

## Insurance-Linked Securities

Updated December 2020<sup>1</sup>

*Insurance Linked Securities (ILS) is one of the few alternative strategies that continues to receive close investor attention from its potential as an uncorrelated, “risk-off” asset. Conceptually, the frequency and severity of natural disasters are independent of broader capital market events and therefore returns on investment products designed to support the reinsurance market should demonstrate low or zero correlation with equity market returns.*

*Long-term reinsurance index data are generally supportive of investor expectations though depressed premium levels and a high severity of claims have led to near zero actual investor returns over the last five years. Looking forward, the major considerations for reinsurance investors are the following: (1) the third-party market for reinsurance capital remains very small and is not growing, (2) reinsurance premiums have risen but not to a level that is compelling, (3) claim levels are not normally distributed and historical index returns are not an unbiased representation of future experience, (4) Indices are not investable so implementation relies upon active management where fees are high, wide return dispersion exists across managers, and there is no evidence that index outperformance is the norm.*

*Without a “wind at your back”, successful reinsurance outcomes will require extensive due diligence at the manager level and once invested, either luck that severe left-tail events are avoided, or the perseverance to remain invested long enough to normalize their impact.*

### Overview

Insurance is an agreement whereby regular, small payments (premiums) are paid by the first party in exchange for recompense payments (claims) by a second party for infrequent, large losses suffered by the first party as the result of some adverse occurrence. Auto premiums and collision claims between a driver and insurance company come immediately to mind. Reinsurance follows the same concept except that the second party, in turn, pays part of the premiums it receives to a third party, and in return the third party agrees to pay part of the claims. The third party is a reinsurance company or other entity that specializes in this activity rather than directly underwriting insurance with the first party. The structure of reinsurance agreements generally involves the third party agreeing to pay second party claims above some fixed maximum level rather than a fixed percentage of all claims.

Catastrophe reinsurance covers rare events such as natural disasters where losses can be too large for any individual insurance company or entity that otherwise self-insures, such as a government or corporation. For example, Berkshire Hathaway began reinsuring California earthquake losses after the Northridge Earthquake in 1995.

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<sup>1</sup> Cliffwater Research, “Will Harvey Draw Investors to Reinsurance” (September 1, 2017)

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## History

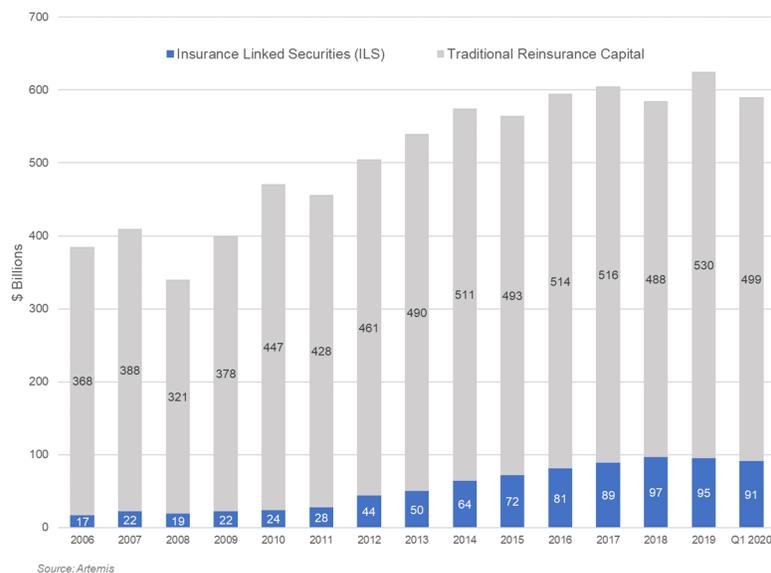
The insurance industry was an important development in global commerce because it allowed large financial risks to be shared. The oldest written insurance policy was discovered on a Babylonian monument<sup>2</sup>, and for thousands of years, insurance has facilitated the transfer of risk from one party that is exposed to bad fortune to another party that can better absorb the impact. Insurance for insurance companies, or reinsurance, was created in the mid-19<sup>th</sup> century when a fire that destroyed Cologne revealed that a single event could overwhelm the pooled risk capital in a specific city or country. This led to the creation of internal markets for reinsurance in which countries had a publicly owned ultimate risk taker, like Munich Re, Swiss Re, General Re.<sup>3,4</sup>

It wasn't until Hurricane Andrew in 1992, which cost the industry \$15.5 billion and resulted in the insolvency of 11 insurance companies<sup>5</sup>, that the development of the current catastrophe reinsurance market started to develop. But it was after Hurricane Katrina in 2005, the costliest hurricane in US history, that the use of insurance-linked products became commonplace<sup>6</sup>. A specialized industry began to grow whereby catastrophe risk was transferred to the capital markets rather than reinsurance companies.

## Types of Reinsurance

Today there are two categories of reinsurance – traditional reinsurance and insurance-linked securities (ILS). Traditional reinsurance is kept on the balance sheets of reinsurance companies and represents \$499 billion of the \$590 billion reinsurance market. ILS are any insurance-related security that provides exposure to reinsurance, typically bonds or contracts, and which allow for the transfer of event-linked risks to an investor. ILS has nearly quadrupled over the past decade, totaling \$91 billion at the end of the first quarter 2020. Exhibit 1 reports growth in the reinsurance market.

Exhibit 1: Reinsurance Market



<sup>2</sup> "Insurance and Risk: Some History", Risk Engineering (April 2017).

<sup>3</sup> General Re, or Gen Re, is one of the largest American reinsurers. Founded in 1846, it was acquired by Berkshire Hathaway in 1998.

<sup>4</sup> Nephila Climate, "Using Risk Transfer to Achieve Climate Change Resilience" (June 2019).

<sup>5</sup> AIR, Twenty-Five Years after Hurricane Andrew: AIR Analyzes the Impact if it Were to Strike Again Today, (August 21, 2017).

<sup>6</sup> The Global Treasurer, "Investing in Cat Bonds" (September 2017).

## Traditional Reinsurance

Traditional, or direct, reinsurance is the most common form of risk transfer in the reinsurance market, supported by the balance sheet of a regulated and rated reinsurance company. In these syndicated transactions, an insurance company will buy catastrophe protection from a group of reinsurance companies through brokers, resulting in a single price for a standard risk contract. Coverage in the traditional reinsurance market is provided on an indemnity basis, meaning that the reinsurer pays out claims to the primary insurer dollar for dollar against actual claims paid by the primary insurer. Traditional reinsurance can cover a wide range of risks and contracts are typically 12 months in duration.

## Insurance Linked Securities

There are five general categories of ILS: catastrophe bonds, collateralized reinsurance, retrocessional, quota shares/sidecars, and industry loss warranties (ILWs).

- i. *Catastrophe Bonds* (“Cat bonds”) are debt instruments that provide reinsurance protection (reimbursement) to the issuing company if specific conditions, such as an earthquake or tornado, occur. Cat bond investors receive regular premium income in exchange for accepting the risk of a loss. If the triggering events do not occur during the tenor of the agreement, the investor receives the principal plus interest repayment at maturity. If one of the specified events occurs, all or part of the principal is used to pay insured losses and investors’ coupon payments cease or are reduced. Cat bonds are typically 2-3 years in duration. Cat bonds are liquid securities which trade on a secondary market. As of December 2020, the Cat bond market totaled \$46 billion<sup>7</sup>.
- ii. *Collateralized Reinsurance* is similar to traditional reinsurance except that risk (loss) is supported by non-insurance entities such as ILS funds, hedge funds, pension funds and unrated, third-party capitalized reinsurance vehicles rather than a reinsurance company. Collateralized reinsurance allows non-rated entities to participate in reinsurance programs through a trust account set up at contract inception which fully funds potential claims. Full collateralization allows capital providers to underwrite insurance risk without a rating, enabling them to receive premiums on the coverage provided. If the specified event occurs, all or part of the collateral account is used to pay insured losses and investors’ coupon payments cease or are reduced. Collateralized reinsurance covers a wide range of risks and contracts are typically one year in length. The reinsurance contracts are private contracts and have no liquidity.
- iii. *Retrocession* (“retro”) is insurance that a reinsurance company buys from another reinsurance company. One reinsurance company will cede part of its underlying portfolio to another reinsurance company with the aim of limiting its own risk. Retro is typically the most volatile (and profitable) ILS market because of the information asymmetry between the cedant (issuer) and the counterparty. Buyers of retro contracts typically do not have access to loan-level details or the internal risk systems of the issuers, leading to higher premiums to offset the unknown risks. The notional dollar value traded in the retro market is around \$7 billion per year, and contracts are typically one year in length and have no liquidity.
- iv. *Quota Shares* or sidecars allow investors to participate pro-rata in a reinsurer’s book of contracts. Investors receive a pro-rata share of the reinsurer’s premiums and pay the same share of the losses, capped at the amount invested. These contracts are highly diversified across geographies (North America, Europe, Japan, and Australia/New Zealand), types of reinsurance coverage (hurricanes, earthquakes, wildfires, etc.), and staggered by contract maturity dates. Quota shares are illiquid, and contracts are typically one year in length.

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<sup>7</sup> Artemis.

- v. **Industry Loss Warranties (ILWs)** are binary options on industrywide catastrophe losses. ILWs differ from all other ILS products because coverage is based on an industrywide loss rather than losses from a specified event. An ILW contract is triggered if Property Claim Services (PCS), an independent third party, certifies the claim amount. These contracts have a specified limit which denotes the amount of compensation the buyer receives if the industry loss warranty is triggered. Developed in 2010, County Weighted Industry Loss Contracts, or CWILs, are a derivative of ILWs that provide more granularity by using loss data calculated at a county level rather than the state level. This enables companies to hedge their earthquake and windstorm risks at a more granular level, which allows for a better match with actual losses. ILW and CWIL contracts are typically one year in length and have some liquidity as they trade through reinsurance brokers.

Exhibit 2: ILS Category Profiles

	Description	Risk Profile	Coverage	Term	Security Type	Liquidity	Market Size
<b>Catastrophe Bonds (Cat bonds)</b>	Publicly traded issuance to syndicate risk	Low	Property and life	3 years	144A	High (secondary market exchanges)	\$46B
<b>Collateralized Reinsurance</b>	Reinsurance of insurance companies	Varies	Property	1 year	Private contract	None	\$40B
<b>Retrocessional</b>	Reinsurance of reinsurance companies (CDO <sup>2</sup> of reinsurance market)	Varies	Property	1 year	Private contract	None	\$7B
<b>Quota Shares</b>	Share of an reinsurer's entire portfolio	High	Broad	1 year	Private contract	None	\$9B
<b>Industry Loss Warranties (ILWs)</b>	Reinsurance derivate security based on industry wide losses	Medium	Broad	1 year	Option contract	Low (OTC market)	\$5B

**Mechanics**

Reinsurance providers assume losses from future catastrophe events underwritten by primary insurers in exchange for cash premiums. As illustrated in Exhibit 3, an individual or corporation (Property Owner) purchases insurance from an Insurance Company against unpredictable catastrophe events such as hurricanes and earthquakes, paying the insurer more than they expect to collect in claims. The premium payments in excess of expected claims are referred to as an "Insurance Risk Premium".

An Insurance Company may in turn purchase reinsurance from a Reinsurance Company or ILS Fund to partially offset its potential claims to the Property Owner, paying its own premium to the Reinsurance Company or ILS Fund. The reinsurance premium payments in excess of expected reinsurance claims are referred to as the "Reinsurance Risk Premium".

Exhibit 3: Reinsurance Risk Transfer Mechanics Diagram



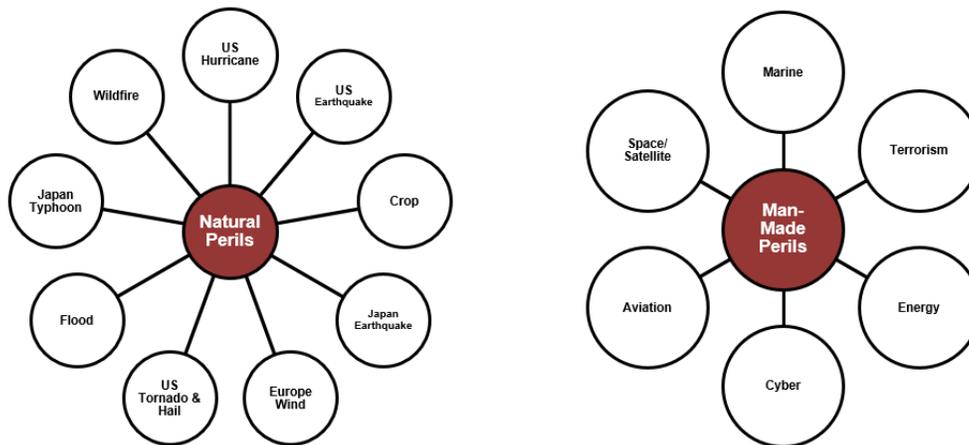
The maximum amount of claim liability is established at inception and is the principal amount of the contract or bond. The Reinsurance Company of ILS Fund places the principal amount in a collateral account that is used to pay potential claims owed to the Insurance Company. Before the reinsurance provider pays claims, the Property Owner must first deplete deductibles and the Insurance Company must exhaust its contractual retained risks.

Reinsurance contracts are usually one year in duration and originated twice a year, in January and July. Premiums are collected quarterly.

### *Insured Catastrophic Events*

Insured catastrophic events can be broad, but reinsurance providers typically assume risks associated with weather and other natural or man-made disasters. These catastrophes include hurricanes or tornados (wind), earthquakes, wildfires, and floods. To a lesser extent, ILS also covers man-made perils, including marine, terrorism, energy, cyber, aviation, and space/satellite.

Exhibit 4: Common Types of Reinsurance Coverage

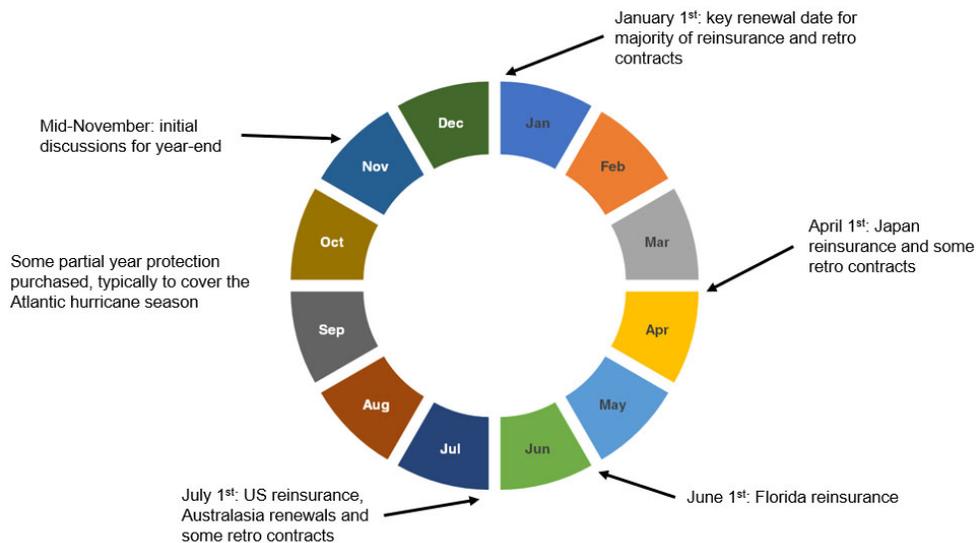


Regions that make up most reinsurance coverage are the US, Europe, Japan, and Australia/New Zealand. Regional exposure is nearly exclusively in developed countries. Within the United States, US hurricane risk is the global “peak peril,” and represents nearly half of the capital of the property catastrophe reinsurance market. As such, it pays the widest spreads to draw in sufficient risk capital, and US hurricane risk is typically the largest risk within ILS manager portfolios.

### *Reinsurance Renewal Cycles*

Traditional and ILS reinsurance and retrocession contracts are underwritten bi-annually (in January and July) and typically mature a year later. Japanese reinsurance and some retrocessional contracts are typically renewed on April 1 each year, which helps ILS managers build calendar diversification into their portfolio. Staggering maturity dates and using a mix of ILS categories across diverse geographies are the primary way ILS managers diversify their portfolios.

Exhibit 5: Key Reinsurance Renewal Dates



### *Investment Return and Risk*

One of the challenges of investing in reinsurance is that it is difficult to evaluate performance for the industry as a whole. Since many of the securities are private contracts between the sponsor and the provider of reinsurance, the performance of those contracts is not transparent to outsiders. However, there are two available ILS indices:

- The *Swiss RE Cat Bond Total Index* is a market-value weighted index of all dollar denominated catastrophe bonds representing approximately 200 issues.
- The *Eurekahedge ILS Advisers Index* is an equal-weighted index of 33 constituent insurance-linked funds.

The Swiss RE Cat Bond Index is the index most commonly referred to when quoting ILS performance and is the more transparent. While neither index is investable, funds and managed accounts exist that seek to replicate the Swiss RE Index or a diversified ILS portfolio.

The Swiss Re Cat Bond Index has returned 7.1% annualized from its February 28, 2002 inception through November 30, 2020, as reported in Exhibit 6. Annualized volatility (standard deviation) equals a modest 3.2% and the Index has not had a negative calendar year. The lowest calendar year return was 0.50% in 2017, a record year for insured disaster losses largely because of three major US hurricanes: Harvey, Maria, and Irma. Impressively, the Index returned 0.5% for the calendar year and was insulated from industry-wide losses because of the seniority and diversification of catastrophe bonds.

Exhibit 6: Swiss Re Cat Bond Index Returns: Feb 2002 to Nov 2020

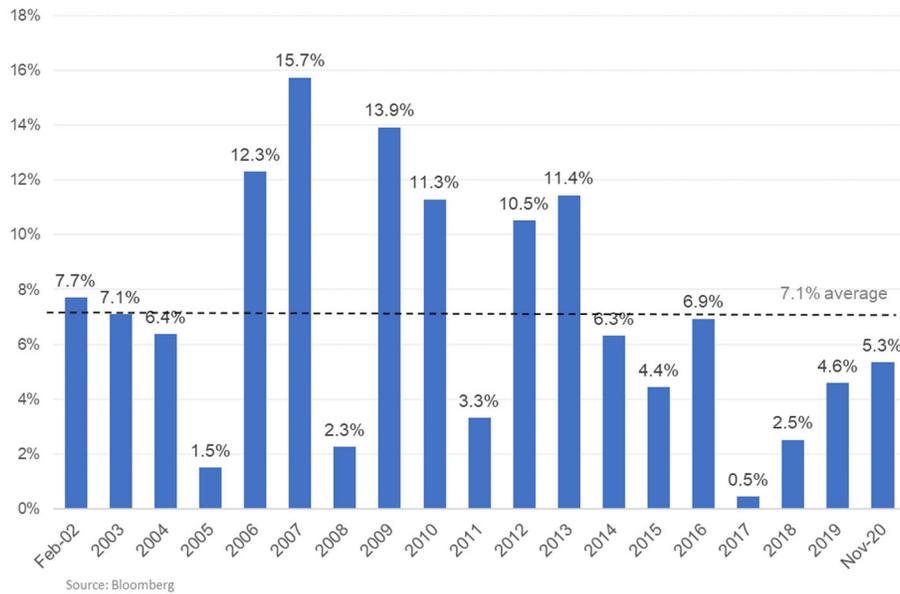
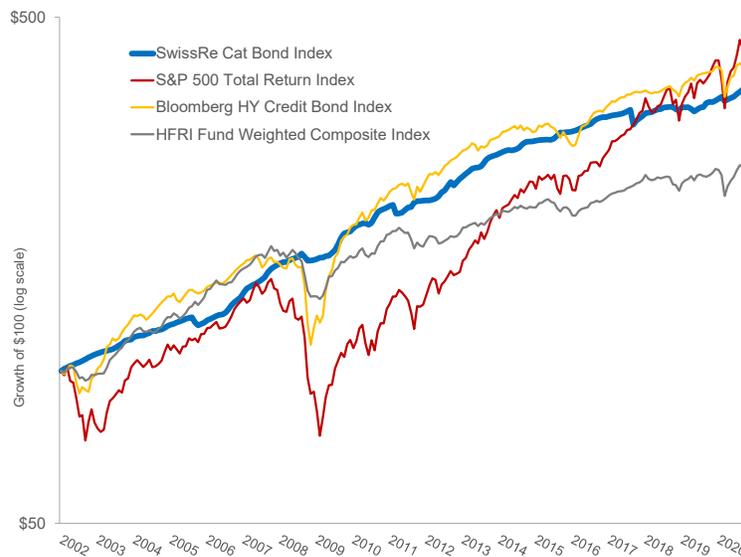


Exhibit 7 shows the compound performance of a \$100 investment from February 2002 to November 2020 for the Swiss Re Cat Bond Index, the S&P 500 Index, the Bloomberg High Yield Credit Bond Index, and the HFRI Fund Weighted Composite Index (hedge funds). Since 2002, the Swiss Re Cat Bond Index has kept pace with both the S&P 500 Index and the Bloomberg High Yield Index and handily outperformed the HFRI Fund Weighted Composite Index.

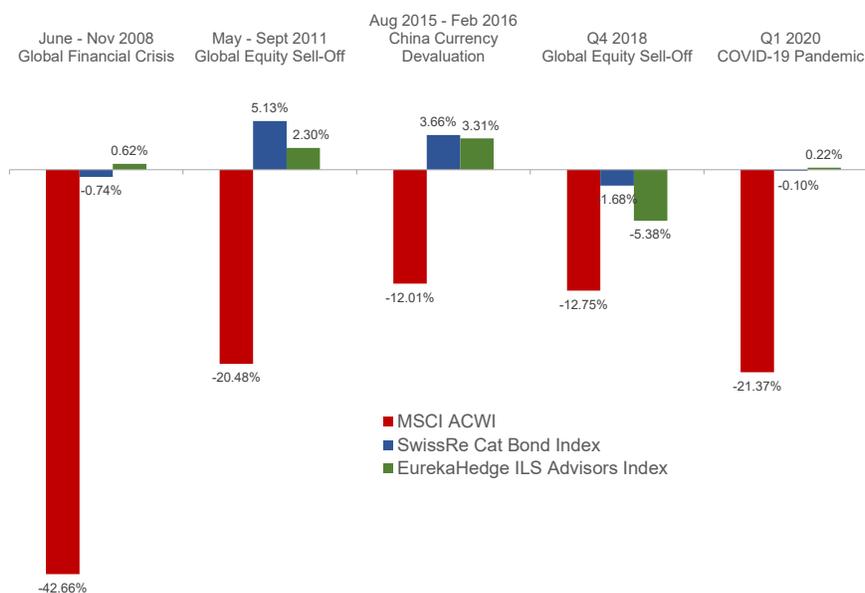
Exhibit 7: Swiss Re Cat Bond Index vs. Other Asset Classes: Feb 2002 to Nov 2020



The Swiss Re Index was largely unaffected by the 2008 Great Financial Crisis, which took its toll on equities, high yield, and hedge funds. However, the Swiss Re Index was affected by the idiosyncrasies of reinsurance industry losses in 2017-2019 when other asset classes saw strong returns. Over the entire time period, the Swiss Re Cat Bond Index had a low 0.19 correlation to the S&P 500 Index, 0.25 correlation to the Bloomberg High Yield Bond Index, and 0.25 correlation to the HFRI Fund Weighted Index.

ILS have been resilient to periods of market stress as shown in Exhibit 8. This resiliency could be attractive to institutional investors. Most impressively, during the six-month period (June – November 2008) of the Great Financial Crisis, the two leading ILS indices were unaffected by the extreme stress of global financial markets. Despite historic low levels of volatility during the decade-long bull market rally since the Great Financial Crisis, there have been several double-digit global equity drawdowns that ILS have also withstood. Most recently, during the first quarter of 2020 COVID-19 market crash, there was some selling pressure on cat bonds as investors sought to raise cash from all forms of liquid securities, but the Swiss Re Cat Bond Index only lost 0.1% over the quarter.

Exhibit 8: ILS Performance During Periods of Market Stress

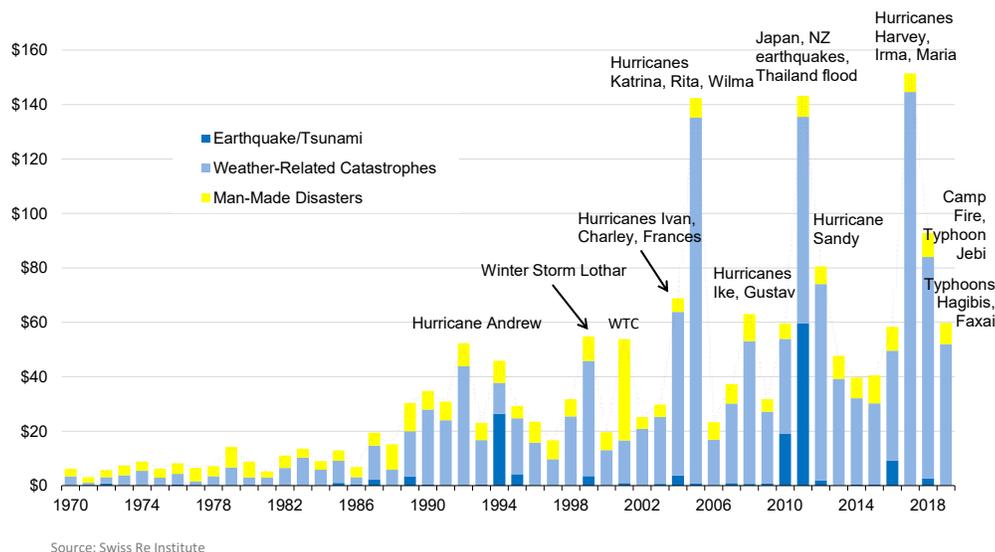


### Current Reinsurance Opportunity

Historically, reinsurance premiums increase in years following large reinsurance industry losses. For example, in years following the losses incurred from Hurricane Katrina in 2005 premiums rose across all types of ILS. Conversely, after several years of low reinsurance losses, premiums tend to come down. More recently, 2017 and 2018 were years with large insured disaster losses of \$151 billion and \$93 billion, respectively. In 2017 the losses were driven by three major US hurricanes (Harvey, Maria, and Irma) and the California wildfires. Meanwhile, 2018 ended up being the fourth worst year on record for insured disaster losses, driven by hurricanes Michael and Florence in the United States and typhoons Jebi and Trami in Japan.

Data from the Swiss Re Institute is presented in Exhibit 9 below. Half a century worth of insured industry losses are plotted annually in a bar chart divided into three loss categories: earthquake/tsunami, weather-related catastrophes, and man-made disasters. While some of the rising losses since the mid-1980s are due to rising property values associated with economic growth and urbanization, the largest losses have occurred in years with greater and more destructive catastrophes (such as 2005, 2011 and 2017). Since 1990, the average annual insured loss has been \$54 billion.

Exhibit 9: Insured Catastrophe Losses in Real (2019) US dollars<sup>8</sup>



Two consecutive years (2017 and 2018) of industry-wide losses set the stage for a widening of reinsurance premiums. Furthermore, investor confidence in ILS investments declined as investors in ILS funds experienced two years of negative returns and there was a growing concern that climate change was driving steadily rising catastrophe losses that were not fully captured in historical-based catastrophe models. These factors led to a reduction in available capital for ILS investments, which in turn led to further upward pressure on reinsurance premiums. Additionally, reinsurance managers have been incorporating evidence of climate change into their models to reprice reinsurance premiums.

Premiums widened going into 2019 and widened again going into 2020 as investor inflows remained low. In 2020, COVID-19 indirectly impacted reinsurance industry premiums due to the pandemic's detrimental effect on the insurance industry. Insurance company claims are strained due to business interruption, making reinsurance capital more valuable. The increased demand for reinsurance capital also offers ILS managers the ability to improve contract terms.

Exhibit 10 below charts the annual average catastrophe bond's expected coupon, loss, spread, and actual loss each year from 2000 to 2020. While cat bonds account for less than one-half of the market capitalization of outstanding insurance linked securities, they are the only category of reinsurance that is exchange-traded. As such, cat bond pricing offers a proxy for the pricing of the ILS universe. Exhibit 10 shows how the average expected reinsurance coupon increases following years of large insured losses and declines following years of low losses.

Data for Exhibit 10 comes from the Artemis Deal Directory<sup>9</sup>, a publicly available database that tracks all public and some private catastrophe bond transactions. Artemis is a leading news and data media service in the insurance-linked security industry.

<sup>8</sup> Swiss Re Institute

<sup>9</sup> Artemis

Exhibit 10: Average Catastrophe Bond Coupon and Expected Loss by Year

	1	2	3	4	5	6	7
	Average Coupon	Average Expected Loss	Expected Spread	Actual Loss	Actual Return (Coupon - Actual Loss)	Swiss Re Cat Bond Index	Annual Insured Loss (\$B)
2000	5.31%	0.90%	4.41%	0.00%	5.31%	NA	19.6
2001	5.85%	0.78%	5.07%	0.00%	5.85%	NA	53.9
2002	4.93%	0.91%	4.02%	0.00%	4.93%	7.71%	25.2
2003	5.42%	1.28%	4.14%	0.00%	5.42%	7.10%	29.7
2004	6.69%	2.07%	4.62%	0.00%	6.69%	6.39%	68.9
2005	6.89%	1.86%	5.03%	2.07%	4.82%	1.52%	142.4
2006	11.46%	3.11%	8.35%	0.00%	11.46%	12.30%	23.4
2007	6.37%	1.88%	4.49%	0.07%	6.30%	15.73%	37.3
2008	7.64%	1.78%	5.86%	0.79%	6.85%	2.28%	63.0
2009	11.05%	2.63%	8.42%	0.00%	11.05%	13.91%	31.8
2010	8.25%	2.47%	5.78%	0.00%	8.25%	11.29%	59.5
2011	8.90%	2.15%	6.75%	3.56%	5.34%	3.33%	143.2
2012	9.20%	2.07%	7.13%	0.00%	9.20%	10.51%	80.6
2013	6.18%	1.97%	4.21%	0.00%	6.18%	11.44%	47.7
2014	4.56%	1.64%	2.92%	0.00%	4.56%	6.33%	39.6
2015	5.01%	2.04%	2.97%	0.20%	4.81%	4.45%	40.5
2016	7.04%	3.00%	4.04%	0.14%	6.90%	6.94%	58.3
2017	6.51%	3.50%	3.01%	4.13%	2.38%	0.46%	151.4
2018	5.88%	2.92%	2.96%	1.43%	4.45%	2.53%	92.8
2019	8.29%	3.51%	4.78%	0.94%	7.35%	4.59%	59.7
2020	<u>7.46%</u>	<u>2.54%</u>	<u>4.92%</u>	<u>1.18%</u>	<u>6.28%</u>	<u>5.34%</u>	<u>NA</u>
<b>Average</b>	<b>7.09%</b>	<b>2.14%</b>	<b>4.95%</b>	<b>0.69%</b>	<b>6.40%</b>	<b>7.06%</b>	<b>63.4</b>

The average CAT coupon in column 1 is the simple average of all newly issued bonds that calendar year. Coupons averaged 7.09% over the entire period but spiked to double digits twice, in 2006 and 2009. Hurricane Katrina in August 2005 was the costliest catastrophe in reinsurance history, which led to a coupon spike to 11.46% the following year as models were recalibrated to include increased assumptions for severity and frequency of hurricanes. The coupon spike in 2009, though, was different. The 2008 Financial Crisis led to a repricing of risk across all asset classes, even catastrophe bonds.

The calculation of calendar year losses is complicated by the fact that many CAT bonds incur principal loss over multi-year periods and the recognition of those losses happens in years subsequent an event's occurrence. Annual cat bond principal loss data is not publicly available, Fermat Capital, a leading ILS asset manager, provided data for Exhibit 10.

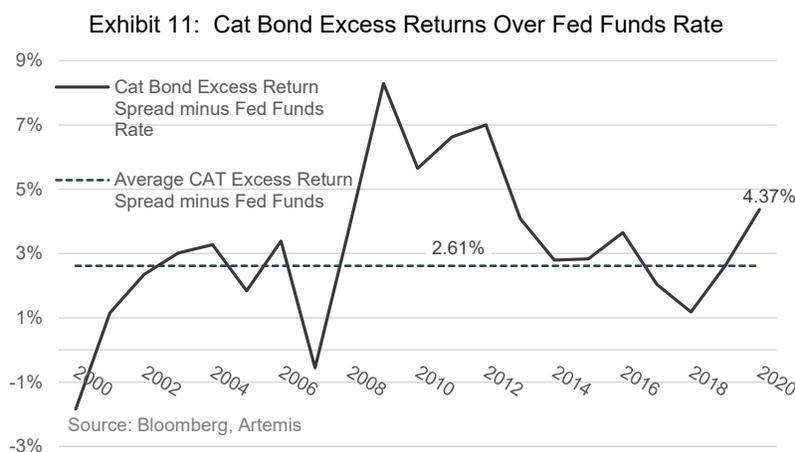
Realized CAT bond principal losses are shown in column 4. The seniority of cat bonds in the capital structure and the dearth of significant weather events in half of the years led to no principal losses. For this reason, the 20-year average 0.69% actual loss rate falls below expected losses reported in column 2. Only in 2005, 2011, and 2017 were actual losses greater than average expected losses. This is because average expected loss is a modelled interpretation of the probability of a loss occurring within a specific cat bond. These calculations by a third-party risk modelling entity<sup>10</sup> include thousands of weather simulations, including large left tail risk weather events. Actual losses over the past 20 years have averaged 0.69%, well below 2.14% in expected losses. This should remind investors that the past 20 years represented in Exhibit 10 may have been favorable for loss outcomes despite headline catastrophes like Katrina.

The best time to invest in catastrophe bonds has been the aftermath of industry-wide shocks. As illustrated in Exhibit 10, returns above 8% (the spread of cat bond coupons minus expected loss) were available in 2006 and 2009 and realized returns exceeded 11%. As of November 2020, the

<sup>10</sup> The largest third-party reinsurance risk modelling agencies are RMS, AIR Worldwide, EQECAT, Milliman, and KatRisk

average 7.46% coupon was above the 20-year average. Subtracting the average annual expected loss of 2.54% produces a current spread of 4.92%, which is an eight-year high and about average for the entire 20-year period. The scarcity of reinsurance capital and the current reinsurance risk premiums are expected to remain in place in 2021.

The current level of reinsurance spread represents an above average opportunity if you consider today's low interest rate environment. Over the past 20 years, the risk-free rate has averaged 1.73%, but it is just 0.13%<sup>11</sup> today. In 2006, cat bonds yielded 8.4%, but the risk-free rate was 5.0%. Today, the risk-free rate is near zero and taxable fixed income yields just over 1%<sup>12</sup>. Exhibit 11 normalizes the annual average catastrophe bond spread (coupon minus expected loss) for the average annual risk-free rate. This excess return shows that the current rate of 4.37% exceeds the 20-year average of 2.61%.



### Reinsurance Investing in Practice

Large departures can occur between investment returns in practice and commonly used benchmarks, particularly with alternative investments.<sup>13</sup> This is true for reinsurance where actual fund performance across managers has differed widely from the reinsurance benchmarks and not in a favorable way. This is partly due to management and administrative fees which can average close to 2%. Manager performance can also differ, as illustrated in Exhibit 12 below where we show returns by fiscal year for two of the largest managers operating registered vehicles investing in reinsurance, Amundi Pioneer and Stone Ridge.

Exhibit 12: Reinsurance Performance Examples in Practice

Fiscal Year Ending April 30,	Stone Ridge			
	Reinsurance Risk Premium Interval Fund	Pioneer ILS Interval Fund	SwissRe Cat Bond Index	EurekaHedge ILS Advisors Index
6 mo. 2020	-3.49%	2.67%	4.40%	1.25%
2019	-8.30%	-5.85%	0.84%	-4.26%
2018	0.10%	5.04%	1.73%	-6.50%
2017	-9.00%	-4.95%	6.22%	4.68%
2016	7.83%	11.23%	5.57%	4.88%
2015	<u>8.33%</u>	<u>5.90%*</u>	<u>4.75%</u>	<u>4.54%</u>
	-0.53%	2.70%	4.26%	0.72%

\*partial year

<sup>11</sup> The Federal Reserve's current target Fed Funds range is 0.00-0.25%

<sup>12</sup> iShares Aggregate Bond (AGG) as of November 30, 2020 was 1.09%

<sup>13</sup> Tracking error measures the standard deviation between actual return and index return.

## *Conclusion*

ILS strategies may help improve the risk/return profile of a diversified investment portfolio. Using cat bonds as a proxy for the ILS universe, the Swiss Re Cat Bond Index has kept pace with both the S&P 500 and the Bloomberg High Yield Index and handily outperformed hedge funds since 2002. The Swiss Re Cat Bond Index was unaffected by the 2008 Great Financial Crisis, which took its toll on equities, high yield, and hedge funds. More recently, during the first quarter 2020 COVID-19 market crash, the Swiss Re Cat Bond Index only lost 0.1% over the quarter. However, the Swiss Re Cat Bond Index is not investible and it is gross of fees, which are often high. Verification that these returns would be representative of a managed account or fund is necessary.

The best time to invest in catastrophe bonds has been the aftermath of industry-wide endogenous or exogenous shocks. In 2006 and 2009, following Hurricane Katrina and the Great Financial Crisis, greater than 8% returns (the spread of cat bond coupons minus expected loss) were available. As of November 2020, the current spread of 4.9%, which is just above the long-term average of 4.8%. However, with the risk-free rate near zero today, yields near 5% are attractive for an uncorrelated return stream.

The ILS market has nearly quadrupled over the past decade and is perhaps of sufficient size and institutional quality to warrant a close look. However, implementation is key to favorable outcomes and underwriting forward is likely more important than studying past index returns.

Chris Solarz  
Managing Director

Stephen L. Nesbitt  
CIO

## Appendix: Reinsurance Glossary

Term	Definition
Aggregate	A transaction that is exposed to multiple events occurring over the course of the defined risk period (e.g. all natural perils in Australia causing an aggregated industry loss of \$10bn). The sum of the accumulated losses determines whether the transaction is triggered or not. Typically, a minimum loss level is defined, which must be reached in order to count toward the aggregate, e.g. only events causing insured losses above \$100m are considered. (contrast with occurrence cover)
Attachment level/point	Depending on the trigger type, this is the loss level or value that needs to be reached for a transaction to suffer a loss (i.e. to payout to the reinsured). The payout can be linear – up to an exhaustion level/point – or binary, i.e. a full payout once the attachment level is reached.
Attachment probability	Likelihood that the reinsurance provider will have a claim, expressed in probability terms such as a 1 in 20-year event.
Cedent / ceding	The “cedent” is the insurance or reinsurance company that transfers risks to another counterparty, i.e. pays a premium to receive coverage. E.g. insurance companies “cede” risks to reinsurers.
Collateral	Funds posted to pay for potential claims, generally collateral posted equals the principal amount of the contract or bond.
Collateral return	Rate of return earned on the collateral account, typically the T-bill rate.
Collateralized transactions	ILS transactions often have to be collateralized as the reinsured wants certainty that liabilities can be paid should the trigger event occur. The collateral is typically held in a segregated account in the name of the ILS fund and invested in money-market funds or similar investments yielding a floating-rate return. The money is only paid to the reinsured if the trigger event occurs. (contrast with rated reinsurance)
Core/opportunistic	An ILS investment approach where the “core” long-term ILS investment is in one of the existing commingled ILS funds (different risk/return profiles available) and an additional shorter-term “opportunistic” ILS investment is added when attractive opportunities exist, e.g. via the IRIS Post-Event Fund. For large investment sizes, this ILS core/opportunistic investment approach can also be implemented in a single-investor fund.
Expected loss	Expected average loss the reinsurance provider expects, divided by principal, expressed in percent.
Fronting	Using a rated and licensed reinsurer to write business (i.e. “front”) which is then passed on to the ILS funds.
Insurance Linked-Securities (ILS)	Financial instruments whose values are driven by insurance loss events. These instruments are linked to property losses due to natural catastrophes and include collateralized reinsurance, catastrophe bonds, retrocessional, quota shares/sidecars, and industry loss warranties (ILWs).
<ul style="list-style-type: none"> <li>▪ Catastrophe (Cat) Bonds</li> </ul>	144A securities that provide catastrophe reinsurance risk transfer for a sponsor, typically an insurance company. The sponsor pays ongoing premium into the structure in return for reinsurance protection, which is paid as interest to investors. If the specified natural catastrophe occurs, the principal of the bond is paid to the sponsor. Otherwise, the principal is returned to investors when the transaction terminates. Cat bonds generally protect against remote risks.
<ul style="list-style-type: none"> <li>▪ ILW</li> </ul>	An Industry Loss Warranty (ILW) is one possible structure of an ILS private transaction. It is a form of derivative or reinsurance contract whose trigger is based on the losses experienced by the whole insurance industry, rather than by a specific company. E.g. hurricane Wilma caused an insured industry loss of \$15 billion in 2005.
<ul style="list-style-type: none"> <li>▪ Quota Shares</li> </ul>	Allow investors to participate in a specified portfolio underwritten by a reinsurer. Investors receive a pro-rata share of the reinsurer’s premiums and pay the same share of the losses, capped to the amount invested. Quota share transactions are generally for one year.
<ul style="list-style-type: none"> <li>▪ Quota Shares / Side Cars</li> </ul>	A quota share is a form of proportional reinsurance in which the risk taker (e.g. ILS fund) assumes a pro rata share of the cedent’s (e.g. insurer) book of business for a specific region or risk class. The two parties share the liability, premiums,

	and losses according to the agreed percentage, which indicates a full alignment of interests. The risk taker typically pays a ceding and/or profit commission to the cedent to compensate for its expenses associated with underwriting the portfolio. A side car is a limited-purpose vehicle created to allow investors to participate in the risk and return of a limited portfolio of insurance policies for a certain period of time. In contrast to quota shares – which are on-balance sheet – sidecars are off-balance sheet. The reinsurer underwriting the policies in the sidecar does not necessarily participate in the profit and loss.
▪ Reinsurance	Reinsurance is insurance that an insurance company purchases from another insurance company to insulate itself (at least in part) from the risk of a major claims event.
▪ Retrocession	This is reinsurance on reinsurance or in other words, one reinsurance company cedes part of its underlying portfolio to another reinsurance company with the aim of limiting its own risk and being able to afford additional capacity
▪ Retrocession	Insurance for reinsurers. Reinsurers purchase protection against either a single catastrophe event or against an aggregation of catastrophic events. Reinsurers pay a premium for a fixed amount of protection that pays out only after losses surpass a pre-defined threshold. Reinsurers can purchase protection from other reinsurers or collateralized protection from capital market providers.
Limit	The contractual maximum liability under a transaction. For example, a \$10m limit means that the transaction covers liabilities of a maximum \$10m.
Line Size	The amount of a given risk that has been agreed to cede.
Layer	Insurers and reinsurers purchase their cover (so called “programs”) in layers. For example, the cover for the “layer” for a loss of \$150m to \$170m is purchased from counterparty A; for a loss of \$170m to \$190m from counterparty B, and so on.
Locked/trapped collateral	The collateral of a private ILS transaction can become locked or trapped if an event has occurred during the risk period which may potentially trigger a loss under the transaction. Even though the risk period of the transaction has ended, the ILS fund cannot withdraw the collateral to reinvest the money until there is reasonable certainty that there will be no loss. Each transaction includes a “release schedule”, which defines the timeframe and threshold that have to be met in order for the collateral to be released after the risk period end.
Lloyd’s (of London)	Lloyd’s is an insurance market place with various independent members (syndicates) that write the risk. The syndicates act on their own but have to operate within the Lloyd’s framework. In return, the syndicates benefit from the high rating of Lloyd’s.
Named peak coverage	“Peak” perils are typically US wind, US quake, Japan wind, Japan quake and Europe wind. Other risks or regions are typically considered “non-peak”. “Named” coverage only covers losses from one of the perils specifically stated in the contract. In contrast, “non-named” coverage covers any losses regardless of what caused them.
Occurrence (1st, 2nd, 3rd ...)	An occurrence transaction only covers losses from a single event. E.g. a transaction with a US Wind \$30bn 1st occurrence trigger only pays out if a single hurricane event causes such insured losses during the risk period. A transaction with a US Wind \$10bn 2nd occurrence trigger only pays out if two hurricanes each cause insured losses of more than \$10bn during the risk period. (contrast with aggregate)
Peril	Catastrophe event, can be natural disaster or man-made.
Principal	Maximum amount of claims liability, also the principal amount of a reinsurance bond.
Rate on-line (premium)	The rate on line or premium is the compensation that the counterparty receives (i.e. the cedent pays) for taking on re/insurance risks. E.g. a rate on line of 10% on a \$10m transactions would mean the counterparty receives \$1m for taking on the risk.
Rated reinsurance	In traditional reinsurance, a reinsurer does not have to collateralize the liabilities he takes on from insurers. The insurers rely on the reinsurer’s rating as guarantee that he will be able to meet his liabilities should a catastrophe occur. This allows reinsurers to write limits (i.e. take on liabilities) far in excess of their capital – so-called reinsurance leverage.

Reinstatement	Traditional catastrophe reinsurance transactions can include up to three reinstatements. This means that once a transaction has been triggered and a full loss has been suffered during the defined risk period, the reinsured will pay the premium again and in return will receive reinsurance cover for the remainder of the risk period
Reinsurance	Insurance provided to an insurer to pay for losses caused by catastrophic events.
Reinsurance premium	Fixed dollar amount paid to reinsurance provider for potential payment of claims.
Reinsurance spread	Reinsurance premium divided by principal, expressed in percent, often referred to as the reinsurance risk premium or yield.
Retention	Also deductible or retained risk, is the amount of risk held back by the ceding company before the reinsurer becomes liable and is therefore not reinsured.
Sponsor	Purchaser of reinsurance, also the cedent.
Trigger level	The trigger level defines the threshold which has to be reached before a transaction is triggered. The trigger level can be, for example, the industry loss level (see ILW), the actual loss of the counterparty (so-called "indemnity") or an index of physically measured values (so-called "parametric"). Other trigger types exist.