ILS investors to watch will be the development of Covid-19

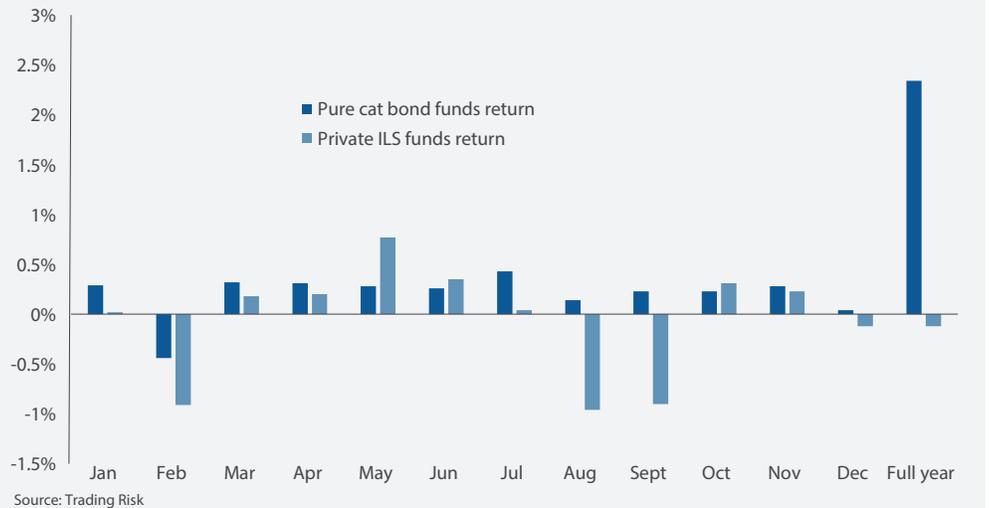
Ida dampens post-Covid ILS returns in 2021



business interruption claims as negotiations over disputed claims may influence the return of 2020 capital and associated performance. Meanwhile, for 2021 Uri, there is the hope of subrogation claims against the Texan utilities whose power supply failures exacerbated losses.

But this potential gain is much more speculative than in the case of Californian wildfire subrogation benefits from pay-outs from the likes of Pacific Gas and Electric Company, as Texan regulation suggests the local state power grid provider is immune from prosecution.

Cat bond funds vs private ILS strategies



January two-speed renewal led by retro market retraction

After 2021's major disaster losses, the January 2022 reinsurance renewals proved a more challenging tussle between buyers and sellers than for many years.

Two of the central features of the renewal were the major shortage of aggregate capacity, and retro rates outpacing first-tier reinsurance pricing for peak US cat cover.

This created a two-speed market that may prove challenging for providers that had been reliant on retro hedging.

Another way the market could be seen as two-speed was in the divergence between the challenges of catastrophe renewals and the generally more straightforward casualty and specialty renewals – or the more stable outcomes on higher-layer risks as reinsurers seek to move their exposure to more remote levels.

Shrinking of the retro market reflects on the accumulated challenges that have made raising capital for higher-risk strategies in particular harder, after the string of cat loss years since 2017, and led to much diminished capacity from major ILS firms in this niche.

Overall, much of the industry's focus in assessing the outcome of the renewal is likely to centre on assessments of how cat rate gains stack up against the negative impact of inflationary pressures, climate change and a changed view of risk around secondary perils.

Some reinsurers were much more positive on the net impact of rate gains than others who argued that inflation offset much of the increases. The varying stances influenced what looks to be a higher level of panel turnover than last year.

Many traditional reinsurers, such as Axis, Axa XL and Everest Re, have cut back their cat exposure.

1 January renewals

- European reinsurance and global retro a major focus for the first renewal of year
- Retro rate increases outpaced underlying reinsurance gains
- Aggregate coverage far harder to secure as reinsurers move away from first-tier risk
- Casualty, specialty renewals ran far smoother than property cat

In Europe, regions impacted by Storm Bernd flood losses were the focus for major rate correction, but given these were coming off low baseline levels and broader increases were in single-digit territory, some sources remain aggrieved about lack of rate adequacy in this region that is dominated by longstanding continental relationships.

Despite US rate increases being more subdued than last year, there were other changing dynamics that enabled rates to rise, such as lower levels of over-subscription from reinsurers on placements.

Private deals in various forms marked the final stages of trading, particularly on European

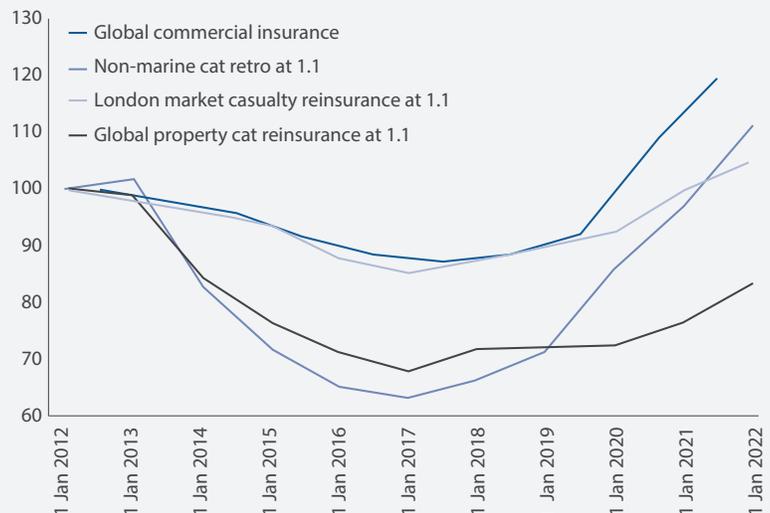
catastrophe business but also to some extent on US cat, meaning the ultimate outcome for reinsurers will be harder to gauge and more variable.

Among the official broker measures of risk, Howden's global property cat risk-adjusted rate-on-line index rose by 9%, taking the index back to pricing levels last recorded in 2014.

The climb was ahead of the 6% jump recorded last year, and the biggest year-on-year increase in more than a decade.

Retro rates rose still more steeply, up 15% on the firm's specific retro index. This has taken pricing levels back to 2009 with rates up by more than 75% since the lows of 2017.

Howden pricing index for primary, reinsurance and retrocession markets – 2012 to 2022



Source: Howden



How inflation could impact on ILS

As the world economy transitions from more than a decade of benign inflation, what will be the impact on ILS deals?

Impacts on ILS from economic inflation are likely to hit the hardest during the current transition period from more than a decade of low inflation to the point where inflation is routinely factored in as part of normal trading, according to market observers.

Inflationary pressures from Covid-19 were biting last year in the form of labour and material cost. On top of this has come Russia's invasion of Ukraine, which will drive further inflationary impacts on energy prices.

US consumer price inflation (CPI) has grown steadily over the past year to 7.5% in January, up from 1.4% the same month a year ago.

Schroders on 1 March revised up its expectation on global CPI to 4.7% for 2022, from 3.8% in its outlook of November 2021.

Inflation impacts on ILS in several main ways. First, rising inflation tends to result in interest rate increases, meaning premiums will go up in the many cases where they are linked to a floating rate.

This is because ILS structures require collateral to be set aside, which earns investment income, typically from short-term treasuries, on top of the insurance premium. This positions the ILS asset class as a defensive play in a

more inflationary world. However, the effect of inflation on insurance premiums itself is ambiguous.

Marc Staub, senior investment consultant at Switzerland-based independent advisors PCCmetrics, said: "Due to lower interest rate sensitivity, ILS can offer some protection against inflation from an asset perspective, as interest rates usually rise in an inflationary environment."

Second, increasing property values also means more need for cover and potential to grow the market, although this may be difficult to quantify as more of an indirect or longer-term gain.

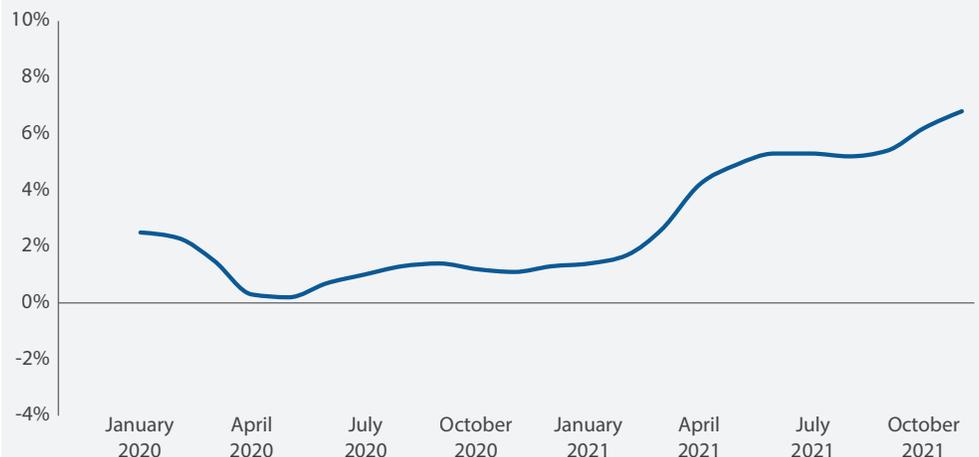
Finally, inflation impacts on ILS in that increased loss costs will feed up through the insurance value chain from primary insurers' books.

The challenge is that, as inflation pushes up claim costs, deals written on an indemnity or market loss basis are more likely to trigger. It doesn't affect deals where the trigger is parametric.

The impact arises when a transaction, which pre-inflation would have been triggered by, for example, a \$100bn catastrophe loss event, now will be triggered by a less severe event. This means deals pay out more frequently.

Tom Larsen, principal, industry solutions, at property data and modelling firm CoreLogic, which has worked on catastrophe bond

How is US consumer price inflation trending?



12-month % change in CPI for all urban consumers, seasonally adjusted. Source: US Bureau of Labor Statistics

Lumber prices doubled from Nov 2021 to Jan 2022



Source: Nasdaq

deals, said: “We saw the glimmers last year of impacts beyond what you would expect from the long-term cost of inflation after a hurricane event.”

Lumber prices in particular shot up – they make up about 15% of a typical property rebuild cost – as did the cost of contractors and labour.

“An ILS instrument that went out last year with an expectation of a \$100bn event, that same event could now cost \$110bn-\$115bn, easily,” Larsen noted.

The typical duration of a catastrophe bond is three years, meaning that for those written before the pandemic, in 2019 or even earlier, current levels of inflation were not factored into the price.

For deals being written today, the impacts of economic inflation can be mitigated. The ways to do this are by price, structure or a mixture of both.

One approach to inflation mitigation is to shift the attachment point. In such a case, an industry loss warranty (ILW) that would pay out based on a market loss excess \$20bn could be adjusted to pay out excess \$22bn, if inflation were 10%.

If the expected loss and the price

stay the same, the attachment can be notched up by the rate of inflation. That’s straightforward.

More complicated is to keep the same attachment and adjust the pricing, because inflationary impacts vary depending on the type of risk.

.....
“It’s non-linear... It’s not enough to say inflation is 10%, so we increase the price by 10%”

Also, the selection of an appropriate inflation assumption is not easy. The increase to rebuild costs may in general come in higher than CPI inflation because price rises may play out differently according to the type of damage caused.

In a hypothetical case where inflation is running at 10% a year, Schrodgers estimates that the price increase required to mitigate the impact could vary typically from around 10%-12% for earthquake, 12%-14% for tropical cyclones and 16%-20% for severe weather. Keeping the attachment point unchanged corresponds to a decrease of the attachment point by 10% in prices of a year earlier.

The change in expected loss is thus equal to the change in attachment probability (and not attachment point) under constant prices when lowering the attachment point accordingly. This change in probability is a property of the underlying loss distribution. The less severe the distribution of the losses, the greater the change in attachment probability.

The severity of that distribution also reflects the different nature of the perils – whereas earthquake losses multiply hugely from more extreme, low-probability earthquake events, severe weather losses which are higher frequency are not likely to escalate as fast in more extreme scenarios.

Christoph Hummel, head of analytics at Schrodgers Capital, said: “It’s non-linear and you need to have the tools and the models and the understanding. It’s typically not enough and wrong to say inflation is 10%, so we try to increase the price by 10%.”

On the structural side, potential adjustments include avoiding structures that can amplify inflation impacts, such as aggregate deals with low event deductibles. In general it’s possible to indemnify based on cash value, which is preferable in an inflationary context, rather than on replacement cost.

With deductibles, another component to understand is how far the cedant insurer has acted at individual policy level to raise deductibles and the extent to which that action has washed through the annual refresh of their portfolio.

A similar question can be asked about sums insured and if these have been updated to reflect current rebuild and replacement costs.

“We need to understand what measures the company has taken. What are the gaps or the areas in which they have not responded?” Hummel said.

The key for investors is to see as much stress testing as possible, so that the sensitivity to inflation of the security is fully understood.

‘How do I choose what ILS ‘perils’ I should invest in?’

Trading Risk examines the question of how investors should choose which perils their ILS portfolios should invest in, amid excitement over emerging risks like cyber and anxiety over climate change

The prime consideration for choosing ILS perils is for investors to ensure that the occurrence of insured loss events are fully independent from financial market dynamics, according to Dr Raffaele Dell’Amore, partner and head ILS centre of competence at Siglo.

“Vice versa, the occurrence of the insured events should have no explicit consequences on financial markets,” he continued. This is not necessarily a given with emerging risks like cyber and terror, as these can have material impacts on financial markets.

In recent years, an increase in awareness of climate change and its impact on ILS, particularly cat bonds, has led some investors to be wary of taking on risk associated with massive weather events such as Hurricane Ida and Winter Storm Uri.

“Investors look at insurance and security and think ‘I like the lack of correlation and the yield, but I just don’t like having anything that’s climate-related in my portfolio,’” said Cambridge Associates investment director Mark Wilgar.

“I think that’s a tough one, because climate change does create uncertainties but that uncertainty pales in comparison relative to areas of casualty and specialty reinsurance, where you have more behavioral, regulatory and litigation related risks, things that are generally much more difficult to model.”

He therefore advises caution to investors who wish to branch out into alternative perils.

Ultimately, to assess whether a risk is worth their while, investors and managers should

consider whether the modelling of risks is robust and trustworthy, the qualitative aspects of the investment opportunity are sound and that the cedents are trustworthy and experts in what they do, according to Siglo.

Furthermore, investors should consider what they themselves require. “Different clients have different requirements with regards to liquidity, risk appetite and risk tolerance from a maximum draw down perspective,” said Dr Dell’Amore.

.....
“You can lose sight of the woods for the trees when trying to avoid model uncertainty”
.....

Scott Pappas, principal consultant, head of alternatives and derivatives at Frontier, concurred: “Our focus is to work with our clients to firstly understand the broad portfolio purpose then help to tailor the ILS portfolio, including peril selection, to work in with these requirements.”

If focusing on nat cat perils, there are several factors which investors should be aware of, such as the peak primary and secondary peril distinction.

“Peak perils (such as earthquakes and hurricanes) tend to be better rewarded with regard to risk vs return, so they tend to make up the bulk of the bulk of portfolios,” explained Robert Howie, a principal in the hedge fund boutique of Mercer’s wealth business.

But the “fuzziness” of secondary perils, due to the relative difficulty in modelling them, can offer a premium loading potentially a good return, he noted.

“We see a diversity of approaches across clients. Some concentrate risk in the major perils with the expectation that returns will be uncorrelated to their wider portfolio. While this works at the total portfolio level, it can make the ILS allocation more volatile,” Pappas continued.

If investors have exposure to secondary perils, it is advisable to make sure it is “remote”, Wilgar advised, by avoiding aggregate risk and opting for indemnity, excess-of-loss and named perils in their terms.

Investors should consider also how exposed risks are to climate change. “I think a reasonable understanding is that not all natural catastrophes are equally affected by climate change... with perils like hurricanes there seems to be less of a clear directional case to say they’re getting riskier. Whereas with perils like wildfire and flood risk, there’s a clear link,” Wilgar pointed out.

“You can lose sight of the woods for the trees when trying to avoid model uncertainty.”

Cambridge Associates
investment director
Mark Wilgar



Swedish pension fund Alecta enters ILS sector

Alecta made its debut ILS allocation at the 1 January 2022 renewal, allocating \$250mn to Swiss Re's 1863 fund and \$200mn to Scor's Atlas Gotland Worldwide Catastrophe sidacar. The Swedish pension fund's focus in ILS is entirely on natural catastrophe risk.

Tony Persson, head of fixed income and strategy at Alecta, told *Trading Risk* that the fund had been monitoring ILS as an asset class for a number of years, before hardening rates and capacity constraints had created beneficial market conditions for its entry.

The fund expects to ultimately allocate up to around \$2.5bn or 2% of its total AuM of SEK1,156bn (\$126.8bn) to ILS.

MLC is also bullish on ILS, saying in a blog post that the asset class is one it looks to in order to balance equities exposure. The Australian pension fund made a 4.8% return from its roughly \$700mn ILS portfolio between September 2020 and September 2021, despite exposure to Hurricane Ida and European flood losses.

The firm has around A\$1bn (\$713mn) invested in the ILS sector. Although it is comfortable with what it described as the "hairball risk" of the asset class, it said it would be taking the opportunity to "adjust and fine tune their portfolios" for January renewals.

Elsewhere, sources told *Trading Risk* in December that Singaporean investment firm Temasek is set

to scale back and withdraw its holdings in the ILS asset class. Sources pointed out that climate-change concerns could play a part in the firm's board-level decision to exit the sector.

The amount of the firm's S\$381bn (\$278bn) investments in the sector are not known but it is believed to employ several ILS managers.

Also paring back was Coca Cola, whose pension fund allocation to ILS fell by 9% in 2021 to \$330mn. The previous year, it allocated \$362mn to ILS.

Coca Cola has decreased its ILS allocation every year since 2017, with the exception of 2020. Its pension plan assets for 2021 equal \$8.9bn, meaning ILS accounts for roughly 4% of the total.

Selected major investors in ILS

Organisation	Domicile	Current ILS allocation	ILS share of total assets	Managers employed
PGGM	Netherlands	\$7500mn	2.4%	Fermat, LGT, Nephila, Elementum, Munich Re, New Ocean, AlphaCat, RenaissanceRe, PartnerRe and Swiss Re
Future Fund	Australia	\$1141mn	1%	Elementum Advisors (A\$100mn 2015); Hiscox Re Insurance Linked Strategies (undisclosed sum in 2016)
Pennsylvania Schools (PSERS)	US	\$966mn	1.63%	Nephila, Aeolus, RenRe
Canada Pension Plan (CPP) Investment Board	Canada	\$900mn	0.34%	Fermat, Nephila and RenRe. Minimum level allocation cited based on 2018 reinvestments
NatWest (RBS)	UK	\$775mn	1.09%	Nephila and Leadenhall, as well as insurance litigation fund. Total ILS holdings may be higher as only partly disclosed
Florida Retirement System	US	\$740mn	0.5%	RenaissanceRe, Nephila, Pillar Capital, Aeolus Capital and CSAM/ILS P&C legacy fund
MLC	Australia	\$713mn	1.25%	Appointed Mt Logan Jan 2018, replaced Nephila with AlphaCat Managers in 2015.
AP2	Sweden	\$686mn	1.71%	Fermat, Credit Suisse ILS, Elementum
Challenger Life	Australia	\$662mn	1%	Not disclosed
AP3	Sweden	\$600mn	0.9%	In-house and external allocations
Teacher Retirement System of Texas (TRS)	US	\$600mn	8.33%	Not disclosed
Abu Dhabi Investment Authority	Middle East	\$550mn	0.07%	Allocated to around 5 ILS firms throughout 2019
State of Michigan Retirement Systems	US	\$538mn	0.77%	Not disclosed
Railpen	UK	\$462mn	1.54%	Credit Suisse ILS
Healthcare of Ontario Pension Plan (HOOP)	Canada	\$437mn	0.53%	Not disclosed
Maryland State Retirement and Pension System	US	\$400mn	0.22%	Nephila Capital, HSCM Bermuda, ILS Property & Casualty
PK SBB	Switzerland	\$390mn	1.9%	Not disclosed
Credit Suisse	Switzerland	\$387mn	1.97%	Humboldt Re (Credit Suisse)
The Coca-Cola Company	US	\$330mn	3.7%	Securis and others
Arkansas Teacher Retirement System	US	\$331mn	1.9%	Aeolus Keystone Fund; Nephila Rubik fund
City of Zurich Pension Fund	Switzerland	\$320mn	1.44%	Broadriver, Miravast, Elementum, Scor
West Midlands Pension	UK	\$313mn	1.53%	Markel Catco (run-off), Credit Suisse, Coriolis

Source: Trading Risk

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UK pooled funds consider ILS splash

Local government pensions funds in the UK are partnering up, creating new strategies and may seek diversification

ILS has kept a place on the discussion agenda with UK pension fund investors this year, say investment directors, adviser firms and ILS managers.

The diversification benefit remained the big draw. But while pricing is seen to have improved in the last few years, some still wanted more gains.

James Turner, investment manager at Railpen pension fund, noted that returns came down between 2005 and 2016, albeit masked by a lack of major events.

Pricing was better now, but Turner said he “would have liked to see more... after a few years of still above-average losses”.

Railpen still considers ILS “one of the best diversifiers there is,” he added. The organisation first invested in the asset class in 2011, dropped out in 2014-2015 as spreads tightened and went back in from 2017.

Generally, advisers see ILS as a mature asset class in the UK.

“The liability-driven strategies of some UK pension funds could incorporate ILS. On a portfolio level, as a diversifier, it makes expected outcomes more predictable,” explained Mark Wilgar, investment director at Cambridge Associates.

Robert Howie, financial investment adviser and principal at Mercer, said some UK investors had adopted ILS early. He agreed that fundamentals had improved, adding this had been offset to a degree by claims inflation and side-pocketing.

Another ILS specialist noted that the failed retro firm Markel Catco still cast a shadow. British Steel’s pension fund was one that supported the provider but has since exited.

However, the West Midlands Pension scheme took Catco losses but remains active in the asset class with allocations to Credit Suisse ILS and Coriolis.

Pooled potential

New pooled funds formed under the local government pension fund initiative might look to make new ILS allocations. LGPS Central was set up in 2018 with eight partner funds – including West Midlands which is already active in ILS.

“On a portfolio level, as a diversifier, it makes expected outcomes more predictable”

The LGPS Central fund is in the process of forming a new targeted return fund and has tendered for strategies, with a number of ILS managers having responded.

“The aim is to have a spread of about six to eight diversifying strategies. Catastrophe exposure could fit in, because of its low

correlation to equities,” explained Colin Pratt, investment director at LGPS Central. The size of the allocation would be “not more than £100mn,” he added.

“Given the performance and risk objectives of the fund it is likely that we will go for low risk assets. That doesn’t mean they can’t produce a negative return, just that they are priced in such a way that things will have to be more extreme for it to go wrong,” Pratt said.

Lorenzo Volpi, managing partner at Leadenhall Capital Partners, has seen UK investors looking carefully at which risk layer suits them best. “Investors will take a different view on where they want to play in the insurance risk tower. Some of them prefer to take less risk and stay out of the money, where the risk adjusted premiums are structurally more attractive – even if lower on an absolute level – to get stable returns and low volatility.

“Others think, ‘well, it’s a strong diversifier, it’s a small percentage of my overall portfolio, and given the favourable current market conditions, we should simply go for the high single-digit or double-digit returns,’” he said.

UK investors allocate to ILS as new pooled funds emerge

Fund	Total assets	ILS allocation	% total assets	Prior-year allocation	ILS partners
NatWest Group Pension Fund (formerly RBS)	£51.3bn	£743mn	1.4%	£768mn	Nephila, Leadenhall
West Midlands Pension	£14.8bn	£227mn	1.5%	£359mn	Credit Suisse, Coriolis
Railpen	£30.5bn	£385mn	1.3%	£362mn	Credit Suisse ILS
IBM*	£11.5bn	£291mn	2.5%		Nephila, Securis
North Yorkshire Pension Fund	£3.5bn	£164mn	4.6%	£159mn	Leadenhall
Local Pensions Partnership*	£17.7bn	£51mn			Aeolus
Royal Mail Pension Plan	£12.5bn	£47mn	0.4%	£67mn	Elementum
Pilkington Superannuation Fund	£2bn	£41mn	2%	£41mn	Nephila
Metal Box Pension Scheme*	£2.3bn	£37mn	1.6%		Nephila
Shropshire County Pension Fund	£1.9bn	£32mn	1.5%		Securis
LGPS Central	£45bn	N/A			Allocating via targeted returns strategy

*Last known ILS allocation; no longer disclosed separately
Source: Trading Risk

Cyclones could shift beyond tropics: study

Two recent studies highlighted the rising threat of cyclones migrating outside tropical latitudes, which could put northeast US cities or Asian hubs such as Tokyo more at risk.

In a December study, ‘Poleward expansion of tropical cyclone latitudes in warming climates’, a group of researchers predicted that climate change will expand the range of tropical cyclones, making millions of people more vulnerable to devastating storms.

Currently cyclones are mainly confined to tropical regions north and south of the equator, but the study, published in *Nature Geoscience*, said they are on track to spread to places in the mid-latitudes such as New York, Beijing, Boston and Tokyo.

Authors Studholme, Fedorov, Gulev, Emanuel and Hodges noted that this shows tropical cyclones will occupy a larger range of latitudes than those of the past 3 million years.

Yale researcher and lead author Joshua Studholme told the BBC that sub-tropical jet stream winds usually act as a “border guard” keeping hurricanes closer to the equator, but warming temperatures may weaken the jet-stream activity.

Subtropical storm Alpha, which made landfall in Portugal in September 2020, took the study’s researchers by surprise, as a decaying mid-latitude storm forming into a tropical cyclone had not happened in Portugal before.

Hurricane Ida was the most recent storm to sweep through the northeast US, as the tail of the storm led to flooding that caused a second round insured loss impact after the initial strike on Louisiana.

.....
“Sub-tropical jet stream winds usually act as a ‘border guard’ keeping hurricanes closer to the equator”
.....

Before that, Superstorm Sandy in 2012 provided a direct hit to the northeast, causing around \$20bn in insured losses per Insurance Information Institute presentations.

On a similar theme, a study by Imperial scientists Wang and Toumi published by *Science* in January 2021 also found tropical cyclones are becoming stronger and occurring at higher latitudes.

In ‘Recent migration of tropical cyclones toward coasts’, Wang and Toumi found that the point of maximum cyclone intensity has been drawing closer to land since 1982, the distance falling by around 30km per decade. There were also on average two more cyclones per decade within 200km of land.

Cyclone paths are moving poleward as well as westward, changes which may be driven by global zonal changes in environmental steering flow. Their analysis points to a “robust migration” of tropical cyclones towards coasts, they said.

However, the study did not show that more cyclones were making landfall, which is the principal driver of insured losses from storm activity – although some can cause damage by lingering offshore.

According to University of Colorado scientist Roger Pielke, the North Atlantic averaged 2.5 hurricane landfalls per year from 1970 to 2019. But while landfalling storm data has been on the rise since the 1970s, the average is more static going back to 1945, as the 1970s and early 1980s was a period of low cyclone activity in general.

What would it cost?

Wildfire risk is increasing and with it demand for quality catastrophe modelling to enable insurance markets to further develop

The UN predicted that wildfires will increase in number by 14% worldwide by the end of this decade, in a report published to coincide with its meeting in Nairobi in February.

Meanwhile, insured US wildfire losses have topped \$12bn in three of the last four years, according to a report published by brokerage Aon in October 2021.

More encouragingly, in January the American Academy of Actuaries produced a report whose thrust was to encourage wider and more effective use of catastrophe modelling for wildfire risk.

It noted that mitigation and prevention measures can reduce wildfire risk substantially.

What the modeller says

We asked KCC to model what would happen if a wildfire hit Santa Barbara. KCC principal scientist Dr Chris Burke outlined several factors impacting this specific hotspot of exposure.

Santa Barbara on the Pacific coast has the Santa Ynez mountains directly to the north. Much of the vegetation in the surrounding areas is the shrub chaparral, like many other wildfire-prone areas in southern California.

Similar fuels were prevalent in historical blazes including the nearby Thomas Fire in 2017 and Woolsey Fire in 2018.

Unique to Santa Barbara is a phenomenon known as “sundowner winds”. These are similar to downslope winds like the Santa Ana winds, but they are specific to Santa Barbara’s unique position along an east-west-oriented coastline, and they can greatly accelerate the spread of fire.

On a typical day, offshore draining winds flow down from the Santa

Ynez mountains in the evening when air flows from the north out to sea, and the reverse happens in the morning.

However, when a high-pressure system sets up to the north of the mountains, the onshore flow is suppressed and the downslope winds are enhanced, causing a sundowner event.

Sundowner winds are often warm and dry. They are associated with abnormal drops in relative humidity and rises in temperature. They often begin in late afternoon or early evening, hence the name.

The loss profile

The KCC US Wildfire Model includes many potential fires impacting Santa Barbara with a wide range of loss estimates. For this analysis, KCC scientists selected a \$20bn loss event, which is around a 50-year return period wildfire loss for California.

The ignition point lies to the north of Santa Barbara in the San Rafael mountains.

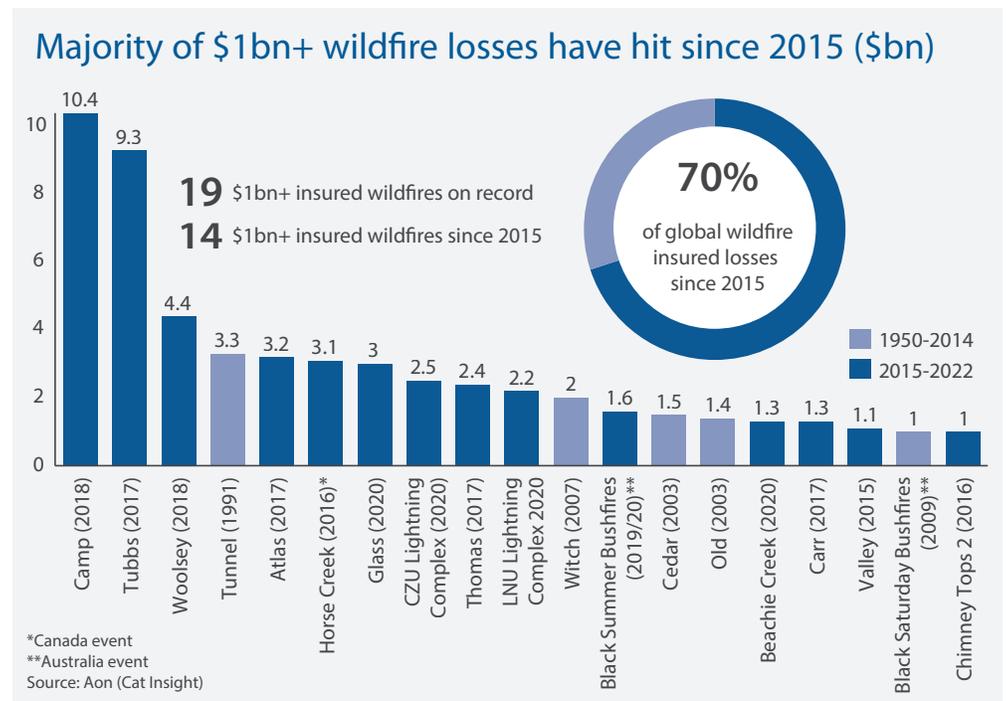
Initially driven by downslope winds, the fire spreads quickly to the southwest towards the Santa Ynez valley, where it spreads and elongates to the west. At this point, the fire climbs the northern face of the Santa Ynez mountains and then is driven towards Santa Barbara by a sundowner wind event.

In fact, it is typical for sundowner winds to occur after Santa Ana wind events.

Because of the high wind speeds and the fact that the fire is already surrounding Santa Barbara as it approaches the city, there is less chance of suppression efforts having a significant impact.

Note that while the blaze surrounds the entire city of Santa Barbara, the spread of fire into the city and towards the coastline is limited by the lack of wildland fuels within the city itself.

However, points within the city which are not directly burned can still be affected by branding from embers transported from the fire.



ILS market primer: from disaster frontline to pension portfolio



What is the insurance-linked securities (ILS) market? As the name suggests, it consists of financial instruments that provide insurance cover.

But don't conflate this industry with a standard burglary or fire insurance product. If you're investing in the ILS market, your risk antennae instead need to be tuned to the kind of natural disaster that might take over CNN screens – US hurricanes or Japanese earthquakes, for example.

The ILS market first emerged in the mid-1990s but it wasn't until after the 2008 financial crisis that it began to take off.

This surge was driven by its major selling point as a source of diversifying, or non-correlating risk – acts of God that won't be triggered by financial market turmoil.

The ILS market has largely made its home within the reinsurance sector – a wholesale industry that provides insurance to insurers to help them bear claims when disasters produce a spike in losses.

The ILS sector is sometimes labelled the “alternative” reinsurance market, and contrasted with the so-called “traditional” reinsurance market, which refers to rated balance sheet companies such as Swiss Re or Munich Re, to cite

Why ILS?

- Diversification from financial market risks
- Catastrophe models provide a framework for analysing risk and quantifying exposures
- Purer access to insurance risks – avoiding investment exposure on the balance sheets of major (re)insurers
- Cushions against inflation risks, as premiums include a floating rate return from cash pledged against insurance liabilities
- Short-term liabilities (largely one- to three-year contracts, some tradeable)

ILS primer: Market timeline

1996 – George Town Re, widely cited as the market's first cat bond, is launched by St Paul Re, followed a year later by the first Residential Re deal from USAA and a Swiss Re deal



1997 – Nephila Capital, which is now the industry's largest asset manager, is founded

2005 – The hurricane season of Katrina, Rita and Wilma sets off a spike in reinsurance rates and a spate of new start-ups



2008 – Lehman Brothers collapses – it had managed collateral for four cat bonds that defaulted – cat bond structures shift to invest collateral largely in Treasury money market funds

2011 – A heavy international loss year produces three full cat bond defaults due to the Japanese earthquake and US tornadoes



2017-18 – Hurricanes, wildfires and typhoon make 2017-18 the ILS market's biggest loss years to date



two of the longest-standing industry brands.

That's because the emergence of ILS market asset managers has given investors an alternative entry route into reinsurance risk, instead of just buying equity.

However, since its early days, any simplistic distinction between the two segments has eroded as the ILS segment has broadened and melded into the wider reinsurance markets.

For one, many traditional reinsurers have set up asset management platforms to compete with ILS managers, while a number of ILS managers have set up or are closely tied to rated reinsurance vehicles, giving them more freedom to take on a broader range of underwriting risks.

In recent years, the ILS market has expanded into segments such as marine and energy and aviation reinsurance. It has also delved into catastrophe-exposed property insurance, a step down the business chain. And for a select group of managers, life (re)insurance risk is a major part of their business.

Despite its blurring boundaries, ILS still offers investors a distinct route into taking reinsurance risk while skirting the equities market.

Perils: US risks dominate

The ILS market portfolio is heavily skewed towards the US, led by tropical storm/hurricane risks. Other major perils are US earthquake and Japanese earthquake, with small elements of European wind or Australian catastrophe.

That's because, historically, these are the most lucrative products for reinsurers. Florida, in particular, is their peak zone of exposure, meaning more capital must be held against these potential liabilities, attracting higher rates in turn.

They are also the most well-studied risks, with third-party statistical models available to help quantify hurricane exposures.

This combination of higher rates and strong data laid the foundation

Non-life catastrophe bond capacity issued and outstanding by year



Source: Willis Re Securities Transaction Database as of 12/31/2020. Aggregate data excludes private ILS deals

for ILS managers to target catastrophe risks in their early days, since for their pension fund capital providers, hurricane risk was a minor source of diversifying income to their own peak peril of equity market risk.

As ILS managers grabbed more market share in the property catastrophe market, the ensuing competition eroded much of the premium previously attached to hurricane risk.

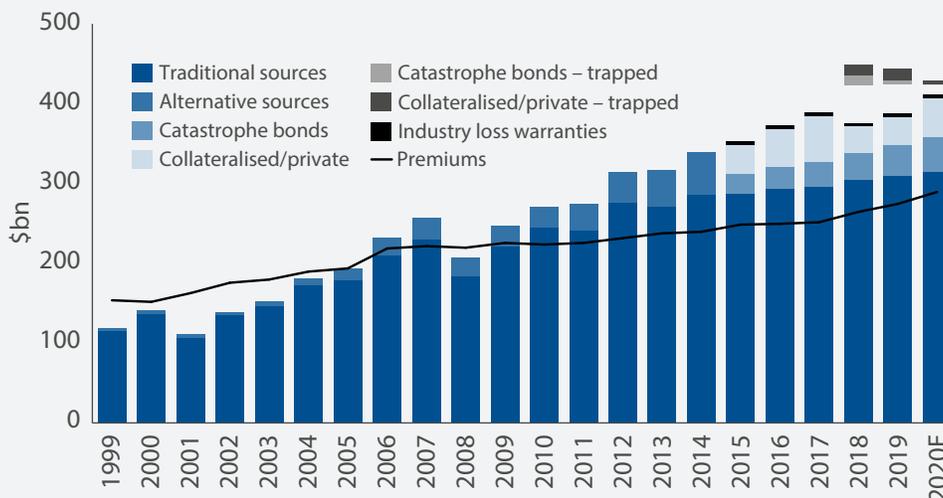
However, it remains the market's peak exposure with a corresponding price advantage compared to the types of catastrophe business that diversify a reinsurer's portfolio.

Continental European catastrophe margins are often said to be little better than break-even, which is one of the reasons why ILS market participation in this sector is relatively limited – cash collateralising limit for such margins would be highly inefficient.

Outside the catastrophe bond market, however, ILS managers are likely to be exposed to a wide range of catastrophe risks beyond the specific perils that are discussed here.

They typically offer “all natural peril” catastrophe cover, which may involve exposures that are unmodelled or less well-modelled – such as wildfires or floods.

Dedicated reinsurance capital and global gross premiums (all lines) – 1999 to 2020



Source: HX Nova Portal, Swiss Re



Sizing up the market

Estimates vary, but ILS makes up around 15% of overall reinsurance capital at \$97bn, according to figures from Aon.

But what exactly does the ILS market's of capacity represent? There are several distinct segments within this total.

The catastrophe bond market attracts a wide range of investors looking for liquidity, although it typically presents a lower risk, lower return opportunity within the ILS world.

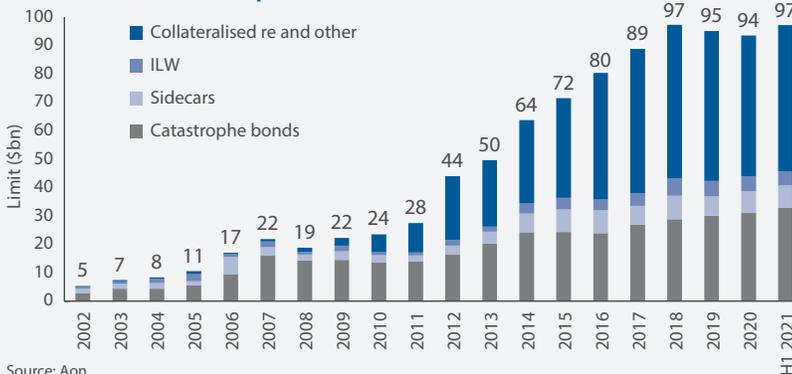
The niche industry loss warranty market is also relatively commoditised and easier to access, with a variety of risk-return options.

What is a cat bond?

A cat bond transaction involves a sponsoring insurer paying investors a premium for reinsurance cover against defined catastrophe losses. If a cat bond triggers, investors' capital is used to reimburse a sponsor's losses. There is no requirement for insurers to later repay such sums to investors. However, if no qualifying event occurs, then investors recoup their capital at the end of the transaction (typically three to four years).



ILS market components



Source: Aon

Catastrophe bonds

The most liquid section of the ILS market. Reinsurance in tradeable form, typically providing slightly narrower terms of cover for specified perils.

Collateralised re

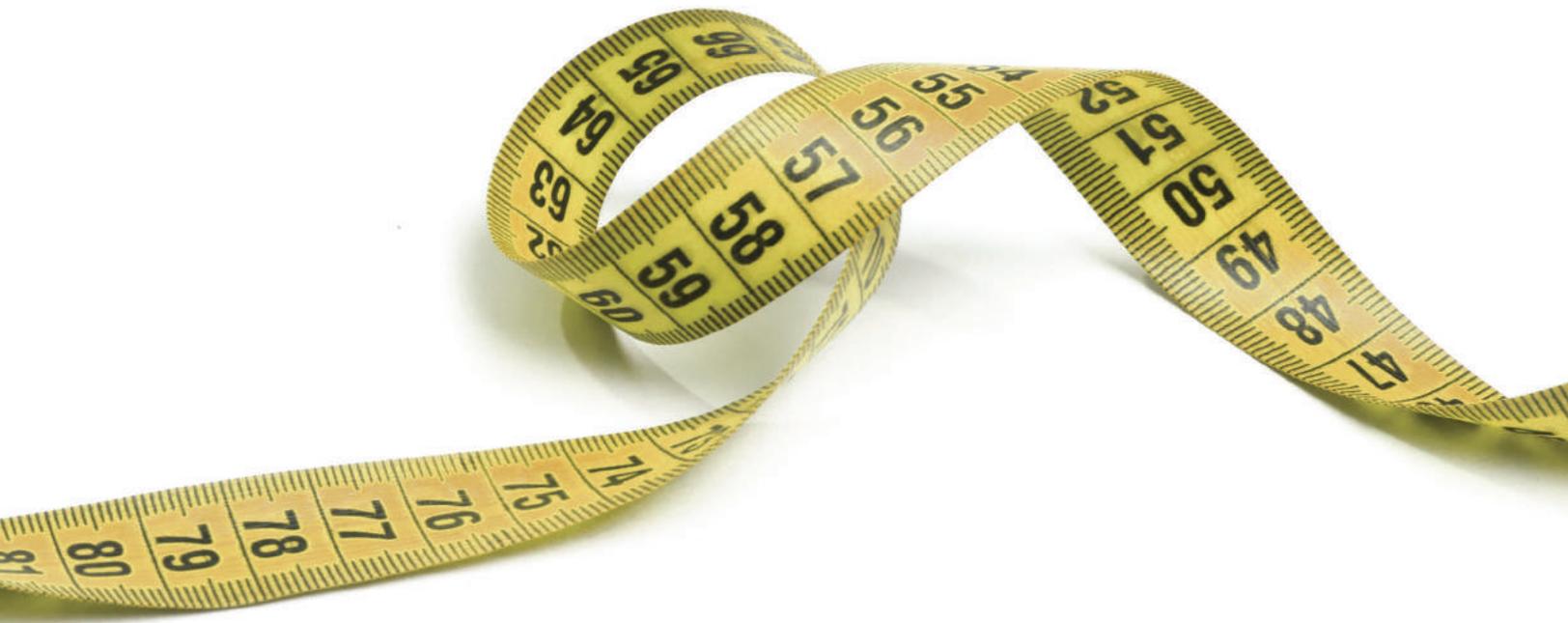
Effectively just traditional reinsurance contracts, providing indemnity cover for a buyer's losses, across a broad range of perils. ILS managers pledge cash collateral to back their liabilities, hence the name.

Industry loss warranty

Contracts that trigger not on a buyer's actual losses, but on the insurance industry's overall loss from specified disasters, e.g. a \$5bn Florida hurricane.

Sidecar

Vehicles run by reinsurers in parallel to their balance sheets. Typically involve a reinsurer ceding a share of a set portfolio of risks to investors (via "quota share" reinsurance). Some are "market-facing", akin to a fund, where a reinsurer writes a specific portfolio for the vehicle.



In contrast, the collateralised reinsurance segment is more specialised and difficult to access, but also provides a range of risk-return targets.

Finally, other small niches such as retro business can provide higher-octane strategies, while sidecars offer the chance to leverage off rated balance sheets and may introduce a range of diversifying risks.

Weighing up returns

So far during its short history the ILS market has delivered strong returns for investors, although margins have softened significantly in recent years.

Before 2017-18, the market's most difficult years had been 2011 and 2005, as a result of the Tohoku earthquake in Japan and Hurricane Katrina, respectively.

These were both testing, but by no means worst-case, catastrophe scenarios for the largely Florida-exposed market.

Even 2017, with its trio of hurricanes, could have been much worse had Irma taken a less favourable track over Florida.

There are a couple of benchmarks of returns that are often cited within the industry.

However, neither is without its limitations.

The Eurekahedge ILS Advisers tracks the performance of 34 ILS funds all equally weighted, which cover a wide range of strategies from high risk-return retro vehicles down to low-risk cat bond-only funds. Its worst year to date was 2017, when it lost 5.60%.

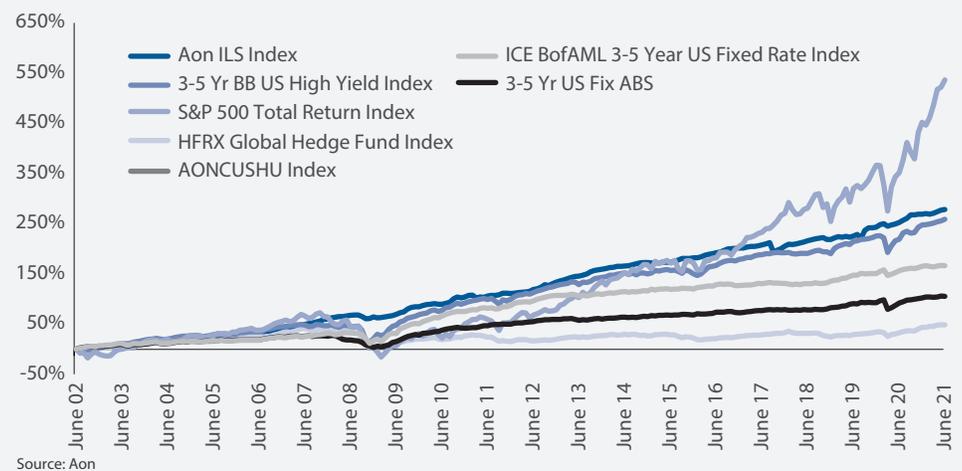
Meanwhile, the Swiss Re Cat Bond Total Return index solely tracks performance of the cat bond segment.

Quantifying risks

Cat bond investors are typically given the "expected loss" of a deal to measure their risk levels, a figure that expresses the likelihood of capital loss in any given year. For example, a 1% expected loss means investors could lose that amount of their principal in any year – or looked at another way, is roughly similar to the prospect that a 1-in-100-year disaster would wipe out all their capital.

Cat bond spreads are often cited as a multiple of the deal's expected loss, which is an easy way of referencing the margin of premium earned in relation to potential losses. Typically, cat bonds in the 1-2% expected loss range now offer investors around a 2x multiple (or spreads of 2-4%), depending on the risk profile.

Aon All Bond index versus financial benchmarks



Manager list

Manager by type	Total AuM in ILS \$mn (estimated)	Notes	ILS strategies	Established in ILS	Base
Specialist ILS manager					
Nephila Capital	8800	Acquired by Markel in Q4 2018	Various multi-instrument funds and single-investor mandates, also invests in weather	1998	Bermuda
Fermat Capital Management	8200	Independent ILS manager	Cat bond focus	2001	US
LGT Insurance-Linked Partners	7600	Former Clariden Leu ILS team moved to Swiss alternatives manager in 2012	Various funds and bespoke mandates	2005	Switzerland
RenaissanceRe Capital Partners	6200	Excluding RenRe capital	Medici cat bond fund; Upsilon funds write collateralised reinsurance/retro; cat quota share sidecars	1999	Bermuda
Leadenhall Capital Partners	6150	Now majority-owned by MS&AD - group took over ownership from MS Amlin subsidiary in Dec 2018	Non-life and mortality funds, life/non-life mandates	2008	UK
Elementum Advisors	4300	Independent manager; sold 30% stake to White Mountains in May 2019	Multi-instrument funds	2009	US
Securis Investment Partners	4115	Northill Capital owns majority stake. Data as of 1 June 2021	Life, non-life and mixed strategy funds	2005	UK
Schroders Capital ILS**	3953	Fully owned by Schroders since July 2019; figures on trailing quarterly basis (Oct 2021)	Six funds: two cat bond; three multi-instrument of which two include life risk, one life fund	2008	Switzerland
Credit Suisse Asset Management**	3900	Swiss bank; estimated AuM figures as recent figures not available	Various funds with different risk levels; two associated rated platforms	2003	Switzerland
AlphaCat Managers	3500	Affiliate of AIG's Validus reinsurance business, AuM excludes \$100mn from parent	Runs a lower-risk and higher-risk fund, BetaCat cat bond tracker fund, and direct mandates	2008	Bermuda
Aeolus Capital Management	3000-3500	Began as private reinsurer; transformed into fund manager in 2011. Now majority-owned by Elliott Management	Retro and collateralised re	2006	Bermuda
Stone Ridge Asset Management**	3100	AuM cited for public funds at 30.10.21 as current size of private funds not disclosed	Cat bond and sidecar funds	2013	US
Scor Investment Partners	3023	Asset management affiliate of reinsurer	AuM per 31 May 2021; now includes Coriolis funds after 2019 acquisition and integration	2011	France
Hudson Structured Capital Management	3000	Independent manager	Reinsurance AuM listed; transport fund not included. Multi-peril ILS strategies and InsurTech venture fund	2016	US/Bermuda
Pillar Capital Management	3000	Management-controlled; part-owned by TransRe	Collateralised re focus but invests across retro, ILWs, cat bonds	2008	Bermuda
Twelve Capital	2550	Spun out from Horizon21; team in ILS since 2007	Cat bond and multi-instrument ILS funds (insurance debt fund not tracked)	2010	Switzerland
Neuberger Berman Insurance-Linked Strategies	2400	Acquired by Neuberger Berman from Cartesian Capital in Nov 2018	Focus on natural catastrophe risk via ILWs, cat bonds & other ILS	2009	Bermuda
Swiss Re	2200	Reinsurer offering quota share sidecars and funds	Internal ILS portfolio of +\$1bn (not tracked). Sector Re/Viaduct sidecars and 1863 Core Nat Cat Fund		Switzerland
Amundi Pioneer Investments	~2000	Amundi subsidiary offers two ILS vehicles and invests multi-strategy funds in ILS	Pioneer ILS Interval fund & others; invests in cat bonds, sidecars & other instruments	2007	US
Hiscox Insurance-Linked Strategies	1550	Hiscox-owned asset manager; Hiscox capital \$55mn	Two co-mingled diversified funds; single-investor funds; one insurance sidecar	2014	Bermuda
Axa XL ILS Capital (ex New Ocean)	1200	Subsidiary of reinsurer Axa-XL which bought out minority partners in Nov 2018	Pantheon Re and Lascaux quota share sidecars; Daedalus algorithmic strategy and other quota shares	2014	Bermuda
PartnerRe	1100	Reinsurer offering quota share sidecars	Lorenz, Fourier and Laplace sidecars writing cat, retro and specialty risk		US
Axa Investment Managers	1086	Affiliate of insurer; invests third-party funds only	Various funds and mandates	2007	France
Axis Ventures	~1000	Reinsurer subsidiary; also oversees \$1bn Harrington Re joint venture not tracked here	\$1bn for property cat support; largely private sidecars	2014	Bermuda
Gildenbrook	1000	New launch from Dan Brookman, ex Axa XL manager	Assets under advisory, not management, in private quota share and collateralised reinsurance and private credit	2021	Bermuda
Aspen Capital Markets	950	Reinsurer subsidiary	Runs managed accounts, commingled funds and sidecars including Peregrine		Bermuda
Mt Logan (Everest Re sidecar)	877	AUM fig from Q1 2021. Includes some Everest Re capital	Quota share of Everest Re book	2013	Bermuda
Plenum Investments	755	Independent asset manager	Main focus on catastrophe bonds, manages also insurance bonds and life settlements	2010	Switzerland
Tokio Marine Asset Management	725	Asset management arm of Tokio Marine Group	Largely ILS/cat bonds		Japan
Integral ILS	675	Independent start-up; collaborates with TransRe and Amwins	Nat cat specialist across insurance, reinsurance, retro	2020	Bermuda
Arch Underwriters	600	Underwrites for rated \$1.13bn casualty-focused Watford Re, not tracked here	Also manages \$500mn third-party capital	2014	Bermuda
Munich Re	590	Major continental reinsurer, significant internal cat bond fund - not disclosed	Eden & Leo Re sidecars	2006	Germany

Manager by type	Total AuM in ILS \$mn (estimated)	Notes	ILS strategies	Established in ILS	Base
Lancashire Capital Management	563	Lancashire subsidiary established mid-2013; estimated AuM shown	Kinesis Re I vehicle writes multi-class reinsurance and retro. Wrote \$340mn limit	2013	Bermuda
TransRe Capital Markets	500	Alleghany's reinsurer subsidiary	Pangaea Re and other sidecars		US
PG3	450	Family office; largely family funds, may take third-party capital	Non-life and life reinsurance; legacy, life settlements, and other insurance finance strategies	2008	Switzerland
Tangency Capital	415	Independent manager launched by trio of reinsurance execs	Bespoke quota share portfolio	2018	London
Invesco	375	Mutual fund manager; runs ILS vehicle and invests via multi-strategy funds	OFI Global Cat Bond Strategy open to external investors	1997	US
ILS Capital Management	300	Independent ILS manager	Insurance and specialty strategies	2014	Bermuda
Brit (Sussex)	300	Brit Insurance sidecars	Sussex market-facing, Versutus quota share	2018	UK
Azimut Investments	275	Luxembourg affiliate of Italian asset management Azimut Group	One cat bond fund plus one multistrategy fund including small longevity exposure	2008	Luxembourg
Agile Risk Advisory	250	Hedge fund seeded D&F strategy led by Agile Risk Advisory	Direct & facultative reinsurance strategy	2021	London
Leine Investments	200	Reinsurer Hannover Re has seeded the fund with \$200mn	Cat bonds and collateralised re	2013	Germany
Chard Re	160	Independent Aquilo spin-off; Markel has small minority stake	Collateralised reinsurance	2021	UK
PIMCO**	150	Mutual fund		1971	US
Sumitomo Mitsui DS Asset Management (Tokyo)	105	Advised by Mitsui Sumitomo Insurance	Diversified, low-risk portfolio with JPY currency hedge	2014	Japan
Tenax Capital	71	Fosun owns majority stake in equities/ILS manager Tenax	Cat bond funds	2017	London
Aizawa Asset Management	50	Formerly Eastpoint, backed by Japanese manager Asuka Asset Management	Cat bond focus	2012	Bermuda
Entropics Asset Management	25	Independent ILS manager	Cat bond focus	2015	Sweden
Solidum Partners	not disclosed	Independent ILS manager	Cat bond and multi-instrument funds	2004	Switzerland
Entropics Asset Management	25	Independent ILS manager	Cat bond focus	2015	Sweden
Chard Re	not disclosed			2021	UK
Solidum Partners	not disclosed	Independent ILS manager	Cat bond and multi-instrument funds	2004	Switzerland
TOTAL	9695				

Select multi-strategy investors active in ILS; but not offering external ILS strategies

Challenger Life	850	Around 1% of \$85bn total assets	Invests in funds and sidecars		Australia
Quantedge	400	Hedge fund with \$3000mn overall AuM	Invests in cat bonds, collateralised re, sidecars, ILWs	2013	US
One William Street	300	\$4bn alternatives manager	Hired AI Selius to build ILS portfolio	2020	US
Baillie Gifford	40	Diversified Growth Fund invests in ILS	Buys ILS directly. Also held stake in listed ILS funds Catco/DCG Iris		UK
Aberdeen Asset Management	25	8% of £427.5mn Diversified Growth fund at end Q1 18; reinvested \$33mn in Catco post-loss			
DE Shaw	not disclosed	Has \$40bn+ total AUM; ILS holdings not disclosed	Writes collateralised re/retro	2007	US
Tiaa-cref	not disclosed	Manages \$800bn overall AuM	Buys cat bonds directly		US
TOTAL	1615				

ILS fund of funds

K2 Advisors	915	Hedge fund of funds manager; \$11.6bn AUM	Invests with multiple ILS funds; buys cat bonds directly	2003	US
ILS Advisers	200	Part of Hong Kong based investment manager HSZ	Fund of funds; index tracker fund tracking ILS Advisers index	2014	Bermuda
City National Rochdale	191	City National Bank-owned advisor targeting HNW clients	Allocates to NB Re and Stone Ridge (Select Strategies ILS fund)	2017	US
Altair Reinsurance Fund	78	Operated by wealth advisor First Republic Securities	Feeds into Hudson Structured ILS funds	2018	US
AIM Capital	20	Finnish fund of funds manager	AIM Insurance Strategies fund	2011	Finland
TOTAL	1404				

**Quarter lagging disclosure
Source: *Trading Risk*

GLOSSARY OF TERMS

Key phrase	Definition
Aggregate exceedance probability (AEP)	Probability of total annual losses of a particular amount or greater
Alternative risk transfer	Transferring risk through methods other than traditional insurance or reinsurance, for example utilising capital markets capacity through the issuance of insurance-linked securities
Attachment point	The point at which excess insurance or reinsurance protection becomes operative; the retention under an excess reinsurance contract
Attachment probability	Likelihood of losses exceeding the attachment point over the course of a one-year term
Administrator	Assumes all operating and reporting protocols for a special purpose insurer/entity
Basis risk	Risk that losses in a non-indemnity trigger differ from indemnity losses
Capacity	The largest amount accepted on a given risk or, sometimes, the maximum volume of business a company is prepared to accept
Catastrophe bond	Securities that transfer catastrophe risks from sponsors to investors
Cedant	Party to an insurance or reinsurance contract that passes financial obligation for potential losses to another party
Collateralised reinsurance	Reinsurance contract that is fully collateralised to the limit
Earned premium	The portion of premium (paid and receivable) that has been allocated to the (re)insurance company's loss experience, expenses and revenue
Excess of loss	System whereby a (re)insured pays the amount of each claim for each risk up to a limit determined in advance, while the (re)insurer pays the amount of the claim above that limit up to a specified sum
Exhaustion probability	Likelihood of losses exceeding the exhaustion point, causing a full loss on a reinsurance layer
Expected loss	The expected loss is the modelled loss within the layer divided by the layer size
Extension period	Time period after the scheduled maturity used to calculate losses for events which took place during the risk period
Extension spread	Spread paid during the extension period (typically a reduced rate from the initial risk spread)
Gross premiums	Premium before subtracting direct costs
Indemnity trigger	Type of trigger that most closely resembles the traditional market ultimate net loss cover, and offers ceding insurers (a.k.a. sponsors) the ability to recover based on actual losses
Industry loss index trigger	Type of trigger where payouts are determined by a third party estimate of industry losses
Industry loss warranty (ILW)	Form of reinsurance or derivative contract that covers losses arising from the entire insurance industry rather than a company's own losses from a specified event
Incurred losses	The total amount of paid claims and loss reserves associated with events from a particular time period
Insurance-linked security (ILS)	Financial instruments whose value is affected by an insured loss event
Limit	The maximum amount of (re)insurance coverage available under a contract
Loss ratio	Incurred losses divided by earned premiums (earned premiums include reinstatement premiums)

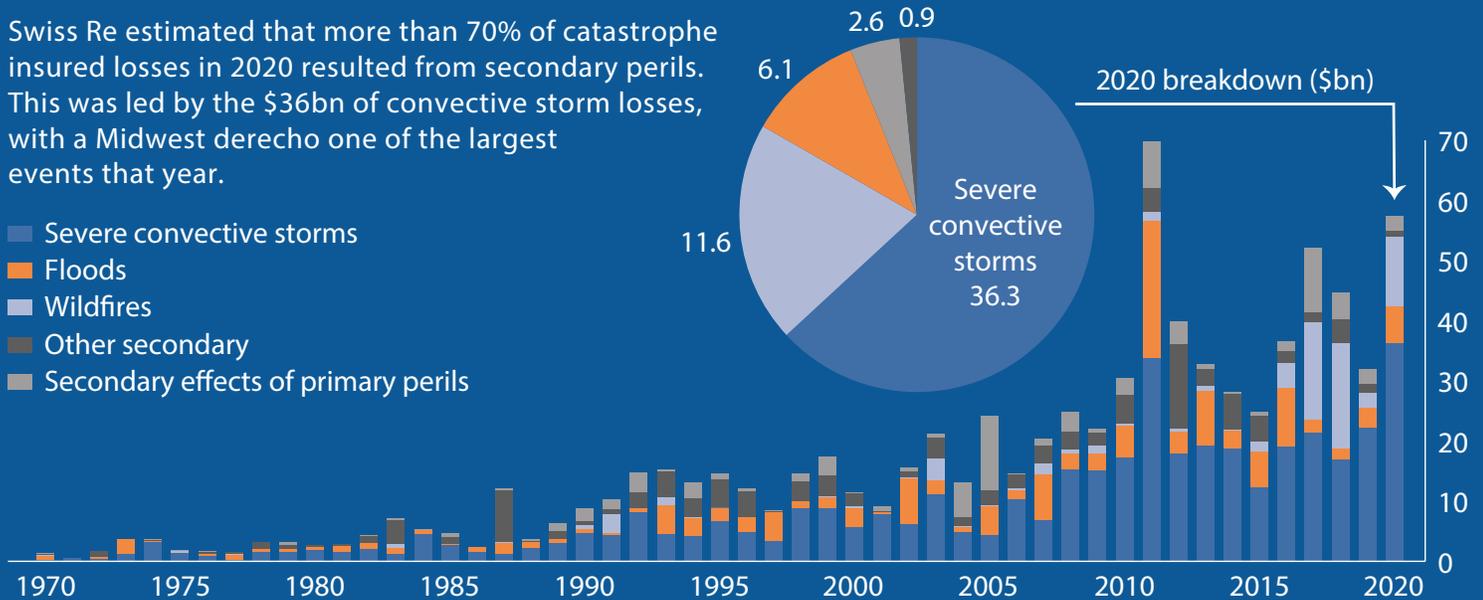
Key phrase	Definition
Modelled loss trigger	Type of trigger where payouts are determined by inputting event parameters into a predetermined and fixed catastrophe model to calculate losses
Net premiums	Premium less direct costs
Quota share	Reinsurance where the cedant transfers a given percentage of every risk within a defined category of business
Occurrence exceedance probability (OEP)	Probability that any single event within a defined period will be of a particular loss size or greater
Parametric trigger	Type of trigger where recoveries are triggered by a formula that uses measured or calculated parameters of an actual catastrophe event (e.g. wind speed, magnitude of an earthquake)
Peril	A specific risk or cause of loss covered by an insurance policy
Probable maximum loss (PML)	The anticipated maximum loss expected on a policy
Profit commission	A provision that provides the cedant a share of the profit from business ceded
Proportional reinsurance	System whereby the reinsurer shares losses in the same proportion as it shares premium and limit
Rate on line	Reinsurance premium divided by reinsurance limit
Reinsurance	A transaction whereby the reinsurer, for a consideration, agrees to indemnify the ceding insurer against all or part of the loss which the insurer may sustain under a policy or policies that it has issued
Reinsurer	Company that provides financial protection to an insurance company
Reset	Adjusting a layer of a multi-year catastrophe bond to maintain a bond's probability of loss at the level defined at issuance
Retention	The net amount of risk the ceding company keeps for its own account
Retrocession	A transaction whereby a reinsurer cedes to another reinsurer all or part of the reinsurance it has previously assumed
Risk period	Time period for which a reinsurance agreement covers events taking place
Sidecar	A structure to allow investors to share in the profits and losses of an insurance or reinsurance book of business
Special purpose insurer/entity (SPI/SPE)	A company created by (but not owned by) a (re)insurer for the purpose of raising capital for a specified programme
Treaty	An agreement between a cedant and a reinsurer stating the types or classes of businesses that the reinsurer will accept from the cedant
Underwriting profit	Earned premium minus incurred losses and incurred commissions (earned premiums include reinstatement premiums)
Variable reset	Adjusting a layer of a multi-year catastrophe bond up or down within a pre-defined range of probability of loss, with a corresponding update in risk spread
Vendor models	Software that estimates expected loss and probability of occurrence for specified exposure sets and predefined peril scenarios. The three largest vendors by market share are AIR Worldwide, Risk Management Services and Eqecat
Written premiums	Premium registered on the books of an insurer or a reinsurer at the time a policy is issued

Secondary perils: no minor loss

Secondary perils are defined as high-frequency, low-to-medium-severity events such as thunderstorms, hail, wildfires, drought, flash floods and landslides.

Swiss Re estimated that more than 70% of catastrophe insured losses in 2020 resulted from secondary perils. This was led by the \$36bn of convective storm losses, with a Midwest derecho one of the largest events that year.

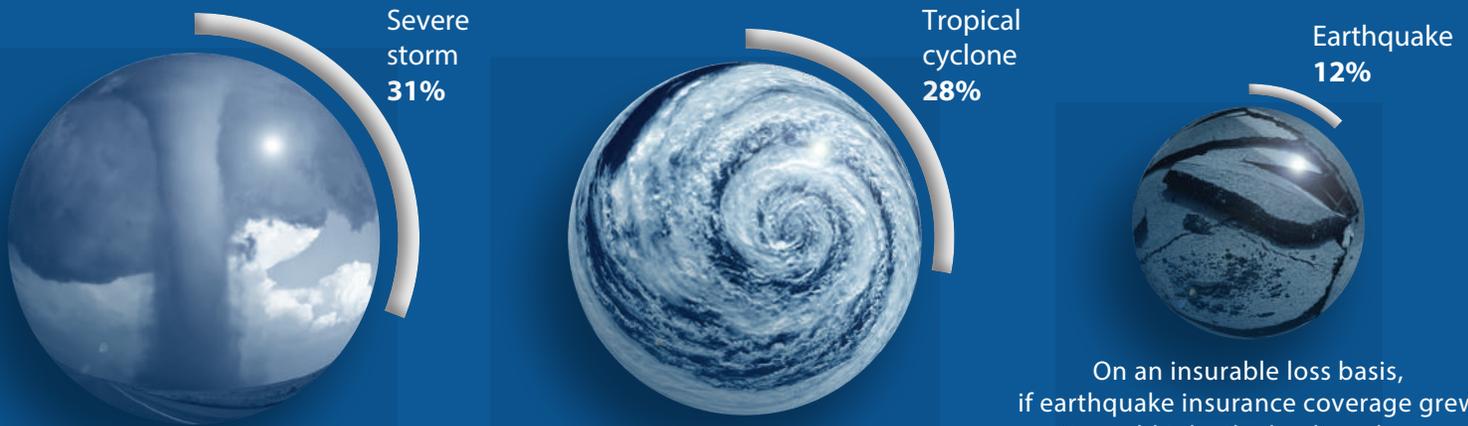
- Severe convective storms
- Floods
- Wildfires
- Other secondary
- Secondary effects of primary perils



Global insured losses from secondary perils by peril types since 1970, in USD billion at 2020 prices
Source: Swiss Re Institute

Annual average outlook

Modelling firm AIR Worldwide estimates severe storm actually drives a higher share of annual average insured losses than tropical cyclones. Severe storms – such as tornadoes and thunderstorms – contribute 31% to its modelled annual average loss, versus 28% for tropical cyclone and 12% for earthquake.



On an insurable loss basis, if earthquake insurance coverage grew it would take the leading share, as it makes up 26% of global insurable average losses.



Contribution to global insured AAL by peril for all regions
Source: Verisk



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