

Issues Paper

INTERNATIONAL ASSOCIATION OF INSURANCE SUPERVISORS



ISSUES PAPER ON NON-LIFE INSURANCE SECURITISATION

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[This document was prepared by the Securitisation Subgroup.]

Table of contents

1. Securitisation: an overview.....	3
2. Asset-backed securitisations: structure and examples	6
3. Liability-based securitisations: structure and examples	9
4. Transformer vehicles	14
5. Loss triggers.....	19
6. Participants to the securitisation process	23
7. The purchasers	29
8. Pricing.....	31
9. Company considerations.....	32
10. Regulatory issues	34
Annex 1: accounting issues.....	36
Annex 2: catastrophe risk swaps.....	39
Annex 3: exchange-traded derivatives.....	41
Annex 4: weather derivatives.....	42
Annex 5: abbreviations used in the paper	44

1. Securitisation: an overview

1. A securitisation involves a simple financial concept: the future cash flows that can be expected from a particular source (e.g., receivables or loan repayments) serve to back up a financial instrument for sale to an investor. When a business entity (“the originator”) engages in a securitisation, it first transforms the cash flows into a tradable instrument and then transfers the attendant risks from the entity to capital market investors who, in turn, expect a return commensurate with the risks. Depending on the source, different cash flows can have different risk characteristics.

2. Securitisations can provide non-traditional sources of capital market financing, thus complementing and supplementing traditional debt and equity financing available to a business. For insurance and reinsurance businesses in particular, the securitisation concept has proven to provide an attractive alternative source of capacity.

3. From the point of view of investors in capital market instruments, the ability to purchase a securitised instrument helps diversify their investment portfolio. Moreover, the securitised instruments can be structured to appeal to a wide variety of investors’ risk and return preferences by “slicing” the risk/return characteristics into “tranches”. The whole process lends itself to creating wide investor appeal, and, hence, securitisations have the salutary effect of broadening the scope of the entire market.

4. For the types of securitisations that are of greatest interest to us – namely, insurance-linked securitisations – there is a further attraction for investors: insurance risks, such as catastrophic risk, tend to be uncorrelated to other, more typical, capital market risks (e.g., interest rate risk, currency risk, economic risks, etc.). Portfolio theory holds that the addition of uncorrelated risks to an investment portfolio enhances the risk-return characteristic of the portfolio. Hence, it is true yet seems counter-intuitive that, by purchasing an insurance-linked security (“ILS”) based on catastrophic risk, for instance, an investor can improve the risk-return characteristic of his entire investment portfolio.

5. In general, most non-life insurance linked securitisations have concentrated on catastrophic risk with triggering events that relate to the occurrence or non-occurrence of a pre-defined catastrophic event. By contrast, while there are risk transfer securitisations in life business that protect against catastrophic mortality risk, the majority of life securitisations to date have been designed to generate present cash flow against the amortisation of statutory and technical provisions. These have been termed embedded value securitisations. These will be described in a later paper.

Asset-backed securitisations

6. The cash flows from either assets or liabilities can be transformed into a securitised instrument. Asset-backed securities (“ABSs”) were developed first. In the early 1980s, credit card issuing companies and banks seized upon opportunities to securitise some of their receivables. Typically, these financial institutions would issue commercial notes backed by the expected credit card or loan payments from a particular pool of customers. Mortgage lenders, including life insurance companies, also became early users of asset-backed securitisations, after the enactment of the 1986 law in the United States creating Real Estate Mortgage Investment Conduits (REMICs). In fact, the notes they issued (also known as Collateral Mortgage Obligations or CMOs), which were backed by payments from the residential mortgages, quickly generated a multi-billion dollar market.

7. Since then, all sorts of other asset types have been successfully securitised. Today, companies of every nationality, size, type, and credit rating routinely raise capital by issuing ABSs in the capital markets. If a company has a pool of performing assets (e.g., trade receivables) of sufficiently high quality, then an asset securitisation offers the advantage of overcoming the capital-raising limitations that, say, declining performance, high leverage or third-world location might impose.

8. Even when assets are of doubtful quality (i.e., the expected cash flows are unlikely to materialise), a financial guarantee or a seemingly exceedingly generous stack of collateral (e.g., the face value of the collateral greatly exceeds face value of the notes) will often serve to seal the deal. Insurance and reinsurance companies are frequent participants in such credit enhancement activities.

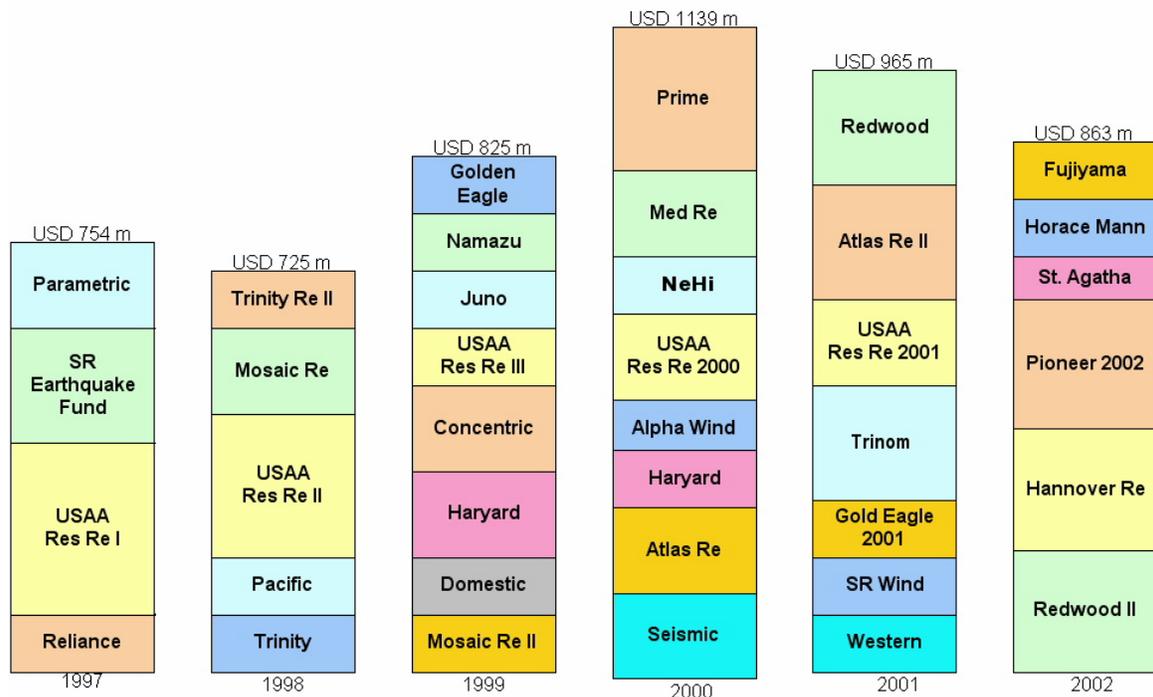
9. Asset-backed securitisations are now commonplace. The methodologies for structuring, pricing, and accounting for these types of transactions have become well established, familiar, and efficient. Similarly, the regulatory framework for both originators and investors is well settled, with banking, securities and insurance regulators sharing oversight. The pool of candidates for asset-backed originations is plentiful and the number of potential investors is large. The market attracts significant liquidity and secondary markets make for transparency and efficient pricing.

Liability-based securitisations

10. Liability-based securitisations have had a less spectacular history. While asset-backed securitisations span the spectrum of all types of business, liability-based securitisations are mostly confined to the insurers and reinsurers. This is only natural however, given that other financial institutions tend to focus on the asset-side of their balance sheets while insurers and reinsurers focus on the liabilities.

11. Liability-based securitisations were first suggested in 1973 but have been much slower to evolve than ABSs. For many in the insurance industry, the original promise shown by these new methods has fallen short of expectations. While asset-backed securitisations have grown at the rate of 30% annually into a \$2.5 trillion market, the market for liability-based securities is much smaller. Since inception, only about \$10 billion of these types of securities have been issued, with about \$2.5 billion currently outstanding. Most of these have been in the form of catastrophe bonds, also known as “CAT bonds”. Since 1996¹, over \$5 billion of these CAT bonds have been issued and annual issuance is expected to grow to more than \$5 billion by the year 2003.

Cat Risks Transferred to the Capital Markets Since 1997



12. Liability-based securitisations are used in the insurance sector as:

- contingent capital instruments, designed to pre-finance insurance-related losses but without a transfer of the underlying insurance risks from insurer to capital market investors
- insurance-linked instruments, designed to finance insurance-related losses with a transfer of the underlying insurance risks from the insurer to capital market investors.

¹ The first CAT bond transaction was attempted by USAA in 1996 but was withdrawn without explanation.

13. By transferring insurance-related risks to the capital markets, insurance-linked securities (“ILSs”) provide insurers and reinsurers with new tools for diversifying risks. Prior to securitisations, the purchase of reinsurance and retrocessional capacity were the only options. Hence, these types of securitisations are both a substitute for and a complement to the more traditional reinsurance arrangements of the past.

14. ILSs continue to remain the subject of much debate. Many firms treat their forays into the market with the caution of experimentation. Investor interest continues to be limited, though it is certainly expanding. The costs both from a pricing standpoint as well as transaction costs remain high compared to reinsurance and compared to other more familiar or standardised financial instruments. Individual transaction capacity also tends to be much more modest in size.

15. Nonetheless, while the liability-based market remains embryonic, many experts forecast significant increases in growth in years to come, particularly in an environment of hardening markets for insurance. Many of these experts point to the spectacular growth of asset-backed securities as a model for ILSs. Their expectations remain untested.

16. Immediately after the events of September 11, 2001, there were heightened expectations for the insurance-linked securitisations market. Steep increases in reinsurance premiums were expected to make securitisations relatively more attractive. Indeed, spreads for catastrophe bonds, for instance, widened significantly in the secondary market. It would appear however that the influx of new capital into the reinsurance industry after 9/11 (ranging to about \$28 billion to date) has mitigated the expected surge in securitisations. Spreads for insurance-linked securities have narrowed again and in 2003 they are only about 10% wider than pre – 9/11.

17. Both asset-backed and liability-based securitisations are of interest to insurance regulators. Insurance and reinsurance firms are major players in both markets as originators and as investors. Moreover, an active market, including a secondary market, in CAT bonds has now developed. Insurance and reinsurance firms are active participants in this market.

2. Asset-backed securitisations: structure and examples

18. In an asset-backed securitisation, a firm issues securities whose costs are determined by the quality of the specific assets that back the securities. Because these assets secure the borrowing, and because they may be of higher quality than the entire firm, an asset-backed securitisation typically results in both an increase in borrowing capacity and a lower cost of capital for the firm. In addition, the securitisation moves the particular assets off the originator’s balance sheet, thereby reducing the firm’s leverage. ABSs also facilitate the release of regulatory capital. For banks, the capital requirements of the Basel Capital Accord were a prime motivation for pursuing securitisations. The 1988 Accord, for instance, required banks to hold 8% of credit-card receivables as regulatory capital, money that could otherwise be deployed to more profitable opportunities.

19. On the demand side, investors continue to show a healthy appetite for asset-backed securities as the volatility of equity markets world-wide and the economic uncertainties of a recession have driven investors into the relative safety of fixed-income securities. Strong demand has also been supported by the existence of a liquid secondary market, which reflects the

origination of larger-size issues and the increasing use of master trust structures that enable an originator to place numerous issues through a single program.

20. The typical structure of an asset-backed securitisation consists of a transfer of assets to a Special Purpose Entity (“SPE”). The SPE serves to separate the legal ownership of the assets from the originator. As evidence that such a separation has indeed been effected, the originator generally secures a legal opinion that certifies that the sale of the assets to the SPE represents a “true sale”. The prime determinant of whether a “true sale” in fact has been achieved is whether or not the originator retains any or all of the risks pertaining to those assets. No actual physical transfer of assets need be involved however to make a securitisation effective. Such so-called “synthetic” transfers are common. For accounting purposes under UK GAAP and IAS, entities are required to be consolidated where the substance of the relationship is that of control (i.e. not just legal interpretation). Indicators of control arise where:

- the SPE conducts its activities on behalf of the originator entity
- the originator entity has the decision making power or other rights to obtain the majority of the benefits of the SPE
- the originator entity has the majority of the residual or ownership risk of the SPE or of its assets.

21. More recently it is thought that a certification of a true sale is not sufficient, and that there needs to be a certification that the all or part of the risk has not been taken back by way of a derivative or other financial instrument. This is referred to as a “clean break”.

22. The SPE can be a corporation, a partnership, or a trust. It is quite common for an SPE to take the form of a trust because the formation of a trust is a relatively simple matter. A corporation, on the other hand, requires directors, equity, articles, and may subject its shareholders to double taxation. The main concern is less over form however and more over whether or not the originator manages to perfect the segregation of the assets within the entity whatever its form. If the originator should go bankrupt, failure to do so might then cause the reversion of the assets to the originator, rather than to the benefit of the investors.

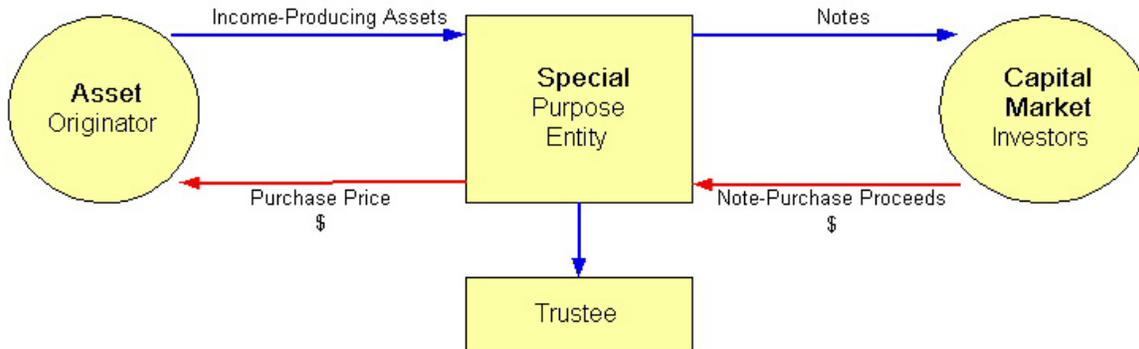
23. An effective SPE can be described as an off-balance-sheet, non-consolidated entity with the following characteristics:

- non--affiliation with the originator
- independence from the originator
- bankruptcy-remoteness from the originator

24. Given its separation from the originator, the SPE’s credit risk is based solely on the quality of the assets transferred to it. The originator’s credit rating is irrelevant. With its own frequently enhanced credit rating, the SPE can then proceed to issue a variety of investment and non-investment grade tranches of securities with appeal to a variety of classes of investors.

25. A simple schematic structure of an asset-backed securitisation would look as follows:

A Simple Asset-Backed Securitization.



An illustration of ABSs: collateral mortgage obligations.

The basis of a CMO is a mortgage loan from a financial institution to the purchaser of a home. The loan is usually repaid with regular monthly payments composed of principal and interest on the loan.

To obtain additional funds for more mortgage loans, a financial institution either accumulates pools of loans with similar characteristics together to create securities or sells the mortgage loans to issuers of mortgage securities. In either case, a stream of income from repayments by homeowners within the different pools backs up the securities.

The fact that a homeowner can prepay the mortgage by selling, refinancing, or otherwise paying off the loan has of course a significant impact on the pattern of these payments within the pool.

The mortgage collateral is placed into a protective trust structure, maintained

exclusively for the benefit of investors. The originator then creates a multi-class issue, known as “tranches”. Different tranches attract different types of principal and interest payments. Investors are thus offered securities that have appeal to different investment objectives as different tranches have different cash flow characteristics.

In an environment of falling interest rates, CMO investors may find that their principal is returned to them sooner than expected (“call risk”) or, when interest rates are rising, later than expected (“extension risk”).

The “plain vanilla” type of CMO provides for the tranches to be paid in sequence. The trust would issue different classes of bonds, typically classified as A, B, C, and Z, with various maturities and coupon rates. The different tranches are then retired in sequence by targeting all principal returns to only one tranche at a time. Z accrues interest but is not paid until the principal and interest of A, B & C are retired in full.

3. Liability-based securitisations: structure and examples

Contingent capital instruments

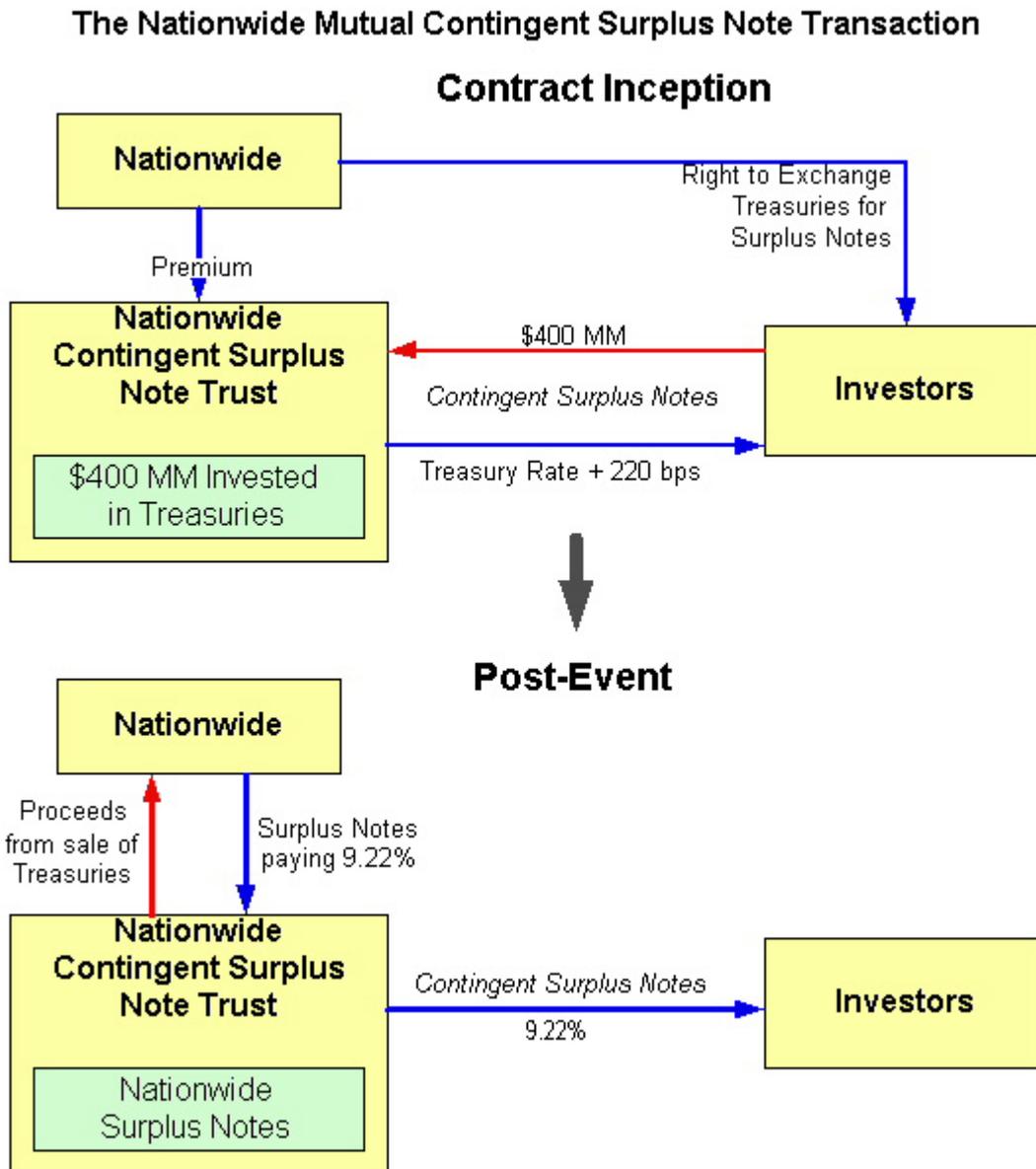
26. These instruments are designed to allow the originator to pre-finance defined losses. Since traditional financing often becomes onerous or unavailable after a major loss, contingent capital arrangements can provide a level of comfort and assurance. The contingent instruments typically provide for the issuance of shares of stock -- often preferred stock -- upon the occurrence of a pre-specified event at a pre-specified price.

Contingent debt instruments

27. In a typical transaction, an insurer issues notes – usually contingent surplus notes backed by surplus earnings² -- to an investment trust set up by a financial intermediary. The arrangement gives the insurer the right, under specified circumstances, to issue surplus notes to the trust in exchange for cash or liquid assets. Investors capitalise the trust in the agreed upon amount in return for participating in the benefits of the trust. The trust invests these proceeds in high-grade securities. Contingent surplus notes, paying an agreed upon interest rate, are issued to the investors by the trust. The insurer pays fees to the trust in exchange for the commitment to purchase the insurer's surplus notes.

² Surplus is an insurer's statutory net worth. Surplus notes are subordinated debt obligations but are considered equity capital for statutory purposes.

An illustration of a contingent capital transaction: The Nationwide Mutual surplus notes deal. In 1995, Nationwide Mutual purchased an option to issue up to \$400 million in surplus notes to a guaranteed buyer, that being a Nationwide trust. Investors purchased bonds issued by the trust. Ten-year U.S. Treasury securities fully back these bonds. If Nationwide exercises its option to issue surplus notes to the trust, the collateral backing of Nationwide trust bonds would change from Treasuries to the surplus notes. The trust would sell its holdings of Treasuries in order to purchase the surplus notes from Nationwide. Coupon payments were the same at 9.22%, regardless of whether the Treasuries or the surplus notes back the payments.



28. Thus an insurer can tailor the transaction to his specific needs. Investors can earn a higher return by investing in a contingent surplus note trust than by investing directly in the high-grade securities. The trust can pay higher returns as a result of the fees collected on behalf of investors from the insurer. Investors receive periodic payments of principal and interest, even after the insurer suffers a catastrophic loss.

29. There are some drawbacks to arrangements of this sort. In the United States, state insurance department approval is required for the issuance of surplus notes. The notes subordinate claims to other claims on the insurer and can only be repaid with the consent of the department of insurance.

Contingent equity instruments

30. Another form of contingent financing is a catastrophe equity put. The put gives an insurer the right to sell a specified amount of its stock, most often common stock, to investors at a predetermined price if catastrophe losses surpass a specified trigger. The insurer thus faces counterparty risk and change in control risks in this type of transaction. In addition, the company faces a risk as to whether the insurance supervisor will approve such a change of control. The counterparty risk can be minimised by collateralisation and the change in control risk can be mitigated by the issuance of preference stock instead of common shares.

31. Again there are significant drawbacks to equity puts. Investors face the risk that they will end up owning or controlling shares in an insurer that is no longer viable. The risk can be minimised by allowing for the exercise of the put only within certain loss limits. Moreover, investors also bear the risk of downward price movements in the insurer's stock.

Insurance-linked securities

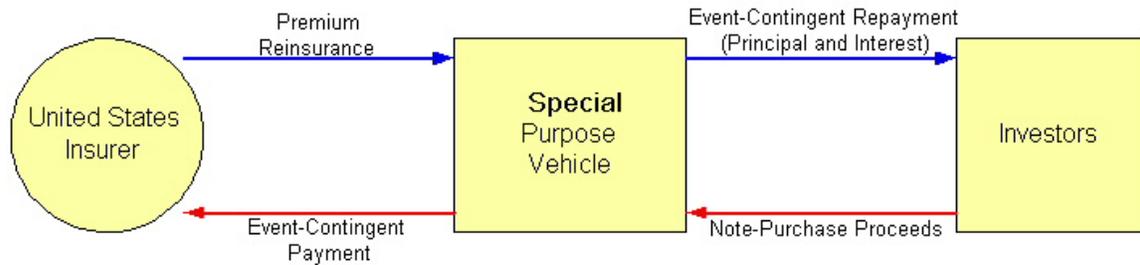
32. ILSs transfer risk from the originator of the transaction to capital market investors. While most of ILS activity has involved the transfer of catastrophe risks to the market, other types of risk are also thought to be ripe for securitisation. These include personal lines in automobile and homeowners insurance, workers' compensation coverages, political risk exposures and D&O coverages, as well as life and health insurance.

A catastrophe bond

33. CAT bonds evolved in the mid-1990s to provide additional capacity to insurers and reinsurers. Following Hurricane Andrew in 1992 and the Northridge Earthquake in 1994, property catastrophe reinsurance became scarce and for some insurers unavailable. Pricing skyrocketed when available at all. That experience caused firms to explore alternatives.

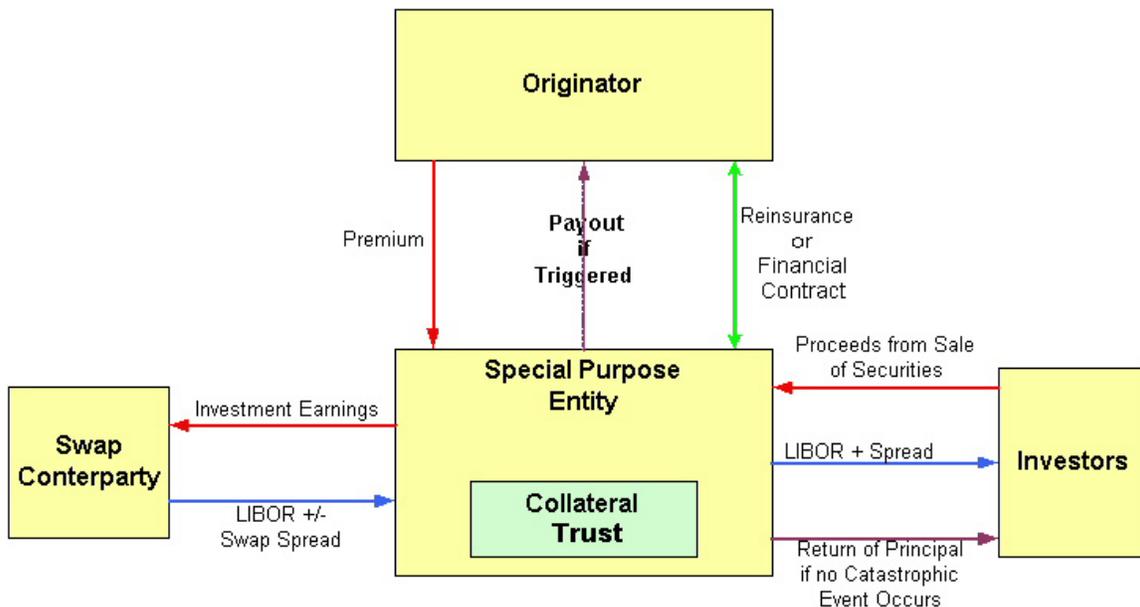
34. Based on the experience with asset-backed securitisations, the following figure illustrates what a simple insurance-linked securitization might look like:

A Simple Insurance-Linked Securitization



35. The fundamentals of CAT bond are simple: A firm transfers a portion of its catastrophic risk to the capital markets by issuing a taxable bond. The return of principal on CAT bonds is tied directly to the occurrence of low probability/high severity catastrophic events such as earthquakes and hurricanes. Some bonds are principal-protected in the sense that the originator may pay back all or part of the principal over a number of years after the catastrophic event. Others put the entire amount of principal at risk.

A Typical Catastrophe Bond Structure



36. Depending on the amount of risk transferred, the bonds will either be rated as investment grade or non-investment grade. The rating is established by independent rating agencies that make their own assessment of the amount of risk that the bonds are subject to. The interest rate on the bonds will depend on the ratings from these rating agencies. Of course, the risks can be sliced into different tranches, each with different terms and with different ratings. The interest rates

have ranged from 2.5% to 15% above LIBOR (currently about 4%) depending on their ratings. Recent issues have also used EURIBOR rates as benchmarks.

37. The specific components of the transactions are looked at further:

The contract between the originator and the SPV: The issue of whether a reinsurance contract or a financial contract is appropriate is discussed in paragraph 45. Under the terms of the contract, the originator pays a premium – in the case of a reinsurance contract, the premium is the equivalent to the rate-on-line for a typical reinsurance construct – to the SPV.

The SPV and the investors: The SPV sets up a collateral trust. Funding for the collateral trust comes from the investors in the CAT bonds issued by the SPV. These bonds offer an interest coupon equal to:

- LIBOR plus or minus the swap spread³; plus
- The premium or rate-on-line paid into the SPV by the originator.

The return of principal to investors under the terms of the notes is usually dependent on the amount of CAT-related obligations owed by the SPV under its contract with the originator. A number of transactions have provided for the repayment of all or part of the principal (with or without interest) even after an SPV has paid out all of its funds to the originator for claims stemming from qualifying event. Not infrequently, such principal repayments are begun at a pre-specified future date, with payouts ranging over a period of time.

The swap contract: The proceeds from the investors, now placed in the collateral trust, are then invested in high credit quality assets. The specific types of assets that qualify are generally the subject of negotiation between the originator, the placement agent, and the rating agencies. There is inevitably a difference between the market interest rate on these assets over the time of the bond and the spread required by investors when the bond is closed. In order to ensure that investors are paid a market interest rate, a counterparty is engaged to swap the investment earnings on the collateral to LIBOR plus or minus the swap spread. The amount of the spread above or below LIBOR depends on the type of swap, the identity of the counterparty, and the credit quality and investment yield earned on the assets.

38. There are at least two types of swap arrangements that are in use in these types of transactions. The originator generally makes the choice, depending on his risk preferences.

- a basis swap converts the interest earned on the collateral investments to a LIBOR or EURIBOR basis, but the originator retains the credit risk of the underlying assets as well as the risk of assets being liquidated at a value below par (known as “collateral liquidation/spread risk”).
- a total return swap also converts the interest earned to a LIBOR or EURIBOR basis, but the swap counterparty assumes the credit risk and the liquidation/spread risk of the underlying assets. In essence, the swap counterparty guarantees both the LIBOR or EURIBOR based interest rate and the full return of principal. Thus, principal default would occur only if both the counterparty and the collateral defaulted.

³ The swap spread results from swapping the interest payments on the assets in the collateral trust with the swap counterparty.

39. Non-insurers have also taken advantage of transferring insurance-linked risks into the capital markets.

The Tokyo Disneyland transaction: The owner and operator of Tokyo Disneyland is Oriental Land Co. (hereinafter “Oriental”), a non-insurer. Tokyo Disneyland is built to withstand a powerful earthquake. But such an earthquake would greatly disrupt its flow of visitors. Accordingly, Oriental issued two separate CAT bonds. A Cayman-incorporated SPV issued \$100 million in floating rate notes for a five-year period.

Payments are based on parametric triggers (see paragraph 61 for explanation) related to magnitude, location, and depth of a quake. Oriental also originated a second issue of \$100 million in floating rate extendible notes that, when parametrically triggered by an earthquake, provide capital following the business disruption caused by the earthquake. Recently, Vivendi also issued a direct securitisation.

4. Transformer vehicles

Special purpose vehicles

40. All insurance-linked securitisations face the same issue: the originator wants to purchase loss coverage with the same regulatory, accounting, and tax treatment as reinsurance. Investors however are generally not licensed to sell insurance or reinsurance products and are more interested in purchasing capital market securities. Hence, each securitisation must find a means for transforming reinsurance payments into capital market returns. Historically, this transformation has been achieved through use of a Special Purpose Vehicle (“SPV”).

41. In a typical CAT bond, the originator enters a reinsurance or financial contract with a Special Purpose Vehicle (“SPV”, sometimes also referred to as a Special Purpose Reinsurance Vehicle of “SPRV”). The originator pays premiums to the SPV in order to purchase reinsurance protection.

42. The SPV will be a fully-funded, bankruptcy-remote entity, most likely domiciled in a jurisdiction with favourable tax and regulatory environments. The SPV serves to transform the reinsurance premium into insurance-linked securities sold to investors. While the entire SPV represents the reinsurance security, it is capitalised with only a small amount of common equity. The common equity is typically not at risk and is often assigned to a charitable trust as one more indicia of separation between originator and SPV. It is essential to ensure that the SPV is tax neutral. While in the United States the NAIC has adopted a model law for insurance-linked SPV’s, and at least the States of Illinois, Maine and South Carolina have enacted the model law, a domestic U.S. facility simply is not economically feasible under current tax law. Only in certain jurisdictions can the funds provided by investors be protected from taxation. In the U.S., for instance, thin capitalisation rules and other tax rules make tax neutrality unlikely.

43. For firms that report according to U.S. Generally Accepted Accounting Principles (“GAAP”), a preference share tranche of at least 3% is often included in order to avoid consolidation under GAAP. It should be noted that at the time of writing the consolidation rules are being reconsidered. The preference shares usually have principal and interest components like the notes. The spread is often higher however given that these shares are usually structured to take a hit on a “first dollar loss” basis. In other words, after a qualifying event, preferred

shareholders would suffer losses before the investors in the bonds would lose anything. For this reason, preference shares may pay higher coupon rates than the notes and would be sold to specialist investors. The spread is generally 1% to 1.5% wider than for the remainder. The remainder of the SPV's capitalisation consists of capital raised through the issuance of notes.

44. The SPV may have to obtain an insurance license for an additional fee and may be subject to insurance department regulation in its domicile. Whether a license is necessary or not is determined by the contractual arrangements between the originator and the SPV.

45. The type of contract between originator and SPV will be determined by a legal analysis of the risks transferred. In the US, the form of trigger for the securitisation (see section 5) may have a significant effect. Typically, if the transaction is indemnity based, then a traditional reinsurance contract will be entered into between the originator and the SPV. If, on the other hand, the transaction is parametric or index based, the contract will be of a financial nature. Hence, if it is reinsurance, the SPV will generally need to be licensed as a reinsurer in its domicile. Such a license might not be required when the contract is financial in nature. These issues arise in the regulatory section.

46. The SPV exists solely for the purpose of covering the particular catastrophic losses. If the specified event does not occur, the SPV is obligated to pay principal and interest on the bonds. If the specified event occurs, the SPV is obligated to pay losses under the contract and not obligated to pay principal and interest on the bonds, in whole or in part.

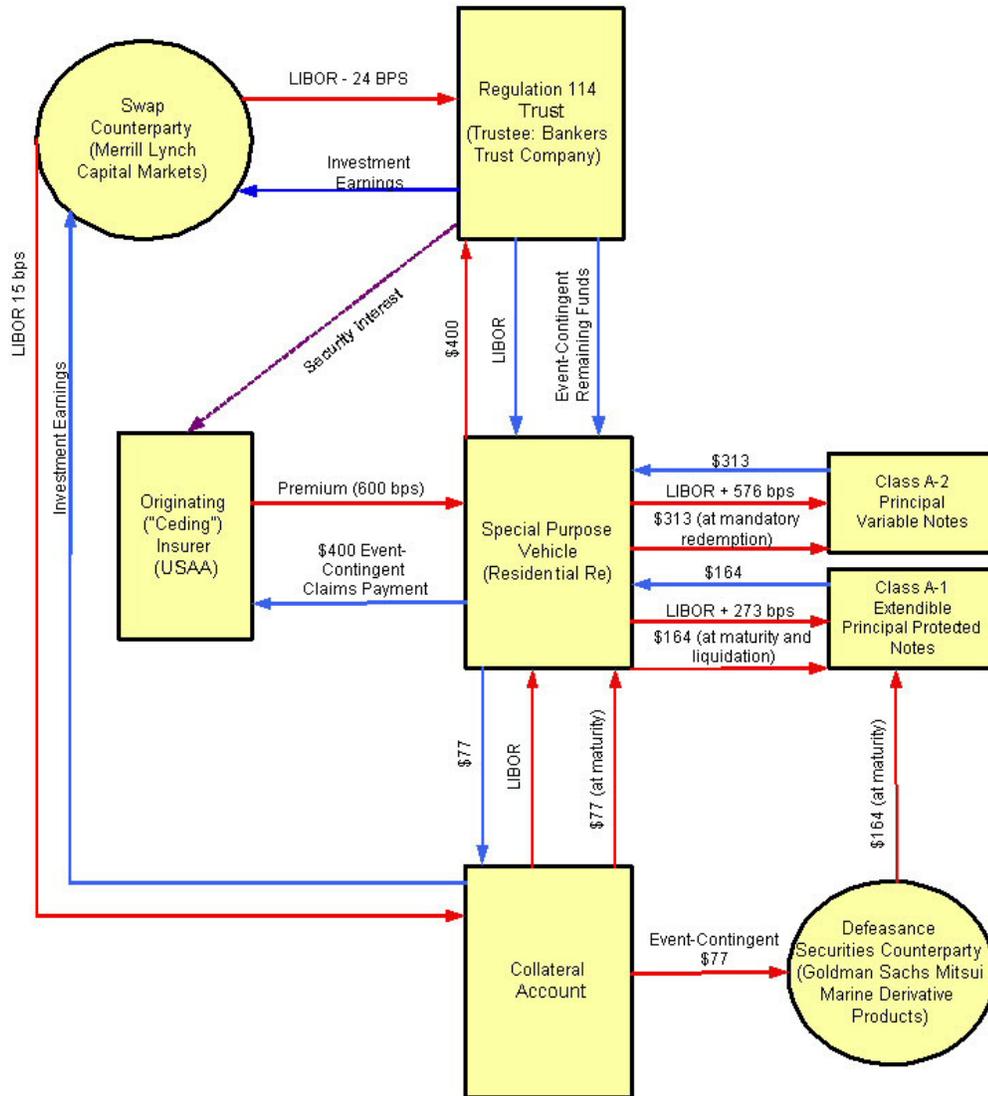
47. The SPV's obligations under the reinsurance or financial contract are collateralised by the proceeds from the sale of CAT bonds to investors. These funds are then invested in a trust and often swapped into a floating LIBOR-based rate of return with appeal to investors. The sum of the LIBOR-based rate of return plus reinsurance premiums paid by the originator to the SPV would in turn be paid to investors as coupon on their investment in the CAT bonds. In the event that the specified catastrophe occurs, funds in the collateral trust would be paid to the originator, thus reducing or eliminating the amount in trust available to be returned to investors at bond maturity.

48. One of the first securitisations of catastrophic risks was originated by USAA in 1997. The format employed by USAA -- commonly referred to as the Residential Re transaction, the registered name of the SPV employed by USAA -- has become a model for most CAT bond transactions since. A description of the transaction follows. Since then, U.S. quake risks in California and the Midwest, U.S. wind exposures, Japanese quake and typhoon exposures, French windstorms -- all have been the subject of successful CAT bond issues. As an alternative to the issuance of CAT bonds, some recent transactions have extended the concept to the use of options on CAT bonds. The Allianz transaction, described below is an example of such a transaction.

An illustration: The Residential Re transaction. In 1997, USAA originated a securitisation of \$477 million in CAT bonds, representing 80% of \$500 million of its aggregate losses from an East Coast hurricane in excess of \$1 billion in one year. One tranche, \$164 million in AAA rated notes, was principal-protected at LIBOR plus 273 basis points. The other tranche,

\$333 million in BB rated notes, placed both principal and interest at risk at LIBOR plus 576 basis points. The cost of the transaction to USAA was the equivalent of a 6% rate-on-line plus transaction fees of another \$10 million or so. The transaction is more fully described in the following figure, which also illustrates the complexity of some real-life transactions:

The Residential Re Transaction



An illustration: The Allianz transaction in CAT bond options. In 1999, Allianz, the German insurer, originated a three-year CAT bond option for European wind and hail exposures. Gemini Re, a Cayman SPV, facilitated the transformation of \$150 million in losses in excess of DM360 million into a put option for CAT bonds from investors. The investors receive a commitment fee. The trigger is reset

annually in order to permit Allianz to maintain a 3.6% loss probability. Accordingly, Allianz manages to retain considerable flexibility in terms of its right, but lack of obligation, to acquire coverage from the option holders. Such flexibility can be extremely valuable given the high volatility of retrocessional alternatives. Other insurers and reinsurers have engaged in similar “optionable” deals.

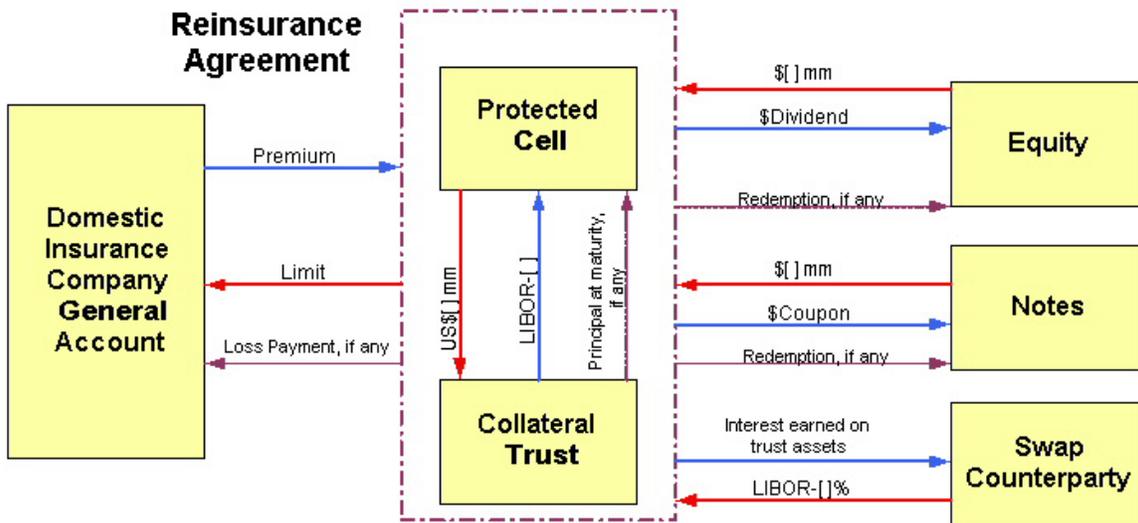
Protected cells

49. Instead of an SPV, an originator can use a protected cell structure within the originating insurer to accomplish insurance-linked securitisation. Though statutory in nature, a protected cell does not give rise to a separate corporate entity. However from a regulatory standpoint, additional cell capital requirements may be imposed. An existing insurer or reinsurer contributes assets to a protected cell within its existing corporate structure and, by law, the cell segregates these assets from the remaining general assets of the company. The assets within the cell are only available to creditors of the protected cell. In those jurisdictions that have passed protected cell legislation, the intention of the legislation is that other creditors must assert their claims against the remaining general assets of the firm, but not against the assets within the protected cell, while protected cell creditors must also only assert claims against the protected cell as opposed to the general account. These positions have not been tested in court as yet.

50. In the United States, the protected cell is regulated separately for solvency and can only operate with the prior approval of a plan of operation by the insurance regulator. Because there is no separate corporate entity however, the protected cell is thought to overcome the tax drawbacks of a domestic securitisation. The entire tax status and bankruptcy-remoteness of protected cells remains untested and uncertain in the United States however.

51. Other jurisdictions have also adopted the protected cell approach. Guernsey was in fact the first jurisdiction to bring in general legislation which allowed companies to incorporate as protected cell companies with one or more cells. Some jurisdictions with legislation allowing companies to incorporate as protected cell companies may like Guernsey, require prior approval for new cells. In Guernsey, a captive insurer can effect a securitisation through the use of a protected cell for instance. Like in the US, the protected cell is regulated separately for solvency and can only operate with the prior approval of a plan of operation by the insurance regulator. Royal Bank of Scotland, for example, has applied a protected cell approach both to the conversion of insurance into ISDA (“International Swaps and Derivatives Association”) products and to a synthetic securitisation of a portfolio of derivative products.

Protected Cells as Transformer Vehicles

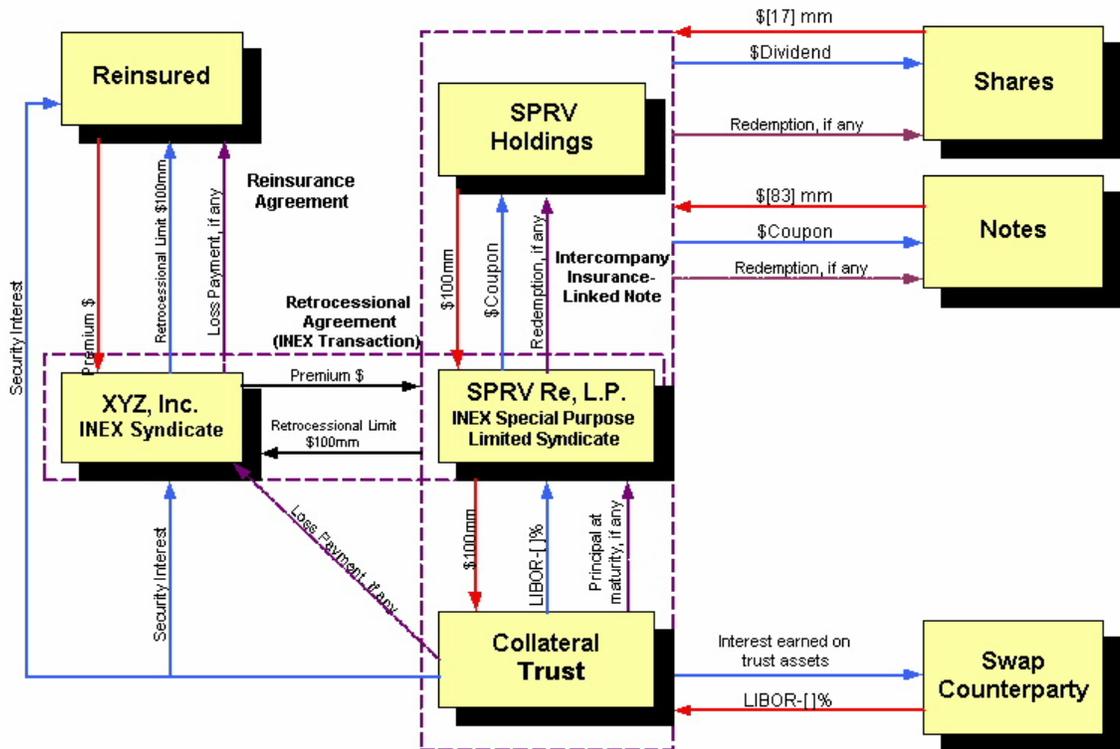


Special purpose limited syndicates

52. As a further alternative to the use of SPV's or protected cells in insurance-linked securitisations, the Chicago-based INEX exchange offers special purpose limited syndicates ("SPLSs"). The INEX Board of Trustees and the Illinois Department of Insurance must approve each transaction and each exercises oversight over INEX transactions. An insurer can launch a securitisation by transferring the particular risks to a full member INEX syndicate. That syndicate then retrocedes the risks to an SPLS, which in turn sets up a collateral trust account to secure its obligations.

53. The minimum capitalisation of the SPLS is \$30,000. While subject to U.S. federal and state income taxes, the SPLS is not subject to premium taxes. Under regulations issued by the Illinois Department of Insurance, investors are not in the business of insurance solely for investing in this type of a transaction. The trust must be administered in Illinois and all assets must be located in Illinois.

An INEX SPLS as Transformer Vehicle



In 2000, Vesta Fire Insurance Corp. securitised a \$50 million layer of property loss exposures. The following is a description of the transaction:

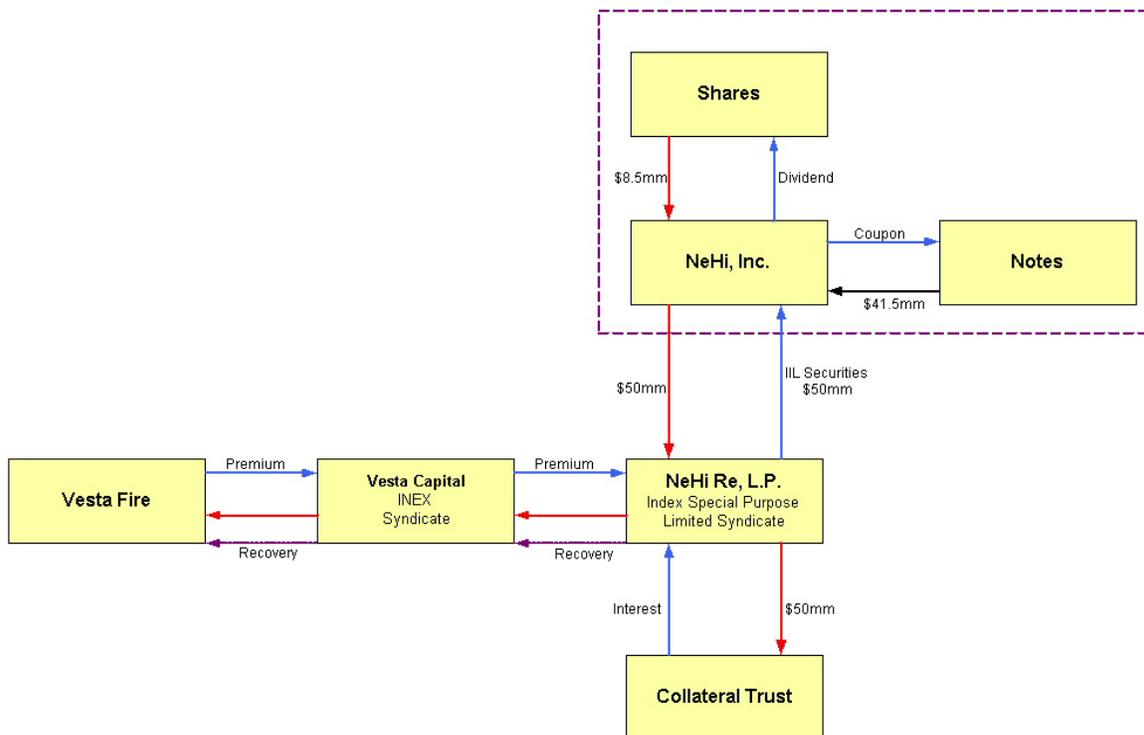
An INEX illustration: The Vesta transaction: In March of 2000, the INEX Insurance Exchange announced the formation of Vesta Capital Insurance Syndicate, Inc. (hereinafter "Vesta

Capital"), a new underwriting syndicate member owned by Vesta Insurance Group (hereinafter "Vesta"). The INEX Board of Trustees and the Illinois Department of Insurance had approved Vesta Capital for

membership. Vesta Capital was capitalised at \$30 million. In July of 2000, Vesta Fire Insurance Company, a wholly-owned subsidiary of Vesta Insurance Group, completed a \$50 million securitisation of property loss exposures to Northeastern United States hurricane exposures and Hawaiian storms. A SPLS named NeHi Re

facilitated the transaction, which involved \$8.5 million in equity investments and \$41.5 million in ILSs. NeHi Re's obligations are fully secured by a fully funded trust agreement. If an event occurs (i.e. a hurricane or storm) and it meets certain computer modelled expectations, payments are made.

The Vesta Transaction



5. Loss triggers

54. The trigger is probably the single most significant design feature of a CAT bond. It determines how the originator of the transaction recovers its losses after a catastrophic event. While a reinsurance contract generally indemnifies a cedent for actual losses, CAT bonds can be structured with non-indemnity types of triggers such as parametric or industry-wide loss triggers.

55. In designing a particular trigger for an intended transaction, an originator must consider two types of risks:

- “tail risk” arises because claims can continue to develop and increase above the amount paid and reserved at the end of a loss development period. Investors usually limit that loss development period to no more than 18 months by providing for a commutation of all losses thereafter to the originator. The Northridge earthquake provides an excellent example of how significant tail risk can be. In February of 1994 for instance, industry losses from the

quake were estimated at \$7.3 billion. By July of 1995, the final estimate had reached \$12.5 billion.

- “basic risk” is associated with differences between the originator’s actual losses and the amount of losses indicated by the trigger. This type of risk doesn’t exist in transactions that apply an indemnity trigger because the pay-outs match the actual loss.

The two types of risk can of course work either for or against an originator.

56. There are methods for an originator to mitigate, but not eliminate, tail risk and basis risk. To mitigate tail risk, an originator can proceed in one of two ways:

- the firm can enter into a reinsurance contract of unlimited duration with a reinsurer. Most likely, that reinsurer would then wish to transform that risk by securitising all or a portion thereof with an indemnity- or an index-triggered securitisation.
- alternatively, an originator can enter into a specific tail risk reinsurance contract with an SPV in conjunction with its own indemnity-triggered securitisation.

57. To mitigate basis risk, an originator can either:

- purchase indemnity reinsurance from a transformer or a fronting reinsurer, which then proceeds with an index-triggered securitisation of the associated risk; or
- proceed with a direct index securitisation with additional reinsurance for basis risk.

Every securitisation involves a further type of risk, namely “model risk”. Modelling methodologies and technologies of an extremely complex nature are an essential part of each of these transactions. Hence, the assumptions regarding the model’s choice of variables for specification, the sensitivities of these variables to various assumed conditions, and the existing correlations among these variables, are of vital importance to matching the model with the reality of catastrophic loss for a particular originator. One might add that thoughtful, careful, and thorough modelling under a wide variety of conditions and assumptions is also an excellent way to minimise excessive basis risk.

Indemnity triggers

58. An “indemnity” trigger links recovery to the actual loss incurred by the originator. The bond’s attachment, defined as the point where insured losses exceed an amount certain, determines when the principal invested begins to be tapped. The exhaustion point is reached when the principal has been fully tapped. The entire process is modelled of course so as to generate investor interest. Hence, an indemnity trigger creates model risk and tail risk but no basis risk. Indemnity triggers, while seemingly simple and attractive from an originator’s point of view, actually also entail an additional risk: an indemnity trigger adds a potential liability risk because of the risk of failing to fully disclose in the offering documents all possible underwriting factors that may cause a loss, thereby resulting in legal disputes post-event.

59. A further drawback to an indemnity trigger is the potential for adverse selection. Since the particular risk zones that are part of the securitisation are typically selected and agreed upon in advance, while of course an ongoing flow of risks in and out of the zones in to the normal course

of business continues, investors tend to become concerned about the quality of the business flow. Moreover, investors tend to have concerns regarding the claims settlement process. Indeed, with an indemnity trigger, incentives favouring moral hazard or sloppy claims handling might in fact be created. Claims can be inflated or at least not carefully scrutinised when losses reach into the layer covered by the securities. Hence, it is common to find investors demanding shared participation by the originator in the transaction so as to align the interests of the two parties. 10% plus from attachment to exhaustion usually satisfies investors' concerns.

Index triggers

60. Instead of an indemnity trigger, a securitisation can be structured with an "index" trigger. The trigger links the monies recovered by an originator from investors after a catastrophe to an insurance index (e.g., the Property Claims Service index, the Guy Carpenter index). Complex modelling is used to establish a significant correlation between the behaviour of the index and losses that can be expected from the originator's portfolio of risks after a specified event. The idea is to establish a match between the actual losses likely to be incurred by the originator after the event, the amount to be recovered from investors, and the distribution of losses by those firms that report losses to the index company to make up the index. In order to achieve such a match, the originator's distribution of business must bear some similarity to the distribution of business for the firms within the index. Index triggers generate both tail risk and basis risk.

Parametric triggers

61. A "parametric" trigger links recovery to the physical characteristics of the event that causes the losses (e.g., hurricane intensity, earthquake magnitude). Losses from the event may or may not match actual losses incurred but, since event parameters are quickly available, parametric triggers generate basis risk but no tail risk. Parametric structures are unlike other triggers. Clearly they add an increased risk of actual losses not matching recoveries. Basis risk tends to go up in these types of transactions therefore. Moreover, the modelling is very different because the probabilistic loss distributions are based exclusively on the physical parameters of the event. Whether quality underwriting or efficient claims management occurs after the event is irrelevant. Hence, unlike in the case of indemnity or index triggers, underwriting or claims practices need not be disclosed to investors. Lower disclosure needs also lessen the likelihood of potential litigation with investors. By the same token, rating agencies and investors scrutiny of the transaction is lower. Parameters tend to be more transparent and objective than indemnity or index calibrations. Hence, investors generally prefer this type of structure. This preference usually is reflected in slightly lower yields being needed to make the deal work.

62. In the Tokyo Disneyland transaction (discussed in paragraph 33), the payout is dependent solely upon the magnitude, location and depth of an earthquake, not on actual property damage. There are in fact two transactions, referred to as Concentric, Ltd. and Circle Maihama, Ltd. Concentric, Ltd. provides Oriental Land (the owner of Tokyo Disneyland) with earthquake-contingent capital, while Circle Maihama, Ltd. provides it with earthquake-contingent financing. In both cases, there are three rings around a central point at the centre of Tokyo Disneyland. The Inner Circle has a radius of 10km, the Inner Ring a radius of 50km, and the Outer Ring a radius of 75km. In order to trigger coverage, an earthquake with an epicentre within the Outer Ring and with a depth of less than or equal to 101km must occur. In the case of Circle Maihama, Ltd. the contingent financing is triggered if the magnitude of the earthquake is at least 6.5, 7.2 or 7.6 on the Japanese Meteorological Agency (JMA) scale for the inner circle, inner ring, and outer ring respectively. In the case of Concentric, Ltd. the principal payout is on a sliding scale depending on the JMA magnitude, and in which radius the epicentre lies. For the inner circle, the payout

ranges from 25% at magnitude 6.5 to 100% at 7.5, for the inner ring it is 25% at 7.1 up to 100% at 7.7, while for the outer ring it is 25% at 7.6 up to 100% at 7.9.

Modelled loss triggers

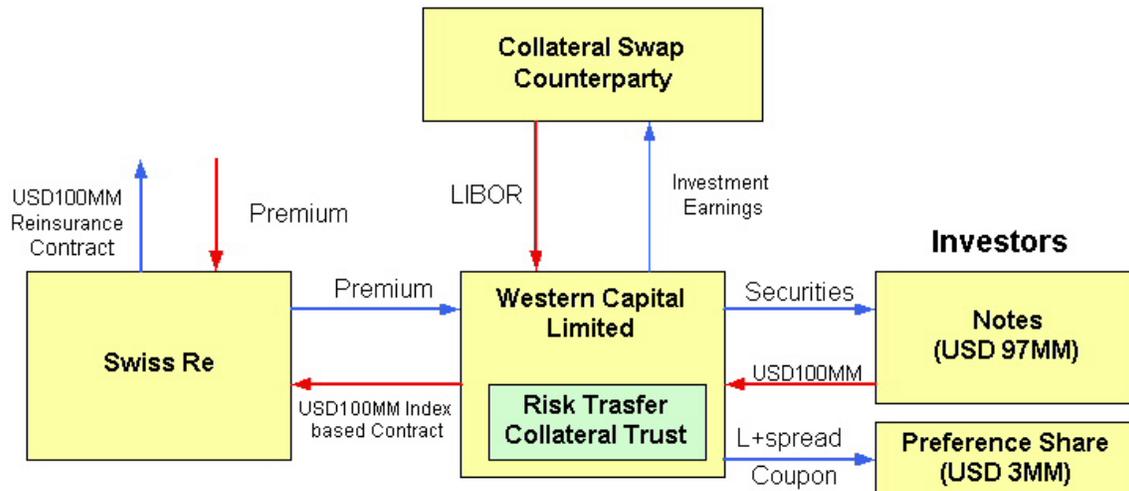
63. A “modelled loss” trigger resembles both an index and a parametric trigger. The originating firm’s portfolio is stored in a modelling firm’s risk model. When the event occurs, the modelling firm calculates the modelled loss on the portfolio by using the physical parameters of the event. Hence, location and magnitude, for instance, determine the model’s payout.

An illustration of a modelled trigger transaction: The St. Agatha Re transaction. Hiscox Syndicate 33, one of the larger Lloyd’s syndicates, recently entered into a catastrophe bond transaction designed to protect it against a major earthquake either in California or in the New Madrid region of the US. The bond secures up to US\$33 million of property losses excluding liability over three years until April 15, 2005. The bonds were priced at 675 basis points over LIBOR and rated BB+ by Standard & Poor’s. The deal uses a modelled loss index as the trigger, and the index is based on two industry models run by Risk Management Solutions (RMS) that measure insurance industry exposure in the two zones. The Qualifying Event trigger is parametric but the purpose of this is merely to set a realistic trigger for a loss calculation, i.e. to eliminate the numerous small earth tremors but to set the level well below the magnitude where significant losses occur. It is only earthquakes of magnitudes above 7 where losses are likely to occur to the bond. So the parametric element of the trigger has been set at a low enough hurdle that it has no influence on the expected loss of the bond. If the event were deemed to qualify RMS would then use the fixed model to calculate estimated insured losses for the notional industry portfolio. If the Index Loss calculated exceeded certain dollar amounts then a loss payment would be triggered. The loss payment amount is on a predetermined sliding scale based on the Index Loss. The earthquake exposures of Hiscox Syndicate 33 are only relevant to the extent that the syndicate must have experienced losses of at least the amount paid under the reinsurance agreement with St Agatha Re.

Hybrid triggers

64. While indemnity triggers provide the closest match between an originator’s risk and its capital markets protection, non-indemnity triggers allow an originator to avoid detailed information disclosure in an offering memorandum. Because of heightened concern pertaining to the potential legal liability associated with erroneous disclosures in such a memorandum, some originators opt for a hybrid approach to securitisations. An originator enters into a traditional indemnity-triggered agreement with a **transformer vehicle**, which in turn transfers the risk to capital market investors by using an index-triggered securitisation. The use of the transformer adds 1% to 1.5% to the cost of the transaction. The recent Western Capital transaction provides an example of this type of approach.

The Western Capital Transaction



An illustration of a transformer: The Western Capital transaction. The California Earthquake Authority (“CEA”) entered into a reinsurance contract with Swiss Re for \$100 million in CAT coverage. Swiss Re then entered into a financial contract with a Bermudian SPV, Western Capital Limited. Investors were given LIBOR plus 5.1% notes. A 3% tranche of preference shares was priced at LIBOR plus 6.35%. The financial contract is tied to an

industry-wide trigger of California earthquake property losses, once the losses exceed a certain level. Swiss Re retained the basis risk between the indemnity-based reinsurance contract and the index-based securitisation. The CEA thus managed to avoid detailed public disclosures regarding its operations. Moreover, as a quasi-public body, the CEA managed to avoid any direct links between itself and an offshore entity such as the SPV.

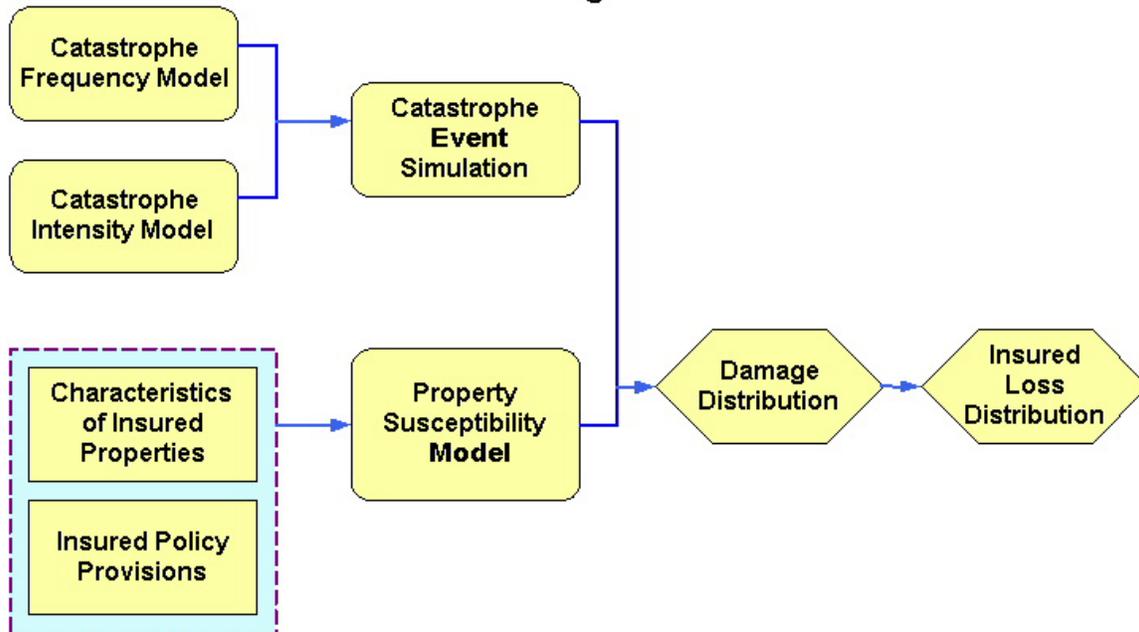
6. Participants to the securitisation process

Modelling agencies

65. Independent modelling is a crucial component to providing investors with confidence in the level of risk involved in the investment. Modelling firms provide an analysis of the risk. A number of companies are in the business of providing these services such as Risk Management Services Inc., EQE International Ltd., and Applied Insurance Research, Inc.

66. From a practical standpoint, it is extremely helpful to an originator to know that the major rating agencies have done extensive examinations and testing of the modelling firms’ models, and hence, a transaction can be brought to a successful closing more efficiently when one or more of these firms’ models is employed.

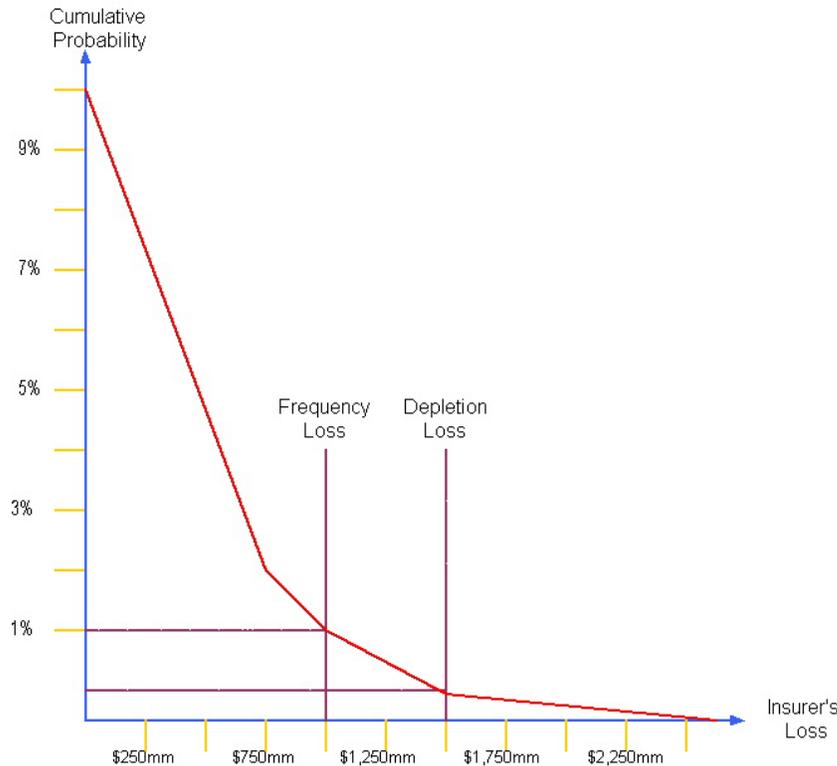
The Modeling Process



67. The risk analysis results also become a major component of the analysis performed by the rating agencies. Moreover, the modelling firm also provides a number of the key ingredients for the ultimate offering circular for the transaction. Of utmost significance is the loss-exceedance curve developed by the modelling firm. The following is an example of loss exceedance curve developed for the Residential Re transaction⁴:

⁴ See also Laurenzano, V. L. and Latza, W. D., *Securitisation of insurance risk*. Insurance Securitisation Educational Program of the National Association of Insurance Commissioners, San Francisco, December 4, 1999.

Loss Exceedance Curve: An example



68. The loss exceedance curve is the result of repeated simulations of catastrophic events on the insurer's book of business. It tracks the cumulative probabilities of losing various amounts of insured losses from catastrophic events for this particular book of business. It also provides the benchmarks that rating agencies and investors will wish to examine:

- the frequency loss, reflected by the exceedance probability at the point of attachment in the reinsurance contract, provides an answer to the question: "What is the likelihood that the investors will lose any money?"
- the depletion loss, reflected by the exceedance probability at the point of exhaustion in the reinsurance contract, provides an answer to the question: "What is the likelihood that the investors will lose everything?"
- the expected loss, reflected by the product of frequency and severity along the exceedance curve, provides an answer to the question: "How much is an investor expected to lose on average?"

An illustration of the use of modelling.

Assume for example that the originator of a securitisation is faced with the loss exceedance curve described in Figure 67. Assume that it wishes to purchase reinsurance for a hurricane event for a single year, with a 20% co-insurance clause. Assume further that the originator is

satisfied with a BB rating, that the one-year frequency loss has a 1% probability, the one-year depletion loss has a 0.30% probability, and the one-year expected loss has a probability of 0.60%. Then the reinsurance contract must provide coverage for 80% of \$500 million of aggregate insured losses (subtract \$1.0 billion from

\$1.5 billion along the Loss axis) from a single hurricane in one year. The 1% exceedance probability at the attachment point of \$1 billion means coverage for a 1 in 100 year event. The 0.30% loss probability at depletion means that investors have 1 in

333 chance of losing all their investment and a 1 in 100 chance of losing some of their investment. The average aggregate expected loss for investors is \$2.4 million (i.e., $0.006 \times (0.8 \times \$500 \text{ million}) = \$2.4 \text{ million}$).

Rating agencies

69. While a number of different rating agencies rate ILSs, a rating from at least one of either Moody's or Standard & Poor's is critical. A second rating will still be necessary but a rating agency such as Duff & Phelps/Fitch IBCA can be an alternative. CAT bonds are subjected to the same rigorous ratings methodology and stress testing as traditional fixed income securities. The rating process will include an extensive analysis of potential default and recovery rates. Most CAT bonds have been rated in the BB range, though some have been B, BBB, and higher.

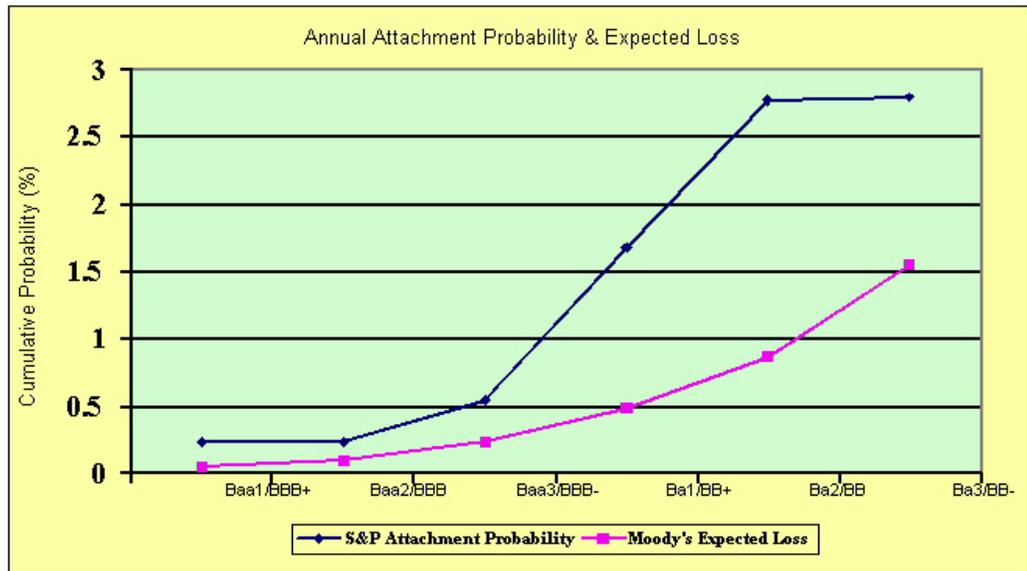
70. The rating methodology and testing tend to focus on matters such as (1) the justification for the historical sampling period used and the sensitivity of results to using other assumptions; (2) the reliability of the historical data sets; (3) the sensitivity of results to varying event parameters. The rating firms will also consider (4) the terms and structure of the transaction; (5) the attachment points, the expected loss, and the confidence intervals around mean probabilities; (6) if an indemnity transaction, the underwriting guidelines and historical loss experience, claims handling practices, and reserving practices; (7) the bankruptcy remote status of the SPV; (8) the investors' priority over other creditors of the SPV; (9) the credit rating of the counterparty to the swap; and (10) the credit quality of the collateral.

71. Before reaching a final rating, the rating firm will also make a comparison of the security's risk characteristics with those of other rated bonds. In this respect, the attachment probability of a CAT bond is treated similarly to credit default probability of an ordinary bond and the expected loss of the CAT bond is similar to the assumptions regarding the recovery amounts of an ordinary bond.

72. Rating agencies differ in their approach to rating CAT bonds:

- Standard & Poor's focus is on attachment probability. The firm puts a BBB+ ceiling on CAT bond ratings.
- Moody's focus is on the expected loss. While it does not impose a specific ceiling on CAT bond ratings, the firm does perform extensive sensitivity analysis with its own proprietary models.
- Fitch's focus combines both the attachment probability and the expected loss. The firm requires 95% and 99% confidence intervals for both parameters from the modelling firm.

Differences in Ratings Approaches for CAT Bonds: Moody's and S&P



S&P		Moody's	
Rating	1-Year Attachment Probability	Rating	1-Year E(L)
BBB+	0.23%	Baa1	0.05%
BBB	0.23%	Baa2	0.09%
BBB-	0.54%	Baa3	0.23%
BB+	1.67%	Ba1	0.48%
BB	2.77%	Ba2	0.86%
BB-	2.79%	Ba3	1.55%

73. From a rating standpoint, a securitisation is most feasible when the attachment point is in the supercat or top layers of exposure. The supercat layer with expected losses of 0.25% or less will usually attract an investment grade rating. The top layer, ranging from an expected loss of greater than 0.25% to 3.00%, will qualify for non-investment grades ranging from BBB to B. Working layers with an expected loss greater than 3.00% generally are too risky for capital markets investors. These markets more closely resemble equity markets but with few investors and practically no liquidity.

74. Second event securitisations are also feasible. These provide protection for future events after a single event, or series of events, exhausts the originator to a predetermined level. Typically, coverage is for events with a 1 in 200 or a 1 in 250 year probability. Once triggered, this structure provides protection attaching above the remaining and reinstated layers for any subsequent events. These bonds are attractive to investment grade investors since they cannot experience a loss until after a significant event has already occurred. Market capacity is about \$800 million and an equivalent rate-on-line is about 1.5% to 2.0%.

Other participants

75. Compared to traditional reinsurance, a CAT bond securitisation requires a significantly greater number of specialised professionals. A variety of different professionals are engaged largely to provide confidence and comfort to investors. The product of their efforts is a well-documented offering circular which details the risks and the operating mechanics of the securitisation. Key service providers include⁵:

- **Legal counsel:** In the typical transaction, the underwriter of the securities and the originator will retain separate legal counsel. The originator's counsel however generally also represents the SPV.
- **Indenture Trustee:** The trustee performs his obligations on behalf of the SPV, including the payment of principal and interest, the registration of the securities, and the maintenance of the collateral accounts.
- **Administrator:** The administrator acts on behalf of the SPV and facilitates general banking services, record keeping, filings and correspondence with regulators, and correspondence with investors relating to the securities or the swap.
- **Verification Agent:** The agent verifies the trigger and calculates the resulting principal reductions on the securities.
- **Loss reserve specialist:** the specialist performs an independent actuarial analysis whenever an index or an indemnity trigger is part of the transaction. He verifies loss reserves over the term of the securitisation and provides a commutation calculation at the end of the extension period.
- **Fiscal Agent:** The agent is responsible for the preference share tranche, including the book-entry system, the payment of dividends, and the redemption of the shares.

76. An illustration of transaction costs related to the various parties involved in a transaction follows⁶. The illustration is typical of a \$100 million securitisation of CAT risks:

Securitisation expenses	Upfront costs	Ongoing costs
Modelling costs	\$300,000	
SPV administrator	\$ 20,000	\$ 30,000
Claims review	\$ 50,000	
Loss reserve specialist	\$ 20,000	
Rating agencies	\$150,000	
Swap costs		\$ 50,000
Legal counsel (u/w)	\$400,000	
Legal counsel (f/a)	\$ 5,000	
Fiscal agent	\$ 10,000	\$ 20,000
Indenture trustee	\$ 40,000	\$ 25,000
Legal counsel (i/t)	\$ 15,000	
Legal counsel (tax)	\$ 25,000	

⁵ See Lehman Brothers, *ibid.*

⁶ See Lehman Brothers, *ibid.*

Fees	\$ 50,000	
Miscellaneous	\$ 50,000	
Total	\$1.1 million approx.	\$150k approx.

7. The purchasers

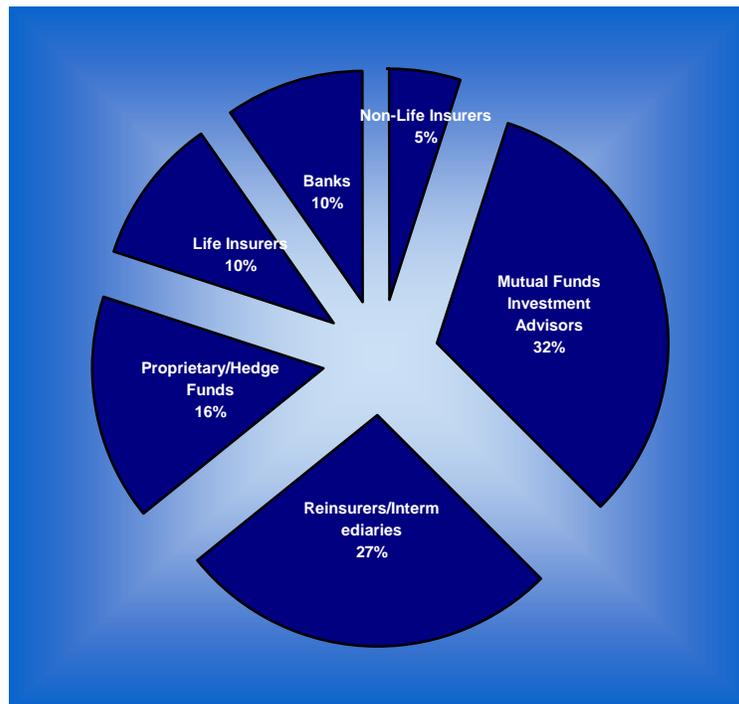
77. The investor base for CAT bonds continues to expand. This is particularly true for money managers, who are thought to be the most stable class of investors. The following classes of investors are frequent participants in these transactions:

- **Money managers:** These are the biggest players and include mutual and pension funds. They tend to be “value-added” investors. Liquidity is important to them, especially when participating in multi-year deals. Some are motivated purely by the spread, while others look for the portfolio effect.
- **Hedge funds:** Financing is a major consideration for these investors. They were larger players prior to the 1998 crisis precipitated by the implosion of Long Term Capital Management but can still be relied on for at least \$20 million per deal. Liquidity is the prime consideration.
- **International banks:** As a group, they generally invest \$25 to \$40 million per deal. They are motivated purely by the floating rate spread. Historically, they favour one-year deals but have recently also participated in multi-year transactions.
- **Dedicated CAT money:** This represents a fast-growing category of participants. Generally, these investors prefer single peril securities. They are also good candidates for common and preferred equity tranches.
- **Life insurers:** They are motivated purely by the spread and generally prefer multi-peril deals. Unlike traders, they buy and hold long-term and look for a “liquidity premium”. Because their investment portfolio is subject to regulatory oversight, the identity and quality of the rating is critical.
- **Reinsurers:** CAT bonds offer lower rated reinsurers the ability to participate in risk diversifications where they were otherwise previously excluded.

78. The distribution of investors for catastrophe securitisations underwritten by Goldman Sachs, for instance, is as follows⁷:

⁷ See Goldman Sachs, Presentation to the California Earthquake Authority, Property Catastrophe Securitisation, January 2002.

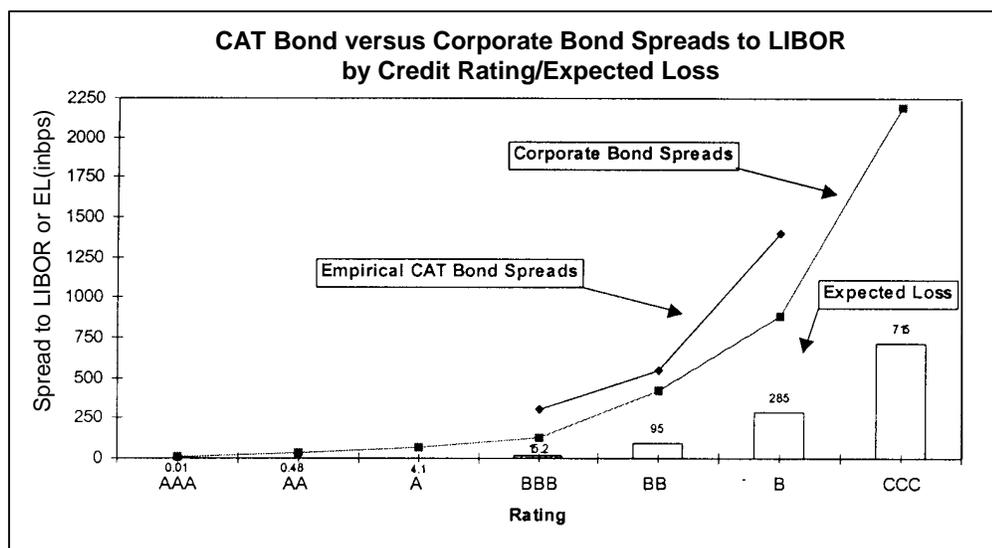
The Distribution of Investors in ILSs.



79. Recent problems in the credit markets have also worked in favour of a broader range of distribution opportunities, particularly since CAT instruments are considered to be uncorrelated to other market risks. Other reasons include the following:

- **Historical performance:** The performance of CAT instruments has matched the expectations and, to date, investors have not experienced any losses. Most offerings have been for risks with a 1% probability of loss or less.
- **Low volatility of spreads:** Risk spreads relative to other assets have remained stable.
- **More issuance of notes with longer maturities:** Early ILSs, like Residential Re, were one-year notes. More recent issues have 3 to 5 year maturities and there is talk of 7 to 10 year deals. Hence, originators can expect expense savings and investors can achieve lock-ins of attractive spreads for longer periods of time.
- **More securitisations allow for greater diversification:** Investors can now assemble a diverse portfolio of uncorrelated catastrophe risks without a disproportionate exposure to a single risk.
- **Attractive returns relative to similarly rated corporate securities:** CAT bonds have traded at significantly wider spreads than corporate bonds.

CAT Bond Spreads vs. Corporate Bond Spreads



80. Liquidity is also an important consideration for investors. Both the supply and the demand for investment grade securities are significantly larger than for below investment securities. Only a limited number of investors are permitted to invest in below investment grade securities. Hence, investment grade bonds have a broader market and more favourable rates, but are generally only available at the supercat and top layers or as second event coverage.

81. The current market capacity constraints for CAT bonds are about \$400 million for non-investment grade bonds (0.5% to 1.5% expected loss range) with terms up to about 5 years. Their equivalent rate-on-line (ratio of net cost to coverage limit) is in the 4.0% to 6.0% range in the current market. For investment grade securities (where the expected loss is less than 0.40%), capacity is about \$600 million with terms up to 5 years and with an equivalent rate-on-line of 2.0% to 4.0% depending on the investment grade. The largest catastrophe risk transaction in the capital markets was the June 1998 Residential Reinsurance II transaction at \$450 million.

8. Pricing

82. The offering spread is generally determined after a pre-pricing period in which potential investors have an opportunity to evaluate preliminary offering documents. Road shows, investor meetings, and “price talk” stimulate an assessment of what the market clearing level price might be. Factors such as similar transactions in the past, modelling results, the existing “risk bucket”, reinsurance rates, and theoretical price levels form the basis for the ultimate pricing of the securities. The typical timeline for taking a deal to market is about 12 weeks.

83. Risk may also be transferred to the capital markets by using other financial instruments such as options, futures, and swaps. Exchange-traded options are standardised and, in the past, included the Chicago Board of Trade catastrophe options based on the PCS catastrophe loss indices. The pricing of such exchange-traded instruments is clearly market driven, although subject to problems with thin-markets. Over-the-counter options can be tailored to meet the requirements of the parties, and will have negotiated spreads.

9. Company considerations

84. Since the purchase of reinsurance is usually a viable alternative to an insurance-linked securitisation, a potential originator must weigh the costs and benefits of either approach. The following are some of the factors to be considered.

85. **A firm can diversify from its reliance on the traditional markets:** An insurer, reinsurer, or other firm may find it prudent to diversify its sources of insurance and reinsurance capacity so as not to be fully dependent on the traditional market. ILSs permit firms to alleviate the impact of capacity constraints within the reinsurance market. Pricing and availability in the traditional reinsurance market are constrained by risk concentrations, by modest capacity based on \$186 billion in industry surplus, and by catastrophic events. Reinsurance pricing tends to be cyclical or spiked in nature. Capital markets can provide a stable alternative to reinsurance. It has been argued that capital markets can more readily absorb losses of USD 50-100 billion⁸, though that remains untested by the ILSs market. To date, there have been no major events covered by ILSs and investors have yet to react to the experience of losing all or part of the principal amount invested.

86. **A firm can find coverage for hard to place risks:** The traditional reinsurance market does not cover certain risks, such as financial risks (e.g. interest and exchange rate risk). Furthermore, repeated losses (e.g., losses from windstorms in Florida) have led to reinsurance becoming very expensive or totally unavailable. Securitisation can provide alternative capacity for the coverage of these difficult to place risks.

87. **ILSs can free up capital for more productive activities:** Capital to satisfy regulatory requirements can be freed up to support additional underwriting or to enhance returns on shareholders' capital.

88. **ILSs can provide multi-year cover at a fixed price:** Securitisations covering several years at a fixed price are now common, in contrast to reinsurance, which is usually priced annually⁹. This has a two-fold benefit:

- reduced exposure to the volatility of traditional reinsurance pricing

⁸ In 1992 Hurricane Andrew caused USD 19.6 billion of insured losses and could have caused more than USD 50 billion of insured losses had it hit Miami, only a few miles away. Since total reinsurance capacity in 1992 was approximately USD 200 billion, a USD 50 billion loss would have represented 25% of the industry's capital base at that time. It is also estimated that it would have caused insolvencies of 36% of US property/casualty insurers. In 1994 the Northridge Earthquake and in 1991 Typhoon Mireille resulted in USD 13.5 billion and USD 6.5 billion respectively. Ten insurers were rendered insolvent. This caused a doubling of reinsurance premium rates and a reduction in the catastrophe coverage available to primary insurers. Although reinsurance capacity in 1999 was estimated to be around USD 300 billion, insured values have also been rising due to growing population densities, increased wealth, and increasing concentrations of property in endangered areas. It is thought that a disaster on a similar scale to Hurricane Andrew today would cause considerably more damage and it is feared that the (re)insurance industry would not have the capital to meet another such disaster. The impact of the events of September 11, 2001 on the industry remain to be seen.

⁹ Multi-year reinsurance contracts of 2 or 3 years' duration are becoming more common. Nonetheless, securitisations still have an edge, given that securitised transactions of 7 to 10 years' duration appear to be feasible.

- lower the administration costs through amortisation and removal of the need to renegotiate a new reinsurance program every year. Fixed cost, such as underwriting fees, can be amortised over multiple years.

89. **ILSs can provide multi-peril, multi-line, multi-party, multi-jurisdiction, and multi-contract coverage:** Several perils from several parties, cutting across multiple lines in a variety of jurisdictions can be covered concurrently e.g., European wind and Japanese typhoons can be combined with U.S., Japanese, and Turkish earthquakes. Several drawbacks to such arrangements however also exist:

- the investors may want to be compensated for taking the risk that market conditions might change while they are locked in
- the underlying risks may also change over time, hence creating a need for periodic re-assessment or re-calibration.

90. **ILS can reduce disclosure requirements:** Compared with a traditional reinsurance contract, the submission requirements for substantiating a claim in a securitisation may be minimal, as in the case of non-indemnity triggers. This may result in cost reductions as well as litigation relief for the originator.

91. **ILSs can reduce credit risk:** The quality of reinsurance security is an important issue in assessing a ceding insurer's capacity to pay claims. Major catastrophes however exacerbate the risk of insolvency, and thus add to credit risk. A securitisation mitigates this risk because the potential claims are fully or partially (depending on the type of trigger) collateralised in the SPE. The money from the sale of the securitised instruments is invested in a fund established exclusively for the payment of claims.

92. **ILSs can reduce the likelihood of future contract disputes and can speed up the claims payments process:** Depending on the trigger, securitised transactions are expected to respond quickly and cleanly to a loss event. Unlike traditional reinsurance, where contractual disputes and delays in paying claims are not uncommon, ILSs generally have clear triggers.

93. **ILSs add competition and potential cost savings to reinsurance markets:** Costs are a major determining factor in the choice of a securitisation over reinsurance. The pricing of the security, together with the transaction costs, needs to be competitive. When reinsurance rates rise, as they did in the early 1990s, interest in securitisation increases; when reinsurance rates fall, the associated costs make securitisation transactions less competitive.

94. In 1999, transaction costs for a securitisation were estimated to be US\$1 million. Fixed costs are high because of the number of parties involved. Costs are also high because each transaction is unique and documentation is not yet standardised, although there is some evidence that more standardisation is occurring. Costs have been coming down however.

95. Certainly, other costs associated with a securitisation may be lower than for a reinsurance contract. For example, securitisation minimises the likelihood of disputes, a common and costly aspect of reinsurance; and securitisations are often arranged with an offshore SPV where the cost of regulation is lower. Moreover, capital market investors do not require a stand-by charge such as a reinsurer requires when setting aside capacity. Such charges can be steep even when reserving capacity for extremely low loss probability events.

96. Companies do however need to consider the limited or non-existent reinstatement provisions inherent within most ILSs in comparison to any possible reinstatement provisions available with traditional reinsurance. However, high layer catastrophe excess of loss contracts – which are comparable risk transfer mechanisms to many catastrophe bonds – do not always include reinstatement provisions.

10. Regulatory issues

97. One of the factors critical to the successful development of ILS is an appropriate regulatory and legal structure. The group has identified a number of issues in that regard. It has further identified whether these issues relate to the insurer as originator or the insurer as an investor. Some brief comments have been included:

- How does the regulator exercise jurisdiction? [Originator and Investor]

Many securitisations may, individually or when aggregated, affect the financial position of the ceding entity. If the ceding entity is regulated the insurance supervisor should inform the securitisation vehicle's regulator of the details of the transaction prior to its inception.

Regulators in a number of territories have recently drawn attention to the scope for complex reinsurance transactions to cause a misunderstanding of balance sheets to the peril of investors and perhaps also policyholders (e.g. APRA's comments in Australia concerning the failure of HIH). Full disclosure of insurance related securities in the accounts of all involved parties is essential for the operation of a healthy marketplace. All transactions of insurance related securities should be at arms length and on terms that are made available to the market.

- How can separateness between the SPV and the originator best be achieved? [Originator]
- Who will be permitted to issue or invest in ILS? [Originator and Investor]

One issue for consideration by insurance regulators is the degree to which a life insurer should be permitted to invest in a non-life securitisation and vice versa. Some regulators feel that such cross sector investments may be inadvisable. Additionally, questions have arisen regarding the possibility of unmonitored concentration risk that might occur when, e.g., a non-life insurer writes risk in an earthquake zone and also invests in a catastrophe bond covering the same area.

- What controls need to be in place to monitor exposure? [Originator and Investor]
- What investment restrictions must be in place for an SPV? [Originator]

Some regulators believe that the SPV should have restrictions in order to minimise market risks in its portfolio. If an insurer is allowed to invest in an ILS, the risks should be assessed from a holistic perspective (not just from the asset-only perspective).

- What constraints must be put in place for insurers who invest in ILS? [Investor]

- What impact does an insurance-linked securitisation have on capital and solvency? [Originator and Investor]
- What financial reporting requirements need to be put in place for originators and investors? [Originator and Investor]
- How should the investment be recorded? [Investor]

Some regulators would be more comfortable with a fair market valuation rather than a historic valuation.

- What impact do tax rules have on ILS? [Originator and Investor]
- What is the impact of regulatory arbitrage? [Originator]
- Should securitisations from multiple cedants be allowed? [Originator]

A traditional approach to risk diversification has been the setting up of mutual risk pools, whereby several insurers agree to share their joint experience. Reinsurers have generally run such pools. Insurance-linked securitisation could provide the means to achieve such risk pooling more widely across markets. It would clearly be helpful if the regulatory framework recognised and facilitated this possibility.

Insurance-linked securitisation should offer particular attractions to mutual insurers who are of course unable to raise additional capital from shareholders to finance growth. A marketable security can be constructed which provides for a loan to be raised with payment of interest and repayment on terms linked to the surplus emerging from a block of business and subordinated to the interests and 'reasonable expectations' of policyholders. National Provident Institution's subordinated debt fund raising in the UK market in the early 1990's is a well-known example to UK actuaries.

- How should hedge effectiveness be measured, and what financial reporting requirements should be put in place? [Originator]
- Impact on policyholders. [Originator and Investor]
- Potential change of control issues in e.g. contingent capital transactions. [Originator]
- Capacity, resources and expertise of the regulator to evaluate and effectively monitor securitisation transactions. [Originator and Investor]

98. The group and the IAIS would expect to consider these regulatory issues in more detail in a future principles paper or papers.

Annex 1: accounting issues

1. The accounting for various forms of ILSs is dependent upon the structure of the ILS, and may differ between securities that are indemnity triggered and those using non-indemnity triggers. In addition, the accounting for derivative type ILSs may also be affected by the degree to which they effectively hedge an insurer's exposures. The accounting is also, in general, affected by whether the coverage transfers underwriting risk.
2. At least three accounting systems have promulgated rules that would cover ILSs: US Generally Accepted Accounting Principles (US GAAP), US Statutory Accounting Principles (US SAP) and International Accounting Standards (IAS).
3. US GAAP, in FAS113, and US SAP, in SSAP62, require that transactions that receive reinsurance accounting treatment must transfer uncertainty in the form of both the net cash flows from premiums and claims ("underwriting risk") and the timing of those cash flows ("timing risk").
4. The disclosure requirements of International Accounting Standard (IAS) 32 "Financial Instruments: Disclosure and Presentation" apply in respect of financial reinsurances that principally transfer financial risk: specifically, there are disclosures regarding price risk, credit risk, liquidity risk and cash flow risk.
5. The International Accounting Standards Board (IASB) has published two project update papers on insurance contracts. The project paper on Insurance Contracts (phase I) would define an insurance contract as one with significant insurance risk. Insurance risk is considered significant if, and only if, there is "a reasonable possibility that an event affecting the policyholder or other beneficiary will cause a significant change in the present value of the insurer's net cash flows arising from the contract." [A20]
6. It seems likely therefore that the basic requirements for uncertainty inherent in both US GAAP and US SAP will be followed by the IASB, although there may be some differences. As such, an indemnity based ILS transaction through an SPRV will likely receive underwriting treatment as ceded reinsurance under these three regimes.
7. In addition, a fully funded indemnity based ILS issued through a protected cell company will also receive full underwriting treatment under US SAP [SSAP74].
8. Under the IAS phase I project summary, "Catastrophe bonds" would be regarded as insurance contracts [para A18 (j)], and therefore a direct issuance of a catastrophe bond by an insurer would presumably be treated in an equivalent manner as ceded reinsurance. More controversially however, the investor in a catastrophe bond would probably be required to treat the catastrophe bond as an insurance contract: the summary states that "any entity that issues an insurance contract (is) an insurer whether or not the issuer is regarded as an insurer for legal or supervisory purposes" [A3]. The purchaser of a catastrophe bond is presumably the entity exposed to "an uncertain event that adversely affects the policyholder". There is a concern that this current version of the project summary would have the effect of discouraging investment in catastrophe bonds, as many potential purchasers need to be able to account for catastrophe bonds as investments.

9. Within the US, both the NAIC's Special Purpose Reinsurance Vehicle Model Act and the Protected Cell Company Model Act address the status of the purchaser of an insurance securitisation. Securitisations are not deemed to be insurance or reinsurance contracts and therefore those persons involved in an insurance securitisation will not be deemed to be conducting potentially unlicensed insurance or reinsurance business solely by virtue of their involvement with an insurance securitisation as investors. As such, investments in securitisations are treated as investments as opposed to assumed reinsurance.

10. Non-indemnity transactions, whether index based or modelled triggered, have less certain accounting treatment. Indeed, one of the major questions is whether such transactions should be given underwriting treatment within the technical accounts. Under US SAP, a recent interpretation has indicated that a modelled trigger transaction would not qualify for pure reinsurance treatment but would be accounted under the forthcoming rules for insurance securitisations.

11. Non-indemnity transactions will likely be treated as derivatives. US GAAP, US SAP and IAS have standards that cover derivatives.

12. Under US GAAP, FAS133 requires that all derivatives be valued in the balance sheet at fair value, while changes in derivative value are recognised in income unless the derivative qualifies as a hedge. While traditional life and property and casualty insurance contracts are excluded from the scope of the statement, an index linked insurance derivative would likely be included due to the existence of basis risk. Under FAS 133 Fair Value hedging applies to recognised assets and liabilities and unrecognised firm commitments, which would include a written insurance contract which the insurance derivative was intended to hedge. In these circumstances, the change in derivative fair value goes to current income and the change in fair value of the hedged item goes to current income to the extent the derivative is effective, with the net effect that any ineffectiveness is recognised in earnings currently.

13. Under US SAP, SSAP86 stipulates that the accounting for a highly effective hedge follows the accounting for the underlying asset or liability. Highly effective has the same meaning as in FAS 133, and the SAP guidance has been expanded based on the recommendations in the AICPA audit guide to state that either an 80%/125% correlation rule or an R-squared of 0.80 or higher using regression analysis qualifies as highly effective.

14. There are, however, problems with how one measures effectiveness. In particular, with catastrophic coverages: what is the correlation or regression analysis value of a 0:0 event – that is, if the catastrophe doesn't occur, was the hedge effective or not? As a result, the American Academy of Actuaries, and the NAIC's Casualty Actuarial Task Force, do not believe that either the 80%:125% rule or a regression analysis rule works for derivatives designed to respond to low frequency high severity events. They recommend a two-stage test based on Tail Value At Risk, and standard deviation measures. This issue has not been finalised as yet, as the NAIC's Insurance Securitisation Working Group has adopted the 80%/125% rule and hence the difference will need to be worked out in the final formulation of US Statutory Accounting Principles for securitisation transactions. One possibility may be to differentiate the hedge effectiveness tests for high severity low frequency events from the rest.

15. The NAIC's Insurance Securitisation working group has proposed accounting treatments for index linked covers: if effective, new detail lines will be added to the income statement "Premium Ceded – Derivative" and "Losses Incurred – Derivative", and an "Insurance Derivative Recoverable" line will be added to the balance sheet. The derivative would therefore receive

underwriting treatment in the technical accounts. However, if the hedge were ineffective, changes in fair value would be accounted as unrealised gains and losses through surplus.

16. The working group also proposes asymmetrical treatment of over and under recoveries that arise as a result of basis risk. Under recoveries would effectively remain in underwriting, but over recoveries would be accounted for in investment income. However, the actuarial profession disagrees with this approach and believes that over recoveries should be accounted for in underwriting. No final decision has yet been made by the NAIC on this issue.

17. The NAIC has issued a Statement of Statutory Accounting Principles (SSAP) relating to indemnity covers in Protected Cells [SSAP 74]: The cost of purchasing coverage from a Protected Cell (the equivalent of a reinsurance premium in a normal insurance transaction) is deducted from written and earned premium. Accordingly, the coverage receives full underwriting accounting treatment in the accounts of the ceding insurer. A purchase of a fully funded indemnity triggered security from a protected cell by an insurer is accounted for as an investment under US SAP. The income does not increase premiums written and earned. As such, there is an asymmetry between cedant and assuming entity. This asymmetry is deliberate, in that the intention is not to force the purchaser of an ILS to account for it as an insurance transaction.

Annex 2: catastrophe risk swaps

1. A catastrophe risk swap entails an exchange of exposures with a counterparty. The objective of swapping is to either reduce the aggregate of a particular kind of CAT risk within a portfolio of insured risks or to diversify by adding CAT risks. Thus, a typical counterparty would have non-correlating exposures available for swapping.
2. A typical party interested in a swap would be one with excessive exposures to a single kind of CAT risk, one that might have excess capital or one wishing to include foreign CAT risks in its portfolio of risks.
3. A number of swap deals have been transacted: Tokio Marine exchange earthquake exposures with State Farm hurricane exposures in a \$200 million transaction, and Renaissance Re has done two \$50 million swaps with Japanese counterparties. In addition, Mitsui and Swiss Re entered into a \$33.8 million agreement to exchange premium for a traditional catastrophe cover via an ISDA (“International Swap and Derivatives Association, Inc.”) format. There are also some pending swaps of catastrophic life insurance exposures.

An illustration of a CAT swap: The Tokio Marine deal. Tokio Marine is the largest non-life insurer in Japan, and hence has huge Japanese earthquake and typhoon exposures. In order to diversify these risks, the firm engaged in a CAT swap with Swiss Re through Tokio Millennium Re. The swap is an aggregate of three separate \$150 million exchanges of catastrophe risks. Japanese earthquake risk is swapped against

California earthquake risk; Japanese typhoon risk is swapped against Florida hurricane risk; and Japanese typhoon risk is also swapped against French windstorm risk. Each swap has different trigger points based on indemnity levels, reference portfolios, and industry indices. The entire transaction of \$450 million in CAT risks is renewable annually.

4. A swap can be performed in two different ways:
 - trade the risk on a pure technical basis by exchanging layers which have equivalent attachment points and expected loss probabilities; or
 - trade the risk on a fair market value basis by exchanging layers of equivalent market clearing rates on line. For example, a 2% risk in the United States may be more expensive in the market place than a 2% risk in Japan or Europe, and therefore the market rate rather than the frequency of loss is used to trade the risks.
5. There are two types of CAT risk swap structures:
 - back-to-back reinsurance contracts
 - ISDA swaps.
6. Under a back-to-back reinsurance structure, each company simply issues mirror reinsurance contracts to the other and offsets a notional (nominal) premium. Typically, the parties exchange a pre-defined risk with little or no initial exchange of premium. Premium payments are made only if the risk exposures do not match. The contract can be set up on an annual or multiple year basis.

ISDA swaps have potential fiscal and accounting problems when foreign companies are involved. However, details at this juncture are unclear. It is expected that any development will be in the future.

Annex 3: exchange-traded derivatives

1. Insurers that want protection against catastrophic losses can buy exchange-traded catastrophe options and futures. A derivative is an instrument whose value is derived from another financial instrument or product. The most common derivatives are in the form of options, futures, or swaps. Options impose no obligation whereas futures impose an obligation.

2. An exchange-traded CAT option is a standardised contract based on a specific catastrophe index. The index reflects the catastrophe experience of a large set of insurers or the entire property and casualty insurance industry. The contracts entitle the buyer of the option to a cash payment from the seller if a catastrophe causes the index used to rise above a certain strike price specified in the option.

3. In the past, insurers and investors could trade options based on a catastrophe index compiled by PCS on the Chicago Board of Trade (CBOT) or on a Guy Carpenter Catastrophe index on the Bermuda Commodities exchange (BCOE). Both of these markets were, however, shut down due largely to lack of interest. The use of organised exchanges and standardised, index-based contracts would make it easier for investors and insurers to liquidate positions. Moreover, the use of clearinghouses by exchanges largely does away with counterparty risk.

Annex 4: weather derivatives

1. It is estimated that weather conditions impact 80% of worldwide business activity. Businesses such as soft drink makers, breweries, ice cream manufacturers, utilities, construction and clothing manufacturers are weather-dependent. Weather derivatives are financial instruments designed to assist in managing weather-related risks. These are comparatively new risk management tools, the first transaction having taken place in 1997. Since then, the market has expanded rapidly into a flourishing over the counter (OTC) trade.
2. There are a number of drivers behind the growth of the weather derivative market. Primary among these is the convergence of capital markets with insurance markets. In the late nineties, the insurance industry faced a cyclical downturn in traditional underwriting premiums, and hence had excess risk capital available for hedging weather risk.
3. At the same time, 1997 was the year of heavy publicity regarding climatic changes related to EL Niño, and many American and foreign companies had to consider the possibility of significant earnings declines due to an unusually mild winter forecast. The ability to hedge weather conditions via weather derivatives hence became an attractive option. The deregulation of the energy market in Europe and the United States has provided further incentives for growth in the weather derivatives market. Moreover, these types of financial instruments, much like ILSs, are thought to be uncorrelated to other market risks. Hence, an investor can benefit from their overall effect on portfolio risk.
4. Any business with an exposure to the weather can use these derivatives to protect its revenues or its earnings against adverse weather conditions. Weather derivatives are particularly well suited to hedge against volume rather than price risks. For the latter type of risk, the more normal options and futures markets provide more appropriate instruments.
5. The derivatives are based on different underlying weather indices. Some commonly used indices are heating and cooling degree-days, rainfall, snowfall and wind speed.
6. A company has a number of alternatives in structuring a weather deal. The first alternative is to buy cooling degree day options (CDD) for the summer season, or a heating degree day options (HDD) for the winter season. CDD options protect against excessively cool summers while HDD options protect against excessively warm winters. Both HDD and CDD calls and puts are available.
 - a cooling degree day (CDD) measures the warmth of the daily temperature compared to a standard of 18 °C. The degree days specification is as follows:
Daily CDD = Max (0; daily average temperature - 18 °C)
 - a Heating Degree Day (HDD) measures the coldness of the daily temperature compared to a standard of 18 °C. Its degree days specification is as follows:
Daily HDD = Max (0; 18 °C - daily average temperature)
7. The weather derivatives market is liquid and there is an active secondary market. Reinsurance companies, in particular, have been active participants.
8. One participant in this market is Scandic Energy of Sweden. An example of a specification for a Scandic HDD call option contract follows:

Parameter	Option
Weather station	Stockholm Arlanda
Index	HDD
Type	Call
Period	January 2002
Strike	500 HDDs
Nominal	1 SEK/HDD
Max payout	200 SEK

- The price of this particular call option on HDD can be computed as follows:

$$\text{Payout} = \min(\max(\text{Total (HDD)} - \text{Strike}; 0); \text{Max payout})$$
- Assume now that Total (HDD) = 600 SEK. Then the payout for this particular the specification of HDD option is as follows:

$$\text{Payout} = \min(\max(600 - 500; 0); 200)$$

$$\text{Payout} = \min(100; 200)$$

$$\text{Payout} = 100 \text{ SEK}$$

In this case, the company buying this option will be paid if the month of January in Stockholm is severe.

9. Weather derivatives differ from weather-related insurance contracts. The insured under an insurance contract must prove financial loss due to weather in order to be compensated. Payouts from weather derivatives however are based solely on the actual weather outcome, regardless of specific impact of such weather on the holder of the derivative.

10. Insurance contracts are usually designed to protect the holder from extreme weather events such as earthquakes and typhoons, and they do not work well with the uncertainties of more normal weather. Weather derivatives, on the other hand, can be constructed for any eventuality in weather conditions.

11. There is further advantage to weather derivatives. Those entities that benefit from a cold winter can transact with parties that benefit from a warm winter. Both parties can hence hedge their risks through a common transaction. An insurance contract, on the other hand, is a zero-sum game: one party gains and the other party loses.

Annex 5: abbreviations used in the paper

ABS	asset backed securities
BCOE	Bermuda Commodities exchange
CAT	catastrophe
CATePUTS	catastrophe equity put
CBOT	Chicago Board of Trade
CDD	cooling degree-day
CMO	collateralised mortgage obligation
CEA	California Earthquake Authority
D&O	directors and officers
DSOP	draft statement of principles
EMTN	European medium term notes
EURIBOR	Euro area interbank offered rate
FAS	federal accounting standard
FASB	federal accounting standard board
GAAP	generally accepted accounting standards
HDD	heating degree-day
IAS	international accounting standards
ILS	insurance linked securities
INEX	(Illinois) Insurance Exchange
ISDA	International Swap and Derivatives Association
JMA	Japanese Meteorological Agency
LIBOR	London interbank offered rate
NAIC	National Association of Insurance Commissioners
OTC	over the counter
RMS	Risk Management Solutions
SAP	statutory accounting principles
SEK	Swedish kroner
SPE	special purpose entity
SPLS	special purpose limited syndicates
SPRV	special purpose reinsurance vehicle
SPV	special purpose vehicle
SSAP	statement of statutory accounting principles