

Catastrophe Bonds: An All-Weather Investment



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Executive summary

- *We believe the catastrophe bond sector may offer attractive diversification benefits when constructing resilient portfolios because the sources of risk, return, and liquidity for the sector are structurally uncorrelated with other asset classes.*
- *The reinsurance industry has existed for over 150 years, and its benchmark, the Swiss Re Global Cat Bond Index, has delivered positive returns in 20 of the past 21 years¹ for investors who have stayed fully invested throughout the year.*
- *The reinsurance industry deploys a data-driven, scientific approach for modeling the risks it underwrites, including hurricanes.*
- *Each year the National Oceanic and Atmospheric Administration (NOAA), and other hurricane forecasters, release their annual outlooks. For the upcoming Atlantic hurricane season, which runs from June 1 through November 30, the NOAA forecasters predict an 85% chance of an above-normal season.*
- *Underwriting hurricane risk has been a consistent and long-term component of the reinsurance industry, Insurance Linked Securities (ILS) and cat bond marketplace. As they have done for decades, professional reinsurance underwriters evaluate a significant amount of data to make and price their underwriting decisions, not just the most recent hurricane forecast.*
- *There is no strong correlation between hurricane forecasts and reinsurance losses.*
- *As with many other asset classes, long-term holdings in the market tend to produce better long-term results than attempting to 'time' markets. This adage holds true for catastrophe bonds as well.*

Demonstrated results over the long term

Over the past 10 years of the Swiss Re Global Cat Bond Index, there have been a wide range of hurricane forecasts, but the index delivered positive performance while outperforming most fixed income indices as well as several equity-focused ones. See Exhibit 1 for details.

¹ Source: Swiss Re Global Cat Bond Index as of March 31, 2024.

Exhibit 1: Ten years of positive performance for catastrophe bonds

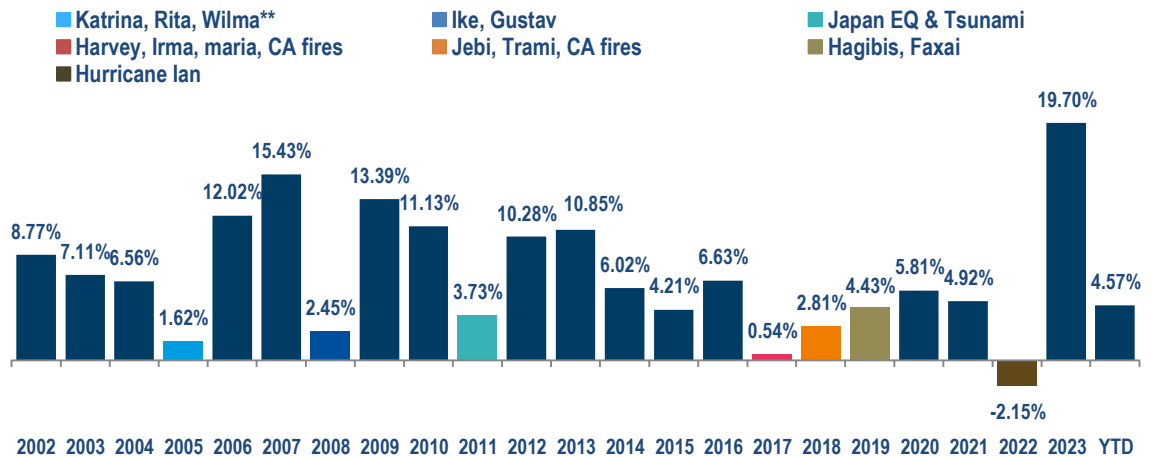
2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	YTD 2024	10 Years
Real Estate 30.2%	Real Estate 4.7%	Russell 2000 21.3%	MSCI EM 37.3%	CAT Bonds 2.8%	S&P 500 31.5%	Russell 2000 20.0%	Real Estate 46.2%	Bank Loans -0.8%	S&P 500 26.3%	S&P 500 10.6%	S&P 500 13.0%
S&P 500 13.7%	CAT Bonds 4.3%	US HY 17.1%	MSCI EAFE 25.0%	Munis 1.3%	Real Estate 29.0%	S&P 500 18.4%	S&P 500 28.7%	CAT Bonds -2.2%	CAT Bonds 19.7%	MSCI EAFE 5.8%	Real Estate 8.0%
Munis 9.1%	Munis 3.3%	S&P 500 12.0%	S&P 500 21.8%	Treasuries 0.8%	Russell 2000 25.5%	MSCI EM 18.3%	Russell 2000 14.8%	Munis -8.5%	MSCI EAFE 18.2%	Russell 2000 5.2%	Russell 2000 7.6%
Treasuries 6.0%	S&P 500 1.4%	MSCI EM 11.2%	Russell 2000 14.6%	Bank Loans 0.6%	MSCI EAFE 22.0%	Globl Bonds 9.2%	MSCI EAFE 11.3%	US HY -11.2%	Russell 2000 16.9%	CAT Bonds 4.6%	CAT Bonds 5.4%
US Bonds 6.0%	Treasuries 0.8%	Bank Loans 10.4%	Real Estate 10.8%	US Bonds 0.0%	MSCI EM 18.4%	Treasuries 8.2%	Bank Loans 5.4%	Treasuries -12.9%	Bank Loans 13.7%	Bank Loans 2.4%	MSCI EAFE 4.8%
CAT Bonds 5.9%	US Bonds 0.5%	CAT Bonds 6.6%	US HY 7.5%	Globl Bonds -1.2%	US HY 14.3%	MSCI EAFE 7.8%	US HY 5.3%	US Bonds -13.0%	US HY 13.4%	MSCI EM 2.4%	Bank Loans 4.5%
Russell 2000 4.9%	Bank Loans 0.1%	Real Estate 3.4%	Globl Bonds 7.4%	US HY -2.1%	US Bonds 8.7%	US Bonds 7.5%	CAT Bonds 4.9%	MSCI EAFE -14.5%	Real Estate 12.4%	US HY 1.5%	US HY 4.4%
US HY 2.5%	MSCI EAFE -0.8%	US Bonds 5.4%	Munis 5.4%	Real Estate -2.2%	Bank Loans 8.7%	US HY 7.1%	Munis 1.5%	Globl Bonds -16.2%	MSCI EM 9.8%	Munis -0.4%	MSCI EM 2.9%
Bank Loans 1.8%	Globl Bonds -3.2%	Globl Bonds 2.1%	Bank Loans 4.3%	S&P 500 -4.4%	Munis 7.5%	CAT Bonds 5.8%	US Bonds -1.5%	S&P 500 -18.1%	Munis 6.4%	Real Estate -0.5%	Munis 2.7%
Globl Bonds 0.6%	Russell 2000 -4.4%	Treasuries 1.1%	US Bonds 3.5%	Russell 2000 -11.0%	Treasuries 7.0%	Munis 5.2%	Treasuries -2.4%	MSCI EM -20.1%	Globl Bonds 5.7%	US Bonds -0.8%	US Bonds 1.5%
MSCI EM -2.2%	US HY -4.5%	MSCI EAFE 1.0%	Treasuries 2.4%	MSCI EAFE -13.8%	Globl Bonds 6.8%	Bank Loans 3.5%	MSCI EM -2.5%	Russell 2000 -20.4%	US Bonds 5.5%	Treasuries -0.9%	Treasuries 1.1%
MSCI EAFE -4.9%	MSCI EM -14.9%	Munis 0.2%	CAT Bonds 0.5%	MSCI EM -14.6%	CAT Bonds 4.4%	Real Estate -2.2%	Globl Bonds -4.7%	Real Estate -26.1%	Treasuries 3.9%	Globl Bonds -2.1%	Globl Bonds -0.1%

Source: Source: Morningstar data, as of March 31, 2024. Data is based on past performance, which is no guarantee of future results. Yearly figures are for the calendar years ended December 2023. (Returns updated quarterly). Asset classes represented by: US stocks – S&P 500 @ Index, small cap stocks – Russell 2000 Index, US high yield bonds – Bloomberg US High Yield Index, bank loans – Morningstar LSTA Leveraged Loan Index, municipals – Bloomberg Municipal Index, US Treasuries – ICE BofA US Treasury Index, US bonds – Bloomberg US Aggregate Index, global investment grade bonds – Bloomberg Global Aggregate Index, non-US developed stocks – MSCI EAFE Index, emerging market stocks – MSCI Emerging Markets Index, real estate – S&P 500@ Real Estate Index and event-linked (catastrophe) bonds – Swiss Re Global CAT Bond Index.

Importantly, over the 22-year history of the Swiss Re Cat Bond Index, there have been a wide range of hurricane forecasts, but the index delivered positive performance in 21 of those years.

This dynamic of positive returns is supported by the industry practice of repricing reinsurance costs. Similarly to other insurance sectors, where premiums increase after severe events so that insurers are compensated adequately, the cat bond sector also reprices risk efficiently. As a result, investors may recoup potential drawdowns quickly.

Exhibit 2: Catastrophe bond returns and risk profile indicates the importance of a long-term investment horizon



Source: Swiss Re Global Cat Bond Index as of March 31, 2024. Swiss Re has calculated index returns for the 5-years prior to the January 2007 inception of the index. There can be no expectation that the returns of the index will match pre-inception returns. Data represents past performance, which does not predict future results. Not meant to represent performance of any Amundi US portfolio. The Swiss Re Global Cat Bond Index tracks the aggregate performance of all USD, EUR and JPY denominated CAT bonds, capturing all ratings, perils and triggers. The index seeks to hedge out the EUR and JPY currency risk at the inception of the bonds. However, the index does not reflect the full ILS market.

The limitations of annual hurricane season predictions

Weeks or months in advance of any specific event, the NOAA, or any other forecaster, cannot accurately predict the number of storms that will make landfall, nor the location. Even the most sophisticated models do not have the predictive power to forecast accurately the path of a hurricane, as there is no certainty about the specific atmospheric conditions that will be in place to steer any particular storm. The path and landfall location of a hurricane are highly random, and the economic and insurable losses from a hurricane are highly correlated with the landfall location, not the overall seasonal forecast.

There are many examples of the forecasts differing from the actual outcomes from the hurricane season:

- 1992 was forecasted to be a below average hurricane season, but Hurricane Andrew struck the Bahamas and Florida, resulting one of the worst reinsurance losses in recent history.
- 2010 was forecasted to be an active season, but no hurricanes made landfall in the US.
- 2020 was forecasted to be an active season. There were 30 named storms, 14 hurricanes, and 7 major hurricanes. While the year was record-breaking in terms of activity, the reinsurance industry had only expected, or “attritional”, losses from those events because they did not make landfall in population density areas.
- 2023 was forecasted to be an active season. There were 20 named storms, 7 hurricanes, and 3 major hurricanes. The total of 2023 US insured losses from hurricanes was approximately \$1.5 billion, which was below long-term averages. This presented little impact to the reinsurance industry, as the insurance industry retained most of the losses.

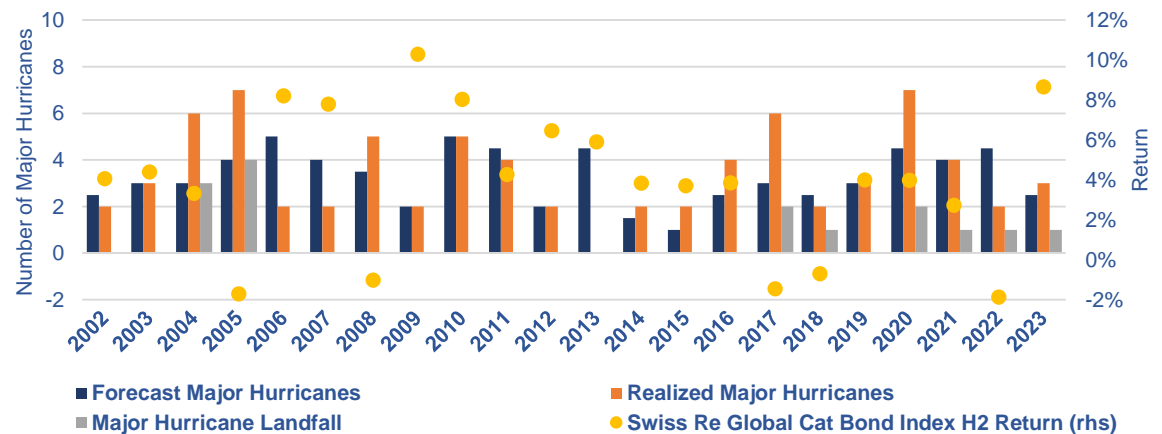
Lack of correlation between forecasts, results and reinsured losses

There is no strong correlation between hurricane forecasts and reinsurance losses. To demonstrate this, Amundi used the 22-year history of the Swiss Re Global Cat Bond Index, along with the NOAA hurricane forecasts, to evaluate the number of major hurricanes (Category 3 and above) forecasted each year, and compared it to the realized number of major hurricanes and those that made landfall in the US. We compared that analysis to the returns in the second half of the year (the period associated with the North Atlantic hurricane season) delivered by the Swiss Re Global Cat Bond Index.

The analysis shows that in only one year (2005) was the forecasted hurricane season considered active (four or more events), and the realized number of major hurricanes met or exceeded the forecast. For this one

year, the Swiss Re Global Cat Bond Index delivered a negative return of -1.7% during the second half of the year. See Exhibit 3 for details. For the full year, the index returned 1.6%.

Exhibit 3: Comparison of major NOAA Hurricane forecasts to actual major hurricanes and second half of year Swiss Re Global Cat Bond Index Performance



Source: Swiss Re Global Cat Bond Index as of March 31, 2024.

The challenges of market timing

As professional underwriters, experienced catastrophic modelers, and other industry experts have learned over many decades of deploying the most sophisticated technologies, predictions of the exact landfall location, even several hours in advance, are not reliable. And because the extent of insurance payouts after a large hurricane are heavily dependent on property values of precise areas, a shift of only a few miles up or down the coast can make a significant difference.

Over the past 22 years, out of 100 events, only three major hurricanes had a significant impact on the reinsurance industry in 2005, 2017 and 2022. Once there is certainty around the landfall location and possible range of insured losses, the market typically prices in the worst-case scenario. As an example, as there was forecasting clarity for Hurricane Ian, the Swiss Re Global Cat Bond Index reflected the possible worst-case losses by dropping approximately 8.75% in September 2022. However, as the actual losses became clearer, the index recovered by 5.93% by year end. There was also further price improvement to the instruments associated with this event into the early part of 2023.

Due to the return structure of these instruments, the majority of the calendar year return stream in the insurance-linked securities marketplace has tended to occur in the second half of the year, driven by seasonality. Although past performance is no guarantee of future results, in years with normal loss activity, historically around 60% to 70% of the annual return has come from the second half of the year.

To receive the full potential benefits of cat bonds, we believe investors should remain invested over the long term.

The importance of asset allocation

From an asset allocation perspective, Amundi evaluated how adding a 5% or 10% exposure to cat bonds (as measured by the Swiss Re Global Cat Bond Index) improved the characteristics of a long-term bond portfolio. This analysis shows that the addition of cat bonds improved the return profile, reduced risk, improved the Sharpe ratio, and reduced drawdowns. This occurred whether deployed in an US Aggregate Investment Grade Bond, US High Yield Corporate Bond or a diversified² hedge fund portfolio as represented by the Credit Suisse Hedge Fund Total Return Index³.

As an example, we inserted an allocation of a 5% exposure of cat bonds, using the Swiss Re Global Cat Bond Index, to a portfolio of the Bloomberg US Aggregate Bond Index over a time period of the past 22 years. The combined portfolio's annualized return increased by 5.22%, the standard deviation of the monthly returns was reduced by 3.33%, and the Sharpe Ratio increased by 12.77%.

Conclusion

The reinsurance industry has existed for over 150 years, and its benchmark, the Swiss Re Global Cat Bond Index, delivered positive returns in 20 of the past 21 years⁴. To derive the value of the structurally uncorrelated nature of cat bonds, Amundi, along with many asset allocators and consultants, believes a more appropriate approach is to deploy this asset class as part of a strategic, long-term asset allocation. The favorable risk and return characteristics have been demonstrated in the current market environment as well as over the longer term. There are also many favorable market trends that continue to make us constructive on this asset class over the foreseeable future.

² Diversification does not guarantee a profit or protect against a loss.

³ Past performance does not indicate future results.

⁴ Source: Swiss Re Global Cat Bond Index as of March 31, 2024. Swiss Re has calculated index returns for the 5 years prior to the January 2007 inception of the index. There can be no expectation that the returns of the index will match pre-inception returns.

Index and Term Definitions

- Catastrophe bonds: High-yield debt instruments designed to raise money for insurance companies in the event that specific natural disasters, such as earthquakes or tornados, occur.
- Correlation: Measures the degree to which two variables move in relation to each other. A positive correlation signifies similar movements; negative correlation indicates opposite movement.
- Insurance-linked securities: Financial instruments that allow investors to speculate on a variety of events, including catastrophes such as hurricanes, earthquakes and pandemics.
- Longevity risk: The chance that life expectancies and actual survival rates exceed expectations or pricing assumptions, resulting in greater-than-anticipated cash flow needs on the part of insurance companies or pension funds.
- Mortality risk: The risk associated with the variability in liability cash flows due to the incidence of death, resulting in greater-than-anticipated cash flow needs on the part of insurance companies or pension funds.
- Rate on line: The ratio of premium paid to loss recoverable in a reinsurance contract.
- Reinsurance: The insurance that an insurance company purchases from another insurance company or investor to insulate itself from the risk of a major claims event.
- Sharpe ratio: Assesses a portfolio's risk-adjusted performance by dividing its excess returns (typically measured against a benchmark, such as the risk-free rate of return) by its volatility.
- Standard deviation: A measure of the amount of variation of a set of values. A low standard deviation indicates that the values tend to be close to the mean, while a high standard deviation indicates that the values are spread out over a wider range.

Important information

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