



sigma

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Securitization – new opportunities for insurers and investors

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Executive summary

Securitization transforms assets into tradable securities.

Securitization is a financial technique that pools assets together and, in effect, turns them into tradable securities. Financial institutions and businesses of all kinds use securitization to reduce their capital requirements and immediately realize the value of cash-producing assets by creating securities separate from the debt and equity securities of the sponsor. Securitization has evolved from its beginnings in the 1970s and is today used heavily by banks along with derivative techniques that have evolved from securitization. Securitization in the insurance industry is relatively new, with the first transaction having taken place in the early 1990's. The number of transactions has increased steadily in recent years, as has the use of associated derivative techniques such as cat swaps.

Life securitizations provide many benefits to their sponsors, including improved profitability.

Life insurers are securitizing parts of their business, improving return on equity through capital efficiency. By selling risks to investors, insurance companies reduce their need to hold capital and increase their ability to write new business. Some securitization structures also provide ancillary tax advantages. Securitization allows (re)insurers to focus on underwriting, structuring and passing risks directly to the debt capital markets, as well as improving their return on equity (ROE). Ultimately, (re)insurers should be able to share these benefits with their clients, increasing the demand for transferring risks. Life bonds also monetize intangible assets, fund regulatory capital requirements, and transfer catastrophic risks, eg mortality, to the bond market.

P&C securitizations to date mostly transfer extreme risks to the debt capital markets.

Catastrophe bonds, the primary P&C securitization approach to date, provide many benefits to re(insurers) as a source of (re)insurance capacity. They serve as collateralized protection for extreme event risk, which eliminates counterparty risk, at a multi-year fixed price. In addition, they augment traditional capacity, since cat bond investors for the most part do not also provide traditional (re)insurance protection.

Interest in the market continues to grow within the investment community.

Fixed-income investors are increasingly interested in insurance-linked securities and related risk-taking, because they provide exposure to specific insurance risks, such as the risk of an earthquake in a specific area, resulting in a "pure play" investment; have their funds held in trust, so the investor faces no counterparty risk with the bond's sponsor, the (re)insurer; and have a low correlation with equity and credit markets, making them a diversifying asset class.

The overall market is expected to grow very rapidly over the next 10 years.

In the past five years, the outstanding volume of P&C securities has doubled, while the volume of life bonds has tripled, taking the total outstanding volume of securities to about USD 23 billion. In the past two years, issuance has accelerated rapidly. Primarily driven by the funding needs of the life industry, the volume of outstanding ILS is expected to grow to USD 150 to 350 billion by 2016. The future size of the market is uncertain due to its nascent state and because there are other ways for investors to provide capital to the (re)insurance industry. Nevertheless, ILS and related solutions will become an increasingly important source of capacity for the (re)insurance industry.

Introduction

There are P&C and life insurance-linked securities, cat and non-cat bonds.

Insurance-linked securities (ILS) are a means of ceding insurance-related risks to the capital markets. In this sigma, ILS are categorized in two ways: by risk type – property/casualty (P&C) and life risks – and by catastrophe (cat) and non-cat risk. To date, P&C bonds have tended to transfer peak risks, while life bonds have usually provided financing backed by future premium flows, though some also transfer peak mortality risks. A cat bond transfers the risk of extreme events – such as hurricanes and earthquakes in densely populated areas or sharp increases in mortality – to the capital markets. A non-cat bond, usually for life insurance books of business, is more of a financing vehicle.

The first P&C cat bond was issued after hurricane Andrew.

P&C bonds originated in the hard market of the early 1990s, after hurricane Andrew, when reinsurance capacity for catastrophes was limited and expensive. The earliest forms provided a simple mechanism to transfer catastrophic risks to capital markets, easing industry capacity constraints. In a typical transaction, a special purpose vehicle (SPV) enters into a reinsurance contract with a cedent and simultaneously issues cat bonds to investors.¹ The reinsurance is usually an excess of loss contract. If no loss event occurs, investors receive a return of principal and a stream of coupon payments that compensate them for the use of their funds and their risk exposure. If, however, a pre-defined catastrophic event does occur, investors suffer a loss of interest, principal, or both. These funds are transferred to the protection buyer or cedent, in fulfillment of the reinsurance contract.

Life bonds are usually a financing tool.

Most life bonds differ from P&C bonds in a very crucial respect – they are usually a financing tool. Life bonds typically securitize the flow of future premium payments of traditional life insurance policies. In a legal sense, risk is not fully transferred, since the life insurance company will always retain the obligation of its policies. However, the burden of life insurance risks, such as mortality and lapse risk, are assumed by the investors. For these bonds, investors and protection buyers share the benefits and losses in the development of the underlying policies which have been securitized.

Some life bonds transfer extreme mortality risk.

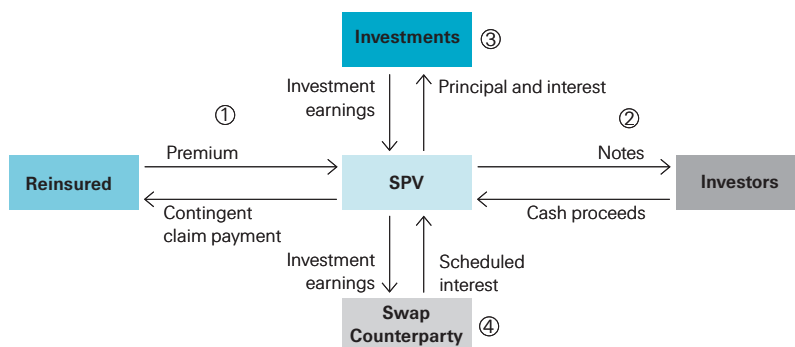
Some life bonds are cat bonds – transferring extreme risks to the capital markets. These bonds are very similar to P&C cat bonds and, so far, have been based on mortality indexes, though longevity bonds as well as morbidity bonds are also feasible. If mortality develops as expected, the investors collect the designated interest and, at maturity, the principal is returned to them. On the other hand, if mortality increases substantially, triggering the bond, the investors suffer a loss of interest, principal, or both.

¹ A SPV is also referred to as a “bankruptcy-remote entity” whose operations are limited to the acquisition and financing of specific assets. The SPV is usually a subsidiary company with an asset/liability structure and legal status that makes its obligations secure even if the parent company goes bankrupt.

Structuring basics

In a typical ILS structure as used for cat bonds, the Reinsured enters into a financial contract with a Special Purpose Vehicle (SPV), (see (1) in Figure 1). The SPV hedges the financial contract by issuing notes to investors in the capital markets (see (2) below). Proceeds from the notes are invested in high-quality securities and held in a collateral trust (3). Finally, investment returns are swapped to a LIBOR-based rate by the Swap Counterparty (4).

Figure 1
Typical ILS structure



Source: Swiss Re Capital Markets

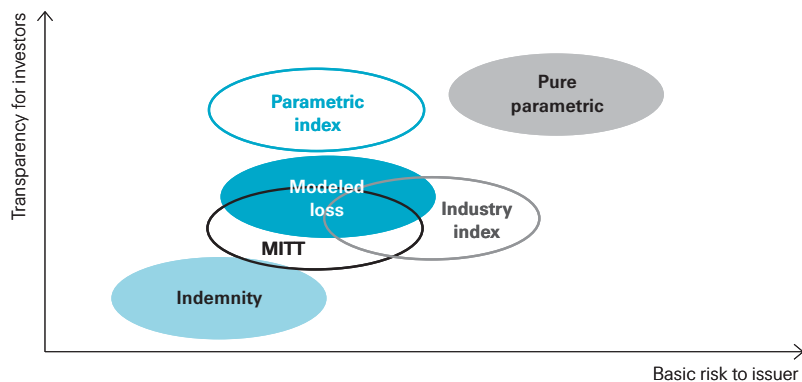
Investors can be protected from the credit quality of the sponsoring company and the underlying insurance risk by credit insurance, and ...

Some ILS benefit from the participation of a credit insurer. Many life securitizations include credit protection, in which a bond insurer (often called a “monoline” or “wrapper”) guarantees the interest and principal payment on the underlying securities. The guarantee backs up the security with a high rating (usually AAA). The issuing company pays a premium to the bond insurer for providing the credit enhancement, or credit “wrap”.

... by legal separation.

There are two common transaction structures, “accounting only” and “legal separation.” In accounting only, the business continues to reside in the insurance company which directly issues the bond. More typically, however, the bonds are issued on a non-recourse basis, with legal separation. In this case, the business is reinsured to a bankruptcy-remote special purpose vehicle (SPV), which issues the debt. In other words, if the sponsoring insurance company goes bankrupt, the bond is not affected, since the underlying assets, usually AAA government bonds, are in the SPV. If the bond has no credit wrap and is subject to recourse, the investor bears the risk of the sponsoring company becoming insolvent.

Figure 2
The transparency and basis risk
for various types of triggers



Source: Swiss Re Capital Markets

There are six types of triggers for cat bonds.

While investors prefer to maximize the transparency of the trigger for cat bonds, sponsors would like to minimize the basis risk. Transparency, however, as shown in Figure 2, is often associated with higher basis risk. Cat bonds have used a variety of triggers to manage this tradeoff:

- An *indemnity* transaction is based on the actual losses of the sponsor.
- An *industry index* transaction is based on an industry-wide index of losses (eg, Property Claim Services (PCS) in the United States).
- In a *Modeled Industry Trigger Transaction* (“MITT”)², industry index weights are set post-event using modeled loss techniques.
- A *pure parametric* trigger is based on the actual reported physical event (eg, magnitude of earthquake or wind speed of hurricane).
- A *parametric index* is a more refined version of the pure parametric trigger using more complicated formulas based on more detailed measurements.
- In a *modeled loss* transaction, losses are determined by inputting actual physical parameters into an agreed-upon, fixed model which then calculates the loss.

“Triggers” for non-cat bonds are generally based on developments of the underlying policies.

Trigger types vary for non-cat transactions. For an embedded-value transaction, for example, the trigger is the quality of the premium payments and investment returns relative to the expected payment flow. For example, losses occur when mortality rates are higher than expected and lapses are earlier than expected.

Over the years, the type of triggers for cat bonds has shifted from indemnity and parametric index triggers to modeled loss and industry index triggers, although this trend has stabilized in recent years, reflecting the varying needs of potential transaction sponsors.

² MITT, patent pending, was developed by Swiss Re.

The cost of a securitization consists of capital and structuring costs.

The costs of securitizations can be divided into capital costs and structuring costs. The *capital costs* are the costs at which the issuing company is able to raise capital, generally at LIBOR plus a risk premium. The risk premium depends on the nature of the underlying secured business or risk as well as the structure of the security. It will be lower for business with a low risk profile (such as level-premium term life or fee business, eg variable annuities) and higher for more complex businesses (such as universal life). Likewise, the risk premium of cat bonds will be commensurate with the probability of the bond being triggered.

Structuring costs are the legal, advisory, actuarial and other service fees and personnel costs to create the security.

The *structuring costs* are composed of fees to lawyers and the costs of advisors, actuarial consultants, rating agencies, structuring and placing the security. Generally, the average costs and fees for lawyers, actuarial consultants and advisors are subject to the complexity and size of the transaction and will decline with the number of transactions done. Expenses for rating agencies and securities structuring and placement, in contrast, may be unrelated to the number and size of the transactions. Expertise in the field of structuring and placement of insurance securitizations is scarce and may represent a significant portion of the costs.

It is important to choose the jurisdiction that best fits the transaction.

The success of a securitization can also depend on the jurisdiction chosen, criteria being the type of security and the tax and regulatory treatment. For example, South Carolina (US) is often used for Triple X securitizations, because these bonds are based on U.S. life business and South Carolina allows organizations to form special-purpose financial captives.

Transformation benefits all parties.

(Re)insurers with a large book of business can use the strength of their balance sheet to transform risks via securitization. Risks are assumed according to the clients' needs and can be securitized in different tranches and/or different triggers in accordance with investors' risk appetite. The "transformer" retains basis risk or (lower) layers of risk that diversify well with their more traditional book of business.

Transaction size matters.

Transactions need to be large to be economical. For the life bonds, transactions are complex and need to be at least USD 200 million to complete the transaction efficiently. P&C bonds are often smaller, but still need to be about USD 100 million. Nonetheless, as with securitizations of other instruments, as the market matures smaller transactions become feasible.

Plan of this *sigma*

This *sigma* updates and expands on an earlier *sigma* on ILS.³ This *sigma* examines developments in the P&C and life insurance securitization markets, focusing on sponsor motivation. It clarifies recent market trends for ILS and explores the interests of investors. Finally, it considers the prospects for the development of the market for ILS and related solutions. Because the life bonds have been on the market for a shorter time and their issuance has recently surged, this *sigma* focuses more heavily on life bonds.

³ Swiss Re *sigma* No 3/2001, "Capital market innovation in the insurance industry".

Characteristics of life insurance securitizations

Securitization is a capital management tool ...

Securitization of life insurance business is a capital management tool for (re)insurers. Securitizations allow a (re)insurer to:

- monetize intangible assets via embedded-value (EV) securitizations,
- fund regulatory capital requirements, or
- transfer catastrophe risks.

... providing many benefits.

Life securitizations have various positive benefits. Embedded value and funding of capital requirement transactions increase the return on equity (ROE). These transactions also may provide tax advantages by deferring realized income into the future. Mortality bonds protect (re)insurers against extreme catastrophic events, such as a pandemic or widespread death from any other cause.

Embedded-value (EV) securitizations

Securitization can monetize intangible assets, such as deferred acquisition costs, and ...

Securitizations can monetize intangible assets, such as deferred acquisition costs (DAC) and the present value of future profits (PVFP). To acquire new business, insurers must pay commissions to agents or brokers. A part of these acquisition costs are generally capitalized as an asset, or “activated.” In the following years, part of the premium paid by the policyholder is used to write down the deferred acquisition costs. A securitization allows an insurer to monetize their DAC, since the risk of early lapse is partially transferred to investors.

... the present value of future profits.

When a company acquires a life insurer or a closed life insurance portfolio, the acquiring company usually activates a part of the present value of future profits of the acquired company. A securitization allows an insurer to monetize the present value of these future profits. These securitizations are viewed differently by internal accountants, regulators and rating agencies (see box: The accounting, statutory and rating agency views on PVFP).

These securitizations provide financing and can improve ROE.

This type of transaction provides financing. It can finance the cash strain associated with writing new business; generate cash for further acquisitions; and free up capital from life insurance business for other corporate purposes, eg, an acquisition, share buyback, or writing P&C business in a hard market. The financing, appropriately structured, can also increase the return on equity, provided the bond is issued at a favorable interest rate, below the return on the book of business securitized (see box: How can securitization increase ROE?).

The GAAP accounting, statutory accounting and rating agency views on PVFP

GAAP accounting, statutory accounting and rating agencies have differing views on the present value of future profits:

GAAP accounting view: Currently, the two dominant international accounting frameworks (IFRS and US GAAP) allow companies to recognize the present value of future profits (PVFP).

Solvency view: In the EU, for example, life insurers are able to include part of the PVFP in the calculation of their available solvency capital.⁴ In the EU, 50% of the PVFP net of taxes can be used for available solvency capital. However, this amount must not exceed the lower of 25% of the required solvency capital or the average profits of the last 5 years multiplied with the factor 6. From 31 December, 2009 onward, life insurers will not be able to use the PVFP item for their solvency capital calculation. Some market observers believe that this may increase the attractiveness of EV securitizations, since companies will even have more incentives to replace the PVFP item on their balance sheet with a cash item.

Rating agency view: Rating agencies have a view of securitizations similar to insurance regulators. For example, the S&P rating model also takes 50% of the PVFP net of taxes into account for the rating capital calculation. A monetization of PVFP will increase the rating capital and can improve the credit standing of a life (re)insurer.

Investors bear risks, such as mortality and lapse risk, ...

Because seasoned books of life business provide transparency for investors, they are very comfortable with EV securitizations. However, investors do bear insurance risks with these bonds. For example, investors partially bear the mortality and lapse risk of the securitized block of policies. On the one hand, if the cash flows from the policies are less than expected, due to higher-than-anticipated mortality or early lapses, then the payments to investors will be, delayed and possibly reduced. In the extreme, for example with a sharp increase in mortality, the payments are reduced to zero. Other risks may also be transferred to the investors, depending on the type of policies covered. For example, some interest-rate risk may be transferred to investors if some of the policies securitized include interest-rate guarantees and the set-aside assets do not fully match these liabilities. On the other hand, if mortality rates and lapse rates prove to be more beneficial to the cash flows than expected, the investor receives the full value of the expected flows, but the life insurance company captures all the excess benefits.

⁴ Switzerland has adopted this EU Directive. Therefore the same principles apply in Switzerland.

... but these risks can be mitigated.

The investors' risk can be mitigated through the provision of financial guarantees, over-collateralization, and other standard credit enhancement techniques for asset-backed securities. For example, with over-collateralization, the insurer pledges excess cash flows which are first affected by adverse developments affecting the cash flow. After this layer of the security is depleted, the lowest layer held by investors is affected next, and so on. If the excess cash flows are not needed, a residual is effectively recaptured with bond repayment.

How can securitization increase ROE?

In an embedded-value transaction, the issue can achieve a higher ROE through earning a spread. The underlying business was written at a certain internal rate of return (eg 10%). The sponsoring company passes a lower return on to investors (eg 7%). The sponsoring company increases its profitability by earning the spread. However, achieving a consistently higher ROE requires continuous deal flow and accurate pricing.

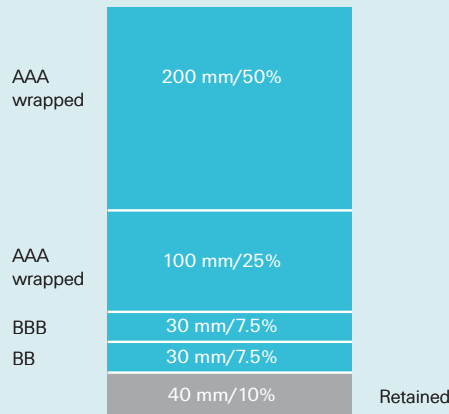
In addition to this, an EV securitization will generally increase the available solvency capital, facilitating share repurchases (increasing ROE) or other investment undertakings (such as new business financing, acquisitions, etc.). Also, the overall capital management may become more efficient, assuming the cost of securitization is below the cost of raising new capital or issuing hybrid debt.

A typical embedded-value securitization

Insurers use securitization for capital relief in pursuing their growth strategies.

A life insurer seeks to securitize a USD 400 million block of business. This block includes a few business lines, such as traditional life, interest-sensitive life, deferred annuities, and corporate-owned life insurance. The insurer seeks capital relief to pursue its growth strategy. A structured solution is created with losses first affecting the retained residual, then the BB layer, then the BBB layer, etc. The retained residual ensures that the sponsor suffers the first loss on the bond, providing protection to the investors owning the higher layers of the bond. The security provides risk transfer, reducing the required reserves the insurer holds and allowing the pursuit of new business. The insurer receives money today in return for the flow of premiums over the life of the policies. The investors receive an income flow with a reasonable risk/return relationship. The flows include interest payments and the return of principal over the life of the bond. This asset helps diversify the investor's fixed-income portfolio, since the bond is uncorrelated with equity or conventional fixed-income securities. However, the investor must be familiar with the risks involved, which include mortality risk, lapse risk, and sometimes other risks, such as interest-rate risk with the interest-sensitive life policies.

Figure 3
A typical embedded-value securitization structure



In the US, securitization is used to fund regulatory capital requirements.

The reserve requirements for XXX and AXXX business are considered to be excessive.

Securitizations that fund regulatory capital requirements

In the US, securitizations can be used to mitigate pressure due to stringent statutory reserve requirements. Many companies have used securitizations to lower their reserve strain. With this approach, “redundant” reserves are securitized.

Triple X/AXXX reserves securitization. In the US, companies and investors regard the reserves required by Regulations XXX (for level-premium term life) and AXXX (for universal life with guarantees) to be much higher than economically justified. One way to alleviate the problem is to issue a bond equal in value to the redundant reserves (the difference between the statutory reserves and what would be economically justified) from a special purpose vehicle (SPV). The investors’ funds reside in the SPV and serve as collateral for the bond and the redundant reserves. In other words, instead of the life company providing the collateral for the reserves, it is provided by investors.

Guideline Triple X, for level-premium term life products, requires excess reserves.

Triple X and AXXX business in the US

In the US, the Valuation of Life Insurance Policies model regulation (better known as Guideline Triple X, or XXX) became effective in 2000 and requires the pre-funding of future liabilities of term life products with a guaranteed, or level, premium. However, the required mortality assumptions are outdated and do not reflect today’s best practices. Companies writing term life business need to hold significantly more capital to cover these conservative estimates than is economically necessary. The National Association of Insurance Commissioners (NAIC) lowered reserve requirements, somewhat, for Triple X business with the introduction of the 2001 CSO mortality table (replacing the outdated 1980 CSO tables), which contain slightly lower mortality assumptions. However, the 2001 CSO tables are also considered conservative.

To relieve the reserve strain, reinsurance – backed by a LoC – has been common.

A variety of approaches to relieving Triple X reserve strain have been tried. The most common approach involves reinsuring business (directly or indirectly) to an offshore reinsurer not subject to US reserve requirements. The offshore reinsurer uses a letter of credit (LoC) to provide required security for the difference between XXX reserve and local reserve. However, there are three concerns about the LoC market. First, most LoCs are short duration, whereas these life policies are typically for 10 to 20 years.⁵ Second, the prices have risen along with demand. Finally, the LoC market has limited capacity. The increased use of securitizations to finance excess reserves has apparently eased some of the pressure on the LoC market. Shorter, and also longer, duration LoCs are now easier to secure and more available.

Guideline AXXX is for universal life policies.

Guideline AXXX is linked to Guideline Triple X. It mandates additional reserves for many types of universal life insurance policies that contain so-called “no lapse” guarantees.⁶ The additional reserves can be very significant and many market observers regard these as largely redundant.⁷ Late in 2006, the first securitization of AXXX business was issued.

Investors are protected by various buffers.

If the mortality experience deteriorates and the company needs to build up additional reserves, initially the losses from the adverse mortality experience (ie higher mortality experience than was assumed when pricing the business) will be withdrawn from the economic reserves of the company. This is the retained layer of the bond, similar to the equity layer of a collateralized loan obligation.⁸ If that is exhausted, then payments will come from the reserves placed with the SPV. These bonds are often credit-enhanced, so investors are also protected by the monoline insurers in the unlikely event that these reserves are insufficient.

XXX securitizations also mitigate the tax disadvantages associated with Triple X.

The main benefit of a Triple X securitization is that it provides an alternative to LoCs. While short-term LoCs are less expensive (at least on a pre-tax basis), they do not match the duration of the life policies. LoCs matching the duration of the life policies are not less expensive. A securitization eliminates the re-pricing risk of short-term LoCs. Another important result of Triple X securitizations is to preserve the tax consolidation of the underlying block of business and allow the continued utilization of the reserve deductions for tax purposes.

⁵ Level-premium term life products typically cover a person for a fixed number of years, usually 10 to 20 years. The insured is required to pay the same premium each year of the contract, reducing lapse risk.

⁶ What the no-lapse guarantee policy adds to the traditional universal life design is a secondary guarantee (ie, in addition to any guarantee with respect to crediting rates, mortality costs or expense loads) that if a certain premium or premiums are paid in the front-loaded manner specified in the contract, the policy will not lapse. In a policy which does not contain a “no-lapse” guarantee, the policy can lapse if the cash value of the policy becomes smaller than the shadow-account value. The shadow account is a hypothetical account, which is augmented by premium payments and interest income on the cash value and reduced by mortality phases and administration costs.

⁷ For example Tillinghast “Life insurance securitization expanding”, in: *Emphasis* 2/2004

⁸ A collateralized loan obligation bundles bank loans into a security for sale to the capital markets. The bank or a specialized investor retains the first loss, or equity, layer.

How does a XXX securitization change the tax treatment for the business?

The typical XXX securitization is constructed by forming a downstream subsidiary and reinsuring the subject business to this newly formed subsidiary. This structure is often designed to maintain tax consolidation of the subject block of business while financing the redundant statutory reserves. As the reserves build, the parent sponsor continues to utilize the substantial reserve deductions on its consolidated tax return. As the reserves peak and begin to decline, the parent sponsor is typically responsible for the taxes on the substantial income reported by the captive. The impact of this reserve ramp-up and subsequent reversal of the redundant statutory and tax reserves on a US GAAP basis is the recognition of a deferred tax liability that builds as the redundant reserves build and declines as the redundant reserves decline. While the overall tax burden is not altered by the securitization, the timing of the tax payment is deferred (up to 10 to 15 years relative to the LoC solution) and brought into line with the original tax treatment which would apply in the absence of reinsurance. If the tax environment changes over this time horizon, it could change the economics of the securitization transaction. Similarly, changes in actuarial methodology for XXX reserves could also affect the beneficial tax economics. This latter risk is likely to be greater than the risk of changes in the tax environment. Neither risk is large for in-force business, but both are possible.

Transaction costs of securitization

The cost of a XXX securitization is difficult to estimate and compare with alternatives (such as reinsurance and LoCs). It is particularly difficult to assess the size of the cost advantage. Transamerica Re⁹ has provided a simple illustration of principles involved in Triple X securitizations. The coupon to investors depends on the risk profile of the underlying business. The pre-tax cost is about 95 basis points (bp) over and above LIBOR. The tax impact may lower this cost. Of the 95 bp, 50 bp is the coupon for investors, 35 bp is the financial guarantor premium and 10 bp is the cost of capital for debt issued (assuming a 1% RBC charge on the debt issued).

Extreme mortality or longevity securitizations

Life (re)insurers can hedge against a pandemic flu or a sharp increase in longevity through securitizations. If the security has a parametric trigger, the transfer of catastrophe risks works well for large diversified (re)insurers with a well diversified mortality or longevity portfolio, because the basis risk is smaller. For indemnity-triggered bonds, investors would prefer a geographically well-diversified portfolio underlying the security. However, no indemnity-triggered bonds have been issued yet.

Securities can also transfer risks, such as mortality and longevity, to the capital markets.

⁹ "Triple X securitization: a review of transactions to date", in: The Messenger, April 2005.

Mortality cat bonds have been successfully issued.

Recently issued mortality bonds

Swiss Re's *Vita I and Vita II* and *Scottish Re's Tartan Capital* are the only mortality catastrophe bonds to be issued so far. *Vita Capital Ltd*, which was issued in November 2003, was a USD 400 million facility with a three-year term that will pay Swiss Re in the event that a predefined population mortality index should exceed 130% of its 2002 level. *Vita Capital II Ltd*, issued in April 2005, raised USD 362 million. The first tranche attaches at 110% of expected mortality for any consecutive two-year period over a five-year term. *Scottish Re's Tartan Capital's* risk coverage raised USD 155 million, has a two-year period and has its principal at risk if its US mortality index exceeds predefined percentages of the expected mortality level, 115% for Class A Notes, and 110% for Class B Notes.

Table 1
SWOT analysis of L&H securitizations

Strengths	Weaknesses
<ul style="list-style-type: none"> ■ Market is growing, liquidity improving, spreads are narrow; inexpensive ■ Seasoned book, generally accepted by capital markets ■ Can be used to monetize intangible assets, fund regulatory capital requirements, transfer cat risks, eg mortality, (perhaps longevity and morbidity?) ■ Improved capital efficiency from, eg, securitizing XXX reserves ■ Favorable tax, regulatory treatment ■ 50% of CFOs surveyed by Tillinghast indicated they would consider securitization over the next 2–3 years¹⁰ ■ Securitization creates associated solutions and unlocks additional traditional capacity 	<ul style="list-style-type: none"> ■ Many are mostly financing, rather than risk transfer, though some risk is transferred ■ Expensive for catastrophic risk, mortality and longevity
Opportunities for protection buyers	Threats to protection buyers
<ul style="list-style-type: none"> ■ Manages concentration of mortality risk, reduces capital needs ■ Hedges pandemic exposure ■ Unloads risk/capital requirement for closed book ■ Increases ROE 	<ul style="list-style-type: none"> ■ Regulatory risk ■ Rising cost of issuance, if market becomes saturated? ■ Some companies may use the securitizations to price more aggressively, increasing the risk of a soft market ■ Invites new competition (eg banks)? ■ There may be unexpected correlations of basis risk with capital markets

¹⁰ Tillinghast, "Life insurance CFO survey No 11: managing current and future demands on capital", August 2005.

Table 2
Risks to sponsors and investors from
the three types of securities

	(Re) insurer risk stemming from the security			Investor Risk	
	Type of security				
Type of risk	Embedded Value	XXX and AXXX	Extreme Mortality		
Interest-rate risk	If the security includes blocks of business that are interest-rate sensitive, due to guarantees or floating-interest-rate policies, the interest-rate risk can be substantial.	Some interest-rate risk may exist. Reserves are mainly held in fixed-income instruments. AXXX universal policies usually have interest-rate guarantees, so these liabilities must be matched with assets that fund those guarantees.	None, unless the security is issued with a floating rate.	With all three types of transactions, the investor faces a reinvestment risk. Interest payments may only be reinvested at lower rates. Also, many issues are floating-rate.	
Equity-market risk	Dependent on the amount of equities held in the asset portfolio. If investment returns – gains on the equity portfolio – are higher than expected, the (re)insurer may earn an excess return. Usually, the sponsoring company keeps the upside.	None, if insurance reserves are entirely held in fixed-income instruments (which is most often the case).	None, if insurance reserves are entirely held in fixed-income instruments (which is most often the case).	With all three types of deal structures, the equity risk is limited. However, embedded-value deals could have equity assets in the reserves supporting the policies. Also, equity risk could come through counterparty risk – if the insurance company becomes insolvent.	
Credit risk	If the bond is credit-wrapped: A downgrade of the sponsoring company may allow the monoline insurer to charge higher guarantee fees. The higher fees may change the economics of the transaction. Generally, the sponsoring company pays the monoline insurer a quarterly fee (based on the amount of the outstanding loan).			None	The investor has the risk that the (re)insurer becomes insolvent and is not able to pay interest and/or face amount. However, with many securitizations, the interest payments and the principal are protected by a monoline insurer, reducing or eliminating the counterparty risk for the investor.
Mortality risk	The payback of the bond may vary depending on the mortality experience. If mortality experience is lower (higher) than was assumed when pricing the bond, the payback will be accelerated (slowed).	If mortality experience is adverse, it will first deplete the economic reserves of the life company and then the redundant reserves in the SPV.	If mortality index does not exceed the agreed threshold, the (re)insurer has to pay back the full face amount of the bond to investors. However, if the mortality index exceeds the pre-determined threshold, the adverse mortality experience will reduce the payment of principal to investors (in the extreme case, none of the principal will be repaid upon the bond's maturity).	<i>Embedded value:</i> If mortality increases above what was assumed when pricing the bond, the payback period will lengthen and the principal may be reduced. <i>Triple X, AXXX:</i> If mortality experience is adverse, it will first deplete the economic reserves of the life company and then the redundant reserves in the SPV (ie into the collateral which investors have provided). Investors have the risk that part (or the entire) face value will not be paid back at maturity. If credit-wrapping exists, the depletion of the face value will be covered by the bond insurers. <i>Mortality cat bond:</i> If mortality index exceeds the threshold, the principal reverts (partially or fully) to the (re)insurer.	

	(Re) insurer risk stemming from the security (continued)			Investor Risk
	Type of security			
Type of risk	Embedded Value	XXX and AXXX	Extreme Mortality	
Lapse risk	Higher lapses than expected will reduce the cash flow generated by the embedded-value business. In more extreme cases, the principal may be reduced.	Same as for Embedded Value	Limited. For parametric triggers, lapse is irrelevant. If an indemnity trigger, a higher lapse rate would reduce the probability of the bond being triggered. If it is an industry loss trigger, the lapse rate of the issuing (re)insurer might affect the industry loss, again changing the probability of the bond being triggered.	<i>Embedded value/Triple X, AXXX:</i> Early surrender of a savings policy will create an immediate cash demand for repayment and deprive the insurer of at least some expected future income. Funds will become available more quickly, thus the pay-back period may shorten. However, some of the future expected profits may not be realized. <i>Mortality cat bond:</i> None, if a parametric trigger. Higher lapses would reduce the probability of bonds based on insurance losses being triggered.
Legal risk	Minor	If taxation framework changes during duration of bond, this can substantially impact the economics of the transaction. Sponsoring company bears legal risk.	None	None
Reputation risk	If bond performs poorly, the issuing (re)insurer may have difficulty issuing future bonds. Also, poor bond performance may reflect and call attention to other underlying problems the company faces.	Same as for Embedded Value	None. These bonds are fully backed in an SPV by fixed-income assets.	None

Characteristics of P&C securitizations

P&C risk transfer and capital management options

For P&C insurers, there are many ways to transfer risk and manage capital.

For P&C insurance, there is a variety of mechanisms for transferring risk and managing capital. This wide variety of capital management structures and tools reflects the volatility of the P&C industry, relative to the life insurance industry. The tools include traditional reinsurance, collateralized reinsurance, cat bonds (excess of loss), cat swaps, industry loss warranties, contingent capital and side-cars (which have evolved from quota share cat bonds and collateralized reinsurance). In addition, exchange-traded insurance options can provide protection to (re)insurers (see box: Exchange-traded options). Cat bonds complement or substitute for these various transactions. The structure chosen depends on the specific needs of the protection buyer and the availability of fixed-income investors to support the structure. The characteristics of each of these types of tools are explained below and shown in Table 4.

Traditional reinsurance indemnifies the insurer.

Traditional reinsurance

Traditional reinsurance involves a reinsurer agreeing, for a premium, to indemnify the ceding insurer (the cedent) against all or part of the loss the insurer may sustain under the covered policies it has issued. Typically this has no pre-event collateral, and recovery depends on the ability of the reinsurer to pay claims when due.

P&C cat bonds pay on the occurrence of a pre-defined event.

Catastrophe bonds

Unlike life bonds, which mostly provide financing, P&C insurance-linked securities typically transfer peak risks to the capital markets. The bulk of insurance securitization transactions to date have involved catastrophe bonds (popularly known as cat bonds). In a typical transaction, an SPV enters into a reinsurance contract with a cedent and simultaneously issues cat bonds to investors. If no loss event occurs, investors receive a stream of coupon payments and a return of principal that compensate them for the use of their funds and their risk exposure. If, however, a pre-defined catastrophic event does occur, investors suffer a loss of interest, principal, or both. These funds are transferred to the cedent, in fulfillment of the reinsurance contract.

Cat swaps exchange fixed payments for floating payments which depend on the occurrence of insured event(s).

Catastrophe swaps

Another common way to transfer catastrophe risk is through a swap transaction, in which a series of fixed, predefined payments is exchanged for a series of floating payments whose values depend on the occurrence of an insured event. The cedent can enter into the swap directly with counterparties or through a financial intermediary. Swaps, by design, offer benefits over catastrophe bonds. They are simpler to implement and entail fewer fixed costs. Unlike cat bonds, they are usually not collateralized and do, therefore, entail credit risk. The reduced liquidity relative to a tradable security increases the cost of protection, often outweighing the lower out-of-pocket costs.

In the past, insurance options have been traded on exchanges.

Exchange-traded options have failed due to lack of activity.

Industry loss warranties are over-the-counter contracts which pay the protection buyer on the occurrence of a predefined event.

Contingent capital provides a loan, or other financing, upon the occurrence of predefined event.

Exchange-traded options

Although efforts to date to develop exchange-traded catastrophe options have not been successful, exchange-traded instruments may eventually become a widely accepted means of transferring insurance risk to capital markets. PCS exchange-traded catastrophe call options were standardized contracts that provided the purchaser with a cash payment if an index measuring catastrophe losses exceeds a certain level, known as the strike price. A key shortcoming of these options was that they were based on broad regional indices that introduce too much basis risk to effectively hedge an insurer's cat exposures.

Futures and options contracts based on the initial version of the Chicago Board of Trade (CBOT) cat index began trading in December 1992, but there was little activity in the market, and trading was halted. Other attempts have also been made, only to fail again. Recently, a new exchange has been created, HedgeStreet.com, but so far it has attracted limited interest.

Industry Loss Warranties

Industry loss warranties (ILWs) are typically structured as indemnity insurance or reinsurance contracts covering specified insurance losses. The defining feature of an ILW contract is the presence of a condition for indemnification which is linked to an industry loss metric. The threshold for the first condition (the actual insured loss of the (re)insurer) is set so low that it is virtually certain to occur if the industry loss is triggered. As such, the price of the ILW is based on the risk associated with the industry losses or index. Hence, they are easier to underwrite and can be offered by hedge funds. A second typical feature of an ILW is the backing-up of the policies by letters of credit from global commercial banks for the limit of liability written. This enables unrated players like hedge-fund-owned reinsurers to offer attractive solvency protection to potential buyers. Similar to index-based ILS, ILWs have basis risk. They are most attractive to companies with diversified portfolios whose risk profile is similar to the overall market. This is true for large (re)insurers, which explains the growing role of ILWs in the retrocession market in recent years. The recent focus of rating agencies and regulators on basis risk in ILWs (and index-based cat bonds) may reverse this trend although it is too early to tell.

Contingent capital

Contingent capital addresses capital needs through risk financing rather than risk transfer and is based on the mechanics of "put options".¹¹ These agreements are more complex than traditional line-of-credit deals through commercial banks. Contingent capital instruments provide the buyer with the right to issue and sell securities at a fixed price for a fixed period of time if a predefined event occurs. These securities may be equity, debt, or some hybrid. Contingent capital differs from insurance (whether provided from a reinsurer or via cat bond capacity) in that it does not provide indemnification, but instead provides access to capital that either dilutes equity or must be repaid.

¹¹ "An option contract giving the owner the right, but not the obligation, to sell a specified amount of an underlying security at a specified price within a specified time. This is the opposite of a call option, which gives the holder the right to buy shares." (Source: www.investopedia.com)

Side-cars provide capacity of limited duration.

Side-cars are used to accelerate the balance sheet

Side-cars

Side-cars are special purpose vehicles that provide additional capacity to a sponsoring (re)insurer via partially collateralized quota share. Side-cars typically have a lifetime of a few years with a pre-defined divestment procedure. They are set up at the beginning of a hard market with the intent to be divested prior to the next soft market. Side-cars are funded largely by third-party capital seeking to participate in the business of the sponsor. The capital consists of equity and collateralized loans and covers some modeled aggregate-loss exposure. In some cases, the sponsor writes business, and then cedes it via quota share – or some other reinsurance agreement – to the side-car. In other cases, the sponsor effectively acts as a managing general underwriter for the side-car, and the risk is written directly by the side-car. Investors with reinsurance subsidiaries may invest in the side-car or assume the same risk using quota share reinsurance.

Side-cars enable the sponsors to leverage access to business and underwriting capabilities on a broader capital base without raising expensive equity capital. Risk-bearing capital can be kept off balance sheet in the side-car vehicle. The underwriting reinsurer is able to accelerate the balance sheet and earn superior returns on capital over the cycle due to higher leverage. The sponsors also charge fees for the underwriting and administrative expenses and receive a ceding commission. As a capital management tool, side-cars offer the advantages of tailor-made protection without material basis risk and with favorable regulatory, accounting, and tax treatment. The typical side-car structure does require the sponsor to retain the tail risk at the top of the partially collateralized structure, which may be set at, for example, a 250-year event.

A dozen side-cars were formed after hurricane Katrina, supporting Bermuda-based sponsors. Interestingly, four side-cars in 2006 were for start-up insurers of the class of 2005 (Harbor Point, Validus, Lancashire, and Flagstone). It is important to remember that side-cars are actually “old wine in a new bottle” and are much the same as securitized quota shares such as 1996’s Georgetown Re, which effectively launched the cat bond market after the 1994 Northridge earthquake.

Table 3
List of side-cars formed post-Katrina

Side-car	Capital, USD million	Sponsor/investor
Bay Point Re	150	Harbor Point
Blue Ocean Re	300	Montpelier
Concord Re	750	Lexington
Cyrus Re	525	XL Capital
Flatiron Re	800	Arch Capital
Helicon	145	White Mountains
Mont Fort Re	60	Flagstone
Petrel Re	200	Validus
Rockridge	91	Montpelier
Sirocco	95	Lancashire
Starbound Re	310	Renaissance Re
Timicuan Re	50	Renaissance Re

Source: A.M. Best

Table 4
Summary of capital management
innovations

	Cat bonds	Cat swaps	Industry loss warranties	Contingent capital	Side-cars
Compensation/financing	Compensates buyer against losses	Compensates buyer against losses	Compensates buyer against losses	Provides financing on pre-agreed terms in case of loss event. No earnings relief	Compensates reinsured against losses
Basis risk/tail risk	Minimal if indemnity trigger, MITT, significant if index-, model-, or parametric-based	Present in deals with trigger based on index	Significant	Minimal if indemnity trigger; significant if index-, model-, or parametric-based	Significant tail risk with some basis risk created by structural mitigants
Moral hazard	Low if index-based/parametric, medium if indemnity-based, mitigated via contract design	Low if index-based/parametric, medium if indemnity-based; mitigated by contract design	Low; index-based	Low; index-based	Medium; mitigated via contract design
Counterparty risk	Minimal. Capital is invested in safe securities held by trustee	Yes	Depends on whether limit is collateralized	Depends on whether pre-funded or unfunded	Depends on side-car structure and collateral arrangements for any "pass through" quota share reinsurance
Liquidity for risk taker	Medium for rated transactions; same as similarly rated corporate and ABS bonds sold in a Rule 144A or similar private placement	Low	Low	Low	Limited to retrocession market
Regulatory/accounting/tax (RAT) rules for cedent	Varies	No favorable RAT treatment,	Varies	No favorable RAT treatment	Well established + favorable RAT treatment subject to penalty for tail risk and basis risk created by structural mitigants
Capacity providers	Institutional fixed-income investors, hedge funds	Large primary or reinsurers	Reinsurers, hedge funds, institutional investors	Reinsurers, hedge funds, commercial banks institutional investors	Institutional fixed-income investors, financial sponsors (private equity), hedge funds
Buyers of protection	Large primary insurers, reinsurers, corporates, and government entities	Large primary insurers or reinsurers	Reinsurers, hedge funds	Primary insurers, reinsurers, corporates, government entities	Predominantly reinsurers
Intermediation	Investment banks	The counterparties, brokers	Reinsurance broker	Direct, reinsurance broker	Direct, reinsurance broker
Standardization	Customized	Customized	Customized	Customized	Customized
Complexity of underwriting	High, expected to decrease as firms gain experience	High, expected to decrease as firms gain experience	Low, based on market risk only	High	Varies by book of insured business

Benefits for P&C (re)insurers and investors of cat bonds

Sponsoring and accessing capacity via a cat bond may provide a P&C re(insurer) with many benefits, but these may come with some drawbacks, such as basis risk.

Issuing a cat bond increases capital efficiency and, like other forms of reinsurance, improves return on equity.

In sponsoring a cat bond, a (re)insurer can potentially improve both its risk and capital management effectiveness. Cat bonds provide an additional avenue to hedge underwriting risk – especially risk related to low-frequency, high-severity events – by transferring the risk from the (re)insurer’s balance sheet (supported in large part by equity capital) to the broad fixed-income market, reducing peak risk to the (re)insurer. Securitization also adds flexibility to a reinsurer’s access to capacity. As with traditional reinsurance, it adds to rating agency capital-adequacy requirements and may improve ROE and other performance measures. Unlike traditional reinsurance, there is usually no credit risk for the issuing (re)insurer, since the cover is fully collateralized.

Investors benefit from the low correlation with other fixed-income markets ...

Fixed-income investors also benefit from investing in cat bonds. The bonds allow investment in specific insurance risks without exposure to other risks carried by the (re)insurer that come with equity investment. Moreover, because of the low correlation of defaults between debt capital markets and cat risks, investors can improve their portfolio risk/return profile.

... and from reasonably high returns.

Cat bonds may pay a higher interest rate than similarly rated corporate debt and traditional asset-backed securities (eg MBS, credit card receivables etc). These higher spreads compensate investors for the perceived illiquidity of cat bonds and the non-traditional nature of the securities (ie the novelty premium). These spreads have narrowed substantially since the early 1990s, when the first cat bond was issued, as more fixed-income investors and broker-dealers have become involved in the market.

Weaknesses

Cat bonds usually carry basis risk.

Cat bond protection buyers generally face more basis risk than do buyers of traditional reinsurance, since investors prefer index- or model-based triggers for these bonds.¹² This is because deals linked to synthetic portfolios (such as industry loss indexes), unlike those with indemnity triggers, are not subject to moral hazard problems.

Rating agencies are focusing on basis risk.

Rating agencies have recently focused on the basis risk introduced by cat bonds and ILWs in an effort to accurately reflect the advantages and disadvantages of these products in their financial strength models. These efforts are expected to evolve and be refined considerably in coming years as the financial strength models develop in concert with regulatory initiatives such as Solvency II.

¹² Traditional reinsurance treaties will typically have numerous sublimits, exclusions, terms and conditions that can introduce basis risk and run counter to the “follow the fortunes” fundamental of treaty reinsurance. Nonetheless, these features are often minor relative to the basis risk in a cat bond or ILW.

Most cat bonds are for short-tail risks.

Moreover, cat bonds have predominantly been issued for short-tail risks. Since books must be closed when bonds mature, investors and sponsors are unwilling to carry the potentially severe run-off risk associated with longer-tail risks. Since they are fully collateralized, standard cat bond deals require the special purpose vehicle (SPV) to hold the full cover in highly rated investments. Hence, ILS investors cannot benefit from the built-in leverage available by investing in (re)insurance shares.¹³

Is a mega cat really a zero-beta event?

Finally, there is some question about whether a mega cat is really a zero-beta event, or whether there can be default correlation with other asset classes. For example, Katrina affected energy prices. Much of the analysis of the correlation between cat bonds and other asset classes is based on lower-layer, higher-frequency insurance risks that are currently not securitized.

Impediments to growth

Rating agency and regulatory capital models do not reward the full benefits of cat bonds.

A major impediment to growth in the cat bond sector is that rating agency and regulatory capital models understate some of the major benefits of cat bonds. While collateralization of reinsurance recoverables receives favorable treatment, buying reinsurance from either a fully collateralized cat bond SPV (or a highly rated reinsurer) is given little if any incremental benefit over buying reinsurance from a lower-rated reinsurer. Counterparty risk from reinsurer insolvency becomes much greater for the relatively remote events for which cat bonds provide capacity.

Insurers face more rigorous risk transfer tests than banks.

The relatively less favorable regulatory capital treatment of (re)insurers compared to banks for economically equivalent transactions impedes the development of some types of transactions, such as on motor insurance. Most US ABS deals that achieve meaningful capital relief would fail risk transfer tests imposed on insurers to qualify as reinsurance, if measured with a similar approach. Given an equal playing field, (re)insurer usage of these transactions could expand significantly.

The favorable diversification aspect of multi-year cat bonds is not recognized.

The ability to obtain multi-year fixed-price capacity also receives no benefit in the current models, even though it creates substantial value. Sometimes during the term of a major cat bond, a major event changes the price of the underlying risk. The sponsor of the cat bond does not face any re-pricing or refinancing risk with its bond, but market participants with annually renewed protection do. This diversification of protection with multi-year bonds and annual renewal reinsurance is not recognized by rating agencies and analysts. However, this type of diversification is well-recognized in the case of debt financing – a mix of short- and long-term debt is viewed favorably.

¹³ See Swiss Re technical publishing, "The economics of insurance", 2001, for a discussion of how insurers create value for shareholders.

Cost may also be a partial impediment to growth.

Demand for cat bonds has often been stronger than supply. One reason for the shortage of supply appears to be the relatively high cost to the sponsor. The leverage over surplus inherent in the capital structure of a diversified reinsurer gives it a significant capital-efficiency and pricing advantage over cat securitization for non-peak cat risks that is unlikely to be overcome. Even for peak risks, investors are still demanding novelty and liquidity premiums for non-standard risks while a liquid and tradable market develops. However, this premium has declined substantially over time, as fixed-income investors have become more familiar with cat bonds and their financing techniques and as liquidity has increased. Previously, a drawback for sponsors was the sometimes unclear regulatory, accounting, and tax (RAT) treatment for cat bonds. Properly structured reinsurance from indemnity cat bonds now receives accounting treatment similar to reinsurance. Reinsurance from a properly structured non-indemnity cat bond may also achieve substantially equivalent RAT treatment with the assistance of an experienced advisory team in the structuring process.

The rating agency cap on cat bonds has slowed the development of the market.

Another impediment stems from the cap that rating agencies typically place on cat bond ratings. The actual ratings, therefore, effectively overstate the expected loss on the transaction. This is particularly true for the most remote layers, where the benefit of collateralization for the industry would be the greatest.

Standardization of cat bond contracts would facilitate growth.

The lack of standardized cat bond contracts has reduced liquidity and slowed the development of a secondary market. For most cat insurance risks, defining a standardized, broadly accepted trigger is still a challenge. The development of transparent, objective, consistent, credible, frequent and timely industry loss indexes for a wide variety of cat risks could be very beneficial. Currently, no such index exists outside of the US, which has Property Claim Service (PCS) data for industry loss indexes. Industry loss indexes for European wind and flood and for Japanese earthquakes would increase issuance of cat bonds.¹⁴ Any standardization, however, would need to take into account the evolving views of regulators and rating agencies on retained basis risk.

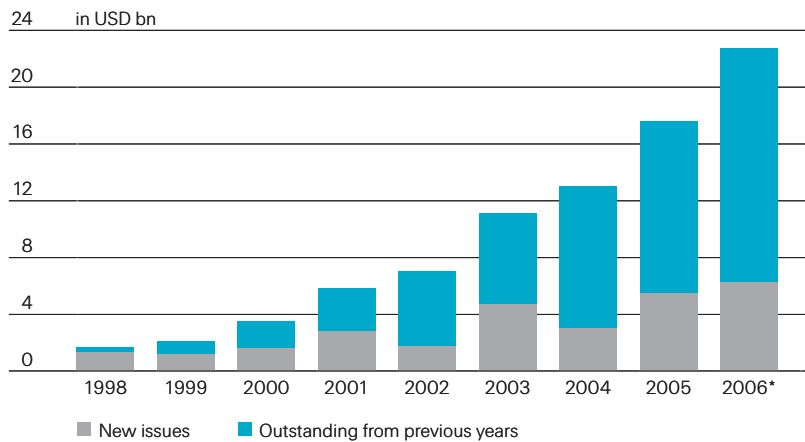
¹⁴ Market participants have begun to explore new possibilities of an independent company providing the loss data. It would be based on a survey of the largest insurers for particular risks, such as Europe windstorm and/or Japanese earthquake.

Issuance of life bonds has been robust, driven mostly by monetizing embedded value and, in the US, by funding regulatory reserves.

Figure 4
Total ILS issued and outstanding, 1998–2006: the market is taking off

Key Developments

For the past few years, the issuance of life bonds exceeded that of cat bonds. Interest in life securitization has increased due to the need to (1) fund growth of new business and regulatory reserve requirements (XXX); (2) monetize embedded value of defined blocks of business; and, (3) transfer catastrophic mortality risk to capital markets. The total outstanding volume of insurance-linked securities has grown to nearly USD 23 billion, from about USD 6 billion in 2001. It is important to remember that the USD 23 billion is only for bonds. Hence, it substantially understates the participation of fixed-income investors in the market because it excludes swaps, ILWs, and private transactions.



* data through August 25, 2006

Source: Swiss Re Capital Markets

Total issuance of life securitizations was USD 15.9 billion between 1996 and 2006.

The life bond market

The total volume of life securitizations placed in the fixed-income markets amounted to USD 15.9 billion between 1996 and June 2006. More than half of the transactions were embedded-value deals. The bulk of the remaining volume was Triple X securitization in the US. To date, only Swiss Re and Scottish Re have placed excess mortality bonds. The face amount of the two Swiss Re transactions was USD 762 million, and of the Scottish Re transaction USD 155 mn. So far, no pure longevity transactions have been closed, even though there is an active life settlements market which absorbs some longevity risk.¹⁵ Since 2001, the outstanding volume of life insurance-linked bonds has more than quadrupled, from USD 3.4 billion to USD 15.6 billion (August 2006).

¹⁵ A life settlement is the sale to an investor of an existing life insurance policy for more than its cash surrender value but less than its net death benefit. The investors in these policies then become the beneficiaries of the policies, paying the premiums until the death of the insured.

Spreads appear to decline after first issuance.

In XXX securitizations, coupons to investors may fall after a company's first transaction. In contrast, spreads for AAA-indexed bond funds were relatively constant from February 2005 to May 2006.

The market continues to develop.

Costs are shrinking as the market matures. When Barclays Life issued GBP 400 million of floating-rate notes backed by life policies in November 2003, the issue had an average life of 2.1 years and was priced at 40 basis points over LIBOR. Friends Provident's December 2004 two-tranche issue had average lives of 2.9 and 5.8 years, respectively, and the tranches were priced at tighter spreads – 20 and 23 basis points, respectively – over LIBOR.¹⁶

Structuring costs have been lowered through "shelf" securitizations.

Structuring costs have also been lowered through "shelf" registrations. Shelf-offering programs are structured in such a way that all the legal, modeling, rating and other structuring costs are done for a very large bond issue. However, not all of the bond capacity is issued initially, some "sits on the shelf" and is issued at any time that the capacity is needed by the protection buyer and the market is willing to absorb the extra risk. After the initial bond issue, subsequent issues are released without additional structuring cost, lowering the cost of issuance and, more importantly, reducing the time between a decision to access the market and closing.

Credit-wrap costs are also falling.

Often, bonds contain a credit wrap. The issuing company has to weigh the costs (premium paid to the bond insurer for providing the credit protection) and benefits (lower coupon of bond) of a credit wrap. Intense competition has resulted in costs charged by monoline insurers for XXX securitizations falling from 50–55 bp (on excess reserves securitized) to 25–30 bp.¹⁷

Unwrapped bonds have also been issued – a sign of the market's developing risk appetite.

The market is developing its capacity to absorb risk. Barclays Life and Friends Provident backed their embedded-value securitizations with credit wraps, but Swiss Re's Queensgate transaction of USD 245 mn of life-insurance-backed bonds had no credit wrap. The Swiss Re security was able to raise relatively more capital, 87% as a portion of the amount of its value in force, than the Barclays Life and Friends Provident deals, which raised only 50 to 60% of future profits.¹⁸

¹⁶ "Securitization comes to life", in: Institutional Investor, 12 May 2005

¹⁷ Smith, B, "Securitization of Excess Reserves", Society of Actuaries Annual meeting, Nov 2005

¹⁸ "Securitization comes to life", in: Institutional Investor, 12 May 2005

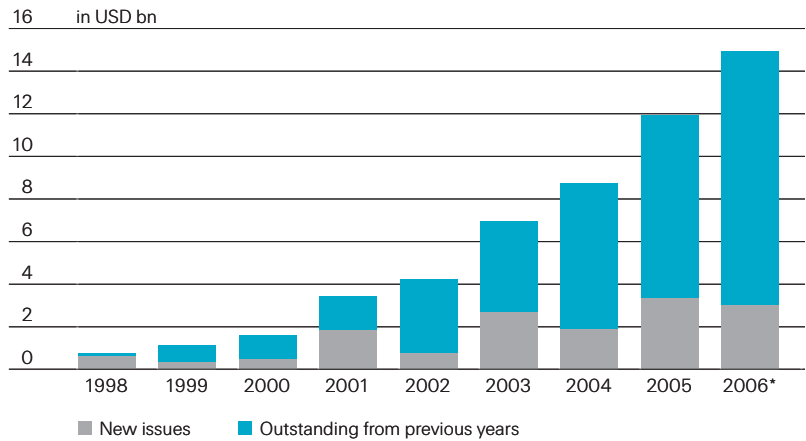
In the US, life securitizations have been mainly on excess XXX reserves.

The first AXXX securitization was recently issued.

Scottish Re issued a 30-year bond of USD 850 million in January 2005. This is the first securitization of excess reserves arising from XXX to be completed for a reinsurance company. Some primary insurers had already used this capital management tool for XXX reserves (Banner Life, Genworth). Nearly half of the outstanding life securitizations are XXX transactions (see Figure 6).

In October 2006, First Colony Life Insurance, a wholly-owned subsidiary of Genworth, issued the first AXXX securitization, a private placement. Few details are available, but it is known that the issue was for USD 315 million and it's a floating-rate bond maturing in 2050.

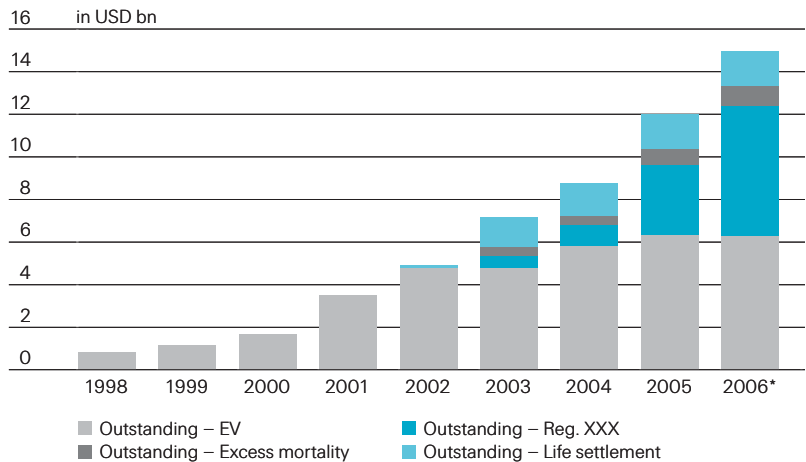
Figure 5
Newly issued and outstanding life securitizations, 1998–2006



Some issues have already been paid back. 2006*: year to date

Source: Swiss Re Capital Markets

Figure 6
Outstanding life bonds by type, 1998–2006



Some issues have already been paid back. 2006*: year to date

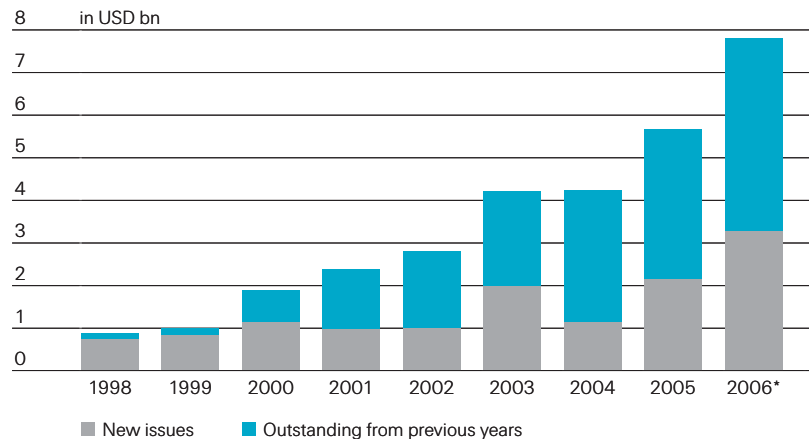
Source: Swiss Re Capital Markets

The volume of outstanding P&C cat bonds has more than doubled in five years to USD 8 billion.

Figure 7
P&C bonds issued and outstanding, 1998–2006

The P&C bond market

The volume of outstanding and newly issued P&C cat bonds increased robustly in 2005 and 2006, particularly after Katrina. Since 2001, the outstanding volume of cat bonds has more than tripled, from USD 2.4 billion to USD 7.7 billion (August 25, 2006). Demand for cat bonds from investors remains strong, despite the potential triggering of one rated bond after Katrina.



* data through August 25, 2006

Source: Swiss Re Capital Markets

Industry loss warranties are a large and growing segment of ILS, with hedge funds selling protection to insurers.

In addition to ILS, which use fully-funded SPVs, there is a large volume of over-the-counter swaps, industry loss warranties (ILW), and collateralized reinsurance arrangements. Hedge funds are very active in all these instruments. The volume of these undisclosed deals is assumed to be roughly the same as the capacity of non-life ILS. Estimating the market may become more complicated, since some money managers are selling, via reinsurers, ILW-type protection through over-the-counter derivatives. In recent years, ILWs have played an increasing role in providing retrocession cover to reinsurers, although this may change with the new, less favorable, rating agency treatment for ILWs.

New types of P&C bonds involve transfer of liability risk, motor-book risk, and credit risk.

Recent bond issues have extended the boundaries of ILS. In July 2005, Oil Casualty Insurance, an energy-industry-owned mutual liability insurer set up a USD 405 million pure casualty catastrophe bond (claims-made indemnity trigger). In December 2005, AXA securitized 85% (USD 234 million) of their French personal-motor-book risk (indemnity trigger). In January 2006, Swiss Re securitized USD 252 million of credit risk (indemnity trigger).¹⁹

¹⁹ See box: Three innovative P&C securitizations on the following page for more details on this transaction.

Risks from motor insurance policies have been transferred to capital markets.

Three innovative P&C securitizations

In an innovative deal, AXA transferred part of the risk of its French motor insurance policies, covering about three million vehicles with EUR 1 billion of premium income, to the capital markets. The transaction is triggered when the loss ratio of this book of business rises over the trigger rate in any of four one-year periods. If the trigger threshold is confirmed to have been exceeded, the losses above the trigger ratio are deducted, up to the full EUR 200 million of the contingent deposit, before the securities' funds are returned to investors. Thus, if claims jump unexpectedly on the book of business, AXA will be partially protected from excessive motor insurance losses. This protects AXA from, for example, rising damages being awarded for personal injury cases. The AXA deal is unique in a few ways. First, this is the first time that exposure to high-frequency, low-severity risk has been transferred to the capital markets, even though it would likely take a low-frequency, highly severe event to trigger the bond. Second, it is the first transaction primarily involving motor insurance. Finally, it stabilizes their loss ratio on a particular book of business.

Credit reinsurance risk has also been transferred.

In January 2006, Swiss Re completed the first indemnity-based credit reinsurance securitization. The EUR 252 million retrocession transaction covered the aggregate loss in excess of a first loss retention over a three-year period and was tailored to provide optimal economic and rating capital relief. The underlying risk is linked to claims and reserves on Swiss Re's credit reinsurance business for underwriting years 2006, 2007 and 2008. Thus, the transaction allows investors to participate in an actively managed, broadly diversified credit book for three years. The first loss retention and the participation proportional to the entire portfolio create financial incentives for Swiss Re to maintain its performance.

Even liability risk has been successfully securitized.

In another innovative deal, Oil Casualty Insurance, Ltd. (OCIL) received reinsurance coverage from Avalon Re, a special purpose vehicle, for its excess general liability book of business. Oil Casualty Insurance is a mutual with 80 shareholders from the energy sector. The securitization has an indemnity trigger and the cover is per occurrence and in aggregate over the three-year life of the security. The first attachment point is at USD 300 million and is for 90% of the next USD 150 million of losses (B rating); the next is at USD 450 million for 90% of the next USD 150 million of losses (BB+); the final tranche attaches at USD 600 and is for 90% of the next USD 150 million (BBB+). The securitization covers events within a three-year period. This transaction was the first to transfer liability risk to the capital markets and it provides protection to OCIL similar to excess of loss reinsurance, but without the counterparty risk.

Sources: Tillinghamst, Swiss Re, Lane Financial LLC

Most P&C bonds are still cat bonds for wind and earthquake.

Prior to 2005, the P&C bond market was exclusively for large natural catastrophe, predominantly wind and earthquake. About 85% of the current outstanding volume is still this type of bond. The remaining 15% is split fairly evenly between liability, credit, auto and other miscellaneous risks.

Spreads have generally narrowed.

Excluding US wind peril, on a risk-adjusted basis, spreads on cat bonds have narrowed since 2002. In addition, structuring costs have fallen, making it more attractive for sponsors.

The cat bond market was well-behaved after the 2005 hurricane season.

The cat bond market responded to Katrina in an orderly manner, with the bond potentially affected falling in value, while other bonds were only marginally affected. Spreads have increased for non-indemnity deals due to higher frequency and severity expectations. Spreads for US indemnity deals rose more, due to additional fears of unmodeled exposures to secondary perils. There was a wave of new issues post-Katrina with many new sponsors (Munich Re, AXA, Hartford, Montpelier, and PXRE), which put downward pressure on prices as a normal market reaction to increased supply, thereby raising spreads.

Who buys insurance-linked securities and why?

Investors find ILS bonds attractive.

Investors prefer non-indemnity triggers to indemnity triggers for property cat risks to reduce moral hazard risk and avoid the modeling uncertainty associated with secondary perils – especially with commercial portfolios – that can come with indemnity triggers. Due to basis risk, non-indemnity triggers are more acceptable for large diversified (re)insurers than for clients with a narrow risk exposure. Despite a post-Katrina hike in spreads and higher uncertainty regarding the underlying models, cat bonds remain attractive for investors, given their relative returns and low correlation to other fixed-income investments.

Cat bonds are a diversifying asset class.

Cat bonds yield reasonable returns, usually with less volatility than comparable-quality corporate bonds, especially if the seasonal volatility of hurricane and windstorm bonds is excluded (ie, year-over-year returns). The returns on cat bonds may still have some “novelty” premium, earning a higher return for the same rating. Also, since corporate bonds carry credit risk, while cat bonds carry natural catastrophe risk, the correlation of these two different fixed-income asset classes is negligible. Hence, the addition of cat bonds to a portfolio improves the performance and lowers the risk of the portfolio.²⁰

Dedicated cat funds and hedge funds have increased their participation in the sector in recent years.

The investor base, which was insurance and reinsurance companies and money managers in 1999, has shifted dramatically to dedicated cat funds (28%, up from 5% in 1999) and hedge funds (31%, up from 5% in 1999). The other major segment is money managers, which has been fairly stable – 29% recently and 30% in 1999. Life insurers still invest but for the most part do so indirectly via cat funds and hedge funds.

²⁰ The analysis here is specifically for natural catastrophe bonds.

Hedge funds and the insurance industry

Hedge funds are providing protection to (re)insurers.

Hedge funds purchase ILS, but also provide protection directly to (re)insurers through ILWs and collateralized reinsurance. In addition, hedge funds have many other connections to the insurance industry. For example, they purchase the stocks and hybrid capital issued by (re)insurance companies, set up reinsurance vehicles and companies and fund side-car capital arrangements, and take other non-cat risks (life, life settlement, aviation, terrorism, etc), whether or not in rated bond form.

Cat bonds increase return and reduce volatility when added to a fixed-income portfolio.

Cat bonds tend to be less volatile than corporate bonds with the same rating. Hence, adding cat bonds to a fixed-income portfolio reduces the standard deviation of returns. In addition, if it is assumed that corporate bond returns have a normal probability distribution, that they are uncorrelated with insurance-linked securities, and that the individual perils of the cat bonds are uncorrelated, then it can easily be shown that the Sharpe ratio improves as cat bonds are added to a speculative-grade corporate bond portfolio. The Sharpe ratio adjusts the returns of a portfolio for its volatility. A higher Sharpe ratio implies better risk-adjusted performance – higher returns with the same or less volatility. Adding a slightly high-return, but much more volatile asset to a portfolio will lower the Sharpe ratio, but adding a higher return, less volatile asset – such as a cat bond – to a speculative-grade corporate bond portfolio will increase the Sharpe ratio.²¹

Life bonds have been particularly well received by investors.

Traditional money managers are very interested in ILS securities, but have been particularly receptive to financing life bonds, such as embedded value and those concerning Guideline Triple X. The life bonds tend to have high ratings and are usually based on seasoned policies. Because there is a track record for the performance of the policies, the investors can become familiar with the asset by analyzing the history of the policies. This is very similar to other asset-backed securities, such as mortgage-backed securities, or an ABS of credit card debt. This explains the narrow spreads for life bonds, most of which have low-volatility premium flows. Mortality bonds have also been well received, because data on mortality is readily available, very detailed and transparent.

²¹ The Sharpe ratio is a measure developed by Nobel Laureate William Sharpe to assess risk-adjusted performance. It is calculated by subtracting the risk-free rate from the rate of return for a portfolio and dividing the result by the standard deviation of the portfolio returns.

More US insurance CFOs are considering securitization.

Market potential for life bonds

According to a Tillinghast survey of the CFOs of twenty-eight large US insurers, securitization is showing a dramatic increase in popularity. Tillinghast found that while only 4% of respondents are currently using securitization to address capital needs, 50% said they will consider it in the next two to three years, ranking it second only to reinsurance.²² Of the respondents, 55% are currently using or exploring securitization of term business associated with Regulation XXX, while 66% are considering securitizations for universal life business associated with AXXX.

Solvency II may increase use of securitization.

The introduction of Solvency II may increase the use of securitization in Europe. Solvency II is expected to treat all risk-mitigating instruments such as reinsurance, hedging and securitization, in a consistent manner. Solvency II is likely to accept a wider spectrum of risk-hedging and risk-transfer instruments than Solvency I, which permits a uniform capital reduction for the use of reinsurance. Solvency II is based on economic principles and therefore securitizations are likely to receive appropriate credit, which is not always the case under the Solvency I framework. Solvency II may therefore facilitate a substantial expansion of P&C securitization beyond cat bonds.

Global life (re)insurers are well positioned to securitize mortality risk.

Given investors' preference for well-diversified mortality portfolios, global life (re)insurers are well positioned to transfer some of their mortality risk to the capital market. These companies will also be able to bundle a portfolio with a critical size.

There have been no excess-longevity-risk transactions so far.

Life insurers and pension funds are increasingly faced with longevity risks. In some markets (such as in the US, Canada, the UK, Switzerland and the Netherlands), pension schemes are predominantly privately arranged. In other markets in Europe and Asia, private and occupational pension policies are increasingly in demand, raising the longevity risk accumulated by life insurers and pension funds. Securitization would allow some mitigation of longevity risk, however, no longevity bond has yet been placed because it has been difficult to match sellers and buyers. Global longevity risk is estimated to be very large. Life insurers' technical reserves for private annuities in payout were probably in excess of USD 600 billion at end of 2004. It is difficult to estimate an equivalent figure for pension funds. However, pension funds in OECD and select non-OECD countries had assets of USD 15.6 trillion in 2004.²³ The rapidly developing life settlement market, via which fixed-income investors absorb substantial longevity risk, provides hope that a pure longevity solution is possible.

²² "Life insurance CFO survey No 11: managing current and future demands on capital", Tillinghast, August 2005

²³ "Pension markets in focus", OECD, December 2005. Pension schemes in some countries have significant deficits. For example, Lane Clark & Peacock (LCP) estimates that the overall deficit under FRS17 for the UK defined benefit pension schemes of FTSE 100 companies was GBP 37 billion as of July 2005, which was equivalent to 12% of assets (source: Accounting for pensions 2005, Lane Clark & Peacock).

The market for embedded-value transactions is USD 400 to 500 billion.

The potential global market for embedded-value securitizations (defined as deferred acquisition costs (DAC) and present value of future profits (PVFP)) is estimated to be USD 400–500 billion for primary life (re)insurers. Compared to the current outstanding volume of EV transactions (USD 6.3 billion), there is a large upside potential for further transactions. The top 10 European and US life insurers alone, with market share of 23.7%, have total intangible assets of USD 173 billion, of which USD 100 billion are DAC.

The market for Triple X business is USD 86 billion by 2016.

In the US, life insurers' regulation on XXX reserves will be a focus for the securitization markets in the medium term. Securitization offers large insurers a flexible capital management tool which can potentially improve profits. To date, USD 6.1 billion of Triple X bonds have been issued. Triple X reserves in the US were USD 52 billion in 2005 according to Milliman.²⁴ It is assumed that around two-thirds of these are redundant reserves (USD 34 billion), thus only 18% of the redundant reserves are currently securitized. Based on Milliman's projections of triple X reserves, redundant reserves are estimated to be USD 72.5 billion in 2010 and USD 86.3 billion in 2016, while S&P believes they may even amount to USD 100 billion in a few years. This leaves ample potential for Triple X securitizations. Though only one securitization of AXXX business has been issued to date, there is substantial potential in such transactions, although the structuring is more complex.

The market potential for excess-mortality risk is difficult to estimate.

The combined volume of *extreme* mortality bonds issued so far is USD 0.9 billion, which is tiny compared to the global sums assured. However, it may only make sense to securitize extreme mortality risk, not the entire sum assured, so it is difficult to accurately estimate the market potential for this type of securitization. Securitization of extreme mortality risks is an option for large and well diversified life (re)insurers, since investors seem to prefer a diversified mortality book. Life reinsurers can play a major role in this business, since they can bundle business from various geographical areas and reach the diversification level desired by investors.

²⁴ Burden, J and G Kelly and B Smith, "XXX Implications," Society of Actuaries, Reinsurance News issue No 54, August 2004

Table 5
Estimation of current and potential market size

In USD billion	Embedded value (PVFP and DAC) ^{a)}	Triple X redundant reserves ^{b)}	Extreme mortality ^{c)}
Outstanding bonds, as per June 2006, USD billion	6.3	6.1	0.9
Potential size of market, USD billion	400–500	34.4	5 500
Volume of outstanding bonds in % of current size of market	~1.5%	18% (1) 7.1% (2)	0.02%
Estimated potential market size in 2010, USD billion	N/A	73	7 000

(1) Market share on the basis of the current size of the market (34.4 USD billion).

(2) Market share on the basis of the estimated size of the reserves in 2016 (86.3 USD billion) for the current business. Reserves for the business today will gradually increase over the next decade.

a) The global embedded value (here interpreted as DAC and PVFP accounted for in the balance sheet) is based on 23 of the largest European and US life insurance companies, accounting for 42% of the global life insurance premium volume. These companies reported approximately USD 175 billion of embedded value in their balance sheets for 2005. Japanese life insurers do not currently activate DAC or PVFP on their balance sheet.

b) Volume and projections are from Milliman. There are no projections available for AXXX.

c) The extreme-mortality-risk market is derived from a pandemic scenario which assumes that the current population mortality doubles in every country in a given year, leading to an additional loss of 56 million lives and a loss of population income of USD 5 500 billion.

Market potential for non-life bonds

The market for cat bonds is expected to grow four- to five-fold.

Five years ago, cat bonds provided USD 2 billion capacity, which was equivalent to some 3% of the traditional reinsurance market. To date, the volume of outstanding cat bonds is USD 8 billion²⁵, which is equal to 6% of the aggregate global cat reinsurance capacity (exposure) of USD 124 billion. Within the next ten years, the global cat capacity is expected to almost double to about USD 230 billion. If the penetration of cat bonds in relation to the traditional reinsurance capacity doubles, we can expect outstanding cat bonds of USD 30 billion, an almost four-fold increase. If the penetration tripled, the outstanding capacity would grow to USD 44 billion, a more than five-fold increase. Given past developments, a USD 30 to 44 billion market by 2016 appears to be most likely.

Table 6
Estimating the potential for cat bonds

USD billions	2001	2006*	2016	2016	2016
Global cat reinsurance covers	83	124	234	234	234
Outstanding cat bonds	2	8	15	30	44
As a % of traditional capacity	3%	6%	6%	13%	19%
Compared to 2006			same penetration	double penetration	triple penetration

(*) year-to-date

²⁵ As of August 25, 2006.

Motor insurance provides a huge pool of risk to be potentially securitized.

The securitization potential for other non-life risks is more difficult to estimate, since the markets are nascent and there are only few initial transactions. Motor insurance has been discussed for a while as a risk with good potential for securitization, and the first deal was finalized in 2005. The potential for motor bonds is large, due to the huge volume of insured motor risk. In 2006, motor insurance incurred estimated losses of USD 350 billion. This is expected to grow to USD 660 billion by 2016. Securitization of 3% of the claims – which is equivalent to the penetration of property cat risks five years ago – would require a volume of USD 20 billion of outstanding motor bonds, while a penetration comparable to property cat today would result in motor bonds of USD 42 billion. This would presuppose overcoming the regulatory impediments to growth raised above.

Complementary solutions could develop along with ILS securitizations, as in the banking industry. For example, banks use the credit default swap market in tandem with the securitization market to manage their credit exposures, and something similar could evolve along with the development of the motor insurance securitization market or other ILS techniques.

Table 7
Estimating the potential for motor bonds

	2006	2016	2016	2016
Global motor claims	350	660	660	660
Outstanding bonds		10	20	42
As a % of traditional capacity		2%	3%	6%
Compared to property cat		half penetration as 2001	same penetration as 2001	same penetration as 2006

Demand for life securitizations could change with adverse development for these bonds or excessive issuance.

Investor appetite for life securitizations could change rapidly if, for example, the mortality experience of a transaction proves worse than expected. It is a relatively new market, and poorly structured or inadequately supported bonds could undermine confidence in the market. Also, if supply increases rapidly, with a large number of life (re)insurers sponsoring bonds, it could outstrip demand. Investors would require wider spreads in both cases, at least until their interest catches up with supply.

Only large insurers can currently use securitization for capital efficiencies.

Capital markets require at least USD 200 million in the issuance of a life insurance-linked security and USD 100 million for a cat bond. Hence, in the near future only large insurers will securitize their blocks of business. However, as the process becomes more acceptable and standardized, smaller-scale issuance will become possible. In any event, reinsurers can and have pooled and securitized the risks of a number of their clients, so this scale issue is not really a significant impediment to growth.

Securizations tend to keep the market competitive and complement (re)insurance.

Securizations could impose market discipline on the industry by providing an ongoing window into pricing of risk, potentially reducing the volatility of insurance pricing cycles. It is unlikely, however, to replace or substitute for reinsurance or insurance products. Instead, it complements the industry and expands it by making capital available for high-frequency risks and protecting against extreme losses from low-frequency, high-severity risks.

Securitization of riskier tranches of business may be limited to large (re)insurers.

Life securitizations completed to date have tended to focus on very low-risk cash flows. The ability to securitize riskier tranches of business could be limited to the very largest life insurers, since only these companies would be able to provide a sufficiently diversified pool of risks to satisfy capital markets' requirements.

Funded securitizations have a lower cost of capital than financial reinsurance.

The cost of capital of a funded securitization is lower than that of financial reinsurance. However, the rigidities are greater, since securitizations are structured transactions and long-term in nature. Financial reinsurance may therefore be more suitable for flexible and short- and medium-term transactions.

The insurance industry, governments and regulators, and rating agencies can facilitate the development of the ILS market.

Nevertheless, more work needs to be done to support this nascent market:²⁶

- The insurance industry needs to increase the transparency of these types of transactions. This includes clarification of the risks transferred through improved data, modeling, and documentation. In addition, more standardization of contracts, special purpose vehicles and triggers would help. One reason the L&H bonds have proved so successful with investors is that their cash flows are better documented and available than for P&C cat bonds, making the modeling easy and transparent on seasoned books of business. Finally, transparency would be facilitated by making the price comparison with (re)insurance contracts explicit. This would make the decision to securitize versus insure more straightforward, though an estimate of the basis risk imbedded in most securitizations would be necessary.
- Governments and regulators could facilitate the market in many ways, also. First, it will be necessary to recognize the risk transfer involved with securitizations and allow capital relief for this commensurate with the value of the transfer. Second, securitizations are a risk management tool and should be recognized as such in the qualitative assessment of (re)insurers. Properly constituted SPVs must be accepted as counterparties providing capital relief and subject to no more stringent solvency requirements than other financial entities. Finally, no unwarranted restraints should be imposed on institutional investments in ILS securities.
- The rating agencies also play a key role in the development of this market. In addition to recognizing the risk transfer, risk management, and counterparty issues of securitizations, the rating agencies must clarify precisely how they will incorporate securitizations into their ratings.

²⁶ See the Group of Thirty, "Reinsurance and International Financial Markets," Washington, DC, 2006 for a similar list of recommendations.

Insurance-linked securities will help to develop and expand the insurance market.

All parties – the insurance and reinsurance industry, government and regulators, rating agencies, other legal and financial sectors, and the public – need to cooperate in developing a framework for facilitating securitizations. Currently, some peak risks – such as global pandemic risk, Japanese earthquake risk, European windstorm and flooding risk, Florida windstorm risk, and California earthquake risk – are underinsured. One part of the solution to this social problem is to offload more of these risks to the fixed-income market, which has enormous capacity compared to the (re)insurance industry. Also, just as the mortgage-backed security market facilitated the development of the US housing market, insurance-linked securities will be able to improve capital and risk management for insurers, lowering the cost of insurance to consumers. Regulators can play an important role by creating a level playing field between (re)insurers and banks in using securitization techniques: equivalent transactions should receive equivalent treatment. Finally, securitizations are capital and risk management tools for (re)insurers, which will help develop this industry by making the market more complete and efficient. History has shown that the development of the financial sector – banking and insurance – has promoted economic growth and development.

Appendix

Table 8
Life insurance securitizations since 2005, excluding private placements

Sponsor	SPV	Issue date	Maturity (years)	Size USD m	Rating	Coverage
Banner Life	Potomac Trust Capital	05/01/2005	20	49	AAA/Aaa	Reg XXX
Banner Life	Potomac Trust Capital	10/01/2005	20	49	AAA/Aaa	Reg XXX
Swiss Re	Queensgate	12/01/2005	20	175	A+/A1	Embedded Value
Swiss Re	Queensgate	12/01/2005	20	45	BBB/Baa1	Embedded Value
Swiss Re	Queensgate	12/01/2005	20	25	BB/Ba1	Embedded Value
Genworth	INC Money Markets	19/01/2005	30	100	AAA/Aaa	Reg XXX
Banner Life	Potomac Trust Capital	24/01/2005	20	49	AAA/Aaa	Reg XXX
Banner Life	Potomac Trust Capital	24/01/2005	20	49	AAA/Aaa	Reg XXX
Genworth	INC Money Markets	28/01/2005	30	100	AAA/Aaa	Reg XXX
LILAC	Patrons' Legacy	01/02/2005	19	100		
Scottish Re	Orkney Holdings	04/02/2005	30	850	AAA/Aaa	Reg XXX
Banner Life	Potomac Trust Capital	06/02/2005	20	49	AAA/Aaa	Reg XXX
Swiss Re	Vita Capital II Ltd.	13/04/2005	5	62	A-/Aa3	Excess Mortality
Swiss Re	Vita Capital II Ltd.	13/04/2005	5	200	BBB+/A2	Excess Mortality
Swiss Re	Vita Capital II Ltd.	13/04/2005	5	100	BBB-/Baa2	Excess Mortality
Genworth	INC Term Securities	09/06/2005	28	200	AAA/Aaa	Reg XXX
Genworth	INC Term Securities	04/10/2005	30	300	AAA/Aaa	Reg XXX
Scottish Re	Orkney Re II	21/12/2005	30	383	AAA/Aaa	Reg XXX
Scottish Re	Orkney Re II	21/12/2005	30	43	A-/Aa2	Reg XXX
Scottish Re	Orkney Re II	21/12/2005	30	30	BBB+/Baa2	Reg XXX
Swiss Re	ALPS Capital II	23/12/2005	20	220	AAA/Aaa	Embedded Value
Swiss Re	ALPS Capital II	23/12/2005	20	90	AAA/Aaa	Embedded Value
Swiss Re	ALPS Capital II	23/12/2005	20	30	BBB/Baa1	Embedded Value
Swiss Re	ALPS Capital II	23/12/2005	20	30	BB/Ba1	Embedded Value
Scottish Re	Tartan Capital	04/05/2006	3	75	Aaa/AAA	Excess Mortality
Scottish Re	Tartan Capital	04/05/2006	3	80	Baa3/BBB	Excess Mortality
Scottish Re	Ballantyne Re	02/05/2006	30	250	Aa2/A-/AA	Reg XXX
Scottish Re	Ballantyne Re	02/05/2006	30	500	Aaa/AAA/AAA	Reg XXX
Scottish Re	Ballantyne Re	02/05/2006	30	500	Aa1/AAA/AAA	Reg XXX
Scottish Re	Ballantyne Re	02/05/2006	30	400	Aaa/AAA/AAA	Reg XXX
Scottish Re	Ballantyne Re	02/05/2006	30	10	Baa1/BBB+/BBB+	Reg XXX
Scottish Re	Ballantyne Re	02/05/2006	30	40	Baa1/BBB+/BBB+	Reg XXX
Scottish Re	Ballantyne Re	02/05/2006	30	50	NR/NR/NR	Reg XXX
RGA	Timberlake Financial	28/06/2006	30	850	AAA/Aaa	Reg XXX

Source: Swiss Re Capital Markets

Table 9
P&C insurance securitizations since 2005, excluding private placements

Sponsor	SPV	Issue date	Maturity date	Size USD m	Rating	Trigger	Peril
Swiss Re	Arbor I Series VIII	3/15/2005	3/15/2007	20	B	Parametric Index	Multiperil
USAA	Residential Re 2005 Class A	5/31/2005	6/6/2008	91	BB	Indemnity	Multiperil
USAA	Residential Re 2005 Class B	5/31/2005	6/6/2008	85	B	Indemnity	Multiperil
FM Global	Cascadia	6/7/2005	6/13/2008	300	BB+/BB+	Pure Parametric	PNW EQ
Swiss Re	Arbor I Series IX	6/15/2005	6/15/2007	25	B	Parametric Index	Multiperil
OCIL	Avalon Re Class A2	6/30/2005	6/6/2008	135	B+/BB-	Indemnity	Industrial Accident
OCIL	Avalon Re Class B	6/30/2005	6/6/2008	135	CCC/CCC	Indemnity	Industrial Accident
OCIL	Avalon Re Class C	6/30/2005	6/6/2008	135	CCC-/CCC-	Indemnity	Industrial Accident
Zurich American*	KAMP Re	7/28/2005	12/14/2007	190	CC	Indemnity	Multiperil
PXRE	Atlantic & Western Re Class A	11/8/2005	11/15/2010	100	BB+/BB	Modeled Loss	Multiperil
PXRE	Atlantic & Western Re Class B	11/8/2005	11/15/2010	200	B+/B	Modeled Loss	Multiperil
Munich Re	Aiolos	11/18/2005	4/8/2009	130	BB+	Pure Parametric	Euro Wind
AXA	FCC SPARC Class A	12/9/2005	7/15/2011	126	AAA/AAA	N/A	Auto
AXA	FCC SPARC Class B	12/9/2005	7/15/2011	76	AA	N/A	Auto
AXA	FCC SPARC Class C	12/9/2005	7/15/2011	32	BBB/BBB-	N/A	Auto
Swiss Re	Arbor I Series X	12/15/2005	12/15/2006	18	B	Parametric Index	Multiperil
PXRE	Atlantic & Western Re II Class B	12/21/2005	1/9/2009	125	BB+	Modeled Loss	Multiperil
PXRE	Atlantic & Western Re II Class A	12/21/2005	1/9/2007	125	BB+	Modeled Loss	Multiperil
Montpelier Re	Champlain Re Class A	12/22/2005	1/7/2009	75	BB-	Modeled Loss	Multiperil
Montpelier Re	Champlain Re Class B	12/22/2005	1/7/2009	15	B+/B-	Modeled Loss	Multiperil
Swiss Re	Crystal Credit Class A	1/13/2006	12/31/2008	131	BBB-/Baa2	N/A	Credit Reinsurance
Swiss Re	Crystal Credit Class B	1/13/2006	12/31/2008	98	BB/Baa2	N/A	Credit Reinsurance
Swiss Re	Crystal Credit Class C	1/13/2006	12/31/2008	76	B/B2	N/A	Credit Reinsurance
Swiss Re	Australis	1/26/2006	2/3/2009	100	BB	Parametric Index	Multiperil
Undisclosed third party*	Redwood VII	2/9/2006	1/9/2008	160	BB+	Industry Index	CA EQ
Undisclosed third party*	Redwood VIII	2/9/2006	1/9/2008	65	BB+	Industry Index	CA EQ
Hartford Fire	Foundation Re Class D	2/17/2006	2/24/2010	105	BB	Industry Index	Multiperil
FONDEN*	CAT-Mex Class A	5/11/2006	5/19/2009	150	BB+	Pure Parametric	Mexico EQ
FONDEN*	CAT-Mex Class B	5/11/2006	5/19/2009	10	BB+	Pure Parametric	Mexico EQ
ACE*	Calabash Re Class A1	5/24/2006	6/1/2009	100	BB	MITT	US Wind
USAA	Residential Re 2006 Class A	5/31/2006	6/5/2009	48	B	Indemnity	Multiperil

Sponsor	SPV	Issue date	Maturity date	Size USD m	Rating	Trigger	Peril
USAA	Residential Re 2006 Class C	5/31/2006	6/5/2009	75	BB+	Indemnity	Multiperil
Swiss Re	Successor Cal Quake Parametric Class A I	6/6/2006	6/6/2008	48	BB/Ba3	Parametric Index	CA EQ
Swiss Re	Successor Euro Wind Class A I	6/6/2006	6/6/2008	97	BB/Ba3	Parametric Index	Euro Wind
Swiss Re	Successor Euro Wind Class B I	6/6/2006	6/6/2008	19	BB-/B1	Parametric Index	Euro Wind
Swiss Re	Successor Euro Wind Class C I	6/6/2006	6/6/2008	111	B/B3	Parametric Index	Euro Wind
Swiss Re	Successor II Class A I	6/6/2006	6/6/2008	73	B/B3	Various	Multiperil
Swiss Re	Successor II Class E I	6/6/2006	6/6/2008	154		Various	Multiperil
Swiss Re	Successor III Class A I	6/6/2006	6/6/2008	7		Various	Multiperil
Swiss Re	Successor IV Class A I	6/6/2006	6/6/2008	30	B/B3	Various	Multiperil
Swiss Re	Successor Japan Quake Class A I	6/6/2006	6/6/2008	103	BB/Ba3	Modeled Loss	JP EQ
Swiss Re	Successor Japan Quake Class B I	6/6/2006	6/6/2008	26	BB-/B1	Modeled Loss	JP EQ
Swiss Re	Successor Japan Quake Class C I	6/6/2006	6/6/2008	71	B/B3	Modeled Loss	JP EQ
Swiss Re	Successor Hurricane Industry Class B I	6/6/2006	12/6/2007	14	BB-/B1	Industry Index	US Wind
Swiss Re	Successor Hurricane Industry Class C I	6/6/2006	12/6/2007	7	B/B2	Industry Index	US Wind
Swiss Re	Successor Hurricane Industry Class D I	6/6/2006	12/6/2007	34	B	Industry Index	US Wind
Swiss Re	Successor Hurricane Industry Class E I	6/6/2006	12/6/2007	5		Industry Index	US Wind
Swiss Re	Successor Hurricane Industry Class F I	6/6/2006	12/6/2007	54	B/B2	Industry Index	US Wind
Swiss Re	Successor Hurricane Modeled Class B I	6/6/2006	12/6/2007	42	BB-/B1	Modeled Loss	US Wind
Swiss Re	Successor Euro Wind Class A II	6/6/2006	6/6/2007	3	BB/Ba3	Parametric Index	Euro Wind
Swiss Re	Successor Euro Wind Class C II	6/6/2006	6/6/2007	3	B/B3	Parametric Index	Euro Wind
Swiss Re	Successor Hurricane Industry Class D II	6/6/2006	6/6/2007	10	B	Industry Index	US Wind
Swiss Re	Successor Hurricane Industry Class E II	6/6/2006	6/6/2007	35		Industry Index	US Wind
Swiss Re	Successor Japan Quake Class C II	6/6/2006	6/6/2007	3	B/B3	Modeled Loss	JP EQ
Munich Re	Carillon Class A1	6/19/2006	3/30/2007	51	B+	Industry Index	US Wind
Munich Re	Carillon Class A2	6/19/2006	3/30/2007	24	B+	Industry Index	US Wind
Munich Re	Carillon Class B	6/19/2006	3/30/2007	10	B	Industry Index	US Wind
Balboa	Vasco Re 2006	6/21/2006	6/5/2009	50	BB+	Indemnity	US Wind
Liberty Mutual	Mystic Re Class A	6/21/2006	5/31/2009	200	BB+	Industry Index	US Wind

Sponsor	SPV	Issue date	Maturity date	Size USD m	Rating	Trigger	Peril
Dominion Resources	DREWCAT Capital	6/30/2006	12/28/2006	50	BB-	Pure Parametric	US Wind
Hannover Re	Eurus	7/28/2006	4/8/2009	150	BB	Parametric Index	Euro Wind
Endurance	Shackleton Re Class B**	8/1/2006	8/1/2008	60		Industry Index	US Wind
Endurance	Shackleton Re Class C**	8/1/2006	8/1/2008	50		Industry Index	Multiperil
Endurance	Shackleton Re Class A	8/1/2006	2/7/2008	125	BB/Ba3	Industry Index	CA EQ
Tokio Marine*	Fhu-Jin Class B	8/3/2006	8/3/2011	200	BB+	Parametric Index	Japan Typhoon
Swiss Re	Successor Hurricane Industry Class E III	8/4/2006	1/5/2007	50		Industry Index	US Wind
FM Global	Cascadia II	8/25/2006	8/31/2009	300	BB+/BB+	Pure Parametric	PNW EQ

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