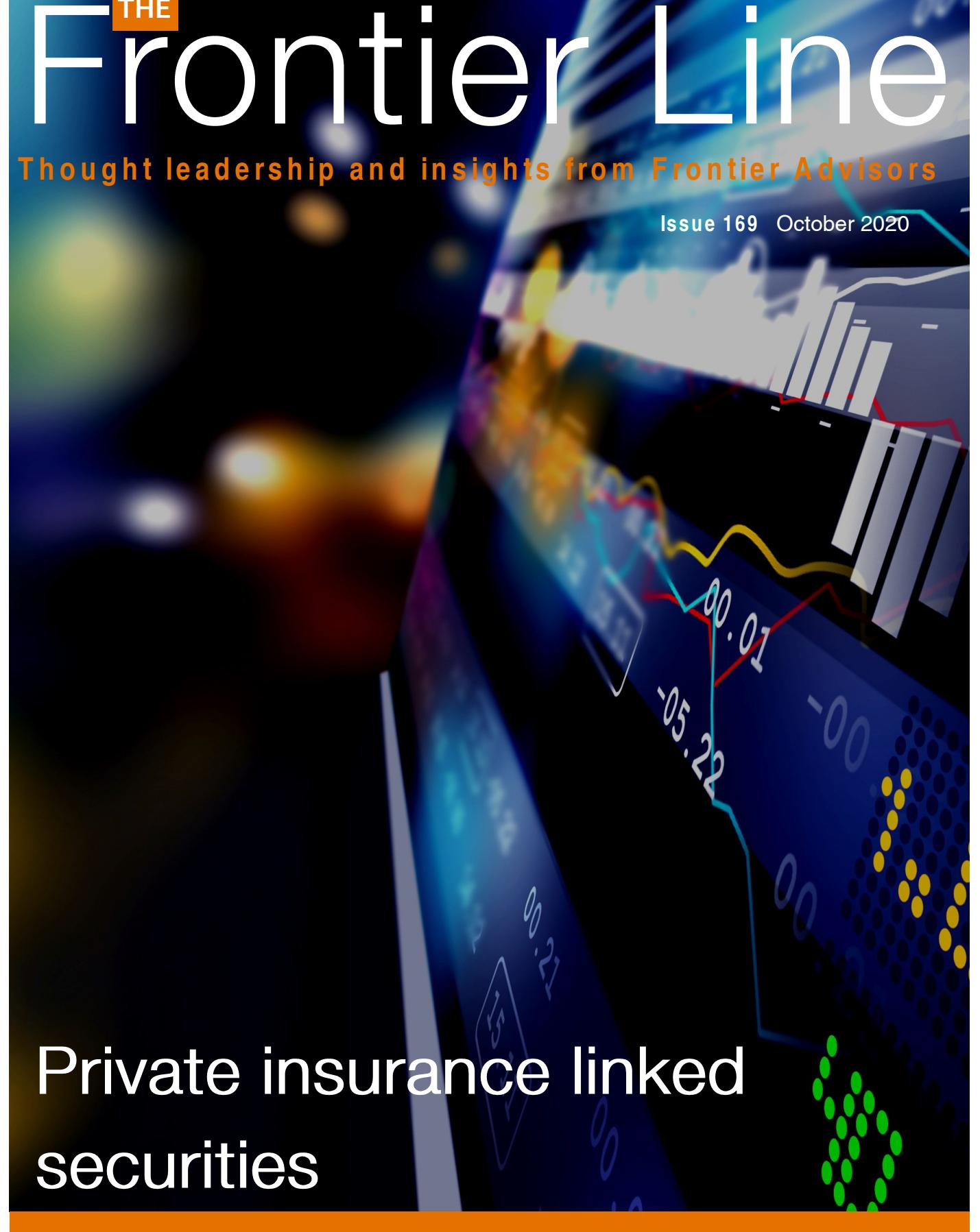


# THE Frontier Line

Thought leadership and insights from Frontier Advisors

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Private insurance linked  
securities

# Frontier Advisors

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# Introduction

The modern Insurance Linked Securities (ILS) market was founded to repair tattered insurer balance sheets from Hurricane Andrew in 1992. Collateralised insurance linked products helped insurers weather these storms outside of traditional reinsurance channels, and investors found the low correlation (noting traditional capital markets tend to be unrelated to weather events) to equity markets helped to weather their own storms in 2008 and 2020.

The emergence of ILS as an entry point for non-insurance investors has created another type of storm for the insurance industry. Traditionally the bulk of the reinsurance business was conducted in the smoke-filled rooms of the annual Rendez-Vous de Septembre conference in Monaco. Now cedants<sup>1</sup> can skip the conference entirely, issuing Catastrophe bonds directly to the market or placing collateralised reinsurance with Japanese pension funds. As the market evolves, contracts become more standardised and transparent, and price discovery improves. Third-party capital has proved not to be as fickle as the industry had feared, with investors returning after successive loss years in 2017 and 2018.

The marginal risk of a Florida hurricane is more naturally held by a pension fund with heavy exposure to equities than a long-socked Bermudian reinsurer with heavy exposure to Florida hurricanes. In consequence, reinsurers have increasingly pivoted to providing third party access to reinsurance risk, essentially installing themselves as brokers, and earning ever more through commissions and less through premiums. The winds that blow these changes, good or ill, will continue.

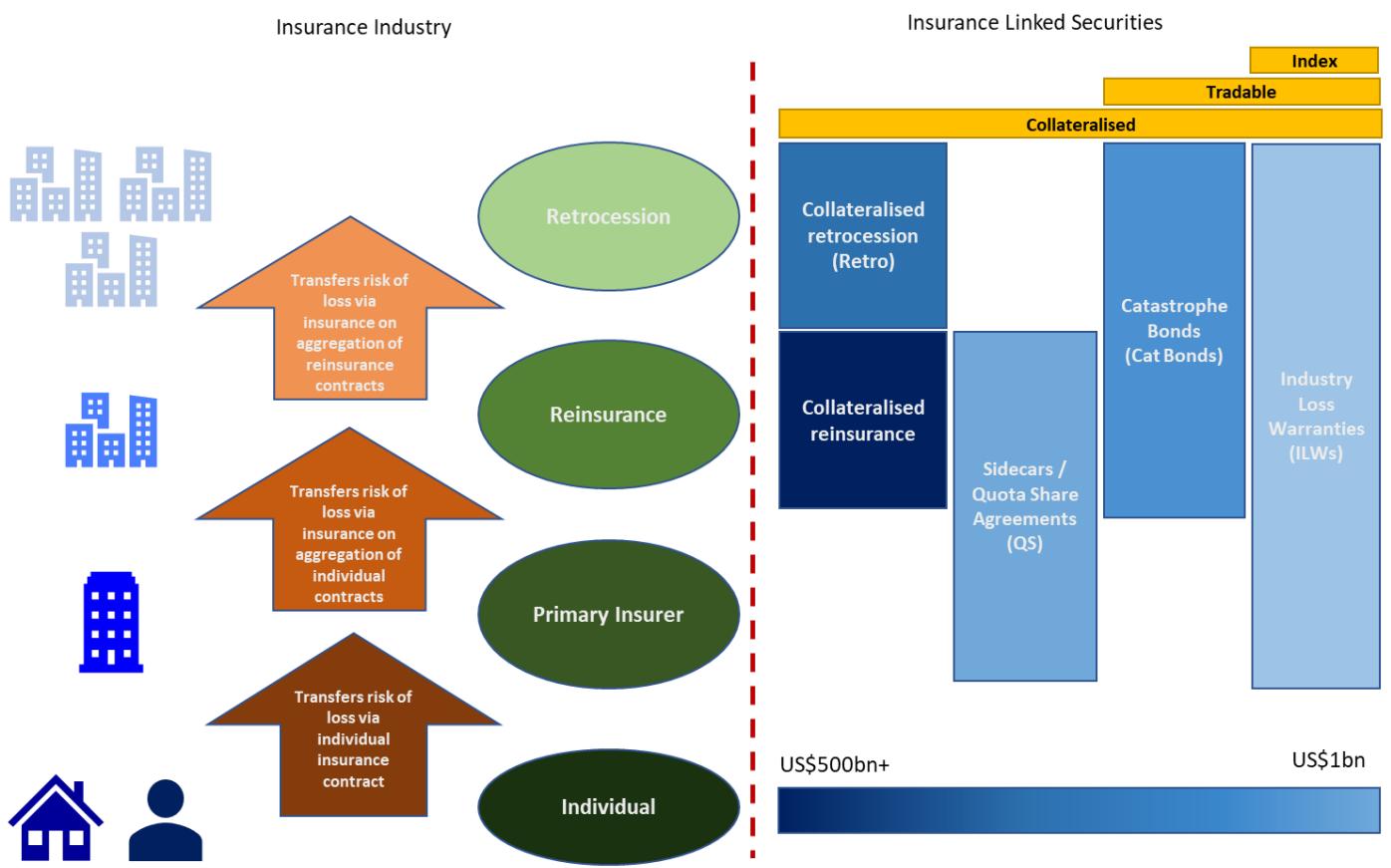
In this paper we take an inspective tour through the ILS market, examining how ILS assets differ in their risk and return metrics to traditional asset classes and how they can add value to a traditional investment portfolio. There are various participants in the insurance market and various types of ILS – some tradeable within public markets and others collateralised in private markets. The structure of the insurance market and various ILS instruments are summarised at a high level in Figure 1 on the following page.

*"As you be muche the worse. And I cast awaie.  
An yll wynde, that blowth no man to good, men saie.  
Wel (quoth he) euery wind blowth not down the corn  
I hope (I saie) good hap [luck] be not all out worn."*

**John Heywood, 1546**

<sup>1</sup>A cedant is an entity (either a primary insurer or reinsurer) who underwrites an insurance policy then contractually transfers (cedes) a portion of the risk to a reinsurer

Figure 1: The Insurance Linked Securities market



Source: Frontier, managers

# What are insurance linked securities?

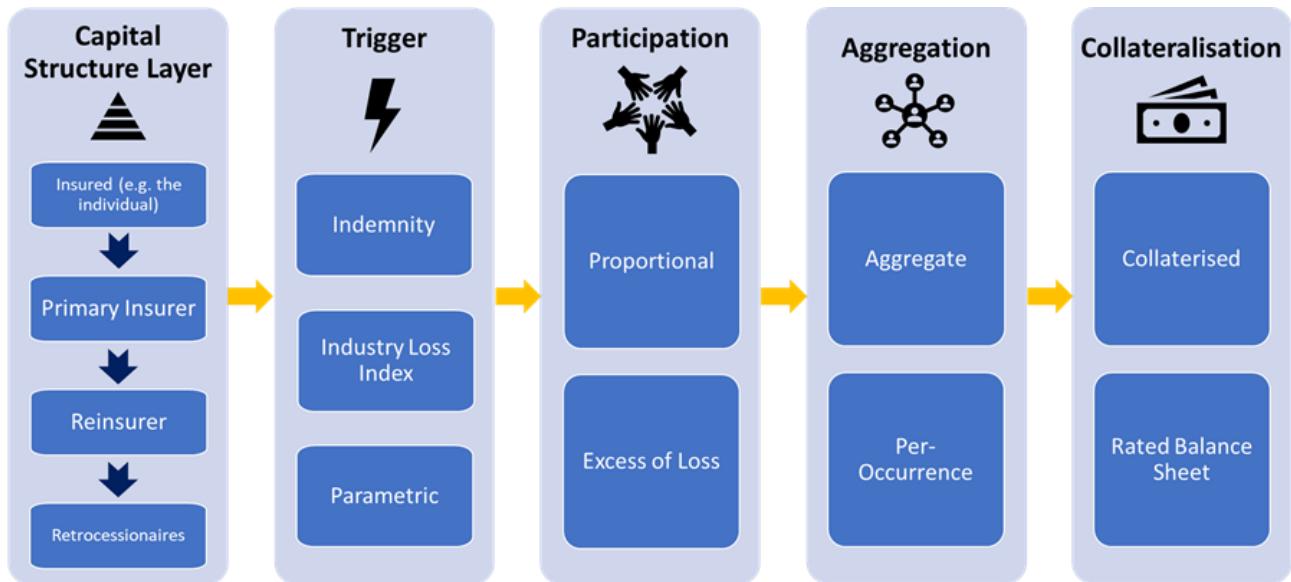
Insurance is a capital structure. At the bottom of this capital structure is the insurance purchaser, who takes the first loss from a claim as excess. The next layer is insurers paying claims, then reinsurers, then retrocessionaires, with successive layers insuring increasingly remote losses.

Insurance can be securitised in layers from the insurer upwards, and in a variety of configurations. We view insurance linked securities in five primary dimensions:

- **Capital structure layer:** losses from an event are first paid by the insured (i.e. the individual in Figure 2 below; as deductibles), then primary insurers, then reinsurers, then by retrocessionaires.
- **Trigger:** Payoffs can be linked to the value of actual claims (indemnity<sup>2</sup>), industry loss warranties across multiple insurers from a particular event or group of events, or linked to a physical parameter of the peril such as wind speed for a hurricane or ground acceleration for an earthquake (parametric)<sup>3</sup>.

- **Participation:** Proportional contracts take a percentage of all losses incurred by the cedant, excess of Loss (XoL) contracts take a percentage of losses from the cedant beyond a predefined attachment level.
- **Aggregation:** Aggregate cover groups losses from multiple sources (e.g. all hurricane losses over a year, losses from multiple natural perils, losses from multiple locations), per-occurrence coverage for a single specific event such as a particular hurricane.
- **Collateralisation:** In collateralised contracts the maximum loss is posted by the insurer as collateral. In other types of reinsurance, the insurance contract is a claim against a balance sheet, or against the credit of the protection seller.

Figure 2: The five primary dimensions of insurance linked securities



Source: Frontier

<sup>2</sup>Indemnity in the context of insurance refers to the compensation for loss or damages by one party to another party. The party providing compensation is generally not the party which created or caused the loss or damage.

<sup>3</sup>Parametric insurance provides cover associated with the occurrence of an event, regardless of the size or nature of the associated loss.

Across combinations of these categories there are several standard instruments.

### Tradable ILS

- Catastrophe bonds (cat bonds): Tradeable bonds with losses linked to natural peril events. These instruments were first issued in the mid-1990s to provide reinsurance exposure in a standard format under rule 144a<sup>4</sup> and can have any of the three trigger formats in Figure 2 above (for further background information refer to the previous Frontier paper “An Introduction to Insurance-Linked Securities”).
- Industry loss warranty: Industry loss trigger, usually paying a fixed amount if losses exceed a trigger and zero otherwise.

### Private ILS

- Reinsurance contracts: A contract with a primary insurer covering losses (proportional or XoL)
- Retrocession contracts (retro): A contract with a reinsurer covering losses (proportional or XoL)
- Sidecar: Proportional participation in losses beside an insurer or reinsurer for a subset of risks (these are discussed in more detail in section 2.3)

Table 1 provides a pairwise comparison between a tradeable ILS such as a Cat Bond and a private ILS investment.

Table 1: Comparison of private ILS to cat bonds

Private ILS		Cat bonds
Typically 12 months (or less)	<b>Term to maturity</b>	Typically 3 years (range from 1-5 years)
~ \$590 billion	<b>Market size<sup>5</sup></b>	~ \$40 billion
No, additional data can be requested from issuers until investors are satisfied with the modelled assumptions	<b>Model selection bias</b>	Yes, as modelling agency only uses information provided to it by the issuer
More relationship based (directly or via intermediaries)	<b>Source</b>	Capital markets brokers/dealers
Difference between insured amount and premium is held in a special purpose vehicle	<b>Collateralised structure</b>	Entire insured amount held in a special purpose reinsurer vehicle
Private ILS is not generally transferrable. Within funds liquidity is low (typical is quarterly with 6-month notice)	<b>Liquidity</b>	Cat bonds are tradable at any time. Within funds liquidity is high (typical is twice monthly with 10 business day notice)
Higher, identification of managers with the right skillset in this space plays a more important role	<b>Complexity</b>	Lower, more straightforward for clients to understand

Source: Frontier

<sup>4</sup>Inc Rule 144a is a provision of the Securities Act 1933 to provide safe harbour from the registration requirements of the Act for suitable buyers. Essentially it makes it easy to trade insurance risk as a bond

<sup>5</sup>Data as at Q1 2020, sourced from Aon Securities Inc

## Reinsurance contract

Reinsurance is insurance cover provided to a primary insurer (see Figure 1). A primary insurer sells insurance to individuals and businesses – car, life, home and contents, etc. Insurers insure their own portfolio against large losses generated by, for example, paying claims on many policies at once due to an earthquake or wildfire. The insurer seeking reinsurance is known as a cedant.

A traditional reinsurance firm writes insurance on to its own balance sheet, backed by its own equity and debt capital. New alternative capital reinsurance companies are more like intermediaries, sourcing capital from third parties such as pension funds in exchange for a fee. The cost of capital for this second type has proved to be lower since insurance risk is diversifying for pension funds in a way it is not for reinsurers. The result is an increase in funds providing all types of reinsurance, from private ILS to cat bonds, and also that traditional reinsurers are increasingly soliciting third party capital with sidecars (see section below).

## Retrocession contract

A retrocessionaire provides reinsurance to a reinsurance company or contract (see the top green ellipse in Figure 1). This layer of insurance gives additional capacity to the original reinsurer and aids in reducing the reinsurer's risk of loss. The reinsurer can arrange for cover to be either specific or aggregate. Specific or per-occurrence cover links the loss to a single risk, or a named group of risks. Aggregate cover can encompass the reinsurer's entire portfolio and generally has XoL participation.

As the retrocessionaire is higher in the capital structure, this layer of insurance tends to be less transparent. Identification of individual underlying risks, and the calculation of how a particular loss event may generate losses can be challenging and take longer to determine than in lower capital layers.

Retrocession losses are most likely when multiple reinsurance contracts have losses at the same time. This makes retrocession centrally an assessment of the correlation between reinsurance exposures, as well as the distribution of risks for each specific exposure. For this reason, it is essential that retrocessionaires have good data on the underlying reinsurance and insurance cedants to correctly model this correlation.

## Sidecar contract

Sidecars allow investors to participate proportionally in the risk and return associated with a group of insurance policies. These policies can be held by either primary insurers or reinsurers (refer to Figure 1). The purpose of these types of contracts is to share the risk of the insurance book, providing additional capacity to the cedant as well as revenue from ceding commissions and other fees paid by the investor.

A common feature of sidecars is a tail-risk or leverage fee. If the amount of collateral is lower than the amount of liability, the cedant assumes the tail risk onto its balance sheet and charges a fee to the investor. This is structurally like buying reinsurance from the cedant for a remote layer of risk. The difference is that this reinsurance is not always offered at arm's length, or necessarily at a competitive market price. The pricing of this risk should be carefully scrutinised by investors.

Sidecars are generally for a calendar year, sometimes with inbuilt renewals where the proceeds from a preceding year are rolled into the new year. If losses have been experienced, it is common for reserves to be held for up to three years while uncertainty over the value of claims is resolved.

## Industry loss warranty

ILWs provide compensation to the holder based on total industry loss (across all insurers) from either a specific region/peril combination, rather than losses from a specific cedant. ILW contract structures are commonly binary, where a fixed payoff is made if the industry loss is above a trigger, or proportionally above an attachment and below an exhaustion point. These second type are structurally call option spreads on the industry loss (long a call option at the attachment point and short a call option at the exhaustion point). The structure is similar to a tranche of a Credit Default Swap (CDS).

ILWs are used as hedging instruments by insurers, reinsurers, and ILS funds, who have diversified portfolios of insurance that are correlated to levels of industry loss. The industry loss amount used for settlement is typically calculated by a third-party reporting body to maintain impartiality in the calculation. Most ILWs use industry loss published by Property Claim Services (PCS).



## Example contract structures

These examples provide a snapshot of the described contracts:

**Example 1:** An investor buys a catastrophe bond for \$10m. At maturity, the bond receives \$10m plus \$1m premium from a book of insurance contracts, less insurance losses.

**Example 2:** An investor enters a collateralised excess of loss reinsurance contract, putting up \$10m to receive \$1m in premium against \$11m in indemnity liability if an insurer's losses exceed \$100m. If the insurer's losses were \$111m or more, the investor would get nothing.

**Example 3:** An investor enters a collateralised excess of loss reinsurance contract, putting up \$10m to receive \$1m in premium against \$11m in indemnity liability if an insurer's losses on the first North American earthquake over 7.2 magnitude in 2020 are over \$100m.

**Example 4:** An investor trades an industry loss warranty, putting up \$10m to receive \$1m in premium if industry losses over a year are less than \$50b. Otherwise the investor receives nothing.

**Example 5:** An investor enters a sidecar to pay 10% of the losses of a reinsurer's book up to \$10m in exchange for \$1m in premium. At the end of the year, the reinsurer's losses were \$5m in total, the investor therefore will cover 10% of these or \$0.5m and will receive the remaining \$0.5m (left over from the original premium). Overall, on a \$10m investment, the investor has made 5% in a year.

**Example 6:** An investor enters a retrocession agreement to pay a reinsurer's aggregate losses exceeding \$100m in exchange for \$1m in premium. A letter of credit from the investor against a rated balance sheet is used as collateral.

The cat bond and ILW markets are less complex, more transparent (data is publicly available), relatively liquid, and lower cost to trade. The private reinsurance and retrocession markets are broader and deeper with larger potential transaction sizes and more customised risk transfer. Retrocession exposures are more complicated still, with losses generated from interactions in the extreme tail of a portfolio of reinsurance exposures. US hurricane risk makes up a large part of the cat bond market and cat bonds tend to be more concentrated in this risk. Private collateralised reinsurance funds have more diversified portfolios across perils (e.g. hurricanes, earthquake, wildfires) and regions (e.g. Florida, North East US, Japan).

Reinsurance and retrocession contracts are typically annual, this compares well to the liquidity of other private market strategies. Reinsurance contracts renew each year in four key periods:

- January for global reinsurance contracts
- April for Japanese contracts
- June and July for US contracts

Table 2: Example span of ILS instruments

#	Name	Layer	Trigger	Participation	Aggregation	Collateral
1	Cat bond	Above insurer	Indemnity	Excess of loss	Aggregate	Collateralised
2	Collateralised aggregate reinsurance	Above insurer	Indemnity	Excess of loss	Aggregate	Collateralised
3	Collateralised per-occurrence reinsurer	Above insurer	Indemnity	Excess of loss	Per-occurrence (quake)	Collateralised
4	Industry loss warranty	Above \$50bn industry loss	Industry loss	Binary	Aggregate	Collateralised
5	Reinsurance sidecar	Beside reinsurer	Indemnity	Proportional excess of loss	Aggregate	Collateralised
6	Retrocession aggregate	Above reinsurer	Indemnity	Excess of loss	Aggregate	Balance sheet

Source: Frontier

# ILS portfolio construction

Fund managers construct diversified portfolios of ILS instruments (which can encapsulate aspects of both cat bond/ILW public markets as well as private markets), offered to investors as either shares in a trust style structure or under Separately Managed Accounts (SMAs). Under the SMA, the investor dictates the terms and type of portfolio they are seeking.

The risk and return profile is driven by the five dimensions in Table 3, i.e. the level within the capital structure, the peril type, regions covered by the instrument etc. Table 3 provides a high-level flow of the overall portfolio construction process.

Table 3 : The ILS portfolio construction process

<b>Deal provided by a broker</b>	<ul style="list-style-type: none"><li>• Transaction details and supporting data provided from a broker – deal sourcing relationships are important</li><li>• Review of key deal risks and the incentives / motivation of the issuing company – experience is valuable for this qualitative part of the process</li><li>• Understand how the deals structured, attachment point and what costs could arise in an event</li></ul>
<b>Standard modelling</b>	<ul style="list-style-type: none"><li>• The information uncovered from the deal analysis is run through third party industry standard models (e.g. RMS, AIR)</li><li>• Models create a probability distribution of losses. The expected loss is constructed by weighting losses by their probabilities</li><li>• Models are tested to understand the actual history relative to the modelled history for different perils and regions</li></ul>
<b>Proprietary modelling</b>	<ul style="list-style-type: none"><li>• Best practice managers have their own proprietary risk models which incorporate assumptions and experiences with particular insurers as well as adjusting for known model biases</li><li>• Proprietary modelling provides the manager with an advantage over those who solely rely on third party modelling outputs, allowing the manager to add their own views and assumptions leading to better trading decisions</li></ul>
<b>Portfolio optimisation</b>	<ul style="list-style-type: none"><li>• The manager will typically keep a record of past and potential transactions which is used to estimate the universe of potential transactions</li><li>• Portfolio investment guidelines (target risk metrics, exposure limits, instrument types) are assembled</li><li>• The manager constructs targets to optimise objectives given constraints</li></ul>
<b>Deal analysis</b>	<ul style="list-style-type: none"><li>• Data from individual investments aggregated to establish the behaviour of the current / target fund</li><li>• A new deal is assessed by its expected return distribution as well as its impact on the fund</li><li>• Peril and regional considerations help the manager to understand concentration risks in the portfolio</li></ul>
<b>Risk management</b>	<ul style="list-style-type: none"><li>• Mitigate tail risks by diversifying perils, triggers, layers, cedants, instrument type, and geography</li><li>• Mitigates tail risks by hedging with reinsurance/retro, issuing cat bonds, or buying ILWs</li></ul>

Source: Frontier

Fund managers typically offer products as either higher-risk or mid-risk portfolios. Table 4 has some representative risk and return metrics. A useful rule of thumb is that high risk managers replicate the risk/return metrics of CCC rated bonds and mid risk managers replicate BB bonds (although unlike ILS, high yield bonds can benefit from the interest rate duration in risk-off episodes).

Private ILS strategies offer a return stream with little fundamental relationship to the economic drivers of most asset classes. Economic and natural catastrophes have not been strongly related historically, and this has made ILS appealing as part of a traditional portfolio.

Such portfolios provide strong expected return dimensions per the table above and an even more compelling proposition from a risk management perspective as outlined in Chart 1.

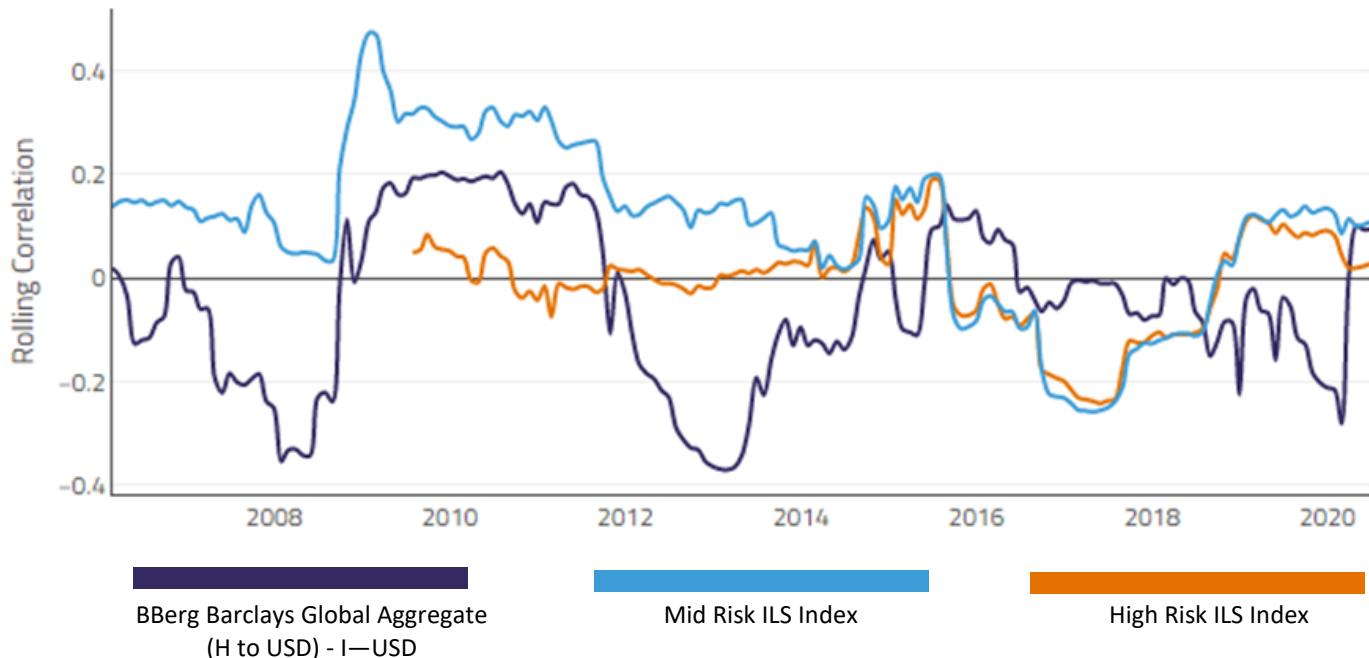
In addition, the use of non-traded private collateralised reinsurance allows a fund manager to target different risk/return profiles, different perils (i.e. natural catastrophes such as hurricanes, wildfires, earthquakes) and different regions.

Table 4: Expected risk and return metrics for high and mid risk ILS managers for 2020

	<b>Return if no losses (A)</b>	<b>Expected losses (B)</b>	<b>Expected return (C = A + B)</b>	<b>95% tail loss<sup>6</sup></b>	<b>99% tail loss<sup>7</sup></b>
<b>High risk</b>	15%	-8%	7%	-17%	-41%
<b>Mid risk</b>	8%	-4%	4%	-8%	-29%

Source: Frontier

Chart 1: Three year rolling correlation to MSCI World (Price) Index



Source: eVestment, Frontier

<sup>6</sup>Portfolio loss is expected to be lower once in 20 years.

<sup>7</sup>Portfolio loss is expected to be lower once in 100 years

# ILS risks

There are significant risk considerations for this type of investment. For the reasons highlighted below, private ILS investment requires a high level of governance, oversight and a higher appetite for complexity and tail loss potential, including around ever evolving research on climate change and the understood timelines of impacts.

## Complexity

Reinsurance contracts require meteorological and exposure modelling to determine a distribution of returns. While standards for both are relatively mature, with standardised modelling platforms and a degree of industry consensus on pricing, there are still significant risks. Modelling of weather and seismic events can vary strongly with small changes in assumptions. The impact of ocean temperatures can have very different effects under different plausible modelling assumptions. History is not always a reliable guide either. Certain configurations of plausible losses have not been observed in historical data, so realistic modelling relies on robust forward-looking models.

Managers approach model uncertainty by introducing conservative assumptions into models: increasing the losses from events, changing how perils impact losses in a certain region (e.g. increasing the tidal height from hurricanes which increases the losses from flooding), and changing the number of perils (e.g. increasing the number and severity of hurricanes during a year when water temperatures are higher than average).

Complexity also exists in the structure of reinsurance contracts (recall Figure 1). A cat bond or Industry Loss Warranty (ILW) portfolio is most straightforward. ILWs settle against aggregate losses and cat bonds resemble zero coupon bonds that “default” to the extent of losses. Most cat bonds issued in standardised form under Rule 144A and can be readily traded in the secondary market.

The private ILS market has a wider variety of contracts including collateralised reinsurance (an insurer passes on the risks from its insurance portfolio to a reinsurer) and retrocession (a reinsurer reinsurance a portfolio of reinsurance contracts). The regional and peril coverage is also broader than cat bonds. While managers are generally transparent with portfolio exposures, it requires increased focus for investors.



## Illiquidity

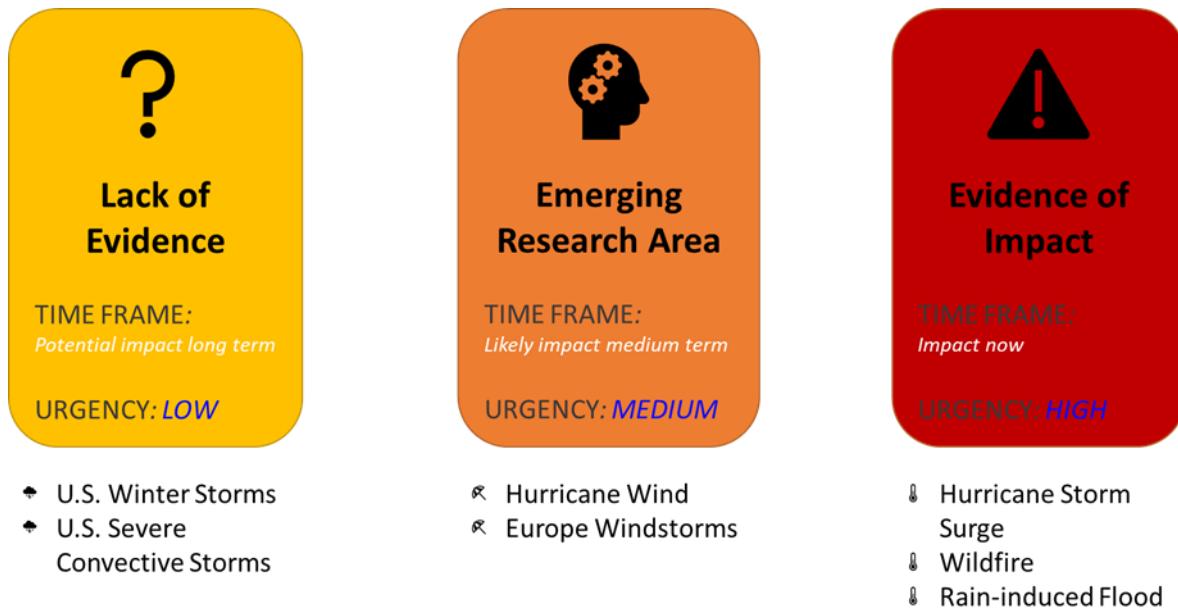
Collateralised reinsurance contracts are illiquid over standard risk periods – usually one year. Reinsurance contracts are not easily transferred, partly due to confidentiality agreements and partly because counterparties are not identical from a protection buyer's perspective. ILS managers can smooth over this illiquidity to some extent by allowing unit holders to sell for free cash, though this leverages the remaining investors, or by selling transferrable instruments, or by crossing buyers and sellers. But each of these requires a robust valuation methodology to determine a transfer price. As a rule of thumb, investments in a private ILS manager are held for a minimum of a year. Cat bonds have longer tenor, generally three to four years, but are tradeable. Lock up periods vary manager to manager, ranging from one month to three years, and discounts are sometimes offered for longer-term commitments.

## Climate change

There is agreement amongst scientific and insurance industry bodies that climate change is expected to increase ocean temperatures and raise sea levels. The level of expected impact depends on the type of peril and on the frequency and severity of natural catastrophes and the subsequent insured loss (Figure 4). For example, there are conflicting views on the impact of ocean temperatures on the frequency and severity of hurricanes, and on temperatures in general on the prevalence and intensity of wildfires, with research continuing to evolve on both subjects.

Most managers articulate clear climate change views and are adjusting their modelling in some form to incorporate likely impacts. Several argue that the year-to-year volatility of El Nino and La Nina has a more prominent effect than climate change broadly, which is expected to impact ocean temperatures on a slower upward trajectory. The increased hurricane activity of 2005 and again in 2017/2018 has led some reinsurers and ILS managers to question the assumed slow trajectory. This modelling uncertainty means that tail losses might be larger than expected.

Figure 4: Climate change impacts on catastrophe risk



Source: Frontier, Nephila

<sup>4</sup>Collateralised Debt Obligations (CDOs) are a type of structured debt which essentially repackages a pool of structured debt assets and sells them again with a higher credit rating, which exaggerated losses when any of the original underlying assets experiences losses.

## Modelling risks

Most managers articulate clear climate change views and are adjusting their modelling in some form to incorporate likely impacts. Several argue that the year-to-year volatility of El Niño and La Niña has a more prominent effect than climate change broadly, which is expected to impact ocean temperatures on a slower upward trajectory. The increased hurricane activity of 2005 and again in 2017/2018 has led some reinsurers and ILS managers to question the assumed slow trajectory. This modelling uncertainty means that tail losses might be larger than expected.

## Capital inflows eroding pricing

The increase of capital available in the developing ILS market has the potential to dilute returns over time. The sector has experienced a ~50% increase in available capital since 2006 which has led to a proliferation of new funds and structures. As with other asset classes, there is a delicate balance of supply and demand. If the capital markets demand ILS products faster than it can be sensibly packaged from underlying insurance risk, quality will suffer. On the other hand there is still a large amount of insurance retained on the books of insurers and reinsurers that can usefully be transferred to the capital markets where it can be best borne.

In 2020 there have been net capital outflows from the sector following losses in the 2017/18 and economic uncertainty surrounding the pandemic. This has combined with increased demand for protection to materially increase premiums and expected returns, particularly for previously loss affected contracts.



# Managers

For clients considering an allocation to private ILS, we believe that new investments should be averaged in over the four main reinsurance renewal periods in January, April, June and July to build a portfolio diversified to various perils and regions.

There are a handful of institutional quality managers providing a range of strategies across the risk/return spectrum, a number of which are either Buy or Positive View rated by Frontier.

Fees for private ILS are higher than for cat bonds and are hedge fund-like, although we have noted willingness by managers to negotiate on fees for size. As new managers enter the space and further regulatory changes increases the capacity for institutional investors, we expect fees to reduce further. For some investors, the fees will not be palatable at this point.

## The final word..

The ILS investment universe includes attractive risk/return profiles with very low correlation to risk assets and good liquidity after one year. There are also risks which need to be carefully considered including complexity (both in modelling and structuring), climate change, and a range of modelling risks.

A private ILS investment might be inappropriate for investors with a low appetite for complexity and/or rare but material tail-losses, or a view that climate change will increase the impact from natural perils at a rate significantly faster than expected by the standard scientific modelling.

If this is a sector you are interested in, please contact Frontier to discuss how this opportunity fits with your specific investment requirements.



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