

Bond Basics

August 2007

Bond Basics: What are Event-Linked Bonds and Why Invest in Them?

The event-linked bond market is a growing sector of the global fixed income market that provides investors with high return potential in exchange for taking on “event risk”, such as the risk of a major hurricane, earthquake or pandemic.

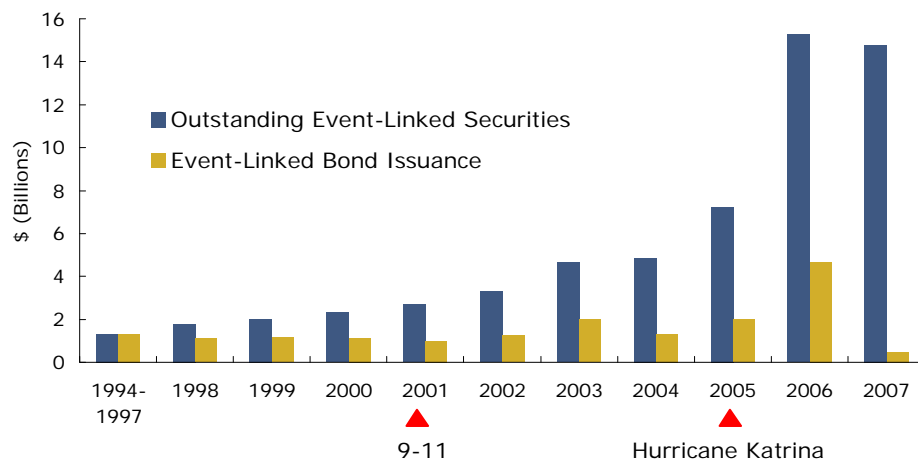
Investors in an event-linked bond (also known, less formally, as “catastrophe bonds” or “cat bonds”) are essentially betting that the specified event will not occur during the period when they own the bond. What happens if the event does occur? That depends on the specifics of the bond, but the investor may be at risk of losing some or all of their principal. Why would investors take these risks? In short, event-linked bonds offer high return potential that may overcompensate investors for the risks they take. In addition, their risks have low correlation with traditional financial market risks.

In this article, we will discuss why the event-linked bond market exists, why some investors may find these bonds attractive, and how event-linked bonds work.

Why the Event-Linked Bond Market Exists

The event-linked bond market has grown steadily since the first of these bonds was issued in 1994, as fig. 1 illustrates. To understand the reasons for this growth, we must first look at why the event-linked bond market exists in the first place.

Growth of the Event-Linked Bond Market



Source: Goldman Sachs

Fig. 1

Event-linked bonds allow insurance companies to transfer risk to investors, benefiting both insurance companies and investors. First, event-linked bonds diversify insurance risk among many investors, which benefits the insurance companies as well as investors who specifically seek risk in exchange for attractive compensation. Second, event-linked bonds allow insurance companies to offload pure volatility risk and focus

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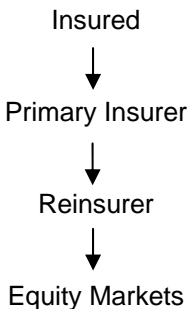
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on their strengths: selling insurance, adjusting claims, managing subjective and idiosyncratic risks, and handling other unique aspects of insurance policies.

Traditionally, insurance companies manage risk by buying reinsurance policies to protect against major losses. Insurance companies buy these policies from large reinsurance companies, which then attempt to diversify these risks, and transfer them to equity market investors by selling stock.

Through reinsurance, insurance companies can protect themselves against major catastrophes of the sort that are expected to occur about once every 10 years or even once every 30 years. However, reinsurance companies have limited capacity to take on the risk of “super” catastrophes—the sort expected to occur once in a hundred years. Concerns about the insurance industry’s ability to handle one or more of these super catastrophes were a key catalyst for the creation and early growth of the event-linked bond market. Event-linked bonds provide another avenue by which the insurance industry can transfer risk, as illustrated in figure 2.

Before Event-Linked Bonds



Now

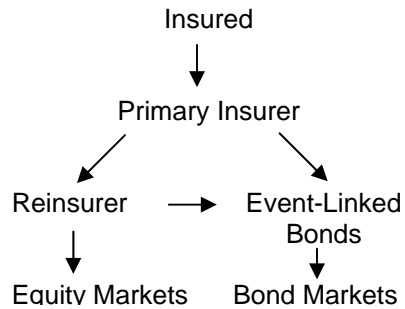


Fig. 2

Katrina

The insurance industry’s need for additional risk capacity became acutely evident in 2005, when Hurricane Katrina struck New Orleans. Hurricane Katrina was a super catastrophe, which are very rare events because they not only require a huge event such as a Category 5 hurricane (the largest category of hurricane) but also must coincide with a population center, like New Orleans.

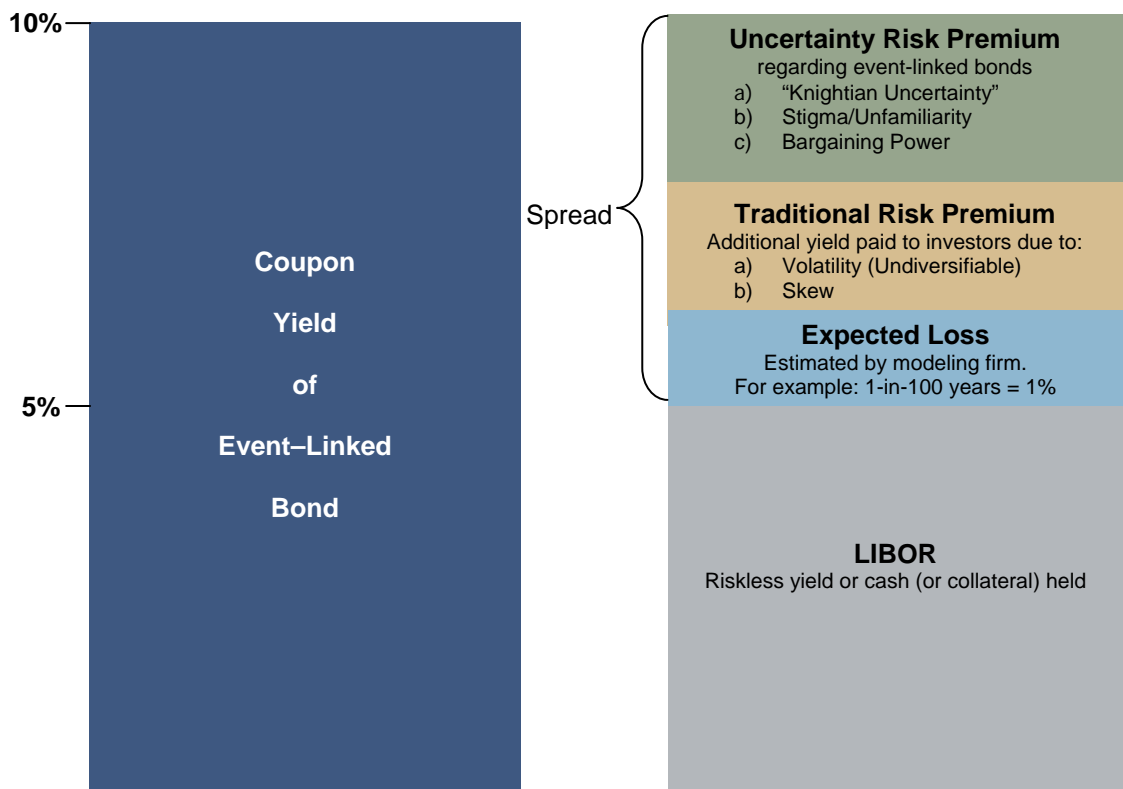
Hurricane Katrina strained the insurance industry’s capital and inflamed concerns about the reinsurance industry’s capacity to handle a future super catastrophe. Another concern related to the industry’s ability to handle a sequence of catastrophes. Because of these concerns, the insurance industry is increasingly turning to event-linked bonds as a way to reduce risk, which explains the rising issuance of these bonds in recent years...but does not explain why investors are buying these securities.

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Why Invest in Event-Linked Bonds?

Why would an investor take on the risk of a super catastrophe? The short answer is that investors believe yields on event-linked bonds may compensate them for the risks involved, and at times overcompensate them. See figure 3.



Source: PIMCO and Swiss Re

Fig. 3

Example for illustrative purposes only

The Wake of Katrina

In the wake of Hurricane Katrina, ratings agencies and analysts began to reevaluate their risk models, factoring in higher probabilities for the events covered by event-linked bonds—not just hurricanes, but also earthquakes, pandemics and other events. The combination of Hurricane Katrina and the industry’s reevaluation of the likelihood of all manner of super catastrophes led to a significant increase in yields across the spectrum of event-linked bonds.

As risk premiums on event-linked bonds were increasing, risk premiums on other asset classes that have traditionally offered investors high income—such as emerging market and high yield corporate bonds—were falling. Thus, event-linked bonds have likely

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become more attractive to investors seeking high return potential in exchange for risk that is comparable (but uncorrelated) to the risk of a high-yield corporate bond.

Risk Premiums

Still, given the uncertainty associated with event-linked bonds, all investors likely have a tipping point where the yield simply does not justify the risk. How do investors determine where that tipping point is? The answer depends on whether the yield offers enough compensation to offset the risks entailed in an event-linked bond. The familiar risk is “Expected Loss”. This risk is the quantification, by third party modeling firms, of the physical risk of loss embedded in the bond. This however is typically just a fraction of the yield. The balance of the spread can be termed “risk premium.” Risk premium is less tangible as it is determined by markets through the intersection of supply and demand.

Consider a hypothetical bond that is linked to an event that models predict should only occur in one out of a hundred years (i.e., in each year we assume there is a 1/100 probability of occurrence), and yields 1 percent over LIBOR¹ (an overnight money market rate that can be considered the “risk free” interest rate). If the specified event does not occur, the investor in this bond would double their initial investment in 100 years, in addition to collecting the LIBOR interest rate.² If the specified event does occur, the investor loses their entire principal. Probabilistically speaking, the event could occur within that 100-year timeframe or well after it. For this example, let’s assume the event occurs in year 100, after the investor has collected all the interest. In this scenario, the investor is back where they started: the 1 percent x 100 years makes up for the lost principal, and the LIBOR rate earned offsets the opportunity cost of a risk free investment.

Few, if any, investors would find this a very attractive proposition, given they would merely break-even with a riskless money market investment, despite having risked their capital. However, this hypothetical example provides a frame of reference for assessing yields on event-linked bonds. If 1% over LIBOR is roughly the break-even yield for accepting a 1-in-100 year expected loss, bonds paying 5% or 10% over LIBOR may begin to appear attractive, offering significant compensation not only for the expected losses that may occur, but the risk premium as well. In fact, some event-linked bonds offer spreads of 5% or 10% (and therefore yields of 10% to 15% based on the 6/30/2007 LIBOR rate of 5.36%).

In addition to potentially attractive yields, event-linked bonds offer potential diversification benefits because returns on event-linked bonds are uncorrelated to returns on traditional assets like stocks and bonds. In particular, the factors that affect returns on traditional assets like stocks and bonds have had little or no effect on event-linked bond returns, and vice versa. [\[click here to read the study\]](#)

¹ LIBOR (London Interbank Offered Rate) is the rate banks charge each other for short-term Eurodollar loans. It is not possible to invest directly in an unmanaged index.

² Assumes no reinvestment of capital and fees

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Evaluating Risk Premiums

To evaluate an event-linked bond, investors need a thorough understanding of the risks they are taking. The pricing of event-linked bonds is based on tail probabilities derived from historical data on storms, earthquakes and other large catastrophes and is based on judgment regarding how to apply this history going forward. In most cases, modeling firms, or actuaries, compare data on the natural disasters that are being covered in order to develop the probability of an event and the expected loss. Thus, event-linked bond investors should have, or have access to, expertise in probability modeling, weather forecasting, seismology and other technical factors that can help determine the value of an event-linked bond.

The ratings agencies perform similar analysis for each event-linked bond and assign a rating that reflects the probability of loss, which can help in evaluating specific bonds. In addition, the rating agencies evaluate a number of other details. These include:

- reviewing the third party modeling firm's expected loss numbers, and the validity given the specific structure
- reviewing the data granularity, the rebalancing of exposures, periodic resets and post-event resets
- reviewing the documentation, and qualification of service providers such as claim verification agent, loss reserve specialists, accountants, and administrators.

The rating on an event-linked bond is conceptually the same as a rating on a corporate bond because the rating indicates the probability of loss of principal based on historical experience.

For example, BB-rated corporate bonds (high yield) and BB-rated event-linked bonds both have the probability of loss around one percent, although the underlying risk exposures are very different. In particular, event-linked bond losses are triggered by specific, observable—physically driven—events. In contrast, losses on corporate bonds are triggered by complex, subjective default events. Arguably corporate defaults are much more difficult to model and quantify! In spite of this, event-linked bonds may offer a significantly higher yield than similarly rated corporate bonds.

Event-linked bond investors may also want to diversify their exposure to the asset class, which can help to limit the risk associated with any single event. Because of the scale required to justify the resources needed for the complex analysis, participation in the event-linked bond market is primarily limited to asset managers and other professional investors.

How Event-Linked Bonds Work

Event-linked bonds tend to be tied to catastrophes that fall into one of six major categories: U.S. hurricanes, U.S. earthquakes, Japan earthquakes, Japan typhoons, European windstorms and global mortality events, which can include pandemics or acts of terrorism.

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The terms of an event-linked bond generally require investors to forgive or defer some or all payments of interest or principal if the specified event occurs, as defined by one of the following four types of “triggers”:

- **Parametric Trigger:** The bond sets specific parameters that define the event, such as wind speed for a hurricane-linked bond or ground acceleration for an earthquake-linked bond.
- **Modeled Loss Trigger:** The insurer’s exposure is calculated through a predefined model and the event-linked bond is triggered if the actual parameters of the event, when entered into the model, result in losses that exceed the specified “attachment level.”
- **Industry Index Trigger:** The bond is triggered when the industry’s loss, usually as determined by an independent third party such as Property Claims Service (PCS) or Guy Carpenter, exceeds a predetermined amount.
- **Indemnity Trigger:** The bond is triggered when the insurer’s loss due to the event (not the industry’s loss) exceeds a predetermined amount. For example, a hurricane in Florida might need to result in insurance claims of more than \$1 billion to the insurer before triggering a loss of principal for event-linked bond investors.

If an event does occur (as defined by the specified trigger) during the event-linked bond’s “risk period”, the insurer can use proceeds from the bond to pay insurance claims. If no event occurs, the bonds pay coupons and return investors’ principal when the bond matures in the same way other debt securities do. Of the four triggers, the parametric trigger is generally considered the most transparent for investors, followed by the modeled loss trigger, while the indemnity and industry index triggers offer the insurer the best hedge against losses.

Conclusion

The event-linked bond market is a dramatically growing segment of the global fixed income market that offers both issuers and investors potential benefits. Event-linked bonds provide an important mechanism for transferring insurance risk to willing investors, in exchange for returns that have the potential to be very attractive. For investors with the capacity to absorb risks involved with event-linked bonds and the size to diversify their exposure, an allocation to this growing asset class is worthy of serious consideration and evaluation.

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Each sector of the bond market entails risk. With corporate bonds there is no assurance that issuers will meet their obligations. An investment in high-yield securities generally involves greater risk to principal than an investment in higher-rated bonds.

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Event-linked exposure results in gains or losses that typically are contingent, or formulaically related to define trigger events or magnitude of losses. Examples of trigger events include hurricanes, earthquakes, weather-related phenomena, or statistics relating to such events. Some event-linked bonds are commonly referred to as "catastrophe bonds." If a trigger event occurs, a portfolio may lose a portion or its entire principal invested in the bond or notional amount on a swap. Event-linked exposures such as "event-linked bonds" or "event-linked swaps" or "event-linked strategies" often provide for extension of maturity to process and audit loss claims where a trigger event has, or possibly has, occurred. An extension of maturity may increase volatility. Event-linked exposure may also expose a portfolio to certain unanticipated risks including credit risk, counterparty risk, adverse regulatory or jurisdictional interpretations, and adverse tax consequences. Event-linked exposures may also be subject to liquidity risk. Diversification does not ensure against loss.

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