

TRADING
Risk
INVESTOR GUIDE

WHERE TO NEXT FOR THE MATURING ILS MARKET?

Insurance-linked asset class
looks to new areas for growth





New Ocean is a Bermuda-based asset manager with expertise investing in reinsurance risk products. With strong and knowledgeable institutional backing, the experienced management team oversees investment strategies spanning the reinsurance universe.



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COMMENT

Dear Reader

Trading Risk was first launched in 2008 just before the crux of the financial crisis – a period that was ultimately to boost the fortunes of the ILS market, as it showed the value of a truly non-correlating asset class.

When I first joined the firm and began writing about the reinsurance markets in 2010, I had never even heard of the industry or considered the concept of insurance companies buying insurance – let alone ILS hedge funds providing this protection.

But the industry's crucial role in the financial sector was hammered home to me just a year later, when major earthquakes in Japan and my home country of New Zealand hit the headlines.

It was clear enough to see that the financial fallout from such catastrophes can take years to recover from, and that it can be crucial to have help from reinsurers and ILS managers to smooth out the costs of a disaster over the longer-term.

That means, of course, that ILS managers must be able to win long-term support and trust from their investors. ILS is not an asset class for all – it is for institutional investors that have the wherewithal to withstand major losses when they come, because they will hit at some point.

Our hope with this Investor Guide is that it will help ILS managers, pension fund consultants and investors in the process of creating this trust and building up the long-term strength of the asset class. Our aim is to provide educational material and independent analysis of market trends that will inform both existing and potential investors in the market.

Please do get in touch with your feedback – and enjoy the read.

Fiona Robertson, *Trading Risk* editor



INSIDE

4-5

SOFTER RATING

January is a key roll-over date for many reinsurance investments – we look at rating trends that prevailed in the latest renewals season

6

MANAGER PROFILE: SECURIS

Securis CEO Rob Procter tells us why the firm is focusing on the life and primary insurance markets for growth in years to come

17-21

INVESTOR'S PERSPECTIVE

Long-term ILS investor AP3 talks about their experience in the asset class and we look at moves afoot to help standardise reporting in the sector

28-35

NEW TO THE MARKET?

What is an ILS, an ILW and collateralised reinsurance when it's at home? Our primer on the market, plus an investor list of ILS managers and glossary



January renewals: reinsurers still to find a pricing floor

Reinsurance rates continued to fall year-on-year in the January 2017 renewal season, but the pace of reductions slowed from previous years to the single-digit-percent range.

JLT Re estimated that global property catastrophe rates fell by 5.7 percent year-on-year on a risk-adjusted basis.

This was down from the reinsurance broker's estimates of an 8.2 percent decline at 1 January 2016 and an 11.0 percent fall at the same date in 2015.

The firm said that global property catastrophe rates were now 33 percent below 2013 levels and

approaching the previous cyclical low of the late 1990s.

Following the US-dominated June 2016 renewals, where rates moved closer to flattening out, there had been hopes that the pace of reductions would slow down – which proved to be the case.

But a truly flat renewal remains elusive, as supply of reinsurance capacity continues to outpace demand and catastrophe losses recorded in 2016 only eroded earnings, rather than capital.

“The market is trying to stabilise but it hasn't yet, primarily because it's making too much money,” commented James Vickers, chairman of Willis Re International. “The truth is the market hasn't reached its pain threshold yet.”

JLT Re estimated that overall reinsurance capital reached about \$320bn by year-end 2016, including approximately \$70bn of alternative limit.

The broker's global CEO, Mike Reynolds, said that 2016 was the first year since 2008 that dedicated reinsurance capital did not grow meaningfully. “It is nevertheless notable that the sector remains overcapitalised,” he added.

However, the firm's peer Guy Carpenter and ratings agency AM Best put overall reinsurance capacity at about \$420bn, meaning it went up 5 percent over the course of 2016, with convergence capital up 10 percent at \$75bn.

And rival broker Aon Benfield noted that despite the alternative market posting a faster pace of expansion than the larger traditional capital base,

ILS Primer: the 1/1 renewals

1 January is one of several major renewal dates for the reinsurance market throughout the year when a large portion of annual contracts are up for renegotiation. The 1/1 renewal season is one of the busiest, with the bulk of European and other non-US reinsurance deals maturing on this date, as well as significant retrocession business.

It is followed by the 1 April renewals (largely focused on Japanese and other Asian business), the 1 June renewals (predominantly Florida and other US accounts), and finally the 1 July renewal, which is a varied one that includes some US transactions, a couple of major Australian contracts and international retrocession placements.

Rate reductions are typically quoted in relation to the premiums paid a year earlier on a risk-adjusted basis that attempts to factor in any changes in exposure if terms and conditions have changed in favour of the buyer, causing more risk to be borne by underwriters.

it was the smallest growth rate the segment had reported in five years.

US rate reductions more subdued

Pricing pressure was most acute outside the US markets, with international reinsurance buyers able to obtain steeper reductions than their US counterparts.

This reflects greater demand from reinsurers for international business that diversifies their US-centric portfolios.

However, JLT Re said that the gap between the two markets had narrowed compared to 2016, when there was more of a bifurcation between single-digit declines for US business and double-digit falls for non-US renewals.

This year, loss-free US property catastrophe rates fell by up to 5 percent year-on-year – whereas broker Willis Re put UK catastrophe renewal rates at 5.0 to 7.5 percent off, with Europe-wide business falling by 4.0 to 6.0 percent on average.

These declines were generally around 250 basis points lower than the order of reductions that occurred in January 2016.

However, with some business affected by 2016 losses – both within and outside the US – and thus paying increased rates, there was a mixed picture for individual renewals that would have helped to offset some of the impact of lower premiums across the market.

Participation from ILS funds expanded in the UK and Europe from a modest base, Willis Re’s Vickers estimated.

But the ILS market share in these regions remains limited.

Within the retrocession market niche there were also differing viewpoints on rate reductions – which may reflect the range of views taken on the impact of changing terms and conditions.

Willis Re said non-marine retrocession pricing had stabilised as the market found a rating floor.

It said non-modelled losses had continued to surprise the market, with rates on catastrophe loss-hit business rising by 7.5 percent to 10.0 percent. Loss-free business priced flat to down 5 percent,

as new capacity entered the market for tail risk – although there were only a limited number of new entrants, Willis Re added.

However, other underwriting sources said retrocession rates fell by 5 percent or more.

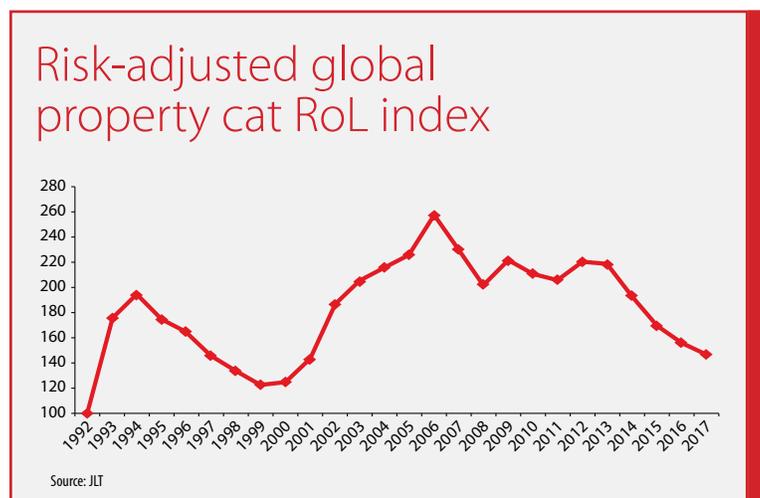
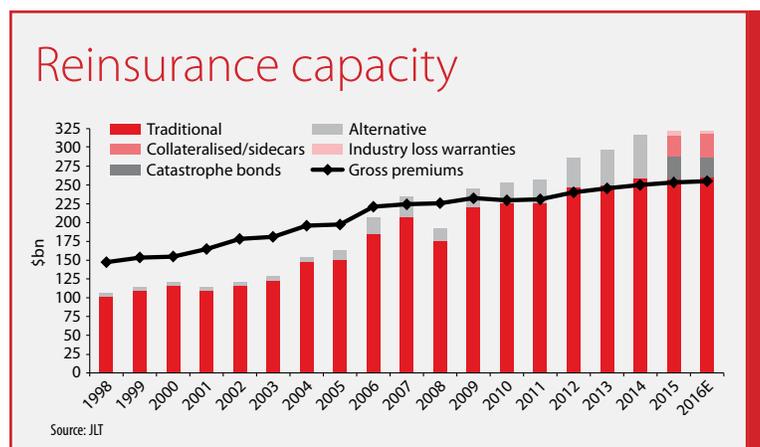
Cat bond market leads reductions in Q4

Pricing reductions in the cat bond market outpaced those in the traditional market during the fourth quarter, although broker reports varied on the extent of the shift that had taken place.

Guy Carpenter said that cat bond rates fell as much as 30 percent in Q4. The firm said it was too early to judge what the impact of these changes would be, but noted that the last phase of market-wide reductions, which began in 2013, was triggered by cat bond competition.

However, the outcome for the various ILS deals that came to market in the fourth quarter varied case by case and sources said reductions of this magnitude were not standard.

Willis Re put the fall in ILS spreads in the second half of 2016 at 10 percent or more.



Property catastrophe rate reductions at 1 January 2017

	US	UK	Germany	Australia/NZ	Retro
Willis Re	0-5%	5-7.5%	2.5-7.5%	2.5-7.5%	0-5%

Flashback to 1 January 2016

Willis Re	2.5-7.5%	10-15%	5-10%	5-10%	5-10%
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*All rate reductions quoted are for loss-free accounts
Source: Broker reports

Tough ILS markets still add value

If there is one question that reinsurance industry magazines are obsessed with asking, it's whether the market is close to finding a pricing floor.

But Securis co-founder and CEO Rob Procter thinks the column inches devoted to this topic might be in vain.

"I'm not a big believer in the existence of a pricing floor, unless you're talking about capital constrained business," he says. "People will continue to find ways to change their model loadings, to reduce their view of risk to stay on programmes – this is what we're seeing."

This isn't all illogical behaviour, he points out. Given that models are generally built by looking back at historical experience, the longer there's no major loss event, the more likely it is that modelled risk is dropping.

The way that Securis tries to counter such behaviour is by spreading its net as widely as possible at renewals time.

"We try and originate as many transactions as possible, that's why we're a team of 48. We're a large team based here in London and in Bermuda.

"By being able to participate in different market segments, it does give you an advantage in a very inefficient market."

Procter admits that the current rating environment is "tough" for ILS managers, and says that the firm has largely withdrawn from writing direct ex-US reinsurance as it believes such business is underpriced.

"All of that said, I would strongly argue [ILS] is still valuable relative to other asset classes. You can add value, comparing the merits of a portfolio with and without ILS."

Established in 2005, Securis now has \$4.1bn of assets under management and is one of the industry's leading independent ILS managers.

The firm is also due to open a third office in the reinsurance hub of Zurich later this year, although initially the staff in Switzerland will be focused on investor relations rather than underwriting.

Securis chief operating officer Vegard Nilssen said the firm was focused on delivering a business platform of institutional quality.

"We have a big focus on attracting the absolute best people within their field, constantly evolving and adapting to ever-changing market and investor needs. Besides investing in people, technology and systems has always been one of our top priorities and something in which we invest a lot of

time, money and resources. At the end of the day, whatever we can do to best execute our business objectives and deliver good risk-adjusted returns to our investors, we will do."

Room for further growth

Procter says there is likely to be a natural ceiling on the growth of ILS capital in its pure collateralised form – given that full collateralisation makes writing reinstatements, multi-year covers or low rate-on-line business challenging.

But the CEO points to an increased trend for state entities to outsource risk to private markets – such as both the US and UK entities buying flood insurance cover for the first time in the past year – as a new area for growth.

"I don't know whether it's [a ceiling of] 25 percent [market share] or 35 percent but if the pie is growing there can still be reasonable growth for ILS in its purest sense," he says.

Moreover, it is becoming more common for ILS funds to not fully collateralise their reinsurance business and to incorporate aspects of leveraged, rated carriers.

"We increasingly look like a traditional carrier in some respects. The best example of that is our special purpose syndicate at Lloyd's. We're providing capital to support 13 syndicates now.

"I think ILS players will find ways to encroach upon other areas of the reinsurance business," he continues.

Moreover, the high cost base of traditional carriers also means that there are businesses in the industry with "massively bloated" expense ratios, Procter suggests.

"At the margin, it is a factor that is likely to push more business over time to leaner, nimbler organisations that might be pure ILS players or they might be a hybrid providing ILS and rated capacity."

In a heavily brokered industry, Procter believes that technology will be one of the factors that prompts change.

"It strikes me that technology and all this vast amount of data available for the first time has got to change things. It will happen via new start-ups which have little downside and everything to gain."

Life funds look longer-term

Historically, the life (re)insurance sector has been the main way that Securis has provided its investors with diversifying risk.

Rob Procter,
co-founder,
Securis



It is an area the manager is placing renewed importance on after five years of rapid growth in its property non-life funds.

“Solvency II [is creating a] need for life companies in Europe and elsewhere to look for capital relief via ILS mechanisms – that is a rich seam, it’s only starting to be explored and exploited now,” Procter says. “I’m hopeful that is a business that will grow significantly.”

The manager is looking to relaunch its life fund on new terms, which will involve locking up investor capital for five years on a private equity-type model.

Investors are now more open to taking on long-duration life insurance risks, he adds. “There’s a great deal of investor interest, and increasingly mandates have a bucket for life risk.”

The restructure also builds on moves by the manager to take on a wider range of life-linked risks.

Historically, the manager’s life fund was virtually all mortality risk – in other words, taking the risk that life insurance policyholders die earlier than expected. But prospectively it is also looking to take on longevity – the risk of annuity beneficiaries living longer than expected – and lapse risk, which is the risk of policyholders ceasing to pay premiums.

Lapse risk may veer towards an element of financial market risk, as higher lapse rates will often occur during financial crises, but Procter says that this risk can be mitigated depending on the specifics of a portfolio.

“You have to look at the block [of business] concerned and you have to understand what are the types of policies,” he says. “Often there are good reasons to think even in a financial crisis, lapses won’t be that high.”

In the non-life sector, Securis has also taken on some specialty business, such as marine, aviation, crop and lottery.

“All of these things we will look at and if we can get comfortable around the data, margin and profitability we’ll engage in them,” Procter says.

However, he expects that ILS involvement in these more esoteric risks is most likely to come via partnerships with (re)insurers that have expertise in these areas.

“The core competency of ILS funds in analytics is property cat, and therefore partnerships are the way to go in the near term at least.”

Closer to risk

The primary insurance sector is also an area of focus for Securis, as it has signed up limited managing general agency (MGA) partners to source US surplus lines insurance on its behalf.

These agencies are essentially administrative

companies that for a fee will underwrite and manage an insurance portfolio on behalf of insurance carriers.

Surplus lines business in the US refers to insurance placed outside the so-called “admitted” or “standard” lines of business. Such business covers more unique risks and is subject to fewer regulatory restrictions on premium rates.

“I’m hopeful that life risk is a business that will grow significantly”

The surplus lines business that Securis is exposed to is largely from small to medium-size enterprises, explains Procter.

Primary insurance business will generally run at a much higher combined ratio – meaning less profit per dollar of premium – than reinsurance, due to higher levels of everyday claims.

But a big part of the peril is still linked to catastrophe risk, Procter notes.

Securis uses its Lloyd’s Special Purpose Syndicate (SPS) 6129 – a reinsurance partnership with London-based carrier Novae – to write the primary portfolio.

“The leverage is massively important because at the primary level you can’t possibly collateralise all the limits written, they are huge,” Procter says.

“The attraction we see is it just brings us closer to the risk – in the sense that we should understand the risk better. The granularity of information is huge, we can literally look into Google maps and see which buildings we’re insuring.

“That’s tremendously powerful, taking on this risk. In some ways, I feel more comfortable with that than with reinsurance or retro, where to some extent it’s a black box and we’re relying on data provided to us by cedants.”

In the end, getting closer to the ultimate buyer of insurance also puts an ILS manager in a better position to achieve more margin, he adds.

“At the end of the day, reinsurance is just a derivative of insurance, and the ability of insurers to buy protection depends on what is coming in on the other side.”

Primary insurance rates may be under some pressure, but arguably less so than pricing in the reinsurance sector.

That’s because it’s a far bigger marketplace, and so far, there has been little encroachment from ILS capital, Procter explains.

However, as he points out, with managers such as Securis looking further afield for growth, that may ultimately change.

ILS intakes rise heading into 2017

The top 10 asset managers in the ILS sector collectively managed more than \$50bn of assets under management (AuM) as of 1 January 2017, according to data collated by *Trading Risk*.

The total AuM of \$52bn for the top 10 was up 9 percent from the \$48bn reported in mid-2016, as their pace of growth picked up from the previous year.

The top 10 had posted a 7.7 percent rise in AuM over the first half of 2016.

Almost all the managers in the top 10 reported an increase in AuM of \$400mn or more at 1 January this year.

Zurich-based LGT Insurance-Linked Partners continued to lead growth after significant expansion in the past two years, adding another \$700mn to its AuM. It was closely followed by Leadenhall Capital Partners and Markel Catco, whose AuM were both up by \$600mn.

This led Amlin-backed Leadenhall to jump one ahead of Aeolus in the top 10 rankings, although the order of the leaderboard otherwise remained stable.

Bermudian manager Aeolus itself reported an additional \$500mn of AuM, while Credit Suisse's ILS funds expanded by another half-billion dollars as well.

Half the group now have more than \$5bn of AuM, with Fermat Capital taking in another \$400mn to move back into the \$5bn club.

Meanwhile, Securis Investment Partners grew by a similar amount to top the \$4bn mark.

The industry's largest manager Nephila posted incremental AuM growth of \$200mn after it re-opened to new investors in 2016.

Outside the top 10, Schroders-owned Secquaero took in more than \$400mn to reach \$2.4bn.

This narrowed the gap between it and the top 10 to only a small margin and continued the expansion Secquaero has achieved since Schroders bought into the management firm in 2013.

Among reinsurer in-house managers, AlphaCat also hovers just outside the top 10 with \$2.7bn of AuM. The Validus subsidiary took in the first third-party capital for its BetaCat fund as it grew by \$100mn in the fourth quarter of last year.

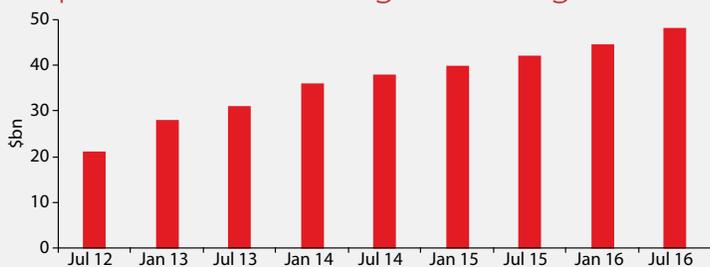
Hiscox's asset management platform added another \$200mn to reach about \$1.2bn, while Aspen Capital Markets edged over \$500mn. Paris-based Scor Investment Partners took in \$200mn to reach \$700mn.

XL-owned New Ocean was up more than \$180mn on mid-year 2016, due partly to funds contributed by its new part-owner, Mitsui.

RenaissanceRe set up a new Fibonacci Re sidecar, although some of the capital included funds re-invested from its \$181mn Medici cat bond fund, in which RenRe itself is a major investor.

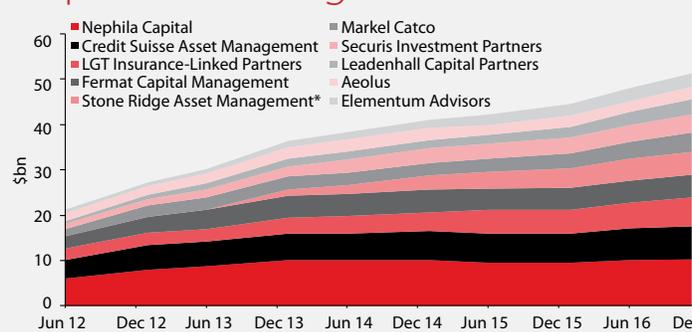
As RenaissanceRe manages rated balance sheets that do not write the same amount of business as collateralised reinsurance funds would, its rated vehicles are not included in AuM for the purposes of listing the industry's top 10 managers.

Top 10 ILS fund managers: asset growth



Source: *Trading Risk*

Top 10 ILS managers: AuM 2013-17



*Latest Stone Ridge AuM is reported on trailing quarterly basis, most recent disclosure as of 31 October
Source: *Trading Risk*

Top 10 ILS fund managers

Manager	ILS AuM \$bn				
	Jan-17	Jun-16	Jan-16	Jun-15	Jan-15
Nephila Capital	10.2	10	9.5	9.5	10
Credit Suisse Asset Management	7.5	7	6.5	6.5	6.5
LGT Insurance-Linked Partners	6.5	5.8	5.2	5.2	4.1
Fermat Capital Management	5.2	4.8	4.8	4.7	5.1
Stone Ridge Asset Management*	5.1	4.8	4.4	3.7	3.01
Markel Catco	4.3	3.7	3.2	2.8	2.8
Securis Investment Partners	4.1	3.7	3.53	3.28	3.25
Leadenhall Capital Partners	3.5	2.9	2.41	1.97	1.8
Aeolus	3.0	2.5+	2.5+	2.3+	2.7
Elementum Advisors	2.7-3.0	2.6-2.9	2.25-2.75	2-2.5	1.7-2
Total	52.3	48.0	44.5	42.2	41.1
% change from prior half-year	9.0%	7.7%	5.5%	2.7%	7.2%

*Latest Stone Ridge AuM is reported on trailing quarterly basis, most recent disclosure as of 31 Oct
Source: *Trading Risk*



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ILS firms disperse in search of growth

As the ILS sector matures, the specialist fund managers in the industry are becoming more diverse as they follow different routes to growth.

Some have been seeking expansion beyond the ILS sector's original home in natural catastrophe risk – for example, by taking on specialty insurance risks such as marine, energy or aviation.

In the past year, the likes of Credit Suisse and Securis have followed this path, with both establishing new vehicles at London's specialist insurance market Lloyd's in 2016 to access such risks.

Other newer independent managers, such as ILS Capital Management or Hudson Structured Capital Management, are also following this trend.

But reinsurer-linked managers are perhaps the most likely group to put greater emphasis on this area in the coming year. After all, their parent companies already have diverse portfolios of all types of reinsurance risk.

Meanwhile, despite some managers searching out new types of diversifying reinsurance risk, others insist that ILS capital's forte remains in natural catastrophe markets.

In this camp are managers such as Nephila, Elementum and LGT. However, innovation can still be expected from these players in order to keep building their share in the catastrophe segment.

Nephila's push into the catastrophe-exposed primary insurance sector exemplifies the demand for managers to get "closer to risk".

Given the greater complexities of the more tightly regulated insurance markets – the need to have licences, claims handling networks and financial leverage, for example – it will be a slow-burning trend, however.

And so far, Credit Suisse Asset Management is the only ILS manager to have set up its own rated reinsurance platform.

However, establishing more partnerships with rated (re)insurers to take advantage of their financial leverage and access to business could be a more imminent concern for ILS managers.

LGT has said it is considering whether having its own rated entity makes sense, while others may look for partnerships in the Lloyd's market.

M&A murmurs

The past couple of years have produced a spate of mergers and acquisitions in the reinsurance markets, as companies seek greater scale and breadth in a challenging market.

The sellers have included Lloyd's and Bermudian reinsurers. Among them, two carriers with ILS management interests sold to Japanese insurance buyers.

Mitsui Sumitomo picked up Amlin (which has a majority stake in Leadenhall) in 2015, and was followed by last year's deal between Sampo and Endurance (which owns Blue Capital).

But 2016 was also an active year for mergers and buy-in activity among ILS fund managers. Bermudian retro and reinsurance writer Aeolus agreed to sell a majority stake to Elliot Management Corporation – a deal that closed in January this year.

XL-owned New Ocean brought in Mitsui as a new minority investor and Schroders more than doubled its stake in Secquaero.

Further M&A activity remains a possibility. As *Trading Risk* reported last year, Zurich-based Twelve Capital is understood to be looking for new investors to allow one of its initial backers to exit.

M&A at ILS funds

Date	Manager (previous/new brand)	AuM at time	AuM 2017	Bought in	Sold down
Jan-17	Aeolus	\$3bn	\$3bn	Elliott (Elliott Associates/International)	Founder Peter Appel, Allied World reduced stake
Oct-16	New Ocean	\$270mn	\$450mn	Mitsui (15% stake)	Dowling exited; XL, Stone Point reduced stake
Feb-16	Schroders-Secquaero	\$2.89bn	\$2.44bn	Schroders increased stake to 50.1% from 30.0%	Management
Sep-15	Catco	\$2.80bn	\$4.3bn	Markel	QIC
Oct-14	Leadenhall	\$1.80bn	\$3.5bn	Amlin (increased stake from 40% to 75%)	Management
Nov-13	Pillar	\$350mn	\$375mn	TransRe, management (50/50)	Aquiline, MMC
Apr-13	Secquaero Advisors	\$280mn	\$2.44bn	Schroders (30% stake)	Management
Jan-13	Nephila	\$8bn	\$10.2bn	KKR (25% stake)	Management, Man Group (18.75% stake)
Dec-12	Aeolus	\$2bn	\$3bn	Allied World (20% stake)	Management
Apr-12	Securis Investment Partners	\$1.40bn	\$4.12bn	Northill Capital (~68% stake)	Stone Point, Swiss Re, management
Mar-12	Clariden Leu/LGT	\$2.70bn	\$6.5bn	LGT Capital Management	Clariden Leu
Jan-12	Juniperus/Pillar	\$149mn	\$375mn	Aquiline, MMC	Aon Benfield, Itochu Corp, Transatlantic

Source: *Trading Risk*

2016 highlights for ILS funds

January: New Lloyd's syndicates/special purpose syndicates go live for Credit Suisse and Securis

February: Schroders lifts its stake in Secquaero to a majority three years after taking a 20 percent investment in the manager

June: Michael Millette's Hudson Structured Capital Management opens with a \$250mn allocation from Blackstone, split between its reinsurance and transport strategies

October: Blue Capital's owner Endurance agrees to sell itself to Japanese carrier Sampo; Mitsui & Co buys 15 percent stake in New Ocean

November: Aeolus announces deal to sell majority stake to Elliott Capital Management

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Cat bond demand surge

The volumes of new cat bonds issued in 2016 dropped back from 2015, but broker-dealers have forecast that strong investor demand could boost deal flow in the coming year.

Lower issuance volumes also encouraged innovation in the types of risk being transferred to the cat bond market throughout 2016.

Several broking firms surveyed by *Trading Risk* estimated that 2017 cat bond volumes could reach \$7bn on average, with upper estimates of \$8bn.

At the top end, this would put the market more than \$1bn above the \$6.8bn transacted last year, and ahead of 2015's total of \$7.5bn.

A high level of cat bonds will mature this year – some \$7.8bn – as deals issued in the bumper year of 2014 roll off risk.

Maturities combined with the slowdown in new issuance to free up cash for ILS managers, which

produced an overhang in demand that pushed cat bond spreads down in the latter part of 2016.

This environment is making the market look more attractive to the insurers and reinsurers that could sponsor new deals.

“Broker-dealers said they were hopeful the current dynamic could bring large primary insurers back to the market for 2017”

Broker-dealers said they were hopeful the current dynamic could bring large primary insurers back to the market for 2017 after some carriers – such as Zurich, Travelers and Allianz – opted to let their cat bond coverage lapse in 2016.

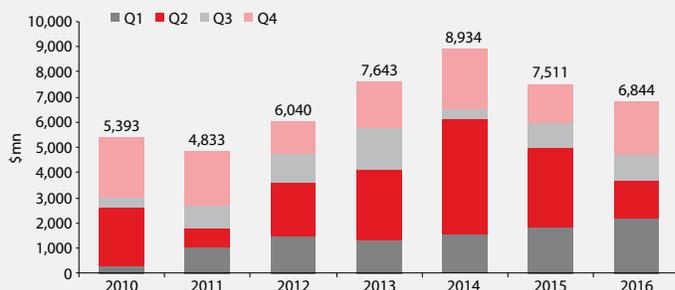
New sponsors are also expected to emerge from the Florida market, which was another important source of deals last year.

Aon Securities CEO Paul Schultz said sponsors were likely to look for deals that provided risk-remote reinsurance, as throughout 2016 lower-yielding cat bonds underwent the largest decreases in pricing.

As well as new sponsors, new risks are also expected to be presented to ILS investors.

Last year, the cat bond market featured the first ever securitisation of third party motor liability insurance, as well as of operational risk –with the latter covering events such as cyber breaches or rogue trader losses for Credit Suisse.

2016 issuance drops back from peak



Source: *Trading Risk*



2016 profile

There was a substantial increase in higher-risk cat bonds during 2016, as sponsors responded to investor demand for yield.

Some 13 percent of volumes in 2016 had an expected loss of above 5 percent – roughly equivalent to a 1-in-20-year return period – compared with 10 percent of volumes in 2015.

More than a third of the year’s issuance had an expected loss of 3 percent or above, compared to just 15 percent in 2015.

The cat bond market remains heavily dominated by US wind and quake risk, but ILS investors still had somewhat more diversity on offer in 2016 compared to the year before.

North American wind accounted for 43 percent of risk placed in 2016, which was down slightly from 49 percent the previous year. However, the share of North American quake increased to 20 percent of issuance by contribution to expected losses, up from 15 percent in 2015.

Japanese typhoon took a 6 percent share of volumes last year, having not featured in 2015 deals.

Japanese quake and Europe windstorm also took a greater share of the peril pie, making up 11 and 2 percent of volumes respectively – up from 8 and 1 percent the year before.

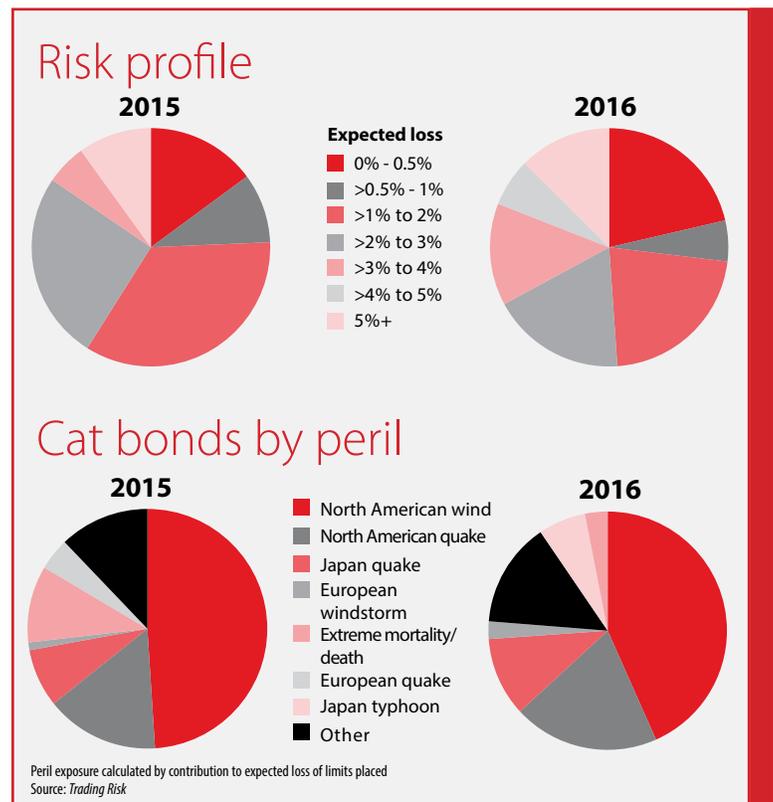
But due to lower volumes, the absolute increase in investible limit from such deals was modest, with \$700mn of Japanese quake deals last year compared to \$590mn in 2015.

On the life side, there was less of a showing from extreme mortality or health perils, which made up only 3 percent of 2016 issuance, down from 10 percent of issuance in the previous year.

The bulk of cat bond deals are indemnity covers that provide an exact match for a sponsor’s losses.

Aggregate structures that cover a string of losses throughout the year were on the rise. These accounted for 52 percent of deals in 2016 compared to 35 percent of deals the year before.

Per-occurrence bonds – which cover a single major loss event – accounted for just under 40 percent of deals in 2016, down from 61 percent in 2015.



ILS momentum to continue in 2017

The current market environment suggests the alternative reinsurance sector will remain competitive throughout 2017, with potentially strong levels of new catastrophe bond issuance.

During the first half of 2017 a record amount of catastrophe bonds will mature, with \$6.4bn coming off-risk. We expect the momentum established at year-end 2016 will continue in 2017, with investors eager to reinvest capital from maturing deals in primary issuances.

Spreads are currently attractive compared to traditional reinsurance, and other coverage benefits such as multi-year terms and aggregate triggers remain favourable. And as Q4 2016 demonstrated, large deal sizes are possible at attractive spreads.

Lastly, the coverage has also started to converge with traditional reinsurance in many respects.

Aon Securities' preliminary view for 2017 primary catastrophe bond issuance is \$8bn.

ILS returns: the case for investors

Investors are finding continued value in the ILS asset class given its status as a diversifying asset and the sector's promising growth – which is expected regardless of bullish or bearish equity markets.

Investors face uncertainty in almost every other major asset class given both domestic and global fiscal and monetary shifts.

Further, many of the same catalysts that caused volatility in the equity markets have spread to commodities. Traditional asset classes remain highly correlated, generating greater investor demand for alternative asset classes.

Low-correlated alternative returns can be obtained through ILS (or funds which invest in these securities), which access the property catastrophe portion of the insurance market.

The Aon ILS Indices tracks the return of such catastrophe bonds using price data provided by Aon Securities and calculated by Bloomberg. With a 10-year average annual return of 8.13 percent, the Aon

Aon ILS Indices

Index Title	Return for annual period ended 31-Dec 2016	10-year average annual return 2006-2016
Aon ILS Indices		
All Bond Bloomberg Ticker (AONCILS)	7.03%	8.13%
Benchmarks		
3-5 year US Treasury notes (USG2TR)	1.26%	3.85%
3-5 year BB US high yield (J2AI)	11.66%	6.77%
S&P 500 (SPX)	9.54%	4.68%
ABS 3-5 year, fixed rate (R2AO)	2.85%	3.37%
CMB3 3-5 year, fixed rate (CMB2)	3.04%	6.28%

Source: Aon Securities, Bloomberg

All Bond Index outperforms comparable benchmarks and reinforces the value of a diversified book of pure insurance risks for investors' portfolios over the long term. Catastrophe bonds and other ILS instruments continue to demonstrate non-correlated returns, but this value was most evident during the 2008 financial crash, when the ILS asset class was down a mere 2.9 percent relative to the 41.0 percent decrease of the S&P 500 and double-digit declines in other comparable benchmarks during the same period.

In addition, catastrophe bonds and private insurance transactions utilise floating rates in their contracts, which creates a built-in hedge against interest rate risk.

New issuances boost secondary volumes

Catastrophe bonds, typically issued as 144A notes, are traded on the secondary market by global market makers. Trades transacted through a US broker/dealer are recorded through the Financial Industry Regulatory Authority's Trade Reporting and Compliance Engine (Trace).

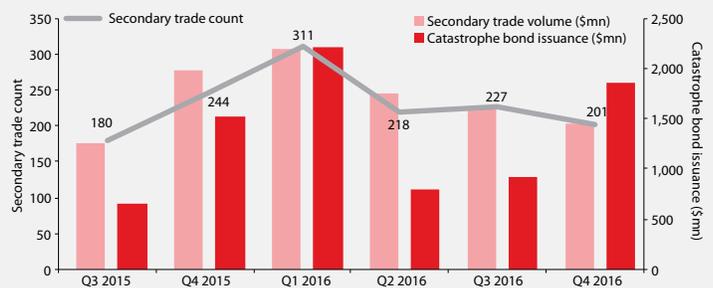
As evidenced by the graph below, periods of larger primary issuance volumes, such as Q1 2016, can directly tie to periods of larger trading volumes. Over the past 18 months, Aon Securities estimates, based on Trace reported trades, that \$1.4bn of catastrophe bonds have traded on the secondary market. By comparison, nearly \$8bn of new issuances have entered the marketplace in that same period.

The cycle of the secondary market is often driven by the scheduled maturities of the bonds. As such, a period with high maturity volumes will often concurrently see an increase in trade activity as investors redeploy freed capital into the market.



Author:
Paul Schultz,
CEO, Aon Securities

Cat bond primary issuance and secondary trading (by quarter)



Note: This is an underestimate of total market volume as trades in bonds rated below investment grade are capped at \$1mn and foreign trades as well as trades by non-US broker dealers are excluded

Source: Aon Securities, Bloomberg, FINRA

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2016 ILS returns boosted

Average ILS fund returns for 2016 were stronger than in 2015, despite a higher incidence of catastrophe events, as softening cat bond rates led to mark-to-market gains.

ILS returns as measured by the Eurekahedge ILS Advisers Index totalled 5.19 percent for 2016, ahead of the 4.24 percent delivered in 2015.

However, the 2016 gain trailed the 6.36 percent annualised average return recorded since the index's inception in 2006. The index tracks 34 ILS funds, which must have at least 70 percent of their assets invested in non-life reinsurance.

Pure cat bond funds returned 4.31 percent last year, against a 5.68 percent gain for funds that invest in a wider range of less liquid ILS investments.

Both groups lagged behind the Swiss Re cat bond total return index, which returned 6.94 percent in 2016. Tightening spreads produced mark-to-market gains for the cat bond sector, with price mark-ups contributing 0.78 percentage points to the Swiss Re index's total return throughout the year.

In 2015, the Swiss Re index gain of 4.45 percent more closely matched the 4.24 percent return on the ILS Advisers index.

On a gross return basis, yields available on the ILS market outpaced the spreads on similarly rated US corporate debt throughout 2016 (see graph).

The Willis cat bond rate-on-line index, which shows the average of new issuance spreads over the past year, hovered above 5 percent throughout 2016 – whereas spreads on BB rated bonds ended the

year below 3 percent. However, when adjusted for expected loss activity, cat bond spreads only topped their corporate equivalents at year-end.

On the cat bond market, investors benefited from an unexpected write-up to the value of the MultiCat Mexico bond – which had initially been expected to default in full, but eventually made only a 50 percent payout early on in the year.

However, by year-end, US storm bond Gator Re had been partly written down.

Private reinsurance contracts were more exposed to the year's disaster losses.

Industry-wide, Swiss Re estimated that insured natural catastrophe losses totalled \$42bn last year, up notably from \$28bn in 2015.

However, this was still below the annual average of \$46bn for the past decade.

2016 cat events

Month	Event	Industry loss	ILS exposure
March	Jubilee oil platform damage	\$1.2bn-\$1.4bn	Marine retro/LLWs
	US storms	\$1.5bn	Erosion of aggregate reinsurance deductibles
April	Texas hailstorm	\$3bn	Regional/aggregate policies
	Japanese quake	\$5bn	Limited, retro sidecars
May	Canadian wildfires	\$2.8bn	Retro, some reinsurance
May-June	European floods	\$2.9bn	Limited, retro & reinsurance
October	Hurricane Matthew	\$4bn+	Lower-lying reinsurance in US Southeast
November	New Zealand quake	\$0.8bn-\$3.5bn	Aggregate covers for Australian carriers
December	Australian storms		Aggregate erosion

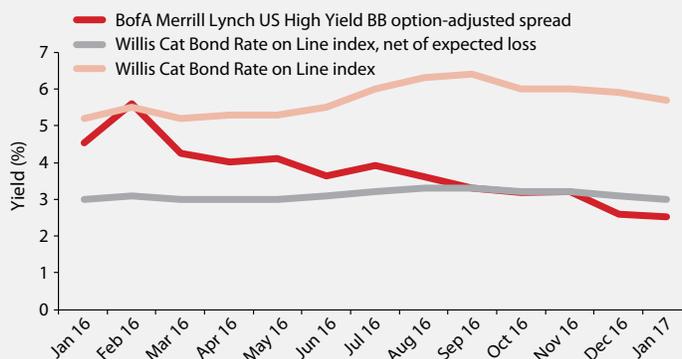
Source: Swiss Re Sigma insured loss estimates incorporating PCS data on US events, Trading Risk

Statistics of Eurekahedge ILS Advisers Index as of Jan 2017

2016 gain (%)	5.19
2015 gain (%)	4.24
Best monthly return (%)	1.60
Worst monthly return (%)	-3.94
Return since inception (%)	97.66
Sharpe ratio	2.18
Annualised standard deviation (%)	1.99
Downside deviation (%)	1.34
Sortino ratio	3.25
Maximum drawdown (%)	-3.94
Percentage of positive months (%)	93.98

Source: Eurekahedge ILS Advisers index

ILS vs corporate BB bond yields



Source: Bank of America Merrill Lynch, Willis

Q&A

DAN BERGMAN

Dan Bergman, portfolio manager at Swedish state pension fund AP3, tells us that board support is crucial to getting involved in ILS investing

Q: How long have you been investing in ILS and what has your approach to the sector been?

We have been investing in ILS since 2008, and always with a long-term strategic mindset to diversify our total portfolio and improve risk-adjusted returns. Our approach has been to build our exposure gradually and focus on a smaller number of strategic partnerships and transactions where we understand the associated risk exposure well. We have a strategic long-term commitment to this space.

Q: Have your ILS investments performed in line with your expectations?

ILS looked good on the drawing board 10 years ago and it has subsequently delivered. In fact, it has exceeded the fund's expectations significantly. This portfolio has delivered stable positive returns every year since inception in 2008. Also, when tested by catastrophes the contracts in the portfolio have performed as expected. For example, the Great East Japan Earthquake in 2011 caused some losses to our portfolio,

whereas Hurricane Sandy in 2012 did not, despite considerable exposure.

Q: What was the biggest challenge for you in dealing with the ILS sector? How did you tackle it?

The first challenge was to convince the board that ILS was a valuable addition to the portfolio mix. This was a new area for AP3 and the board rightfully challenged the value proposition as well as the risk assessment. Another ongoing challenge is ensuring efficient access to high-quality risks. Although we can invest in a direct and cost-efficient way, leveraging our AAA rating, we need to work hard to find the right investment opportunities in this market.



Q: What advice would you give to investors considering their first allocation to an ILS manager?

Each investor is different and no one solution fits all. In our experience, it is imperative to ensure that we have the board behind us and that they understand the long-term nature of our strategy and the risks that we add to the total portfolio by investing in ILS. On a more technical note, I would not put too much weight on the ex-post Sharpe ratios of any manager.

Q: How would you like to see ILS managers evolve in the future?

Over the years, we have worked closely with a small number of strategic partners. In those relationships, we place great value on transparent and professional assessment of the quality of the risks assumed as well as on effective execution.

AP3 disclosed a 2.1bn krona (\$240mn) ILS portfolio as at 30 June 2016, with its year-end report yet to be released. This makes up 0.7 percent of its 304bn krona (\$35.5bn) total assets.

Select pension funds invested in ILS

Pension fund	Current ILS allocation (\$mn)	% ILS allocation	Strategies/managers employed (date of allocation)
PGGM	4,000	2.67%	Fermat, LGT, Nephila, Elementum and other reinsurer-backed managers
Pensionskassernes Administration	1,370	4.09%	Twelve Capital (\$150mn 2011), Nephila, Catco
AP2	1,100	1.79%	Fermat (GAM FCM cat bond funds added 2012, now +\$400mn); Elementum (added 2014; now \$134mn); Credit Suisse added 2015
Pennsylvania School Employees' Retirement System	650	1.33%	Nephila (\$250mn 2011), Aeolus (\$200mn 2012), RenRe (\$200mn 2015)
RBS	390	1.80%	£575mn at year-end 2015, including insurance litigation investment as well as ILS holdings with Nephila (£288mn) and Leadenhall (undisclosed)
AP3	240	0.69%	In-house and external allocations
IBM UK	229	2.68%	Nephila Iron Catastrophe fund (defined benefit scheme only)
New Zealand Superannuation Fund	203	0.25%	Elementum Advisors (\$200mn 2010), Leadenhall (\$275mn 2013)
Maryland State Retirement and Pension System	200	0.22%	Nephila Capital
Ontario Teachers' Pension Plan	153+	0.15%	\$100mn or more in Da Vinci Re and Hudson Catastrophe Fund (in-house vehicle); also invests in Catalina and South Korean life insurer Kyobo
Oregon Investment Council	142	0.20%	OPERF fund allocated to Nephila (\$100mn 2011)
University of Minnesota	136	6.20%	Not disclosed
Indiana Public Retirement System	100	0.27%	\$50mn Aeolus, \$50mn Nephila (but initial capital to work only \$20mn)

Source: Trading Risk

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- **The struggle to deploy capital:** diverging ILS growth tactics
- Assessing the fall-out from the 2016 catastrophe scares and shrinking margins
- **Facilitisation and increased intermediation:** who's got the pen?
- The impact of M&A repositioning and expense pressure

Speakers:

John DeCaro,
Founding Principal &
Portfolio Manager,
Elementum

Mirko Sartori,
Head of Insurance
Liability Management,
Assicurazioni Generali

(further speakers to be announced shortly)

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Q&A

FRANK MAJORS

ILS managers need to share investor pain, says Nephila's co-founder

Q: How should ILS managers approach a soft reinsurance market?

Focus on things that add value that are under a manager's control. It feels to us like we're reaching an equilibrium in the catastrophe market, so we are preparing for a prolonged market with current conditions, rather than wait for the market to change to our liking.

The one thing that we can influence is the total expense load from end consumer to risk capital. As margins shrink, the percentage of the pie that managers are taking is a lot higher than it used to be. We have to find ways to share that pain with investors and deliver more value and services.

We have doubled our staff in the last three years while maintaining our assets under management – while headline fees haven't declined, the amount of services we have brought in-house have increased significantly, delivering an "all-in" expense cut.

It's hard, but wringing efficiencies out of the system is the most exciting incremental value proposition we can offer our investors. If you can take 5 cents of expense out of every premium dollar, that's a much bigger increase than a 5 percent rate increase. It's real return that drops to the bottom line, so that's where we're focusing our efforts.

Q: How do you think today's market would react to a major loss?

In the past, a hard market was a high tide that lifted all boats. In the future, harder markets are going to be short and available to people who can execute quickly.

Q: What are the challenges for ILS managers tackling primary insurance?

A lot of it depends on their timeframe and goal. A number of managers are going into the market via quota share partnerships, outsourcing the sourcing and underwriting of the risk, which has some portfolio value but doesn't cut costs – it just buries the costs so they aren't transparent to the end investor.

"If you're an ILS manager, you definitely need friends"

Our primary motivation is to reduce frictional costs in the distribution chain, so we decided to build our insurance platform [Velocity Risk Underwriters] ourselves. It's pretty amazing that with Velocity, we have homeowners' risk in Florida going directly to a pension fund in another part of the world. From consumer to agent to the Nephila plumbing system, that's the whole distribution chain. The investors are paying one fee to Nephila, and once the original agent has been paid, there are no other organisations taking out distribution fees.

Q: What about when fronting partners are involved?

A lot of our business does not come through an external front. However, when we use fronting partners, that

is another link in the chain but it's a link that introduces leverage, not distribution, and paying for non-recourse leverage has value.

Having strong fronting partners is valuable. If you're an ILS manager, you definitely need friends – a good partner provides flexibility beyond what the traditional ILS business model provides.

Q: Given the expense advantages, would you shift entirely to insurance?

Our investors want access to catastrophe risk, and we have always tried to build a platform to have the biggest possible investable universe to access that risk. We always want to be market agnostic – sometimes reinsurance is more attractive than insurance. If there are efficiencies we'll harvest those, but it doesn't mean we give up our core business, which is reinsurance.

Q: Is technology likely to be a big factor for you in cutting costs?

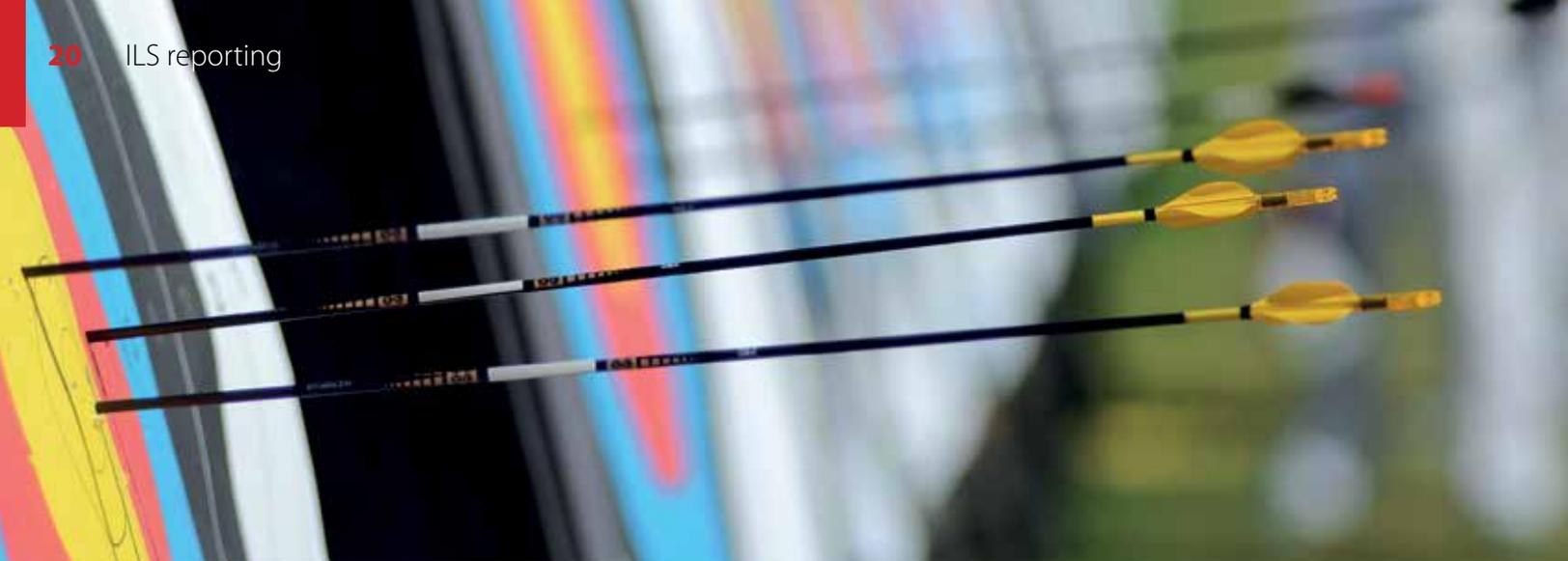
Clearly technology has a role to play, and we have InsurTech as one of our key strategic initiatives. We are exploring all the possibilities in this area, and think we can offer a lot to the right partner.

Q: What role do you think underwriting facilities will play in the future?

It's hard to see how they don't have a bigger role in the future. When you look at the amount the industry spends on distributing and underwriting risk, it's hard to believe there's that much outperformance over an index.

But the facilities have to be set up correctly. It can't be about trying to get two bites of the apple – if it doesn't take a significant amount of cost out of the system it doesn't make sense.





Open Protocol project targets ILS standards

The Open Protocol Working Group is working to create a reporting template for insurance funds, after establishing similar criteria for the hedge fund industry back in 2011.

The group has already released a draft template for the insurance sector and is now working through feedback on the proposals from industry participants.

Michael Hamer of Albourne Partners (pictured below), which led the Working Group developing the insurance template, said the group had received a good supportive response from managers and investors.

The Working Group will be providing a written response to feedback received in due course, which will be posted on the Open Protocol website (www.theopenprotocol.org).

He added that the project would not result in any public disclosure of information, as managers will control who sees the reports.

The project aims to set guidelines for a manager report that allows improved fund and portfolio risk monitoring by investors.

“It’s not intended to replace the manager’s risk analysis that it reports to its investors. We are not seeking to produce a standalone risk analysis of a fund, but a report that allows the flagging of significant changes and/or exposures for further discussion between the investor and the manager,” he said.

Hamer said that one of the drivers behind establishing an insurance protocol was to allow investors

to aggregate their total risk across various insurance fund holdings.

At present, it is difficult for investors to do this because multiple exceedance probability curves cannot be aggregated together (see opposite page for an explanation).

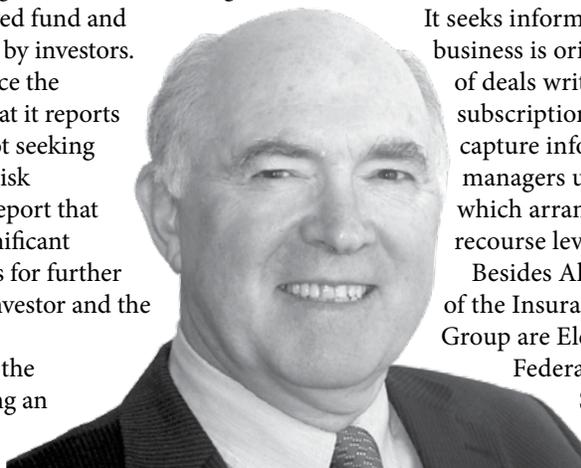
To get around this, the draft insurance protocol suggests that ILS managers provide investors with expected losses from a range of defined historical events, as this information can be more easily combined.

Hamer noted that investors will still face the issue of reported risk levels differing across various ILS funds, as each manager has its own view on risk based on its use of models.

The draft also includes reporting of performance returns broken down by income from catastrophe bonds and other instruments, as well as losses, revaluations, expenses and fees – which would significantly increase an investor’s ability to understand the drivers of performance each month.

It seeks information on how reinsurance business is originated and volumes of deals written on a private or subscription basis. It also attempts to capture information on how actively managers use fronting carriers and which arrangements provide non-recourse leverage.

Besides Albourne, the other members of the Insurance Open Protocol Working Group are Elementum Advisors, Federal Way Asset Management, SS&C, RenaissanceRe and Utah Retirement Systems.



Keys to ILS reporting

Many of the details in an ILS manager's performance reports will be no different to any other asset class: such as the monthly net asset value change, performance history and Sharpe ratios.

But there are also more unique reference points specific to the asset class that help investors assess their exposure to catastrophe risk.

Probably one of the most helpful tools in an ILS manager's report is the exceedance curve, which shows the full spectrum of possible annual losses within a portfolio, and the associated probabilities.

However, exceedance curves typically do not show which scenario causes each loss – so an investor can see what the 99 percent value-at-risk might be, but not what events would produce this loss.

This is what makes it difficult for investors to put two exceedance curves together to establish whether they have any spikes of exposure across portfolios from different managers.

In the example here, kindly provided by Zurich-based cat bond manager Plenum Investments, the horizontal axis shows the various possible annual portfolio losses (in percentage of total assets) and the vertical axis shows the corresponding exceedance probabilities.

Hence, the mark labelled "100-year return period loss" indicates that the chance of annual losses surpassing about 31 percent of total assets is 1 percent. In other words, the annual portfolio loss will exceed roughly 31 percent of assets once every 100 years.

David Strasser, senior portfolio manager at Plenum Investments, noted that the exceedance curve contrasts with standard probability distributions, which give the chance of loss being smaller or equal to a given value.

Strasser also explained that the flatter the curve is in its tail, the more diversified the portfolio.

Another useful metric is the portfolio annual expected loss, which gives the portfolio loss to be expected on average per year.

But a major challenge for investors is ensuring that they are making a like-for-like comparison when

assessing probability curves provided by different ILS managers.

Many fund managers license software from one of the two major modelling companies – AIR Worldwide and RMS – to help them calculate these risks, but there are significant variations between the models.

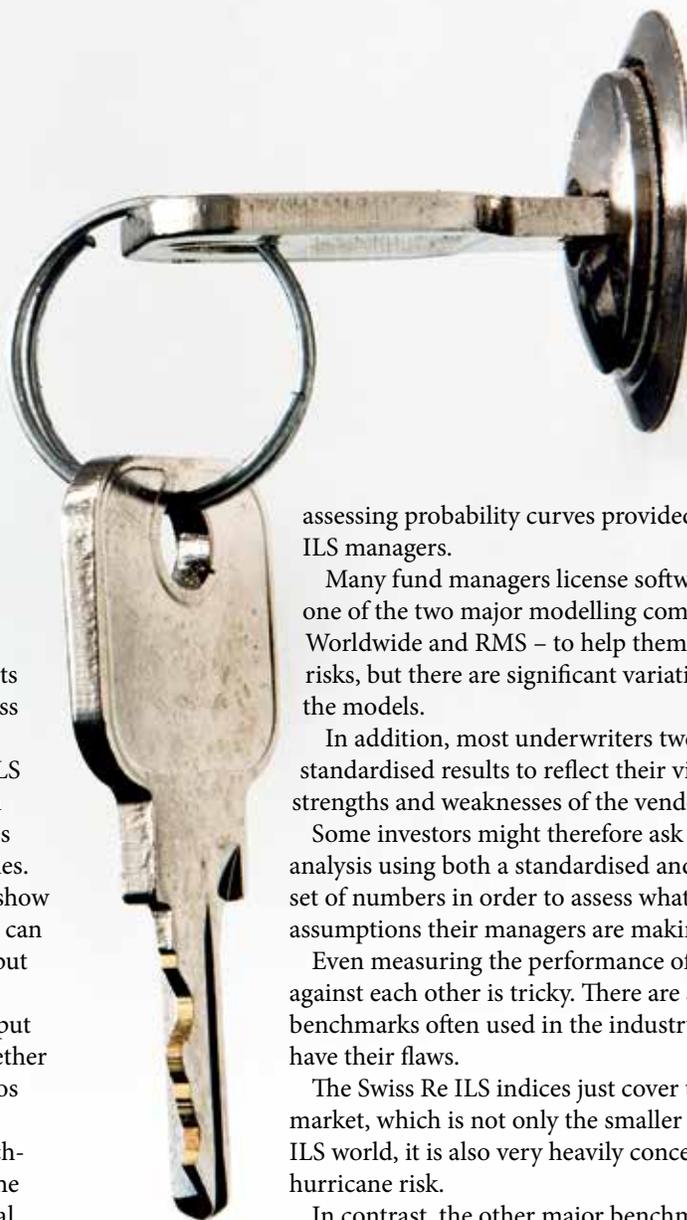
In addition, most underwriters tweak the standardised results to reflect their view on the strengths and weaknesses of the vendor models.

Some investors might therefore ask for risk analysis using both a standardised and adjusted set of numbers in order to assess what kind of assumptions their managers are making.

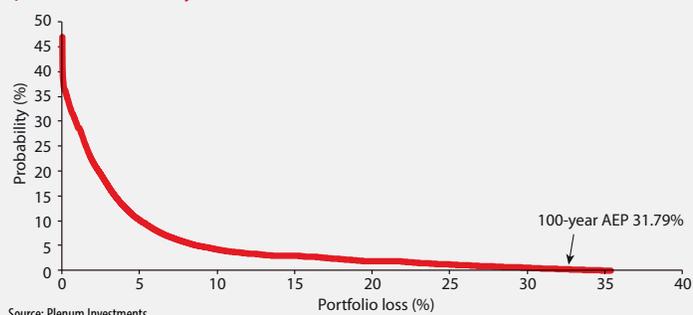
Even measuring the performance of ILS funds against each other is tricky. There are several benchmarks often used in the industry, but each have their flaws.

The Swiss Re ILS indices just cover the bond market, which is not only the smaller part of the ILS world, it is also very heavily concentrated in US hurricane risk.

In contrast, the other major benchmark – the Eurekahedge ILS Advisers index – averages out returns from a wide range of strategies including both conservative cat bond funds and higher-risk retro strategies. But an investor's own risk-return target could differ widely from the average pursued by this peer group.



Annual exceedance probability loss curve



Source: Plenum Investments

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Q&A

MICHAEL JEDRASZAK

The CIO at Hiscox Re Insurance-Linked Strategies talks about why diversification within ILS can pay off

Q: Most of your ILS funds are ceded risk from Hiscox itself. How do you take a portfolio that works for a rated balance sheet and make it work for ILS investor collateral?

The basic premise of our funds is to provide access to the market via Hiscox, and construct actively managed portfolios backed by an efficiently sized single pool of capital. We improve returns by not having to collateralise the maximum downside for each trade, whilst making it possible to write reinstatable cover.

Capital efficiency and improved market access through a rated balance sheet are the game changers from the collateralised reinsurance approach from many years ago, where you had to write single-shot deals at a certain rate-on-line to achieve target returns. That's become a small world. The much bigger world is tapping into and having relationships with buyers worldwide who buy across a broad spectrum of rates-on-line with reinstatements.

Q: What levels of leverage are you able to get for the funds?

It depends on the portfolio but generally speaking we're getting 2:1 leverage [on first-event limit to AuM]. When we write 2 percent rate-on-line business in Japan, it's actually generating a 4 percent return for our investors, roughly speaking. That way we can stay further away from the action whilst still generating attractive returns. Other fronting companies might allow independent ILS managers to have similar leverage, but we still feel that there are huge amounts of frictional cost in the commercial fronting model, which can be hidden away.

Q: What other questions do you think ILS investors should be asking about diversification?

If you write a portfolio of worldwide retro and you then show a pie chart to an investor saying my portfolio is exposed all over the world, I'm diversified – I think that's misleading because actually, as they're worldwide deals, all you need is a single large loss in any of those zones and your entire portfolio is significantly impacted. To help assess portfolio diversification investors should instead be asking for a breakdown of discrete exposures by region.

Q: What kinds of specialty insurance risk do you think will work for ILS investors?

The kind of specialty exposure that we include in our funds is cat-like – it's short tail and volatile. It includes risks from nuclear to terrorism, fine art; we've added wildfire liability, agriculture and fire per-risk. We haven't added marine or aviation, which currently in our view are not priced appropriately.

It makes up less than 10 percent of our exposure.

Specialty opens up a whole new range of risks – the issue is you need to get investors comfortable with the lack of third party modelling associated with that.



Q: How does the level of information that is available to analyse specialty risk compare to the standard of cat modelling?

For most specialty risks because there is no model, you need a fair amount of history and data to figure out what is a good risk. The tools we use will invariably differ to those offered by a third party modelling agency, they are however very quantitative and robust. We get investors comfortable with this as Hiscox has been writing such business profitably for a long time and the lack of price commoditisation offers opportunities for outsized margins.

Q: You've done one insurance vehicle – Cardinal – so far. How do you expect ILS markets will get on venturing into primary insurance business?

There has been a lot of competition for non-catastrophe insurance business – margins in that business have fallen to a point where we're not that comfortable offering it in large volumes to investors.

The jury's still out on how ILS capacity will work in the primary markets longer-term. We're open to exploring that, but we haven't yet found something suitable that's scalable.

Q: Would increased use of leverage mean ILS investors face more volatility in returns than in the past?

You can't leverage a portfolio of peak US cat risk, the cost of the leverage ought to outweigh the gain.

Our balanced portfolios, however, use leverage resulting in better returns in typical years, but they also have similar downsides in bad years as other ILS funds. You can achieve that through good access to risk.

Know the news...

AEOLUS WEIGHS UP CHANGE

Bermudian fund manager Aeolus is working with advisers as it considers bringing in new investors in early 2016, sources told *Trading Risk*.

Advisory firm Evercore is working with the company, although there is no marketing process underway, sources said.

There has been a surge of interest in potential M&A transactions in the ILS sector after Market acquired Catco last year for \$200mn, or 5x annual earnings. However, sources said that...

How *Trading Risk* subscribers were the first to learn about potential Aeolus M&A, January 2016

Before it happens...



A deal was announced...
PR Newswire,
1 November 2016

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Shipping challenges drag down marine rates

The marine and offshore energy markets have not been immune to the soft market conditions which have dogged the broader reinsurance sector over the past few years.

However, the challenges for marine and offshore energy reinsurers have been compounded by the struggles of their ultimate clientele.

The shipping industry is in the midst of a crisis that has claimed numerous high-profile scalps, most notably that of Korean behemoth Hanjin, which began insolvency proceedings last August.

Reduced insurance budgets at shipping firms have had a knock-on impact for the reinsurance sector, which together with chronic overcapacity has squeezed margins in the segment considerably.

Offshore energy reinsurers have also suffered as a result of reduced premiums at primary carriers, as a drop in exploration activity and the related fall in exposures at energy companies has been reflected in lower insurance rates.

All signals at the 1 January renewal season indicated yet more rate cuts in the region of 5 percent to 10 percent for excess-of-loss business, as primary carriers sought to take advantage of cheaper reinsurance to cover their books.

Despite the continued downward trend, JLT Re said rate reductions for marine and energy programmes at 1 January this year were “typically lighter” than those recorded during the 2016 renewals.

The broker also pointed to increased discipline from reinsurers at this year’s renewals, with underwriters less willing to pay additional commissions given the already compressed margins, while some resisted cedants’ attempts to negotiate price discounts that were deemed excessive.

The International Group of protection and indemnity clubs, which purchases one of the largest marine reinsurance programmes in the market, achieved rate reductions of between 7 percent and 9 percent on a risk-adjusted basis for 2017.

After several years of benign loss activity, marine and energy reinsurers were hit with a number of expensive losses in 2016.

The most notable claim stemmed from damage suffered by the Kwame Nkrumah floating production, storage and offloading vessel in the Jubilee field off the coast of Ghana, for which losses have been pegged at \$1.2bn to \$1.4bn.

Other meaningful hits set to impact the reinsurance market include the Pemex, Bigfoot and Yme offshore platform losses.

The spectre of the port explosion in Tianjin in 2015 continues to hang over the market. Total recoverable losses remain unknown but estimates run into the multiple billions.

Sizing up the marine market

The marine insurance market receives premiums of approximately \$30bn each year. The class is split between proportional and non-proportional policies and facultative and treaty policies.

The major marine (re)insurance classes are: hull, cargo and specie, offshore energy and liability.

Marine and energy reinsurance is a core class of specialty business written widely in both the Lloyd’s and company markets globally.

Swiss Re is viewed as the largest reinsurer in the market, while most other major players such as Scor, Hannover Re and Munich Re write substantial marine and offshore energy books.

ILS market involvement in the marine sector could come through various channels, including retro sidecars such as Hannover’s K vehicle, or partnerships such as that between Credit Suisse’s Arcus Syndicate and Lloyd’s insurer Barbican.

Marine-specific industry loss warranties are also written in limited quantities, including by retro writers such as Markel Catco.

Fault jumping jolt to quake models

For years, scientists believed there was no correlation between earthquake risk along the northern and southern parts of the 800-mile-long San Andreas Fault in California.

Portfolio managers based their investment strategies on the assumption that if an earthquake took place in northern California, the south of the state would be unaffected – and vice versa.

But new research suggests that earthquakes can “jump faults”, and that the San Andreas Fault has the potential to rupture from one end to the other.

The findings have been incorporated into a new earthquake model from CoreLogic and are the primary source for the 2017 updates of the RMS and AIR Worldwide seismic models for California.

“The assumption in the past was if we had an earthquake in northern California, the assets in southern California wouldn’t be affected and vice versa. The new science is saying this is not the case anymore,” said Dr Mahmoud Khater, chief scientist at CoreLogic.

The new model implements the third Uniform California Earthquake Rupture Forecast (UCERF3), developed by the Working Group on California Earthquake Probabilities using “grand inversion” or modelling to define the rate of possible earthquake

ruptures in the interconnected California fault system.

The findings reflect the high connectivity of the California fault system, where it is believed that nearly all fault sections connect to each other without jumping more than 5km.

CoreLogic said an earthquake could start on one of these faults, rupture the fault and then jump to the next one and continue on to the adjacent one.

“We might have big losses in southern California simultaneously with a big loss in northern California and vice versa,” Khater said.

“We may need to rethink the process and the strategy that we used in the past for portfolio diversification,” he added.

CoreLogic estimated that in the instance of a large earthquake in northern California, producing for example \$50bn of insured losses or more, there would be about a 25 percent chance that southern California would simultaneously see an event causing \$30bn of insured losses or more.

“Twenty percent more damage is estimated at a bigger magnitude earthquake than before,” said Dr Howard Botts, vice president and chief scientist at CoreLogic.

The UCERF3 model is the primary source for the new RMS seismic model for California.

The model includes possible events that extend from north of San Francisco to south of Palm Springs.

“Fortunately, the likelihood of such events is very, very small,” said Delphine Fitzenz, principal earthquake modeller at RMS.

The possibility of one rupture “jumping” to another nearby fault means RMS scientists will allow for larger magnitude events that are closer to downtown Los Angeles than previously modelled.

UCERF3 has also been a key source for the update to AIR Worldwide’s earthquake model for the US, which is scheduled for release this summer.

The methods used for California could also be applied to other regions such as the Alpine Fault in New Zealand.

The Working Group on California Earthquake Probabilities made significant changes to its projections of annual earthquake activity after taking account of the potential for multi-fault ruptures and using much larger numbers of fault sections in its modelling.

In the Los Angeles region, this increases the predicted annual occurrence rate of earthquakes with magnitude 5.0 and above by nearly 60 percent.

However, the annual occurrence rate for earthquakes with magnitude 6.7 and above was reduced by a factor of two.

For the San Francisco area, the estimated annual occurrence of earthquakes with magnitude 5.0 is 0.780 – a 39 percent increase on the figure from 2008 modelling.

For San Francisco earthquakes with magnitudes 6.7 and above the annual occurrence is virtually the same.

What would it cost: San Francisco earthquakes

What impact would a 100-year and a 250-year event near downtown San Francisco have on the insurance industry? And how much of those insured losses would be transferred to the cat bond market?

Trading Risk's asked modelling companies CoreLogic and AIR Worldwide to analyse both of these scenarios for an event occurring within a 10km radius of the city.

Both firms noted that low take-up rates for earthquake insurance meant total property damages from a San Francisco disaster would be much higher than insured losses.

This swathe of uninsured losses is often called the "protection gap" in the insurance industry.

Moreover, AIR Worldwide's analysis also suggested that the cat bond market would only be influenced by above the 1-in-100-year level.

AIR

AIR Worldwide's modelling database showed that a 6.3 magnitude tremor off the coast of San Francisco and Marin counties would cause a 1-in-100-year loss.

This event would not cause any modelled cat bond losses, but the firm noted that it was just one simulated event.

"While an earthquake within 10km of San Francisco would certainly be devastating, it is simply one of many scenarios that could be extremely impactful to the Bay Area," said AIR assistant vice president Brent Poliquin and Justin Pierce, manager of the firm's client consulting services group.

Above a 1-in-100-year level, the cat bond market would be highly likely to bear losses – with 92 percent of the scenarios above this risk level showing

some ILS payouts.

AIR calculated that its 1-in-100-year event would produce \$14.8bn of insured losses.

Meanwhile, the total loss to properties that are not necessarily insured would be \$42.2bn.

"In other words, for this simulated event, there is a protection gap of \$27.4bn – 65 percent of the total insurable loss," Poliquin and Pierce said.

Looking at the 1-in-250-year event – a 7.4 mag quake in San Mateo – AIR's modelled industry insured losses totalled \$34.4bn.

A similar protection gap would occur, with a total insurable loss of \$99.8bn.

Such an event would cause a \$1.1bn loss in the cat bond market, affecting 10 bonds that would lose 48 percent of their total principal.

The \$1.1bn loss represents a 5 percent loss to the outstanding cat bond market and would wipe out 9 percent of all cat bond principal exposed to California earthquake perils.

CoreLogic

It is important to understand that many different events can generate a 100-year or 250-year loss for the San Francisco Bay, according to Maiclaire Bolton, senior product manager for insurance and spatial solutions at CoreLogic.

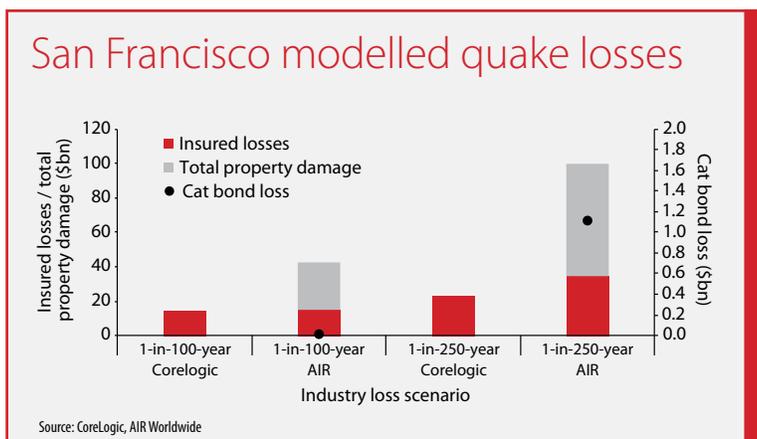
A magnitude 6.0 event with a direct hit on a city could be more damaging than a magnitude 7.5 event that is further away."

The 74-mile Hayward Fault, which is situated to the east of San Francisco Bay and runs through heavily populated areas, would most likely be the focus of both a 100-year and 250-year event.

"The 1906 San Francisco earthquake released a significant amount of stress on the northern segment of the San Andreas Fault and, as such, there is a lower probability of a large event recurring because not enough time has passed for a sufficient amount of energy to build up again," said Bolton.

The Hayward Fault, on the other hand, has a recurrence interval of about 150 years and it has been 149 years since the last major rupture in 1868, she added.

On the protection gap, CoreLogic estimates that earthquake insurance take-up in California hovers around 14 percent, although it is higher in high-risk areas such as the Bay Area, reaching about 20 percent.



ILS market primer: from CNN catastrophe to pension portfolio



What is the insurance-linked securities (ILS) market? As the name suggests, it consists of financial instruments that provide insurance cover – some of which might be tradeable securities, while other instruments are less liquid.

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.

That's largely due to its major selling point as a source of diversifying, or non-correlating risk. The industry is predominantly exposed to natural catastrophe events such as hurricanes or earthquakes – acts of God that won't be triggered by financial market turmoil.

Despite its name, 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 has also been labelled the “alternative reinsurance” market, and contrasted with the so-called “traditional” reinsurance market, which refers to rated, often listed companies such as Swiss Re or Munich Re, to cite two of the longest-standing industry brands.

That's because instead of simply buying

reinsurance equities, the emergence of ILS market asset managers has given investors an alternative entry route into reinsurance risk, and one that carries several key advantages.

An ILS portfolio provides a theoretically purer source of diversification, because a reinsurer's shares are subject to the swings of market fortunes while their sizeable – albeit typically conservative – investment portfolios add a degree of asset risk.

In contrast, investing via an asset manager isolates underwriting risk. Without a rated equity base, ILS managers have to pledge cash-equivalent collateral against their reinsurance liabilities. Alternately, they can pay a fee to a rated company to essentially borrow their rating.

This structure also cushions investors against inflation risk, because their returns are derived from fixed-rate insurance premiums on top of floating investment rates earned from their collateral, which is typically held in short-term US Treasuries.

In addition, ILS managers have focused traditionally on the catastrophe market, compared to the broader sweep of reinsurance risks that might be covered by traditional companies – some of which may involve more correlation to financial market fortunes.

However, since its early days, this 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 that give 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 or aviation reinsurance. Meanwhile, for a select group of ILS managers, life (re)insurance risk is a major part of their business.

Despite blurring the boundary with the broader reinsurance industry, ILS still offers investors a distinct route into taking reinsurance risk while skirting the equities market.

Why catastrophe risk?

There are various reasons why the ILS market is

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 by Frank Majors and Greg Hagood within broking house Willis. It later shifts to Bermuda and becomes independent

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 The cat bond market records three full defaults in one year: the \$300mn Muteki deal triggers after the Tohoku earthquake in Japan and \$200mn is paid out under two Mariah Re deals in response to US tornado claims



predominantly exposed to property catastrophe risks, besides the non-correlation benefits.

The segment's well-developed risk models help to provide a strong statistical analysis of the risk levels being taken, although there is a relatively limited range of well-modelled perils.

The reinsurance market's top risks are US hurricane or wind, US earthquake, Japanese earthquake and European wind. Australian storm and earthquake, often bundled with New Zealand earthquake, follows these four peak perils.

All of these risks also feature on the ILS market, although its risk profile is even more highly skewed towards the peak peril of US hurricane events.

However, underwriters might also provide cover for "all natural perils", which will include exposure for any catastrophe event, modelled or otherwise.

Historically, unmodelled catastrophe perils that have caused surprise losses for the reinsurance market include the Canadian wildfires that burned through Fort McMurray in 2016 or the Thailand floods that hit in late 2011.

Beyond the models, however, there was a more financial rationale that led the ILS market to colonise catastrophe risk. US hurricane offered higher rates than other types of risk, as it was the reinsurance industry's biggest source of exposure

and required companies to set aside more capital to write than if they were providing a small amount of Colombian earthquake cover, for example.

This offered a chance for ILS managers to target the market's prime source of income, 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 has over the past few years eroded some 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 – such as the smaller market for European wind or Australian cat risk, for example.

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.

Imagine the mathematics of it as a kind of gambling game where reinsurers have piled their catastrophe chips onto the "US hurricane" slot on their roulette wheel.

Hence, the ratings agencies that supervise their gaming to ensure they're good to meet any payouts insist on reinsurers holding more collateral against every dollar gambled on this risk. Conversely, the stakes on a Colombian quake loss are so much lower, that they can add this bet into their game at a much lower regulatory cost.



Sizing up the market

Brokers estimate that total reinsurance capacity is about \$320bn-\$420bn, with the alternative reinsurance segment providing about \$70bn-\$80bn of this sum.

Within this segment, there are several distinct product types, including the catastrophe bonds that kicked off the market's development (confusingly, the term ILS can sometimes be used to refer to these

tradeable securities specifically, as well as the broader segment overall).

But although the market began with cat bonds, at \$22bn in size they are no longer the dominant force in the industry. Instead, so-called "collateralised reinsurance" has driven growth over the past few years to stand at roughly \$40bn. These are effectively just traditional reinsurance contracts. However, while traditional reinsurers with a credit rating from Standard & Poor's or AM Best can use that stamp of creditworthiness to guarantee any reinsurance obligations they take on, ILS asset managers typically have no such security to offer reinsurance buyers.

Instead, they either pledge cash-equivalent collateral against any reinsurance cover that they provide, or pay a reinsurer a fee to stand in their stead and cede on the risk – a practice known in the industry as "fronting".

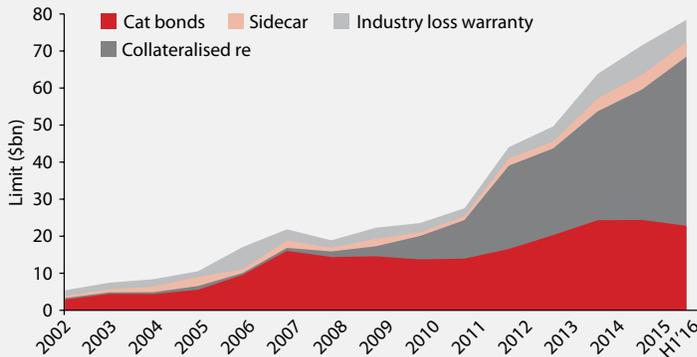
Industry loss warranties, or ILWs, are a niche market segment that provide reinsurance cover based not on a buyer's actual losses but on the insurance industry's overall loss from a specified disaster or disasters – for example, a \$50bn US hurricane ILW or a \$5bn Florida hurricane ILW.

The "sidecar" market refers to vehicles run by reinsurers, which sit alongside their balance sheets to provide them with additional capacity. Sidecars typically involve a reinsurer ceding a share of their underwriting portfolio to external investors under reinsurance agreements known as "quota shares" (because they involve the counterparty taking a set percentage, or quota, of losses and income from the portfolio).

However, there are several "market-facing" sidecars – so called because reinsurers use these pools of capital to write specific portfolios on behalf of the sidecar vehicles, in a similar structure to a managed fund.

Finally, the retrocession segment is a subset of the reinsurance market that has a relatively high share of capital market participation – it is believed to make

Alternative capital deployment



Source: Aon Securities Inc

What is a cat bond?

A catastrophe 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).



up around half the \$12bn or so of capacity available.

Retrocession is simply reinsurance cover written for a reinsurance portfolio, which may include quota shares or ILW instruments.

Weighing up returns

So far during its short history the ILS market has delivered strong returns for investors. Its most difficult years were 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.

There are a couple of benchmarks of returns that are often cited within the industry, although neither is without its quirks and limitations.

The Eurekahedge ILS Advisers index has returned annualised gains of 6.36 percent and a Sharpe ratio of 2.19 in the decade from 2006 to 2015. The index 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 in 2011, when it finished 0.14 percent down.

Meanwhile, the Swiss Re Cat Bond Total Return index – which solely tracks performance of the cat bond segment – returned 6.64 percent last year. It delivered annualised returns of 7.03 percent over the three previous years, from 2013 to 2015. However, the Swiss Re index will typically deliver stronger gains than ILS managers as they often attempt to build more diversified cat bond portfolios for investors than the US-centric market index.

It is also important to note that competition over the past few years has eroded the kind of returns that were available to ILS investors in the market's early years before spreads began falling in 2013.

How do the reinsurance and ILS industries measure rate adequacy and changes?

Traditional reinsurance premiums are quoted in terms of rate-on-line, whereby premium income is expressed as a percentage of the amount of limit available to meet losses. In other words, if a buyer pays a \$4mn premium on a \$100mn contract, they are paying a 4 percent rate-on-line.

The major reinsurance brokers release rate-on-line indices to show how rates are moving over time.

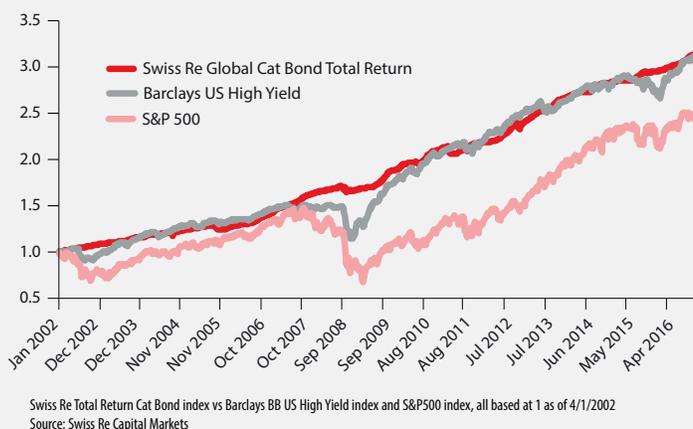
In the cat bond market, investors receive a fixed coupon above a floating rate. The floating portion is linked to the investment return from the bond collateral – typically held in short-term US Treasury money market funds – with the fixed coupon or spread above the floating rate being the insurance premium due to investors.

Cat bond investors are also typically given the

“expected loss” of a deal, a figure that expresses the likelihood of capital loss in any given year. For example, a 1 percent 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 percent expected loss range now offer investors around a 3x multiple (or spreads of 4-5 percent), depending on the risk profile.

Cat bonds vs alternative benchmarks 2002-16



How does reinsurance work?

Typically, a broker will put together a “reinsurance programme” for their insurer client by obtaining capital commitments from numerous different underwriting companies. This is known as “subscription market” business, although some larger insurers might also buy bilateral private deals.

Reinsurance programmes are often stratified into several different “layers” of cover, with all parties on each layer generally receiving the same premium. However, some reinsurance buyers may offer to pay higher premiums to the counterparties that are setting terms for the deal – also known as “lead underwriters” – who will play the main role in settling any claims that arise on behalf of the companies that are putting up smaller amounts of “following” capacity.

Two of the major types of reinsurance cover are “excess of loss” reinsurance, where an underwriter simply picks up any losses within a set band above a fixed threshold (or deductible); and “quota share” or “proportional” cover, which entitles them to a set share of premiums and losses, in effect taking a slice of the portfolio's results. Both are “indemnity” covers where underwriters commit to reinsuring a company's actual incurred losses.

Investor list

Manager by type	Total AuM in ILS \$mn (estimated)	AuM within UCITS funds	AuM within '40 Act funds	AuM within other private funds	Type	Notes	ILS strategies	Established in ILS	Base
Nephila Capital	10,200			10,200	Specialist ILS manager	Part-owned by KKR and Man Group	Various multi-instrument funds and single-investor mandates, also invests in weather	1998	Bermuda
Credit Suisse Asset Management	7,500			7,500	Institutional manager with ILS unit	Bank's asset management arm offers Iris suite of ILS funds	Various funds with different risk levels; targets both catastrophe and specialty risks. One Lloyd's syndicate	2003	Switzerland
LGT ILS Partners	6,500	Y (n/d)		6,500	Specialist ILS manager	Former Clariden Leu ILS team moved to Swiss alternatives manager in 2012	Various ILS funds and bespoke mandates	2005	Switzerland
Fermat Capital Management	5,200	1400		3,800	Specialist ILS manager	Pioneering dedicated manager	Cat bond focus	2001	US
Stone Ridge Asset Management	5,050		5050		Specialist ILS manager	Net assets of end October 2016 (most recent disclosure)	Cat bond and sidecar funds	2013	US
Markel Catco	4,300			4,300	Specialist ILS manager	Runs a public listed fund and private funds	Retrocession writer	2011	Bermuda
Securis Investment Partners	4,116	49.89		4,065	Specialist ILS manager	Northill Capital owns majority stake	Life, non-life and mixed strategy funds	2005	UK
Leadenhall Capital Partners	3,500	168		3332	Specialist ILS manager	Now majority-owned by Amlin after buy-up in late 2014	Non-life and mortality funds, life/non-life mandates	2008	UK
Aeolus Capital Management	~3,000			~3,000	Specialist ILS manager	Began as private reinsurer; transformed into fund manager in 2011	Specialist in retrocession and higher risk-return collateralised reinsurance	2006	Bermuda
Elementum Advisors	2,700-3,000			2,700-3,000	Specialist ILS manager	Managing ILS funds since 2002; team has been investing since 1995	Multi-instrument ILS funds; natural catastrophe focus	2009	US
AlphaCat Managers	2,615			2,615	Reinsurer-backed manager	Validus subsidiary, some capital from Validus	Lower-risk and higher-risk ILS funds, passive cat bond fund BetaCat, direct mandates	2008	Bermuda
Schroders (Secuqero Advisors)	2,445	1,133		1,312	Specialist ILS manager	Schroders owns 50.1% of asset manager. AuM data as of 31 December	Five funds: two cat bond; three multi-instrument, of which two include life risk. Four segregated mandates	2008	Switzerland
Renaissance Underwriting Managers	1793			5793	Reinsurer-backed manager	Runs two rated sidecars of which DaVinci Re is available to third party investors; takes share of RenRe catastrophe portfolio. AuM does not include \$4bn Top Layer Re (State Farm JV)	Medici cat bond fund; Upsilon funds writing retro and collateralised reinsurance; Fibonacci Re – risk-remote US cat vehicle in tradeable format		Bermuda
Pioneer Investments	1,650*				Mutual fund manager	*ILS AuM largely held within multi-strategy funds; offers one ILS-specific strategy (Interval fund) with \$162mn AuM	Focus on tradeable investments – cat bonds, sidecars	2007	US
Twelve Capital	1,300				Specialist ILS manager	Spun out from Horizon21; team in ILS since 2007	Cat bond and multi-instrument ILS funds (insurance debt fund not tracked)	2010	Switzerland
Hiscox Insurance-Linked Strategies	1,200+			1,200+	Reinsurer-backed manager	Hiscox-owned asset manager; Hiscox capital \$50mn	Two co-mingled diversified funds; single-investor funds; one insurance sidecar	2014	Bermuda
Mt Logan (Everest Re sidecar)	867			867	Reinsurer-backed manager	Includes some Everest Re capital	Quota share of Everest Re book; various degrees of leverage available		
Scor Investment Partners	700			700	Reinsurer-backed manager	Asset management affiliate of reinsurer established 2011	Multi-instrument ILS funds	2011	France
Blue Capital Management	672			672	Reinsurer-backed manager	Endurance subsidiary; runs two listed funds; open-ended fund and private sidecars	Collateralised reinsurance (US regional focus); new weather strategy	2012	Bermuda
Coriolis Capital	670	30		640	Specialist ILS manager	Team operating since 1999; established after MBO from Societe Generale	Multi-instrument ILS funds including weather risk strategy	2003	UK
Cartesian Re	>550			550	Specialist ILS manager	Backed by private equity firm Cartesian Capital	ILW writer, also invests in cat bonds. Investment structures include: open-ended funds in Cayman Is and Delaware, Luxembourg SICAV, Bermuda-listed shares of segregated account and managed accounts	2009	Bermuda
Axa Investment Management	550			550	Institutional manager with ILS unit	Affiliate of insurer; invests third party funds only	Various ILS funds and mandates	2007	France
Aspen Capital Markets	525			525	Reinsurer-backed manager	Runs \$130mn Silverton Re sidecar (incl. \$20mn Aspen capital)	Declined to comment on other strategies		
Tokio Marine Asset Management	500			500	Reinsurer-backed manager		Largely cat bonds, some collateralised covers		Japan
New Ocean Capital Management	450			450	Reinsurer-backed manager	XL and Stone Point seeded; Mitsui & Co bought 15% share in 2016	Three funds: Diversified (QS of XL Re property cat book); Market Value (super remote risk); Focus (directly written short-tail reinsurance). Also individual accounts	2014	Bermuda
Oppenheimer Funds	390				Institutional manager	One ILS specific strategy among multi-strategy funds.	Master Event-linked bond fund open to external investors	1997	US
Pillar Capital Management	375				Specialist ILS manager	Previously Juniperus; Transatlantic owns 50%	Collateralised reinsurance focus, runs two funds and mandates	2008	Bermuda

Manager by type	Total AuM in ILS \$mm (estimated)	AuM within UCITS funds	AuM within '40 Act funds	AuM within other private funds	Type	Notes	ILS strategies	Established in ILS	Base
PG3	360				Family office	Family office; invests in QS sidecars, ILWs and ILS across wide range of reinsurance – nat-cat, non-nat-cat, life and health, legacy	Largely family office funds, may take third party capital		Switzerland
Kinesis Capital Management	~272-306			~272-306	Reinsurer-backed manager	Lancashire subsidiary established mid-2013	Writes multi-class reinsurance and retro	2013	Bermuda
Hudson Structured Capital Management	251			251	Specialist ILS manager	Start-up led by Michael Millette; backing from Blackstone	Reinsurance AuM listed; transport fund not included. Invests across natural catastrophe, life/health, casualty, property, financial and distribution risks and various instruments	2016	US/Bermuda
Arch Underwriters	240			240	Reinsurer-backed manager	Also underwrites for rated \$1.13bn casualty reinsurer Watford Re (not included in AuM)		2014	Bermuda
Eskatos Capital Management	200			200	Specialist ILS manager	Azimut Group subsidiaries Eskatos and Katarsis Capital Advisors manage and advise the ILS fund respectively	One fund: Eskatos AZ Multistrategy ILS fund; small longevity exposure	2008	Luxembourg
Plenum Investments	150	Y (n/d)			Specialist ILS manager		Cat bond focus, long-only strategies	2010	Switzerland
Leine Investments	150			150	Reinsurer-backed manager	Anchor investor Hannover Re, which has committed up to \$150mn	Fund of cat bonds and collateralised re. Also runs K retro sidecar with third-party capital		
PartnerRe	140			140	Reinsurer	Internal cat bond fund. Re sidecar of unknown size			US
ILS Capital Management	125			125	Specialist ILS manager	Don Kramer-backed manager	Specialty focus	2014	Bermuda
Deutsche Bank Asset Management	100				Institutional manager	London-run ILS fund	Withdrew from collateralised re market to focus on cat bonds	2015	London
Lombard Odier	~100	Y (n/d)		~100	Institutional manager with ILS unit	Swiss private bank launched ILS fund in 2016	Cat bond funds	2016	Switzerland
Axis Ventures	92			92	Reinsurer-backed manager	Crop and nat-cat facilities – capital from Stone Ridge		2014	Bermuda
Eastpoint Asset Management	50			50	Specialist ILS manager	Backed by Japanese manager Asuka Asset Management	Cat bond focus	2012	Bermuda
Sumitomo Mitsui Asset Management (Tokyo)	50			50	Reinsurer-backed manager	ILS fund launched July 2014; advised by Mitsui Sumitomo Insurance	Diversified, low-risk portfolio – yen-denominated	2014	Japan
Mercury Capital	45			45	Specialist ILS manager	Seed funding from Lloyd's syndicate Ark	ILW tracker fund	2013	Bermuda
Entropics Asset Management	12			12	Specialist ILS manager	Newly operational fund; still raising capital	Cat bond focus	2015	Sweden
Solidum Partners	Not disclosed				Specialist ILS manager		Cat bond and multi-instrument funds	2004	Switzerland
Munich Re	Not disclosed			Not disclosed	Reinsurer	Internal ILS fund, accepts third party capital in Eden Re sidecar		2006	Germany
Swiss Re	Not disclosed			Not disclosed	Reinsurer	Internal ILS fund, accepts third party capital in Sector Re sidecar			
Funds of ILS funds									
K2 Advisors	587			587	Institutional manager	Hedge fund of funds manager; \$10.3bn AuM	Fund of ILS funds	2003	US
ILS Advisers	178			178	Institutional manager	Index tracker fund tracking ILS Advisers index	Fund of ILS funds	2014	Bermuda
AIM Capital	20			20	Institutional manager	Finnish fund of funds manager	Fund of ILS funds	2011	Finland
GT ILS fund	n/d			n/d	Institutional manager	Texas-based advisory firm offering ILS fund of funds solution	Fund of ILS funds		
Multi-strategy fund managers with ILS components									
Baillie Gifford	500				Institutional manager	Scotland-based asset manager; one multi-asset fund invests in ILS – much less active in ILS through 2015 than in 2014	Buys ILS directly. Also holds stake in listed ILS funds Catco/DCG Iris		
Pine River Capital Management	300+				Hedge fund	Trades ILS within fixed income fund	Multi-strategy	2013	US
Quantedge	~250				Hedge fund	Hedge fund with ~\$1,200mn overall AuM; ILS as of Jan 2016 only	Invests in cat bonds, sidecars, ILWs	2013	US
Blackstone Alternative Asset Mgmt	-				Institutional manager	\$266bn asset manager; allocates to Nephila Capital through mutual fund	Blackstone Alternative Multi-Manager Fund		US
Aberdeen Asset Management	8				Institutional manager	3.9% of £190mn Diversified Growth fund at end-May 2016			
DE Shaw	Not disclosed				Hedge fund	Has \$40bn+ total AuM; ILS holdings not disclosed	Writes collateralised re/retro	2007	US
Guggenheim Capital	Not disclosed				Institutional manager	Broker-dealer with portfolio management arm			US
Tiaa-cref	Not disclosed				Institutional manager	Manages \$800bn overall AuM	Buys cat bonds directly		US

Source: Trading Risk

CATASTROPHE COUNT

US hurricanes: where have they struck and how much have they cost?



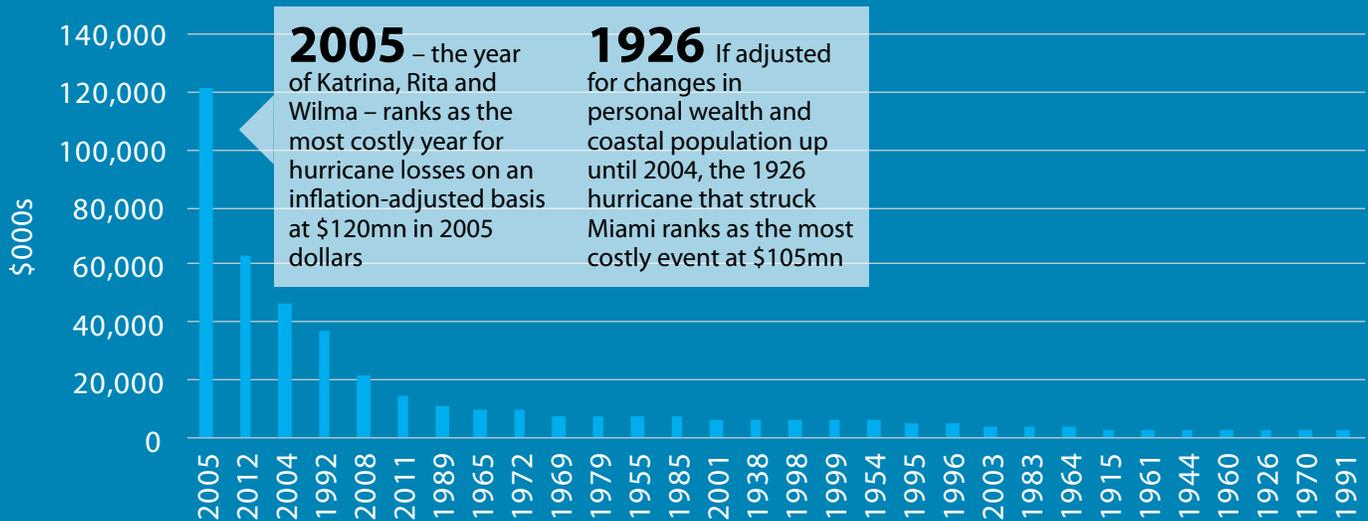
When are major hurricanes likely to strike? September has about as many major hurricane landfalls as October and August combined. The northern Gulf Coast from Texas to northwest Florida is the prime target for pre-August major hurricanes. The threat of major hurricanes increases from west to east as the season progresses, with major hurricanes favouring the U.S. East Coast by late September. Most major October hurricanes in the United States affect southern Florida.

But NOAA scientists point out that even though they can estimate hurricane frequency along the US coast, there are high levels of uncertainty about when a storm might strike any one location.

They gave the example of Pensacola in Florida, which after nearly 70 years without a direct hit, was struck by Hurricane Erin and major Hurricane Opal in 1995, major Hurricane Ivan in 2004 and major Hurricane Dennis in 2005.

Source: NOAA Hurricane FAQs, data from 1851-2010

30 MOST COSTLY YEARS FOR HURRICANE DAMAGE



(inflation-adjusted to 2005 dollars; not adjusted for population/wealth changes)

Source: NOAA

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

KEY PHRASE	DEFINITION
Loss ratio	Incurred losses divided by earned premiums (earned premiums include reinstatement premiums)
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
Sidcar	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

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established infrastructure &
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