

Brookvine Pty Limited
*Insurance Linked Securities –
A Market Primer*

February 2010



specialists in alternative investments



Introduction

As part of the normal business activities of insurance companies, it is a typical risk management practice to share the exposure of insured losses amongst other insurers via a process called re-insurance. Re/insurance¹ companies, in order to take on this sharing of risk, have traditionally raised debt and equity capital to maintain balance sheet strength sufficient to meet their actuarially-determined share of potential losses.

Insurance Linked Securities (ILS) allow insurers to use the capital markets to provide some of the capital required to re-insure these risks. The global capital markets are much larger than the balance sheets of re-insurers and so the latter are willing and able to pay a premium in order to optimise the use of their own scarce capital.

The ILS market covers a wide range of insurance related risks which can be split into two broad categories:

- Life related risk – extreme mortality securitisations, life policy trading, premium financing; and
- Non Life risk – catastrophe, crop failure, property, casualty; for example.

The focus of this primer is the area of ILS relating to catastrophe insurance, which is the largest and most developed sector of the market. The document is divided into four major sections:

- Overview of the catastrophe market
- Cat market investment structures
- Understanding triggers
- Glossary of common terms

¹Throughout this document the term re/insurance means insurance and/or reinsurance.

The Catastrophe Risk Market

ILS allow the transfer of re-insurance risk from the insurers to the capital markets via instruments which pay attractive yields in return for accepting the risk of loss of part of or all capital in the event of a major catastrophe.

Catastrophe related ILS are a relatively new addition to the investment universe after some well publicised transactions between Berkshire Hathaway and certain re-insurers in the mid 1990s. Insuring against catastrophe related losses is expensive and, in a relative sense, more so at the remote (say 1 in 100 years) end of the spectrum.

It is prohibitively expensive for re/insurance companies to hold sufficient balance sheet capital to cover the highly unlikely (risk remote) but hugely expensive (extreme loss) scenarios of a 1 in 100 year event. However, the price of not holding enough capital to cover these risks includes downgrading by the rating agencies, which in turn increases the cost of funding to the re-insurer.

Post Hurricane Andrew (1992), which created a damage bill \$15.5bn² and far surpassed the best industry estimates of likely losses, the insurance industry was forced to review its approach to covering the cost of large catastrophic events. This has become particularly important as latest industry estimates put the likely loss from a 1 in 100 year catastrophe at \$150bn, far in excess of the capitalisation of the entire global re-insurance industry.

ILS allow the transfer of this re-insurance risk from the insurers to the capital markets via instruments which pay attractive yields in return for accepting the risk of loss of part of or all capital in the event of a major catastrophe. One of the key challenges in this developing market is that there have been very few examples of catastrophes large enough to trigger payment under these ILS.

The major types of perils covered in the catastrophe risk market include: (in relative order of importance and market size)

- US Hurricane
- US Earthquake
- European Windstorm
- Japanese Earthquake
- Japanese Typhoon

² All references to currency are expressed as US dollar, unless otherwise indicated.

Types of Catastrophe ILS

There are four major types of cat related ILS:

- *Catastrophe Bonds (cat bonds)*
- *Catastrophe Swaps and Futures*
- *Industry Loss Warranties (ILWs)*
- *Re-insurance Sidecars*

There are four major types of catastrophe related ILS, each of which may seem complicated, but all use a finite number of components and seek to deliver the same basic outcome; transfer of the risk of losses from the re-insurance industry in return for a premium. The four categories are:

- Catastrophe Bonds (cat bonds)
- Catastrophe Swaps and Futures
- Industry Loss Warranties (ILWs)
- Re-insurance Sidecars

Cat Bonds

Cat bonds are issued by insurance companies, re-insurers, governments and corporations with exposure to catastrophe risk and are a flexible instrument typically structured by an investment bank or broker, with the assistance of a catastrophe modelling firm.

A cat bond will typically contain the following key features:

- Issued for a precise level of protection above a specific threshold (trigger)
- Covering losses from a particular catastrophic event (or peril) in a defined zone
- Over a 3-5yr term

For example; a bond might be issued for a three-year period, for an amount of \$200m above a threshold of \$500m, covering losses from a hurricane which hits the Florida coastline.

Therefore, if a hurricane did then hit the Florida coastline during the intervening three years and caused the insurer to pay out claims totalling \$600m, the insurer would bear the cost of the first \$500m and collect \$100m from the cat bond, leaving a 50% return of capital to the bond holders.

If the insurer experienced only \$500m of losses, the cat bond would be un-touched and redeem at par. Alternatively, if the insurer incurred \$800m of losses, holders of the cat bond would lose 100% of their initial investment, but no more.

Cat bonds are issued through an Offering Memorandum which contains all of the legal rights and obligations of the various parties including the key terms outlined above. It will also include a credit rating from a recognised agency. Unlike a corporate bond, which is rated based on the issuer's likelihood of remaining solvent and redeeming the bond at maturity, a cat bond is rated on the likelihood and magnitude of a payout based on the defined event.

Types of Catastrophe ILS

For example, factors included in rating a cat bond include:

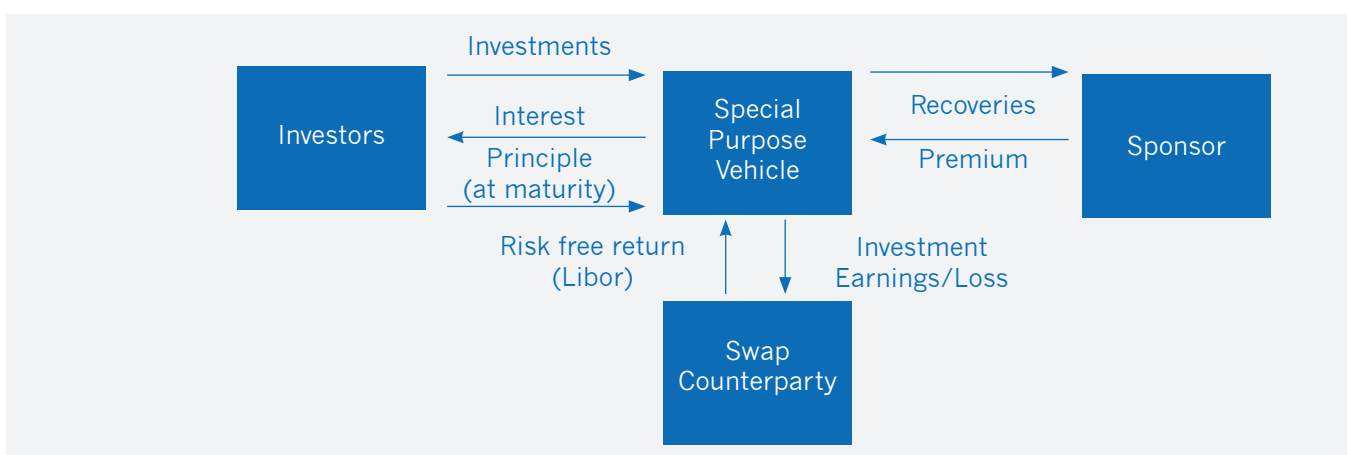
- Probability of attachment, or the likelihood that the bond will suffer some loss. In the example above, where the insurer loses more than \$500m
- Probability of exhaustion or the likelihood that the bond will suffer total loss. From above, where the insurer loses \$700m or more
- Expected loss or the amount investors would, on average, expect to lose in a given year
- Modelling of loss scenarios to give investors some idea of the types of events which would cause a loss
- Historical simulations showing how previous catastrophes might affect the bond today
- Sensitivity analysis showing what might happen if the insured catastrophe were to occur more frequently than modelled

Structure of a Cat Bond

A cat bond is structured as a reinsurance contract between the sponsor, or insurer seeking protection against possible losses and a Special Purpose Vehicle (SPV) which is set up for solely to issue the bond. The SPV is typically set up in an offshore location to ensure it remains “bankrupt remote” from the sponsor and protects the bond holders against changes in the sponsor’s credit rating or financial position.

The bond issued by the SPV mirrors exactly the underlying terms of the re-insurance contract and can only suffer losses up to the issuance amount and subject to the trigger event. The structure eliminates the possibility that the bond would not be honoured by the sponsor in the event of bankruptcy and the cat bond does not count as a debt obligation of the sponsor.

The figure below illustrates the typical structure and cash-flows of a cat bond



Types of Catastrophe ILS

A cat bond may be issued to provide re-insurance coverage for a single event eg: hurricane within a specific region or for multiple perils such as: hurricane and earthquake across multiple geographies. The underlying factor driving the structure and issuance of each bond is the capital requirements of the issuing re-insurer.

In the absence of a catastrophe causing a payout from the bond, bondholders receive coupon payments throughout the life and return of principal at maturity. Those coupon payments are derived from the premiums collected by the insurer and typically paid to investors as a fixed margin above a floating interest rate such as Libor.

Catastrophe Swaps and Futures

Catastrophe derivatives, like most financial market derivatives may be traded on an exchange or issued over-the-counter.

Exchange traded cat swaps and futures trade on the Chicago Board of Trade (CBOT) and the CATEX Global Exchange.

A cat future is a standardised exchange traded contract which reflects a face value of \$25,000 multiplied by the catastrophe risk ratio for the quarter. CBOT calculates on a quarterly basis, the Expected Catastrophic Loss Ratio based on a state by state analysis of premium levels and insurance lines. To the extent that actual cat losses exceed (or fall below) the expected loss at the end of each quarter, the futures contract rises (or falls) accordingly.

A cat swap is a contract in which investors exchange a fixed payment in return for receipt of a floating amount equal to the difference between premiums collected and insurance claims paid out.

The public, or exchange traded cat derivatives market is still developing and forms a relatively small part of the cat investment universe.

Industry Loss Warranties (ILW)

ILWs are a specific example of an over-the-counter swap contract with many of the same features of a cat bond. The key difference between an ILW and a cat bond is that the ILW suffers a loss when the insurance industry (as a whole) suffers a loss over a specified threshold. Those losses are measured on an "indemnity" basis which means the actual dollar losses suffered by the industry for a given catastrophe.

The threshold used to determine when a payout on an ILW is triggered is calculated by reference to an Index. The most common reference index for based cat risk ILS is the (PCS) Index compiled by Property Claim Services, a division of Insurance Services Office Inc. This US based organisation

Types of Catastrophe ILS

compiles data sourced via confidential surveys of insurers, loss adjusters and public officials and combines this with trend factors to arrive at industry wide loss estimates for each catastrophe.

Whereas cat bonds are issued by sponsors with reference to specifically identified parameters related to the capital management requirements of the re-insurer, ILW contracts are best suited to large diversified sponsors with insurance portfolios that closely resemble the total industry profile.

Because ILWs are not issued from SPVs in the same way as cat bonds, there are additional risks to be considered including the credit-worthiness of the issuing counterparty.

Re-insurance Side Cars

Side cars are similar to cat bonds in that they are issued through an SPV, but rather than providing coverage to the re-insurer above a specified threshold, allow investors to take a side by side position with the re-insurer on a specific insured risk.

In a period where no major catastrophes occur, side cars offer little to investors as the capital reserves of re-insurers are more than adequate to cover “normal” business events. However, in the immediate aftermath of a hard event, such as Hurricane Katrina in 2005, re-insurers have an immediate and pressing need for significant amounts of capital to prepare for likely payouts.

This urgent need for capital injections creates an opportunity for investors to take a pro-rata share of insurance premiums, in return for a pro-rata share of specified risks. The advantages to issuers include the ease with which side car structures can be set up and the ability to quickly raise equity capital in times of greatest need. To investors, the advantages include the short-term nature of side cars (typically one year) and a pre-determined exit plan as the need for this extra capital dissipates over time.

Side cars could be viewed by investors as opportunistic re-insurance equity investments at those times when the supply of re-insurance capital is most strained.

Understanding Triggers

Every catastrophe ILS structure contains a reference to some identifiable point at which a payout occurs.

Every catastrophe ILS structure contains a reference to some identifiable point at which a payout occurs. This point is called the trigger and the situation causing the trigger to be activated is the trigger event.

A key to understanding the obligations of an ILS and the payout scenario is the definition of the trigger and its application in a catastrophe situation. There are four broadly used trigger definitions used in ILS structures.

Indemnity

Recovery under this trigger is based on the issuing sponsor's actual dollar losses as a direct result of claims experience. This trigger is most similar to the loss calculation used in most re-insurance contracts. The risk of an ILS using an Indemnity Trigger is calculated on estimates of losses which would flow from actual portfolio exposures.

From an issuer's perspective, indemnity triggers remove the basis risk that actual losses will be different to the insured losses, but this brings with it some challenges.

Indemnity triggers create a "moral hazard" that sponsors may be less rigorous in the claims settlement procedures. Following a catastrophe, it typically takes many months and multiple revisions to ultimately determine the precise dollar value of claims experience. This can create significant delays in portfolio valuations to investors and periods of illiquidity in ILS subject to claims calculation.

Parametric

Parametric triggers are the quickest and simplest to calculate and are based on objective measures of the force of a catastrophe. For example a parametric trigger for hurricane risk will typically be maximum wind speed measured at specified independent weather monitoring stations, or in the case of an earthquake; ground motion acceleration measured by multiple seismometers.

Such triggers have the advantage of being very transparent and quick to calculate, enabling prompt settlement of ILS contracts as well as removing the "moral hazard" risk inherent in indemnity triggers. Parametric triggers are not able to be used in ILWs and other derivative based ILS.

Industry Loss

Most of the contracts using index based loss triggers, such as those referencing the Property Claims Services Index, are based on actual losses to the insurance industry as a whole.

The sponsor of an ILS using an Industry Loss trigger does not need to

Understanding Triggers

disclose its portfolio position but rather relies on the independent third party collation of industry wide insurance losses. The key drawback of this trigger is the basis risk caused by less than perfect correlation between a re-insurer's individual book of risk with the industry as a whole.

Industry loss triggers are often used in conjunction with indemnity loss triggers with ILS structures.

Modelled Loss

Also referred to in some instances as “Notional Portfolio” loss trigger. Modelled loss triggers are calculated with reference to their underlying exposures. In an event, the modelling agent collates the observed parameters of the catastrophe and estimates the impact on a notional portfolio. If the modelled losses exceed a pre-determined threshold, the ILS is triggered.

The main challenge of this trigger mechanism is that the actual portfolio may or may not be similar to the issuer's actual exposure.

Conclusion

One of the most significant challenges to investors new to the catastrophe risk market is understanding the unfamiliar terminology and nuances of the structures of ILS. The rapidly growing market is creating a deeper opportunity set utilising all of the issuing vehicles outlined in this overview and related structuring features.

It is vital that potential investors gain an understanding of the structure and operation of cat related ILS and particularly the processes which follow from a catastrophic event.

Glossary of Common Terms

Attachment Point

The point at which a bondholder starts to lose capital

Basis Risk

The imperfect correlation of a hedging strategy, which causes the potential for excess gains or losses. In the context of catastrophe insurance, basis risk typically refers to the difference between total industry losses (used in ILWs) and the actual losses of an individual insurer.

Bond Rating

An evaluation given to bonds linked to their credit quality. Corporate bonds are based on the probability of the issuer becoming bankrupt. Catastrophe bonds are rate on their probability of default due to a catastrophe. Ratings are undertaken by independent rating companies such as Standard & Poor's, Moody's and Fitch. Catastrophe bonds are typically rated between BBB or A-.

Collateral Account

A bankrupt remote account where the proceeds for the bond are invested and held as security in the event of a catastrophe.

Coupon

Income paid to the owners of a bond as compensation for taking on the risk of default. Usually paid quarterly and funded by a combination of premiums and proceeds of the investment of the bonds principal.

Exhaustion point

The point at which the entire capital of a bond is lost.

Expected Annual Loss

The probability weighted loss that a bond would likely experience over the very long term, expressed as average annual percentage.

Hard Market

A period where the amount of capital available to insurance companies to underwrite risk is extremely limited. Typically follows a period of large underwriting losses and is accompanied by stringent underwriting and higher premiums.

LIBOR

London Interbank Offered Rate. An interest rate which banks borrow funds from each other in the London market. LIBOR is fixed on a daily basis.

Glossary of Common Terms

Indemnity Trigger

A trigger related to losses of a predefined dollar amount. Losses can either be industry or issuer specific. **Index Loss Trigger**

A loss trigger linked to the industry wide losses associated with a pre-specified event.

Industry Loss Warrants (ILWs)

A reinsurance derivative contract, where the sponsor purchases protection based on the total loss from a defined event to the whole insurance industry. ILWs can be created before, during or after the defined event.

Modelling Agent

A firm that undertakes risk analysis of the relevant exposure for the bond to be written.

Modelled Loss

Losses are calculated by using physical parameters within a model to calculate the loss.

Moore's Law

A trend of computer hardware, in which the density of integrated circuits has roughly doubled every two years. The same concept can be applied to wealth concentration every ten years.

No Loss Scenario

The maximum return, given that no catastrophe occurs within a given period.

Parametric Trigger

A trigger linked to the actual physical event of a catastrophe. For example: the wind speed of a hurricane or the magnitude of an earthquake.

Peril

A defined event (catastrophe) which exposes an insured to the risk of loss, against which insurance cover has been purchased.

Premium

Periodical payments a policyholder makes to hold an insurance policy.

Probability of attachment

The statistical likelihood that a bond will have some level of loss

Glossary of Common Terms

Probability of exhaustion

The statistical likelihood that a bond will completely default with 100% loss.

Post event

The time period after a catastrophic event. A time lag occurs between the event and the calculations of industry losses. **Reinsurance**

The process by which insurance companies share the risk on policies they have written with other insurance companies.

Retrocession

The process whereby a reinsurance company provides insurance to another reinsurance company by accepting exposure that has been underwritten.

Securitisation

The aggregation of debt liabilities or securities into a pool.

Sidecar

A special purpose company created to sit alongside an insurance company and its book of risk. Sidecars allow outside investors to purchase a portion or all of specific insurance exposures and share in both the profits and risks.

Special Purpose Vehicle

An entity whose operations are restricted to the acquisition and financing of specific assets.

Sponsor

The party (typically an insurer, reinsurer or government entity) that issues a catastrophe bond.

Tail Risk

Typically refers to the remote possibility of an event occurring more than 3 standard deviations from the mean or expected scenario. Used to estimate the maximum possible loss within a given time span and at a given confidence level. A 99% tail risk estimates the average annual loss likely to occur once in one hundred years.

Trigger

A predefined mechanism for determining when a payout occurs under a catastrophe bond. The four basic trigger groups include: indemnity, parametric, modelled loss and industry loss.

References

“Capital Markets & the P/C Sector,” A.M. Best Company, May 2007

“Insurance Linked Securities Overview,” Cozen O’Connor, 2009

“A second storm: Cat bonds and the uncertainty of post-trigger pricing,”
Guidon & Soulsby, Dec 2008

“So you want to issue a cat bond,” AIR Worldwide Corporation, Feb 2008

“Reinsurance Market Review 2009,” Guy Carpenter LLC, 2009

“Hedging catastrophe risk using index-based reinsurance instruments,”
Lixin Zeng, Mar 2003

“Side cars have a specific role to play,” Christopher Klein – Guy Carpenter
Capital Ideas, Oct 2008