



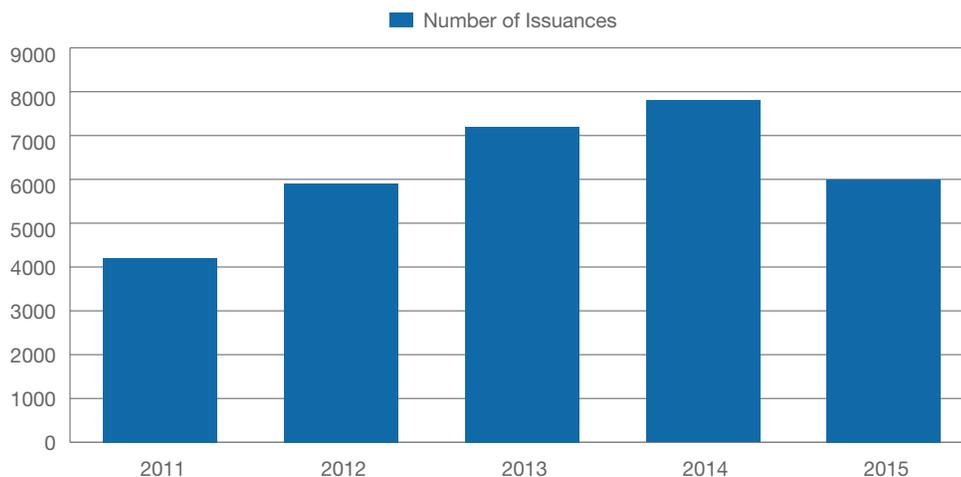
Market Growth and Original Risk: PCS® FY 2015 Catastrophe Bond Report

OVERVIEW

Catastrophe bond issuance activity in 2015 fell approximately 25 percent year over year by limit, suggesting continued insurance-linked securities (ILS) market maturity as cedents and markets explore the full range of risk transfer alternatives available to them in this sector. Perhaps counterintuitively, the decline in original issuance indicates that the market continues to gain a deeper understanding of how ILS can support improved risk and capital management worldwide. The ongoing rise in collateralized reinsurance use and the relative upsurge in industry loss warranty (ILW) activity demonstrate a continued commitment to ILS, as well as a growing sense of which approach makes the most sense for different cedent requirements.

At \$6 billion, 2015 became one of the five most active catastrophe bond issuance years in market history. And there are many signs that the catastrophe bond market continues to mature, particularly in relation to geographical diversity and adoption by the publicly managed entity space. As we've observed over the past couple of years, it would be a mistake to judge the health and growth of the catastrophe bond market only, or even primarily, in terms of the top-line issuance number. Rather, we need to see further foundational growth—a bigger base for future issuance activity.

Historical FY Issuance



In 2015, we saw catastrophe bonds come to market covering nine countries—some repeat sponsors, others enjoying their market debuts. Additionally, six U.S. publicly managed entities raised \$1.9 billion. Three of last year’s transactions had parametric triggers, while five used the PCS Catastrophe Loss Index and 16 had indemnity triggers. The market thus showed the healthy diversity necessary to support long-term expansion and the flexibility to meet the wide-ranging needs of different types of sponsors.

Ultimately, the future of the catastrophe bond market—and the ILS market as a whole—will come down to the attraction of more original risk. New opportunities for sustainable profitable growth will emerge when risks currently not covered in the global insurance and reinsurance supply chain (or risks not covered effectively or sufficiently) become accessible to capital providers worldwide. Original risk: this needs to be the top priority for the market in 2016 and beyond.

FY 2015 CATASTROPHE BOND MARKET HIGHLIGHTS

Catastrophe bond issuance, measured by new limit, fell approximately 25 percent to \$6 billion¹, according to data in the Artemis Deal Directory. While this is a noteworthy decline, 2015 was still one of the most active issuance years in catastrophe bond market history, and the underlying diversity of issuance activity is a clear sign of current and ongoing market health and vitality.

A key driver in the year-over-year decline was the shortage of extremely large transactions. In 2014, nearly \$1 billion in limit came from the Kilimanjaro series, with Sanders Re adding \$750 million through one transaction. And of course, Everglades Re raised \$1.5 billion in protection. Such issuance activity generally doesn’t occur annually, given the multiyear tenor of the transactions, which can lead to swings in overall issuance from year to year. This pattern can also affect average transaction size, which dropped close to 25 percent to \$250 million last year.

1. This does not include cat bond lite transactions, private catastrophe bonds, or transactions focused on lines other than property catastrophe (such as medical benefits and workers compensation).

FY 2015 Issuance Activity

| | FY 2015 | FY 2014 |
|--|---------|---------|
| PCS trigger use (\$ billions) | 2,100 | 2,800 |
| PCS trigger use (# of transactions) | 9 | 10 |
| North American issuance (\$ billions) ² | 5,000 | 6,500 |
| North American issuance (# of transactions) | 19 | 19 |
| Total issuance (\$ billions) | 6,000 | 7,800 |
| Total issuance (# of transactions) | 24 | 24 |

Sources: PCS, Artemis Deal Directory

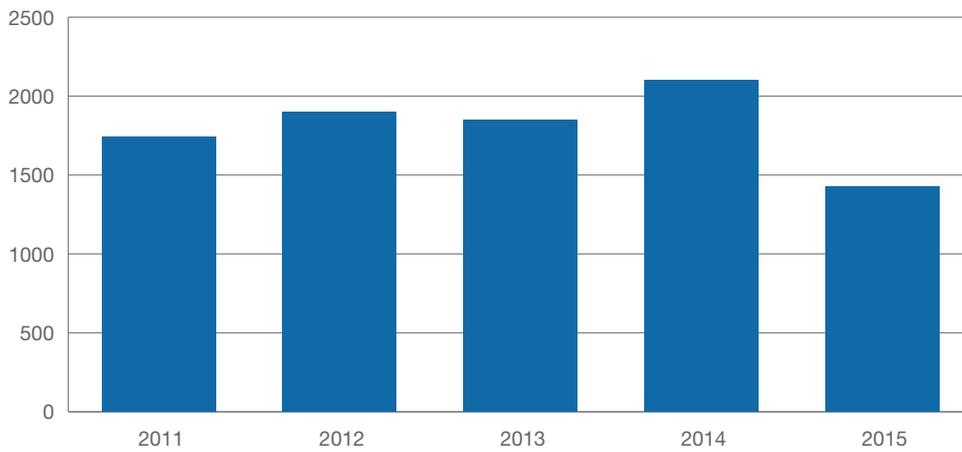
Use of data from Property Claim Services® (PCS®)—in either index triggers or for independent catastrophe designation in indemnity triggers—occurred in nine transactions, down slightly from ten last year. By capital raised, use of PCS fell from \$2.8 billion in 2014 to \$2.1 billion in 2015. However, with index-triggered cat bond lites included, the year-over-year decline was only \$500 million. Part of the reason for the drop was last year's many large transactions that didn't need to be repeated this year, such as the Kilimanjaro Re and Sanders Re catastrophe bonds. Together, they accounted for 61 percent of last year's PCS-triggered issuance activity.

Five of the catastrophe bonds completed in 2015 had no exposure to North American risk. Two covered risks in Japan, one provided protection against European risks, and another covered China. Bosphorous Re, which provides protection for Turkish risks, brought \$100 million in fresh capital. This is the second Bosphorous Re to come to market. Although it's much smaller than its predecessor (which raised \$400 million), the return to the capital markets last year suggests the strategic value of this capital source. Additionally, the launch of PCS Turkey a few months before the August transaction may signal a smaller notional last year in anticipation of a wider range of strategic alternatives this year.

The fourth quarter was relatively quiet last year. As with 2015 as a whole, the quarter showed a year-over-year drop in issuance activity—from \$2.1 billion in 2014 to \$1.4 billion last year. The 31 percent decline comes despite only a slight drop in transaction volume. Sponsors completed six transactions in the fourth quarter of 2014 and five in the fourth quarter of 2015. Again, size made the difference. In the fourth quarter of 2014, three catastrophe bonds had limits of \$400 million or more, with another at \$375 million. Last year, the only fourth-quarter transaction to top \$400 million was Kilimanjaro Re at \$625 million. The remaining deals were all \$300 million or below.

². This includes catastrophe bonds that included the United States and other regions.

Historical Q4 Issuance Activity

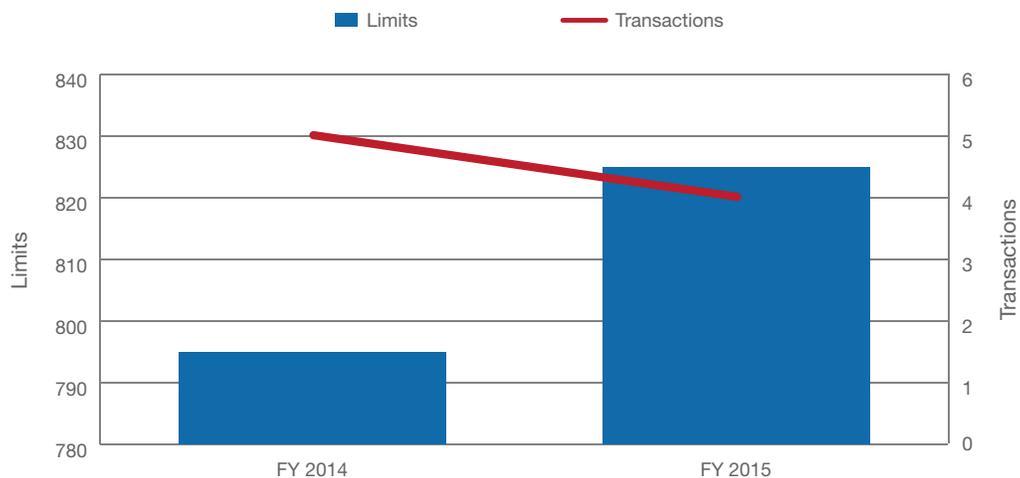


Sources: PCS, Artemis Deal Directory

Use of the PCS Catastrophe Loss Index was roughly flat from the fourth quarter of 2014 to the fourth quarter of 2015. Both periods saw three catastrophe bonds come to market with that trigger; the amount of capital raised grew \$50 million, from \$800 million to \$850 million.

Four indemnity-triggered catastrophe bonds in 2015 used PCS data for independent catastrophe designation. While this is a slight decline from five in 2014, capital raised using this approach climbed 4 percent from \$795 million to \$825 million. In 2015, Long Point Re represented a sponsor’s first-time use of PCS for catastrophe designation in an indemnity trigger.

PCS Catastrophe Designation in Indemnity Triggers



Sources: PCS, Artemis Deal Directory

For PCS to designate an event a catastrophe in the United States or Canada, it must generate an industry insured loss of at least \$25 million and affect a significant number of insurers and insureds (in Turkey, the industry insured loss threshold is \$10 million). The PCS team reviews 40 to 50 events in North America every year that have the potential to become catastrophes. Last year, the team designated 37 catastrophes.

A SHIFT IN CANADIAN ISSUANCE ACTIVITY

The issuance of catastrophe bonds including coverage for Canada remained relatively unchanged year over year. Last year, sponsors raised nearly \$1.1 billion in capital through transactions that included Canada, just \$20 million shy of the 2014 full-year total. In both 2014 and 2015, three transactions were completed.

FY 2015 Issuance Activity

| | FY 2015 | FY 2014 |
|---------------------------------------|---------|---------|
| PCS trigger use (\$ billions) | 1,100 | 600 |
| PCS trigger use (# of transactions) | 3 | 2 |
| Canadian issuance (\$ billions) | 1,100 | 1,100 |
| Canadian issuance (# of transactions) | 3 | 3 |

Sources: PCS, Artemis Deal Directory

The nature of issuance activity did change year over year, however. In 2014, sponsors completed two catastrophe bonds with indemnity triggers, one of which used PCS data for independent catastrophe designation. The remaining transaction used the PCS Catastrophe Loss Index and provided \$500 million in capacity. Last year, all three catastrophe bonds that included Canada used the PCS Catastrophe Loss Index, with transaction size ranging from \$150 million to \$625 million.

In addition to being the most widely used index trigger in the world last year, PCS was the only index trigger used in catastrophe bonds for Canada. PCS Canada®, launched in 2010, has designated 41 events, with total estimated insured losses of \$9 billion through year-end 2015. Our next catastrophe review, due for publication later in January 2016, is available exclusively to PCS clients and will provide full-year 2015 detail for Canada and the United States.

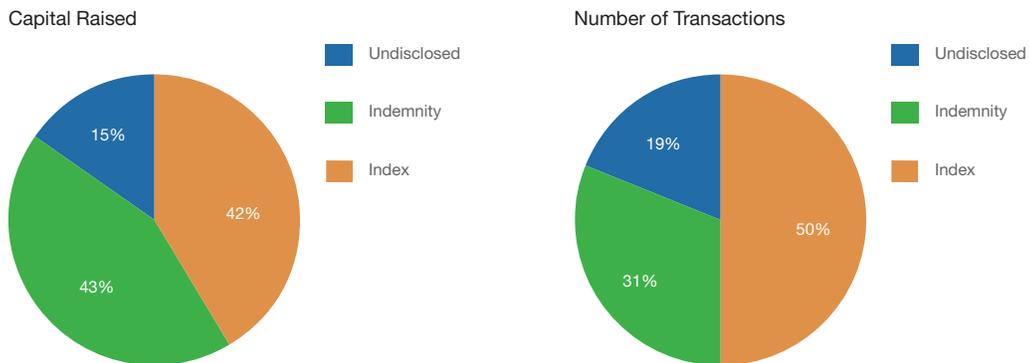
A COMMITMENT TO CAT BOND LITE

There was no publicly disclosed cat bond lite issuance activity in the fourth quarter, but plenty of chatter filled the void as the market began to prepare for the January 1, 2016, reinsurance renewal. The year ended with \$490 million in new limits from 16 transactions, more than doubling the 2014 full-year total of \$242 million in publicly revealed cat bond lites.

In many ways, the signs of increased maturity in the traditional catastrophe bond market flowed into the cat bond lite space as well. The average transaction size was \$31 million, but the two extremes were far apart. The largest cat bond lite of the year raised \$71 million, while the smallest was just under \$10 million. Four transactions exceeded \$50 million, with one closely behind at \$47.6 million.

At the high end of the range, one can see cat bond lite approaching the traditional lower end of the catastrophe bond market (historically around \$75 million). The other end of the spectrum, with seven cat bond lites under \$20 million, stands as a clear challenge to the notion that smaller deals of this type can become too expensive to complete effectively.

FY 2015 Catastrophe Bond Lite Issuance by Trigger Type



Sources: PCS, Artemis Deal Directory

Index remains the trigger of choice for the cat bond lite market. Fifty percent of the transactions completed (eight) and \$203 million (41 percent of limit) used the PCS Catastrophe Loss Index.

Indemnity-triggered lites were fewer in number but larger in size, with five transactions accounting for \$212 million in issuance. The average indemnity-triggered cat bond lite size was \$42.5 million, and the average size of an index-triggered cat bond lite was \$25.4 million. No publicly revealed cat bond lites used parametric triggers, although three transactions didn't reveal their triggers, accounting for the remaining \$75 million in limit.

3. Compass Re is not included as a cat bond lite transaction because of the legacy Compass Re special purpose insurer.

The cat bond lite structure aims to provide a route to securitization that doesn't involve the onerous issuance requirements of traditional catastrophe bonds—while still providing the structural discipline and transparency that have characterized catastrophe bonds since the market's inception. As a result, sponsors have increased flexibility to complete smaller and more targeted transactions quickly while managing their cost of capital. Additionally, the cat bond lite structure enables more participants to enter the ILS sector. Funds with a mandate to participate only in securitized transactions, for example, can use cat bond lite instead of collateralized reinsurance or industry loss warranties to issue and consume risk.

Increased interest in flexibility in the ILS market suggests continued growth for cat bond lite and other private catastrophe bond transactions in 2016, as cedents seek streamlined access to capital markets capacity. Continued rapid growth, however, will rely on the introduction of more original risk into this sector. With index triggers available from PCS for Canada and now Turkey, the opportunity exists for smaller stand-alone ILS transactions for risks in these markets, likely on a retrocessional basis.

The introduction of new indices could help grow cat bond lite beyond its traditional property catastrophe focus. For example, PCS has been working closely with Verisk Maplecroft to develop a parametric-style trigger for global terror ILWs (including cat bond lites), which could help reinsurers and ILS funds hedge the global terror risk they may assume as part of larger property catastrophe programs.

Further, discussion continues about the entry of corporates into the cat bond lite market. MetroCat Re and PennUnion Re show the potential for corporates to transfer risk from their captives to the capital markets, and the potential to extend this thinking to cat bond lites for a wider range of corporates is intuitive. It may take some time for this development to occur, though, given the research and comfort levels necessary to attract any new sector to a relatively new market.

DEBUNKING THE FIVE TOP MYTHS OF EXCHANGE-TRADED RISK

The reinsurance and ILS community has long sought a solution to the challenge of exchange-traded risk. Our team has been working actively on a solution, and it's an initiative we'll focus on throughout 2016. As we move this project forward, we've encountered some myths about how exchange-traded risk should work. Let's take a quick look at them—and the underlying reality.

Myth 1: It can't be done.

The past 25 years or so appear to have shown—some believe almost conclusively—that exchange-traded catastrophe risk solutions can't gain traction. Although the track record for this concept is far from rosy, past attempts at exchange-traded risk encountered certain barriers that may no longer be relevant. In addition to the general maturation that has occurred throughout the ILS sector, the growth of the cat bond lite market over the past two years suggests that the market is ready for exchange-traded risk; in fact, that's the next

logical step for the market. Fund-to-fund cat bond lites have become somewhat popular for tactical risk and capital management, and they show that funds are now sufficiently large to have needs as cedents. As a result, they can become sources of original risk for ILS transactions and in listed binary catastrophe option contracts.

Myth 2: You need a liquid environment immediately.

Part of the dream of an exchange-traded risk environment is sufficient liquidity to allow the sort of trading one normally sees in commodities markets: the ability to move in and out of positions easily. While this should be a long-term goal, it won't happen immediately. For an exchange-traded risk platform to succeed, it will have to survive for a while—at least ten years, according to some estimates—before it will reach the critical mass sufficient to provide the liquidity necessary for easy trading. To reach that point, the platform will need to show value beyond liquidity and ease of secondary trading. The only way to do so is to show reduced frictional costs and faster execution than the existing ILW and cat bond lite markets. An exchange-traded product that can be completed faster and more cheaply will be more likely to endure the early days of the market.

Myth 3: Disintermediation is the goal.

Disintermediation is a natural conclusion to draw from exchange-traded risk, but it's a false one. To overcome the lack of liquidity during its first decade, exchange-traded risk will rely on the placement of contracts by reinsurance intermediaries. If anything, this becomes a new tool for ILW brokers to use in serving their clients in the retrocessional market. The same dynamic holds true for secondary trades, particularly in “live cat” situations, where pricing and terms can become more challenging given the sense of urgency that the scenario brings. The role of the broker in an exchange-traded risk environment may look a little different, but the end result—placing business—remains.

Myth 4: You need contracts for all existing ILWs.

This is another idea that may seem crucial, but it won't happen in the first few years. Providing too many alternatives will mean that the vast majority are likely to be ignored. Also, too much choice can lead to confusion, as “nearby” contracts may attract a cedent and market separately that have no apparent reason to meet in the middle. Going live with only the most frequently used ILW contract thresholds will help drive an orderly market from inception, with additional contracts listed over time and based on participant demand.

Myth 5: Speculators can drive early market support.

While there may be some scenarios in which speculators could participate in an exchange-traded catastrophe risk environment, this approach cannot support a robust market. The problem is the expected loss imbalance. For speculators to take the cedent side of the deal—which is where the need would exist—they would have to be willing to assume a high likelihood of loss relative to the potential return. This may appeal to certain types of investors (such as “black swan” funds), but it generally isn't sustainable. Rather, an exchange-traded risk environment needs cedents with insurable interest that have a reason to pay for a hedge.

FIXING THE GLOBAL TERROR ILW MARKET

For the global reinsurance and ILS market to grow, it's clear that we need more original risk. Recently, several clients have mentioned an interest in the market for global terror ILWs, which has become particularly important because of soft market conditions—not to mention the recent attack in Paris. While the Paris event was truly tragic, it really is only one of many that occurred last year. Verisk Maplecroft identified 7,657 acts of terrorism or political violence across 81 countries in 2015 (as of December 10, 2015, not including kidnap and ransom events), ranging from small anarchist bombings targeting the financial sector to the downing of the Russian Metrojet Airbus over the northern Sinai Peninsula.

Soft market conditions have led many reinsurers and other risk bearers to assume terror risk as part of their global property catastrophe programs. And it's become somewhat common for them subsequently to lay off the global terror risk to be left with, essentially, the book of business they wanted. The ILWs used in this type of transaction, though, can be difficult to manage. Some have as many as 15 reporting agents, and some are not independent (for example, government designation of terror events). As a result, cedents and markets can wind up accepting a certain amount of trigger risk beyond the basis risk they would ordinarily assume.

We're currently exploring an alternative structure that would rely on a single source of information for global terror events. Working with Verisk Maplecroft (like PCS, a Verisk Analytics unit), we're examining how an ILW could be structured on something of a parametric basis—specifically, using parameters from Verisk Maplecroft event reports to trigger ILW protection.

Through early conversations with key clients and other industry stakeholders, we believe triggers would be structured based on certain fundamental factors tracked by Verisk Maplecroft, such as:

- event type (bombing, arson/firebombing, damage to property, nuclear/biological/chemical/radiological attack)
- sectors (government, energy, industrials, financials, telecoms)
- weapon type (vehicle bomb, mortar/artillery, rocket-propelled grenade, firearms)
- fatalities (using a range or minimum threshold)

Fatalities and property damage can both be tricky in terror ILWs. Events with low fatality rates could still lead to significant business interruption losses, but they risk not being covered because of the basis risk involved in the transaction. Additionally, some sorts of attacks may not result in much property damage but could still cause significant business interruption. With this in mind, the most effective way to implement Verisk Maplecroft data would be to use a variety of parameters (as shown above) in addition to the event details in the published bulletins.

For example, a global terror ILW using Verisk Maplecroft event data could cover all events excluding kidnapping, unlawful killing, torture, theft, wounding, and forced disappearance with at least 20 fatalities and excluding fake devices, letter bombs, toxic attacks, and psychiatric medicine. Further, one could specify an event duration of a certain number of days (30, for example) based on the Verisk Maplecroft event bulletin. If an event meeting those criteria were to occur, the instrument would pay the cedent.

We're still in the early stages of exploring this new approach to global terror ILW triggers and welcome your ideas, feedback, and questions. Please contact Tom Johansmeyer at +1 201 469 3140 or tjohansmeyer@iso.com.

YEAR IN REVIEW

After a grueling four-month-long march that began in Monte Carlo, the January 1, 2016, reinsurance renewal is pretty much behind us. With fresh perspective, now is the time to truly appreciate how the ILS market evolved in 2015 and what could be in store for the years ahead. Let's take a look at some of the top ILS sector trends of 2015 and what they could mean for us in the new year.

1. Keep it “lite”: Cat bond lite issuance finished the year at nearly \$500 million in original issuance, half of it using the PCS Catastrophe Loss Index. While the fourth quarter was silent, market discussions suggest that further use of this form of risk transfer would come in the first quarter of 2016. As sponsors seek more efficient and cost-effective ways to transfer small amounts of risk to the capital markets, cat bond lite is likely to gain further adoption. Additionally, it's a natural step in the progression toward exchange-traded catastrophe risk options, which are likely to become the industry's next innovation for faster, cheaper risk and capital management.

2. Source original risk: Sustainable profitable growth will only become more difficult as mature markets continue to tighten and competition among risk bearers becomes increasingly intense. Worldwide, the industry is excellent at improving what it already does well, but that only offers diminishing returns. To achieve ongoing double-digit return on equity (ROE), every link in the global risk and capital supply chain will need to source original risks from around the world. In addition to opening access to catastrophe-prone markets, original risk can come from accessing existing lines of business in new ways (such as energy and marine), launching microinsurance programs, and developing coverage solutions for emerging risks (such as cyber). Among the reinsurance industry's greatest challenges, bringing original risk into the market is at the top of the list.

3. Balance two types of innovation: The reinsurance and ILS market has two types of innovation generally available. One, as mentioned above, is to find ways to make mature market transactions more efficient. While there are gains to be had, this usually means identifying opportunities to strip fractions of a basis point out of existing deals, which has a limit on ultimate benefit. After all, you can't cut below zero. The other type of innovation

is the one that can benefit the industry most: bringing more original risk to market. New risks can help reinsurers and ILS managers generate the stronger returns necessary to achieve higher ROE. And the efficiency gains in mature markets can be applied to original risks to maximize profitability sooner.

4. Engage publicly managed entities: Perhaps the most active source of original risk in 2015—and several years prior—publicly managed entities accounted for approximately a third of the year’s catastrophe bond capital raised. Further, catastrophe and terror risk pools around the world are either eyeing the ILS market or are active in it, and plenty more could still come into the market. There are enough success stories worldwide to ensure that the catastrophe bond market remains an important strategic alternative for publicly managed entities.



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