



Q4 2018 Catastrophe Bond & ILS Market Report

Mortgage insurance risk dominates,
as cat risk issuance shrinks

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INTRO

This report reviews the catastrophe bond and related insurance-linked securities (ILS) market at the end of the fourth-quarter of 2018, looking at new risk capital issued and the composition of transactions completed during the quarter.

Catastrophe bond and ILS issuance during the fourth-quarter of 2018 reached \$1.94 billion, which is \$32 million below the ten-year average for the period, as shown by the Artemis Deal Directory.

On the back of three consecutive record setting quarters, issuance of catastrophe bond and ILS transactions slowed slightly in the fourth-quarter of 2018, a reflection of the challenging level of losses faced recently by ILS markets.

The period was dominated by mortgage ILS issuance, as 68%, or roughly \$1.3 billion covered mortgage insurance risks, while the volume of catastrophe risk issued in the period amounted to only \$682 million, or 32% of total risk capital brought to market. We explore the rise of mortgage ILS deals in more detail later in the report.

Overall, issuance in the fourth-quarter of 2018 included 14 transactions consisting of 22 tranches of notes, as shown by the Artemis Deal Directory.

Artemis is the leading, freely accessible source of timely, relevant and authoritative news, analysis, insight and data on the insurance-linked securities, catastrophe bond, alternative reinsurance capital and related risk transfer markets. The Artemis Deal Directory is the leading source of information, data and analysis on issued catastrophe bond and insurance-linked securitization transactions.

Transaction Recap

Almost \$1.3 billion of Q4 issuance offered protection against mortgage insurance losses, a rising peril class in the ILS space. As shown by the Artemis Deal Directory, almost \$3 billion of issuance offered protection against this peril in 2018, which helped the market once again achieve outright growth. The three mortgage deals issued in Q4 came from repeat sponsor Arch Capital, and first time sponsors Radian Guaranty and MGIC.

The remaining \$682 million of issuance covered a range of natural perils and regions, from repeat, new, and unknown sponsors. New sponsor Sempra Energy brought \$125 million of pure California wildfire risk to market, which, as shown by the Artemis Deal Directory, is just the second deal of this nature in the market's history.

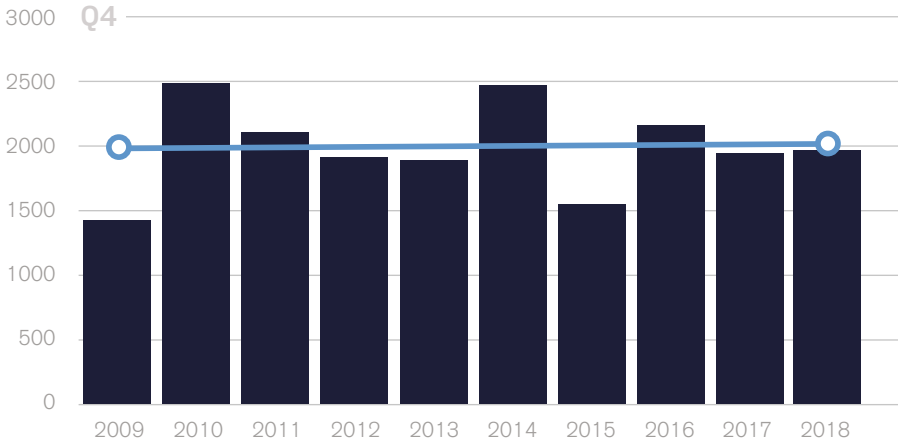
The California State Compensation Insurance Fund also returned, with \$210 million of protection against workers comp claims resulting from a California earthquake. An unknown sponsor issued \$10 million of pure California quake risk. And, prolific sponsor USAA also returned in Q4, with a \$200 million multi-peril U.S. deal, as is typical from its Residential Reinsurance platform.

Seven privately placed deals from unknown sponsors brought a combined \$137 million of unknown and U.S. property catastrophe risks to market in Q4.

ISSUER/TRANCHE	SPONSOR	PERILS	SIZE (\$M)	DATE
LI Re (Series 2018-1)	Unknown	California earthquake	10	Dec
Artex SAC Limited - Series HX Notes	Unknown	Unknown prop cat risks	50.22	Dec
Seaside Re (Series 2019)	Unknown	U.S. prop cat risks	87	Dec
Golden State Re II Ltd. (Series 2018-1)	California State Compensation Insurance Fund	W/c California quake claims	210	Nov
Residential Reinsurance 2018 Limited (Series 2018-2) Class 1	USAA	U.S. multi-peril	50	Nov
Residential Reinsurance 2018 Limited (Series 2018-2) Class 2	USAA	U.S. multi-peril	150	Nov
Eagle Re 2018-1 Ltd. M-1	Radian Guaranty	Mortgage insurance risks	241.4	Nov
Eagle Re 2018-1 Ltd. M-2	Radian Guaranty	Mortgage insurance risks	168.1	Nov
Eagle Re 2018-1 Ltd. B-1	Radian Guaranty	Mortgage insurance risks	24.6	Nov
Home Re 2018-1 Ltd. Class M-1	MGIC Investment Corporation	Mortgage insurance risks	142.449	Oct
Home Re 2018-1 Ltd. Class M-2	MGIC Investment Corporation	Mortgage insurance risks	157.444	Oct
Home Re 2018-1 Ltd. Class B-1	MGIC Investment Corporation	Mortgage insurance risks	18.743	Oct
Bellemeade Re 2018-3 Ltd. M-1A	Arch Capital Group Ltd.	Mortgage insurance risks	107.6	Oct
Bellemeade Re 2018-3 Ltd. M-1B	Arch Capital Group Ltd.	Mortgage insurance risks	211.2	Oct
Bellemeade Re 2018-3 Ltd. M-2	Arch Capital Group Ltd.	Mortgage insurance risks	167.4	Oct
Bellemeade Re 2018-3 Ltd. B-1	Arch Capital Group Ltd.	Mortgage insurance risks	19.93	Oct
SD Re Ltd. (Series 2018-1)	Sempra Energy	California wildfire	125	Oct

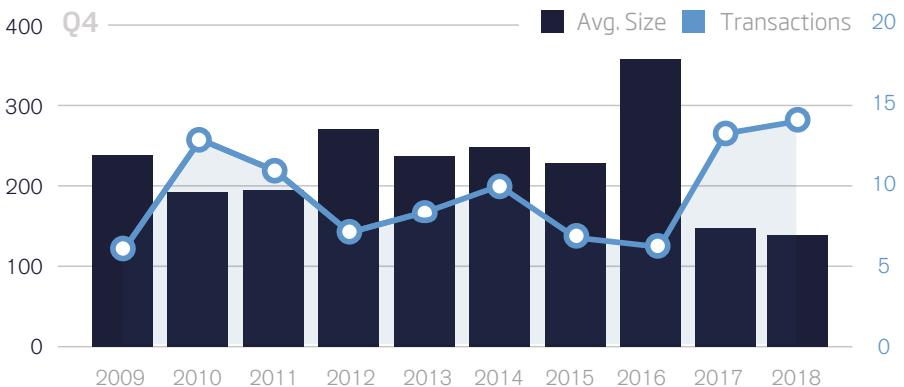
Q4 ILS issuance by year (\$M)

At \$1.94 billion, catastrophe bond and ILS issuance in the fourth-quarter is actually \$32 million below the ten-year average for the period, but roughly \$16 million higher than the same period in 2017, according to Artemis' data. This is largely due to the recent major losses faced by the industry, which caused a number of expected Q4 cat bonds to be delayed.



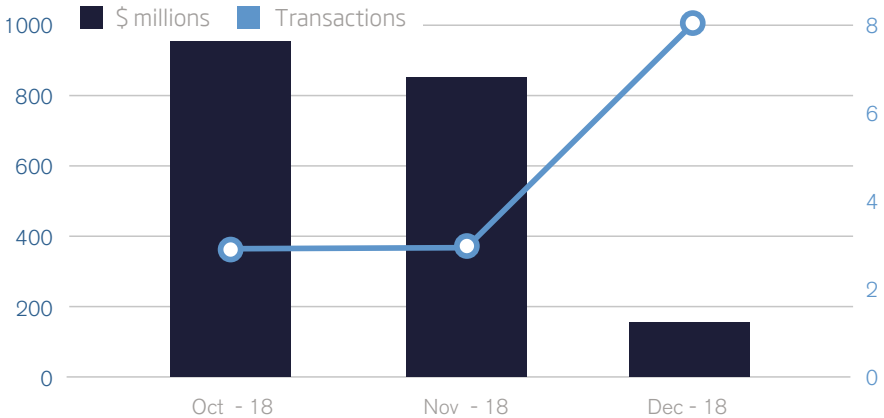
ILS average transaction size & number of transactions by year (\$M)

The average transaction size of fourth-quarter 2018 issuance, at \$139 million, is below the ten-year average for the period of \$224 million. In terms of the number of transactions issued, the 14 brought to market in Q4 is above the ten-year average for the quarter, as shown by the Artemis Deal Directory.



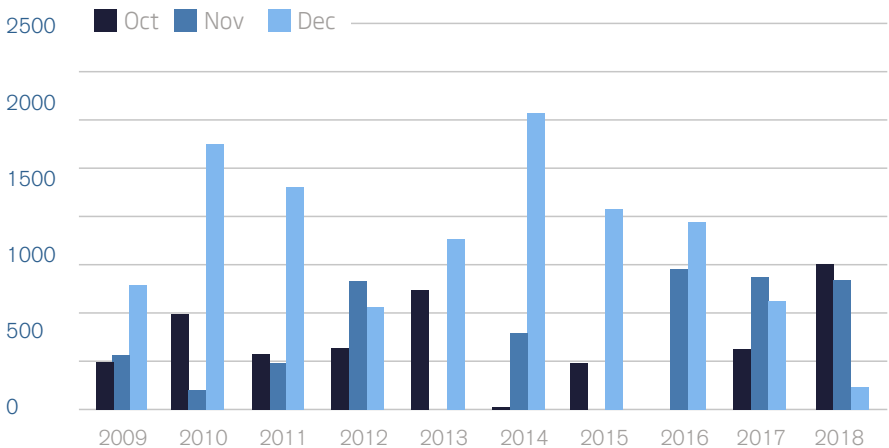
Number of transactions and volume issued by month (\$M)

Typically, December issuance is the strongest of the fourth-quarter, but in 2018, the volume of mortgage deals saw monthly issuance reach \$950 million in the month of October, its highest of the last decade. November issuance was also strong, at \$844 million, almost double the ten-year average for the month. December witnessed just \$147 million of issuance, which is some way off the ten-year average of \$1.1 billion for the month.



Q4 issuance by month & year (\$M)

In terms of the number of deals brought to market in the fourth-quarter, October and November both saw three deals issued, while eight came to market in December.





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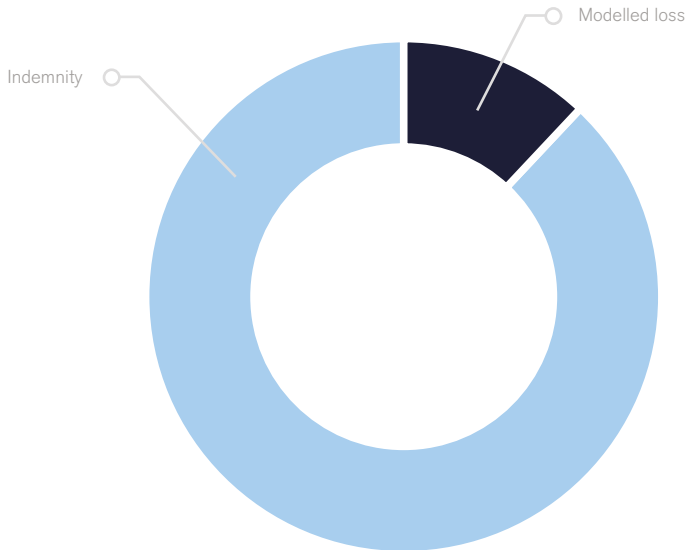
Tim Faries

Managing Partner, Bermuda
Group Head, Bermuda | Corporate
Group Team Leader | Insurance
+1441 298 3216
tfaries@applebyglobal.com

applebyglobal.com

Q4 2018 ILS issuance by trigger type

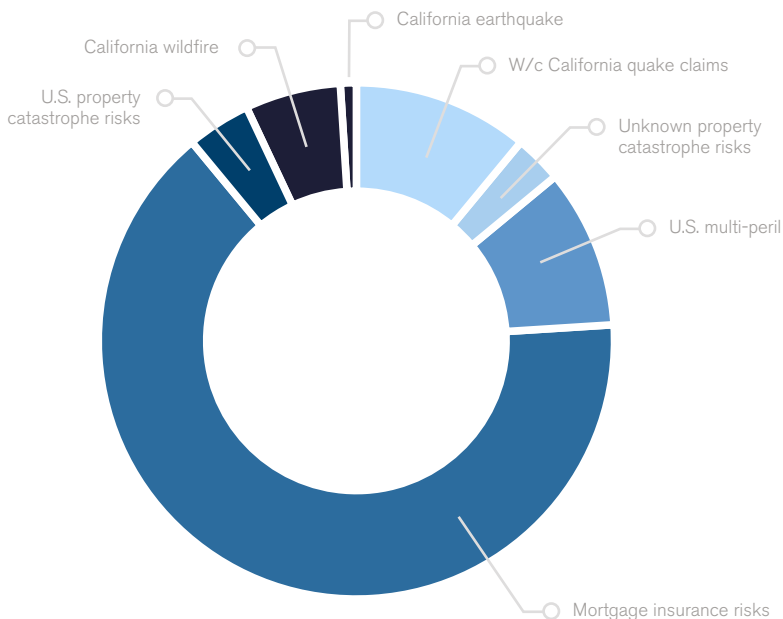
Trigger diversification among fourth-quarter 2018 issuance was lacking when compared with any typical quarter, with indemnity protection once again dominating issuance of catastrophe bond and related ILS transactions.



Indemnity protection accounted for 88%, or roughly \$1.6 billion of fourth-quarter issuance, with all but one transaction utilising an indemnity trigger structure. The remaining 12%, or \$210 million of Q4 issuance utilised a relatively rare modelled loss trigger.

Q4 2018 ILS issuance by peril

Q4 issuance was dominated by three mortgage ILS deals. Arch Capital returned with a \$506 million mortgage deal under its Bellemeade Re platform. While first time sponsors Radian Guaranty and MGIC brought \$434 million and \$319 million of mortgage insurance risks to market, respectively. Mortgage ILS deals have grown in number over the last two years, and issuance in Q4 2018 would have been particularly low without these transactions.



Of the catastrophe risk-focused ILS deals issued, \$125 million came from first time sponsor Sempra Energy via issuance platform SD Re, the second deal in the market's history to cover pure California wildfire risks. The California State Compensation Insurance Fund returned in Q4 with \$210 million of protection against workers comp claims as a result of a California earthquake, while an unknown sponsor issued \$10 million of pure California quake risk.

USAA returned with \$200 million of U.S. multi-peril risk via its Residential Reinsurance platform. \$87 million of U.S. property cat risk came from an unknown sponsor, as well as \$50.22 million of unknown property cat risk from another unknown sponsor.

In 2018, the global capital markets invested billions of fresh capital into insurance risks via new and innovative insurance linked securities. Expect more of the same in the year ahead says Janita Burke and Sherman Taylor, from Estera's Bermuda office.

Insurance linked securities (ILS) have long proven attractive as a means of diversifying investment portfolios and reducing exposure to market volatility. ILS issuances have increased steadily over the past decade with 2018 seeing another record year for the ILS market, with ILS funds again providing large amounts of new capital.

A considerable uptick sets 2018 apart with a broadening of the types of risks and geographical locations covered, with the total amount of capital under management at ILS funds now estimated to be between US\$102 - \$150 billion (Artemis). This figure signals a strong appetite for the asset class amongst institutional investors. The solid growth in the number and size of ILS deals seen in 2018 is a clear indicator that the market is poised for further growth in 2019. 2018 also saw some very interesting expansion of the reach and diversity of ILS products.

Trends in 2018

New developments in 2018 included the first wildfire indemnity corporate catastrophe bond issued in August. The bond provides US\$200 million of insurance protection against losses related to wildfires to benefit a corporate sponsor using an indemnity trigger.

Another innovation was the Federal Emergency Management Agency securing US\$500 million in coverage through a catastrophe bond that is one of the first indemnity triggered flood deal completed in the United States.

One further notable first in 2018 was financial guarantee insurance risks being transferred to the capital markets with a US\$100 million bond and a growing volume of mortgage insurance risk entering the ILS space, along with operational and credit default risks. In June 2018, for example, a new US\$150 million operational risk ILS deal came to market, securing investor support for fully-collateralised reinsurance to back an operational risk insurance agreement. This is only the second deal of its kind, and the fact that it covers a range of corporate risks only strengthens the case for further market expansion and growth of ILS with coverage becoming increasingly flexible and moving beyond its early days of exclusively hurricane and other natural disaster risks.

One of the most heartening things about the performance of the ILS markets in 2018 is that the strengthening came against a backdrop of a series of insurance loss events towards the end of the previous year that threatened to

dampen the capital market's interest in insurance risk related investments. Several hurricanes and wildfires in the second half of 2017, plus the Puebla earthquake that struck Mexico in September that year with a magnitude of 7.1, combined to raise concerns that the capital markets might step back from ILS investments; however, the opposite proved to be the case as investor appetite for ILS products remained strong despite those 2017 loss events.

Today, we are seeing heightened concerns around wildfire risks, with the 2018 wildfire season proving to be the most destructive and deadly on record in California. More than 8,000 fires were recorded in an area of nearly two million acres, the largest amount of burned acreage ever seen, according to the California Department of Forestry and Fire Protection. The fires reportedly caused more than US\$3.5 billion in damages. There is some concern that wildfire risks included in multi-peril ILS products may not have been fully understood or priced correctly, however, time will tell, as estimates of wildfire losses for the insurance and reinsurance industry have been as high as US\$15 billion including losses that may yet hit ILS products.

Bermuda's multi-industry expertise and sound regulatory infrastructure kept the jurisdiction positioned as the domicile of choice for ILS in 2018.

Another busy year ahead

Looking forward to 2019, we anticipate that Bermuda's blue-chip reputation will benefit

further from new legislation including economic substance legislation that underscores and builds on the island's commitment to tax transparency and its reputation for compliance with global standards. Another example is Bermuda's anti-money laundering and anti-terrorist financing standards which meet US and UK standards.

Speed to market and price competitiveness continue to be stand-out advantages for Bermuda as the ILS market continues to look for greater efficiency in an environment of thin profit margins. Bermuda's digital assets legislation regime is also noteworthy, and has already attracted interest from the ILS industry.

The Bermuda Stock Exchange (BSX) continued to play a key role in the global ILS market as it listed a large number of new ILS products in 2018; the fully electronic stock exchange features pragmatic regulations that easily accommodate ILS. The BSX is likely to continue to be the stock exchange of choice for the ILS market into 2019 and beyond.

In summary, we expect growth in the ILS market in 2019, although the capacity of the ILS industry to bring the deals to market may be a limiting factor as investor appetite outstrips availability of ILS products in the marketplace. 2019 may be the year that much discussed cyber risks enters into the ILS market; and it is also possible that we may see some marrying of Bermuda's budding Fintech industry with the ILS market.

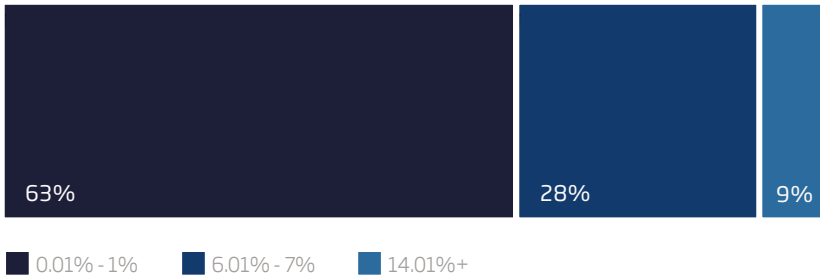


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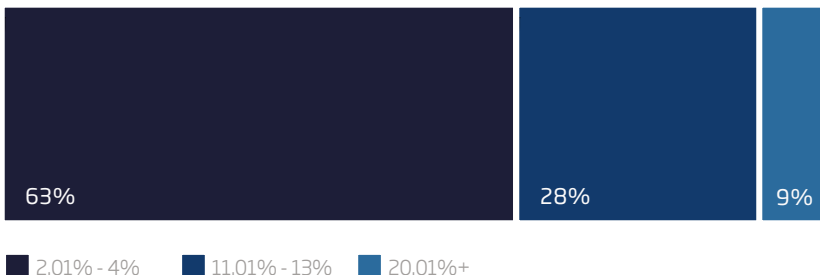
Q4 2018 ILS issuance by expected loss

For the \$535 million of new risk capital issued that we have expected loss data for, 63%, or \$335 million had an expected loss of below 0.5%. \$150 million, or 28% of issuance had an expected loss of between 6.01% and 7%, while \$50 million of Q4 issuance offered an expected loss of above 14%. At 14.07%, the Class 1 tranche of Residential Re notes had the highest expected loss of the quarter. The Golden State Re II notes were the lowest risk on offer in Q4, at 0.14%.



Q4 2018 ILS issuance by coupon pricing

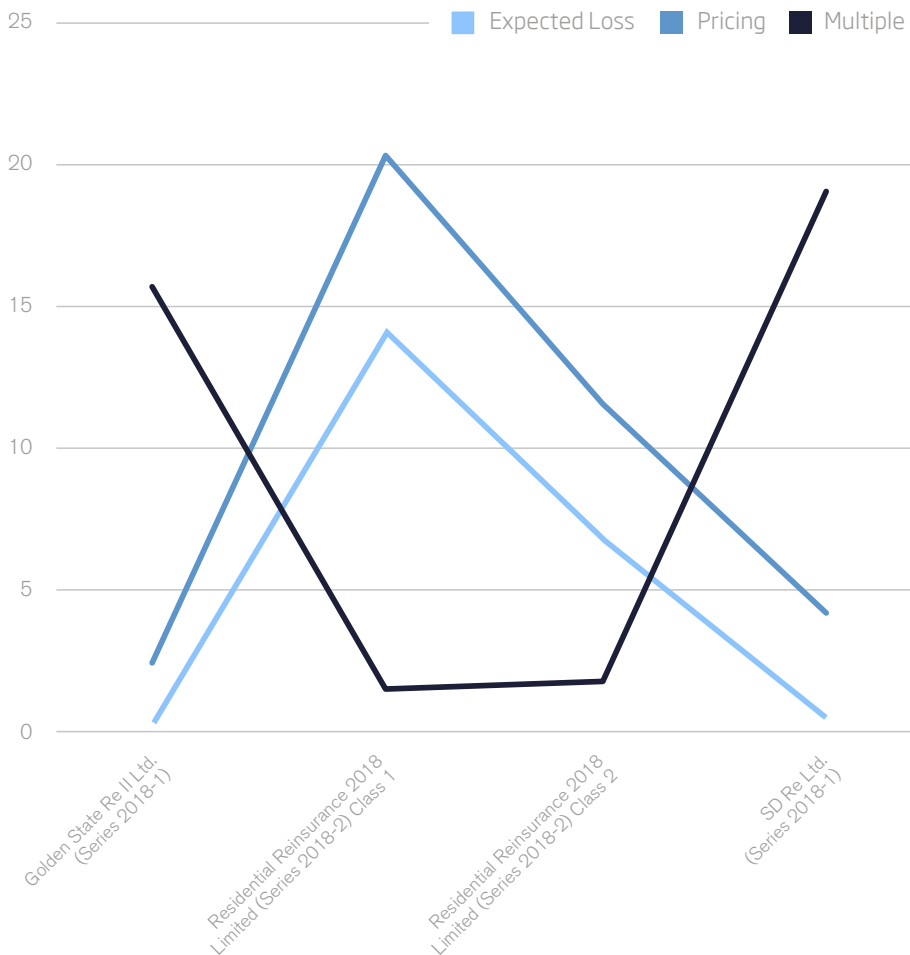
For the \$535 million of Q4 issuance where we have pricing data, 63%, or \$335 million offered investors a coupon of between 2.01% and 4%. \$150 million of issuance in the fourth-quarter had a coupon of between 11.01% and 13%, and \$50 million, or 9% of issuance had an expected loss of more than 20%. The lowest coupon on offer in the quarter, at 2.2%, came from the single tranche of Golden State Re II notes. The Class 1 tranche of Residential Re notes offered investors the highest coupon of Q4, at 20.25%.



Pricing multiples of Q4 2018 issuance

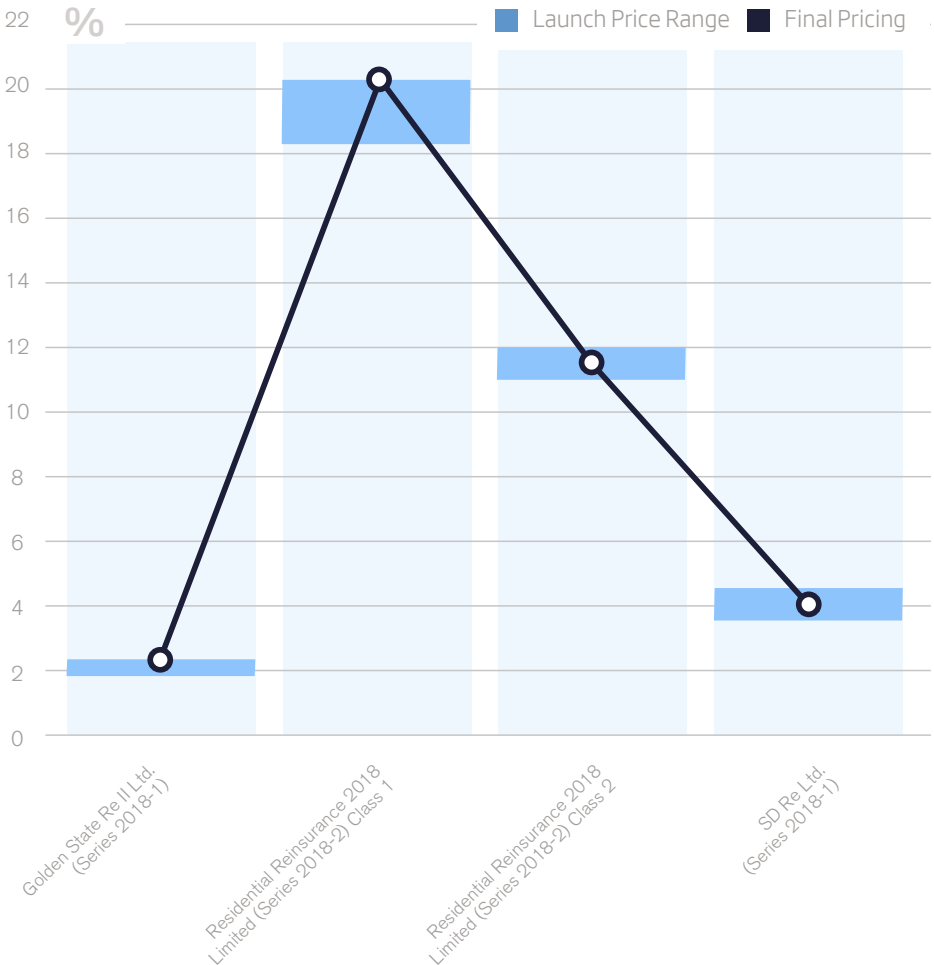
Where we have both the expected loss and pricing data, the average multiple (price coupon divided by expected loss) during the fourth-quarter was 1.82. Artemis' data shows that this is the lowest average multiple at the end of any quarter in 2018, but higher than the 1.67 recorded at the end of Q4 2017.

The average multiple of 2018 catastrophe bond and ILS issuance bounced back in Q3 after declining through the year, but has again declined in the final quarter of 2018.



Cat bond and ILS price changes during Q4 2018 issuance

For the \$535 million of total risk capital issued that we have full pricing data for, the average price change during Q4 2018 was 3%. Two tranches of notes issued in the quarter priced exactly on the mid-point of initial price guidance. Two tranches of notes also priced above the mid-point of initial price guidance. The largest price increase came from the single tranche of Golden State Re II notes, which increased by 7.31% while marketing. The Class 1 tranche of Residential Re notes increased by 5.19% while marketing.

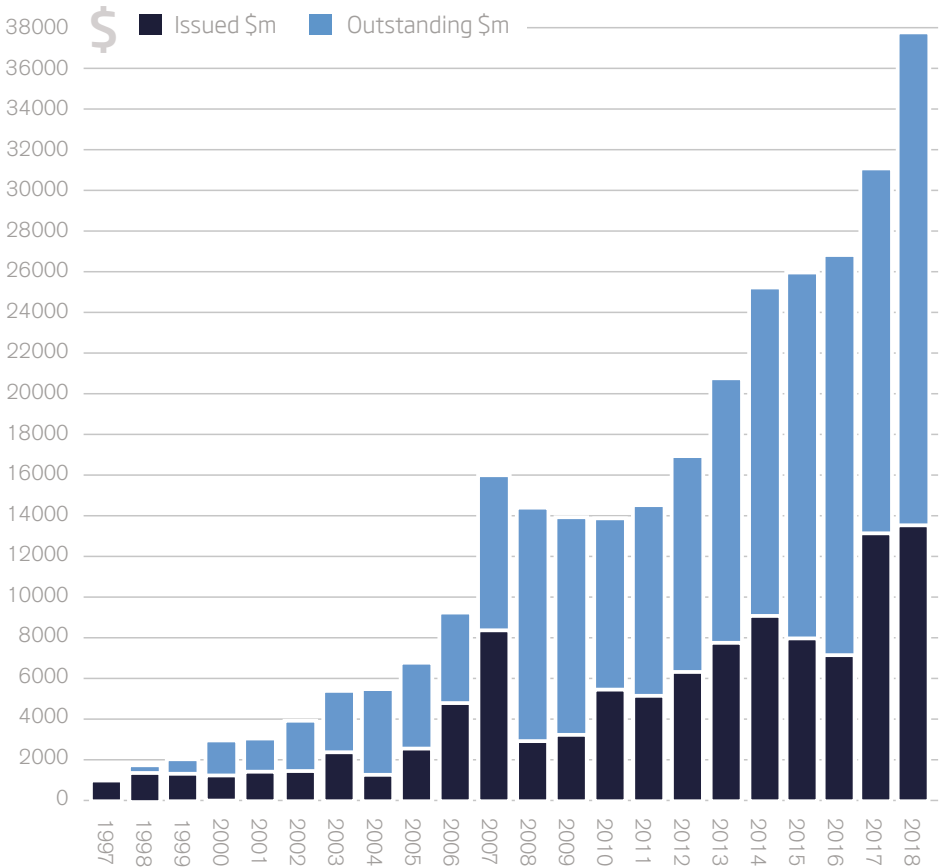


Issued / Outstanding

At the end of 2018, the outstanding catastrophe bond and ILS market volume reached a new high of \$37.8 billion, helped by a record \$13.8 billion of full-year issuance, as shown by the Artemis Deal Directory.

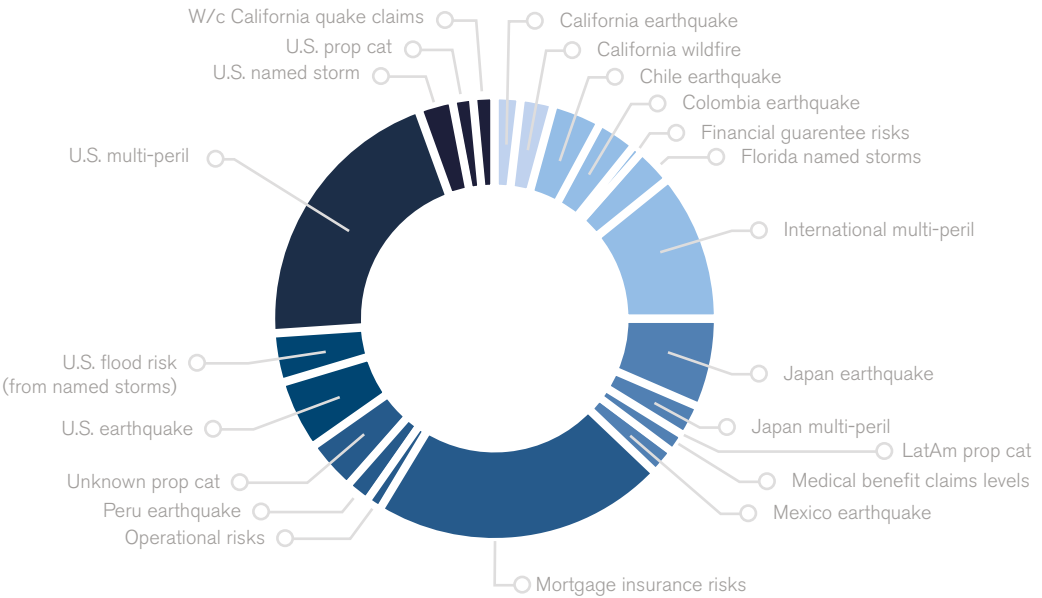
As this report highlights, issuance in 2018 was helped by just under \$3 billion of mortgage ILS deals. When mortgage ILS are excluded from issuance data it takes issuance below 2017's year-end total, although the outstanding market, at \$34.8 billion, would still be at a record size. Data from the Artemis Deal Directory shows that mortgage ILS deals have grown in popularity in recent times, increasingly contributing to quarterly and annual ILS market issuance.

At the same time, appetite for catastrophe risk remains strong, and despite the losses of 2017 and 2018 capital markets investors' attraction to the space continues to push the boundaries of the catastrophe bond and ILS industry.

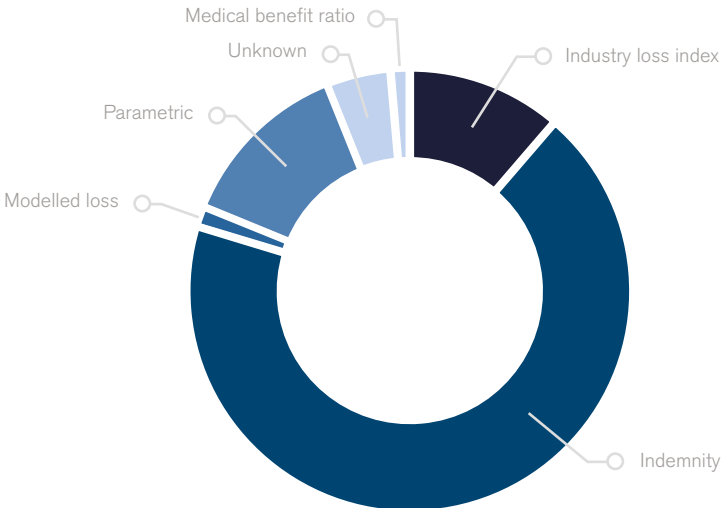


If you want to see full details of every catastrophe bond and ILS transaction included in the data in this report please visit www.artemis.bm/deal_directory/

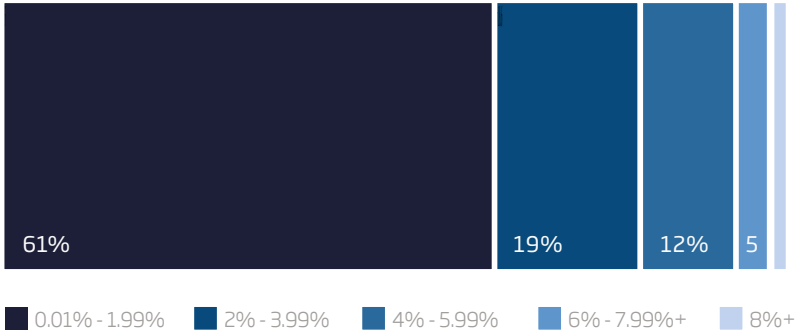
Full-year 2018 ILS issuance by peril



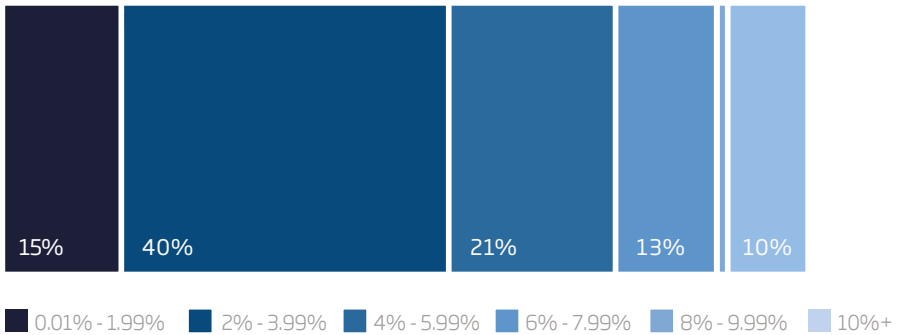
Full-year 2018 ILS issuance by trigger



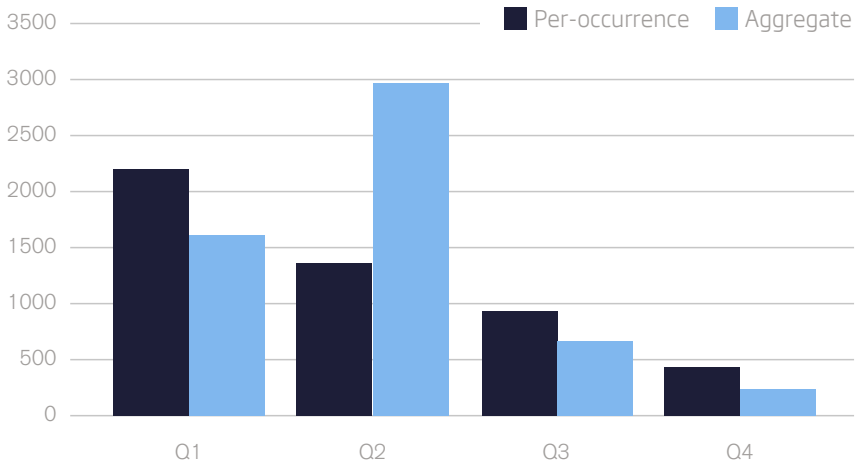
Full-year 2018 ILS issuance by expected loss



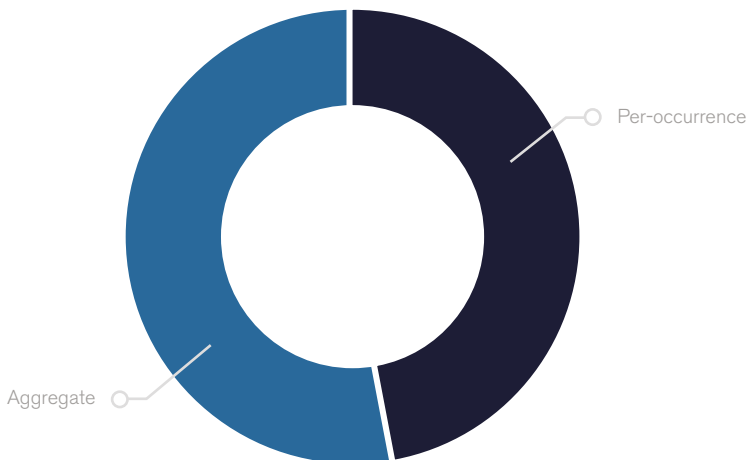
Full-year 2018 ILS issuance by coupon pricing



2018 ILS issuance per-occurrence vs aggregate split by quarter



Full-year 2018 ILS issuance per-occurrence vs aggregate split

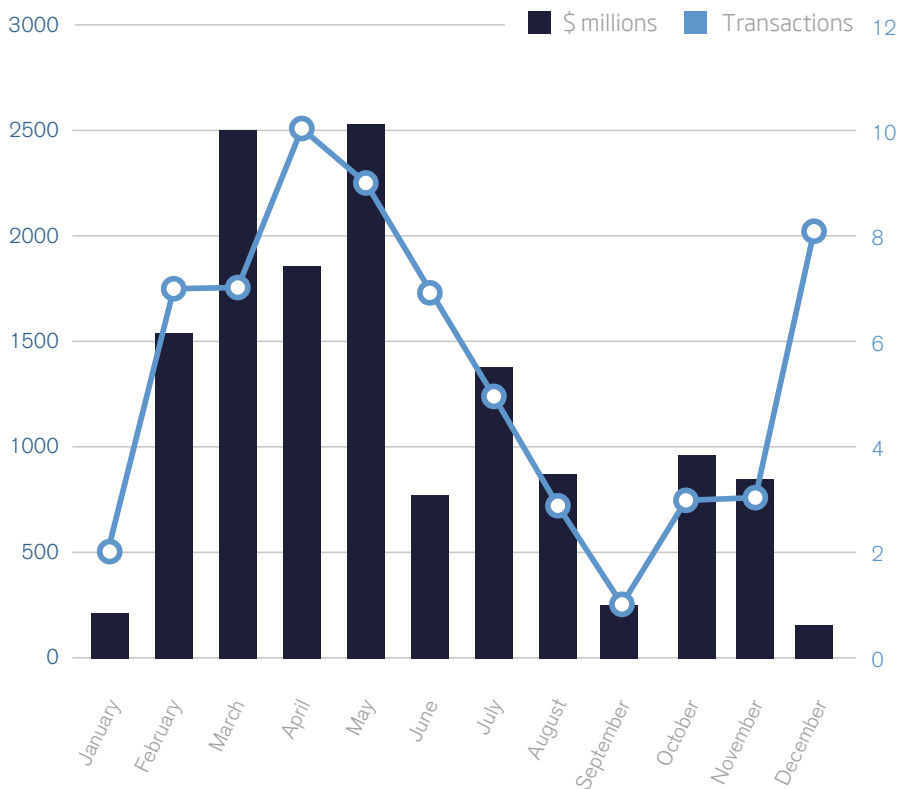


Full-year 2018 number of ILS transactions and volume issued by month (\$M)

Continuing the five-year trend, catastrophe bond and ILS issuance was dominated by the first-half of the year, in terms of the size of transactions and the number of deals. Issuance in both March and May reached a staggering \$2.5 billion, while three other months also saw issuance breach the \$1 billion mark.

At least one deal came to market in every month of the year, something that hasn't happened since 2014, and which helped the outstanding catastrophe bond and ILS market reach \$37.8 billion at the end of 2018, its largest ever size.

Re/insurance market commentary suggests that prices across the industry are expected to increase at the January 2019 renewals, which suggests it could once again be a very interesting and strong year for the catastrophe bond and ILS market.





All catastrophe bond and ILS issuance data sourced from the Artemis Deal Directory.

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