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ALTERNATIVE CAPITAL AND ITS IMPACT ON INSURANCE AND REINSURANCE MARKETS

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EXECUTIVE SUMMARY

The amount of capital used to support reinsurance¹ worldwide has been growing quickly. Most of the growth continues to come from reinsurer and insurer profits, but significant new capital is pouring in from sources that barely existed 15 to 20 years ago. While these alternative capital arrangements have little impact on the typical policyholder, they have significantly affected the way reinsurance is being written worldwide.

Alternative reinsurance capital is characterized by two twists on the traditional reinsurance arrangement. First, a new breed of investor is seeking out the reinsurance market—hedge funds, sovereign wealth funds, pensions and mutual funds. Second, the deals are structured differently. The new arrangements—catastrophe bonds, collateralized reinsurance and reinsurance sidecars—tend to isolate the investment from the rest of the capital supporting a reinsurer, thereby allowing the capital to enter and exit the market quickly.

Alternative capital constituted 12 percent of the global reinsurance market at third-quarter 2014, more than double its market share at the end of 2010 (**Figure 1**).² Aon Benfield Analytics estimates that alternative capital has tripled since 2008, growing considerably faster than traditional reinsurance capital. Growth in alternative capital is 15 percent of the overall growth of reinsurer capital in the same time period.³ (**Figure 2**) According to Aon, alternative capital had grown almost 25 percent from the end of 2013, and as of the third quarter 2014 stood at \$61.9 billion. Other sources of capital, such as retained earnings, in that time grew 6 percent, to \$513 billion.

Alternative capital is concentrated in catastrophe business, protecting insurers against losses in case of hurricane, earthquake or other disaster. Aon Benfield estimates that alternative capital is between 40 percent and 50 percent of the capital backing catastrophe business worldwide.

Catastrophe reinsurance has two primary features that attract investors. First, results from reinsuring these risks (as opposed to casualty risks) are known with relative certainty and quite quickly. Second, profits and losses from catastrophe

¹ Reinsurance is protection purchased by insurance companies to protect their exposure to extreme losses. It is described in detail in Appendix A.

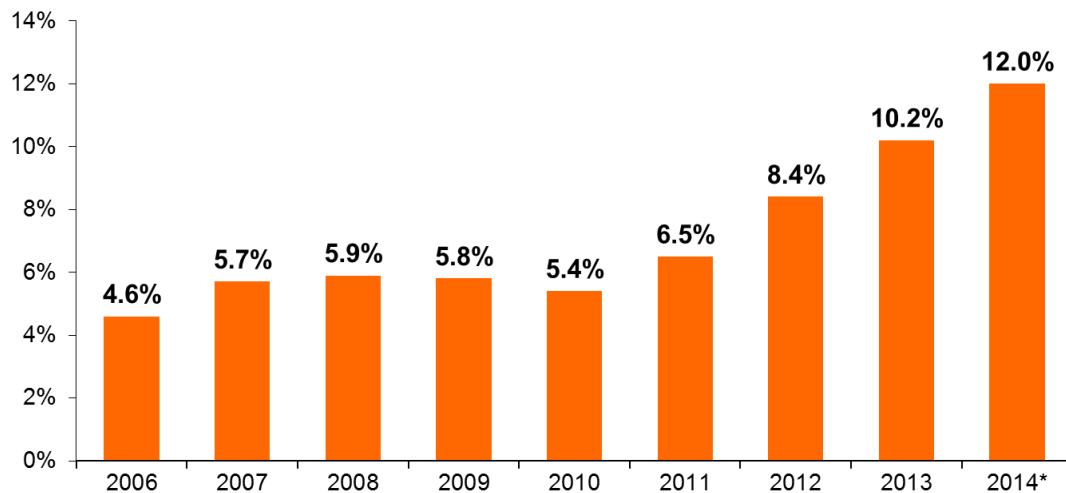
² Aon Benfield, *Reinsurance Market Outlook*, January 2015,

http://thoughtleadership.aonbenfield.com/Documents/20150102_ab_analytics_reinsurance_market_outlook_january2015.pdf.

³ Data in Figures 1 and 2 are Insurance Information Institute calculations based on data in *Reinsurance Market Outlook*, January 2015.

business are uncorrelated with profits and losses in the financial markets, except by chance. The lack of correlation reduces the risk in their overall portfolios.

Figure 1
ALTERNATIVE CAPITAL'S SHARE OF GLOBAL REINSURANCE CAPITAL

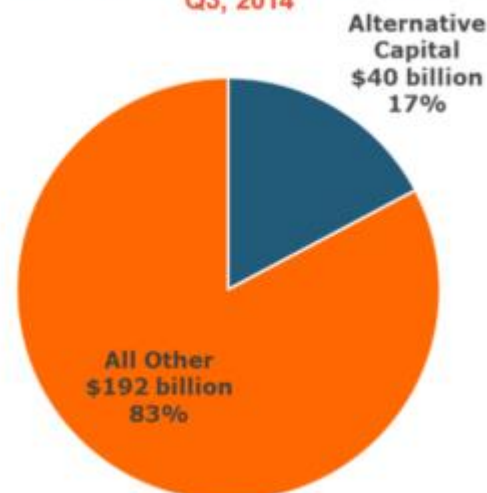


*2014 growth is through September 30
Source: Aon Benfield Analytics.

Alternative arrangements can also look attractive to insurers, which can often lock in prices, terms and conditions for several years, longer than the standard reinsurance contract.⁴

These arrangements bring their own risks. Alternative investors have resisted some traditional reinsurance terms, particularly what sort of event triggers the reinsurance payment, though there are signs that this is changing. Some critics assert alternative investors may be more likely to contest a payout. Alternative

Figure 2
INCREASE IN REINSURANCE CAPITAL, 2008-Q3, 2014



Source: Insurance Information Institute calculation based on data from Aon Benfield.

⁴ This paper focuses on reinsurance companies, but insurers can and do use alternative capital. A few large risks have bypassed the traditional insurance market entirely and used alternative capital providers for risk protection.

capital may flee the market, which might leave insurers in a difficult spot in a race for traditional capital, particularly if a major catastrophe is what triggered the departure of alternative capital.

Reinsurers have varied reactions. Some have partnered with alternative capital investors, helping them form companies and underwriting for them or sharing business with them.

Other reinsurers have resisted, suggesting that suppliers of alternative capital are only the latest group that believes it can reinsure more efficiently than organizations that have been doing so for a century or more. Under this reasoning, alternative investors will retreat when the industry faces the challenges that periodically beset it: a single enormous catastrophe; several small cats striking in close order; a messy situation that does not follow the quick-entry, quick-exit model; or simply rising interest rates worldwide that would make reinsurance returns less attractive relative to more traditional investments.

Alternative capital is driving reinsurance prices lower, particularly in catastrophe business. Its advocates speculate that it will eventually crowd some of the traditional reinsurance capacity out of the catastrophe marketplace.

This paper describes the various forms of alternative capital, with an overview of the various ways capital enters the marketplace, paying considerable attention to the structure and function of insurance-linked securities, often called catastrophe bonds. It also assesses the impact alternative capital has had on the marketplace. Conclusions are:

- Though the bulk of new capital continues to enter the marketplace through traditional means such as retained profits, alternative structures have become an important source of new capital.
- The increase in capital in recent years has contributed to the decrease in reinsurance rates over the past few years, particularly in the property catastrophe business. This may be creating a trickle-down effect into other reinsurance lines.
- The emergence of alternative capital appears to be an important factor in a recent wave of reinsurance mergers.

BIRTH OF THE ALTERNATIVE MARKET

Alternatives to the traditional reinsurance company were first seriously contemplated in the early 1990s. Hurricanes Andrew and Iniki (both in 1992), followed by the Northridge Earthquake (in 1994), led to higher reinsurance prices and questions about the ability of traditional reinsurance to pay losses after catastrophes.⁵

The earliest prominent alternative arrangements go back to the mid- to late-1990s, but only in recent years has their growth reached significant levels.

Figure 3 shows that every year since 2011, alternative capital has grown more than four times faster than traditional capital.

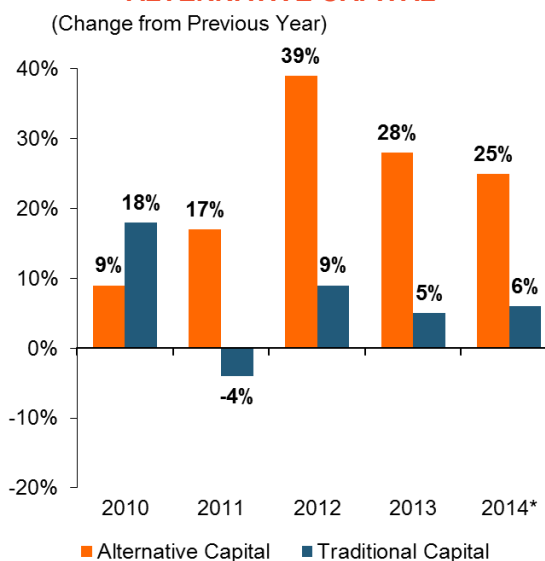
Alternative capital gets its name from either the source of the capital or the way it is used to create reinsurance. The source of traditional capital is a traditional reinsurance company. Alternative capital comes from the financial markets: hedge funds, mutual funds, sovereign wealth funds, pensions and institutional investors.

Investors are attracted to the reinsurance market, particularly the catastrophe reinsurance market, because the potential to gain profit or lose money writing reinsurance is not correlated to the profit/loss potential in standard financial instruments, like stocks and bonds. It is unlikely that an earthquake will strike at the same time as a decline in financial markets. According to basic investment theory, holding uncorrelated assets reduces the risk in one's portfolio.

The way these new investors structure reinsurance has changed as well. Hedge funds and other investors have always been able to invest in reinsurance companies by purchasing stock. Now they create their own investment vehicles.

Figure 4 shows the growth of the most common structures in recent years. Each will be discussed shortly. Collateral reinsurance shows the fastest growth, while

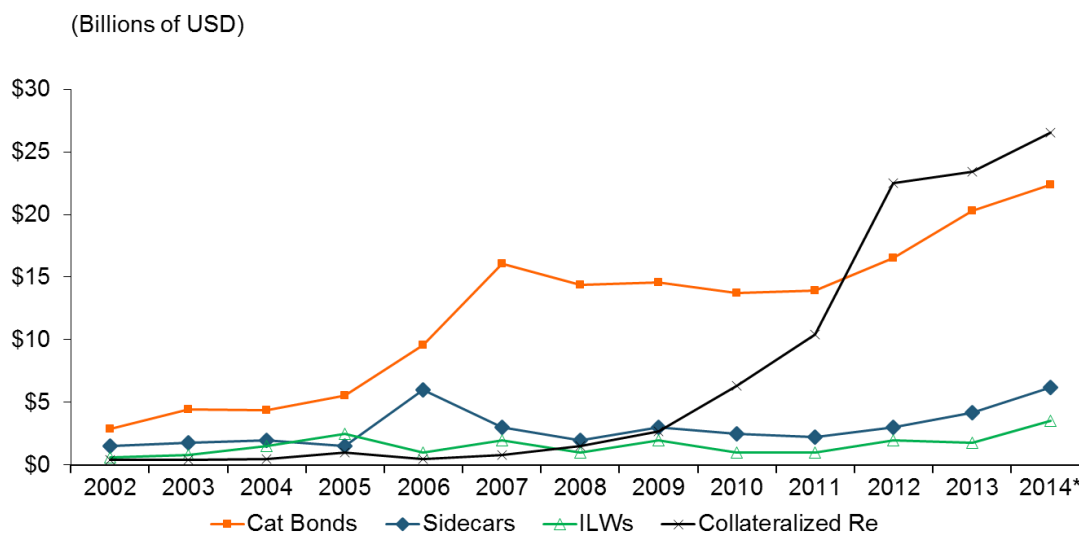
Figure 3
GROWTH IN TRADITIONAL AND ALTERNATIVE CAPITAL



* 2014 reflects growth through September 30.
Source: Aon Benfield Analytics.

⁵ U.S. General Accounting Office, "Catastrophe Insurance Risks: The Role of Risk-Linked Securities and Factors Affecting Their Use," September 2002, 1, <http://financialservices.house.gov/media/pdf/100802d2.pdf>.

Figure 4
GROWTH OF ALTERNATIVE CAPITAL BY TYPE



* 2014 data as of June 30.

Source: Aon Benfield Securities.

industry loss warranties and sidecars have maintained a small, steady presence, with a noticeable uptick in 2014. Catastrophe bonds grew in the early 2000s then shrank in 2008. Growth picked up again in 2011.⁶

In an **industry loss warranty** (ILW), the insurer buys protection against a catastrophe through a derivative contract. The contract will pay if industrywide insured losses from a catastrophe exceed an amount set by the contract. A simple example: An insurer purchases a hurricane ILW that will pay it \$30 million if Florida is struck by a storm whose industrywide losses exceed \$10 billion.

ILWs are generally written to protect insurers from the most extreme events or to plug gaps left by other parts of a reinsurance program. For most of the past decade, between \$1 billion and \$2 billion in limits were written. In the past two years capital available in the market has grown to \$3.5 billion, as insurers appear to be taking advantage of lower prices in the market.⁷

In a **reinsurance sidecar** the nontraditional reinsurer invests in a reinsurance company that closely aligns with a specific traditional reinsurer. The company that

⁶ Aon Benfield, "Insurance-Linked Securities: Capital Revolution - ILS Market Expands to New Heights 2013," August 30, 2013, 23, http://thoughtleadership.aonbenfield.com/Documents/20130830_ab_ils_annual_report_2013.pdf.

⁷ Steve Evans, "ILW's a Brighter Spot in the Reinsurance Market in Recent Weeks," *Artemis.bm*, August 20, 2014, <http://www.artemis.bm/blog/2014/08/20/ilws-a-brighter-spot-in-the-reinsurance-market-in-recent-weeks/>.

receives the investment is called a sidecar, perhaps because that company rides alongside the traditional reinsurer, taking a portion of the risk the traditional reinsurer has underwritten. Sidecars are generally designed to expire after a few years, after the contracts they have underwritten have run their course.

Sidecars became popular after record losses during the 2004-2005 hurricane seasons, reaching \$6 billion in capital in 2006, but waned as alternatives gained traction, particularly collateralized reinsurance, described below. Sidecars have grown over the past year or two with the rest of the alternative market, reaching \$6.2 billion in capacity by mid-2014, up from \$2.2 billion at the end of 2011.

Collateralized reinsurance refers to a treaty in which the nontraditional reinsurer places in escrow the entire amount of coverage it is offering. If a treaty offers \$30 million in protection, the reinsurer escrows \$30 million for the life of the contract. Provided the escrowed funds are invested safely, for example, in a Treasury security, there is little doubt the reinsurer will have funds to pay any claim.

Though they invest conservatively, traditional reinsurers do not generally escrow funds specifically for a contract. This seldom becomes a critical issue; reinsurers rarely fail to fulfill their obligations. Regulators and private third-party analysts like Standard & Poor's and A.M. Best monitor traditional reinsurers' financial health and claims-paying ability.

Collateralized reinsurance is the fastest growing component of alternative capital, with \$26 billion in capital at mid-year 2014, nearly 10 times the year-end 2010 level. Hedge funds, in particular have launched their own companies to write collateralized reinsurance, usually via Bermuda-based companies that get underwriting guidance from traditional reinsurers. There can be tax advantages to the structure, as U.S. taxes on the profits of the hedge fund's insurer can be deferred until the hedge fund sells its reinsurer. That sale is taxed at the lower capital gains rate.⁸

In an **insurance-linked security**, a bond provides the reinsurance protection. Bond investors provide collateral that will be tapped if the reinsurance is triggered. The premiums the insurer pays form the bond's coupon payments. Insurance-linked securities can reinsure life, health or property/casualty insurers. The most common protect property/casualty insurers from catastrophe losses and are called catastrophe bonds.⁹

⁸ Garry Booth, "Enter the Disruptive Reinsurer," *Reactions*, April 2014.

⁹ In this paper we will use the terms *insurance-linked security* and *catastrophe bond* interchangeably even though, strictly speaking, a catastrophe bond is one type of insurance-linked security.

Catastrophe bonds have grown substantially in the past three years. At year-end 2014, \$22.9 billion in catastrophe bonds were outstanding, according to Guy Carpenter, up 60 percent from year-end 2011. Issuance hit a record \$8 billion.¹⁰

To an insurance company, a catastrophe bond acts like a typical reinsurance treaty; the insurer pays a premium, and in case of a catastrophe, files claims and is reimbursed. To an investor, it acts like a typical bond; the investor lends a principal amount, receives periodic interest payments and at the end of a set period, unless there is a catastrophe, gets the principal back with the final interest payment.¹¹

If there is a catastrophe, the bond may be triggered, meaning the insurer is able to tap into it to recoup its losses. **Figure 5** lists notable triggered events, sometimes called defaults to reflect the investors' perspective.¹²

Most events have been small, less than \$35 million. The largest was a \$300 million default (payout) after the Tohoku earthquake in Japan in 2011. Four events were linked not to a catastrophic loss but related to the collapse of Lehman Brothers in 2008.¹³

¹⁰ Guy Carpenter & Co., *Catastrophe Bond Update Fourth Quarter 2014: Issuance Reaches Industry Full-Year Record*, February 3, 2015, http://www.guycarp.com/content/dam/guycarp/en/documents/thought-leadership/Catastrophe_Bond_Update_Fourth_Quarter_2014.pdf.

¹¹ The structure of an insurance-linked security is discussed in Appendix B.

¹² James Doona, "Continuing Innovation in Reinsurance Risk Transfer" (Casualty Actuarial Society: Casualty Loss Reserve Seminar, Boston, September 17, 2013), 6, <https://cas.confex.com/cas/clrs13/webprogram/Handout/Paper2791/Doona%20-%20Munich%20Re%20presentation%20to%20CAS%2017-Sep-2013%20vFinal.pdf>.

¹³ These are described briefly in Appendix C.

Figure 5
NOTABLE CATASTROPHE BOND EVENTS

Bond	Sponsor	Event(s)	Loss to Investors
Kelvin Ltd.	Koch Energy	U.S. Winter 2000-01	\$5 million
George Town Re	St. Paul Re	9/11, Hurricane Floyd, European wind	\$1 million
KAMP Re	Zurich	Hurricane Katrina (2005)	\$144 million
Avalon Re	Oil Casualty	Katrina, 2005 fuel depot explosion, NYC street collapse	\$13 million
Ajax	Aspen Re	2008 Lehman bankruptcy	\$72 million
Carillon	Munich Re	2008 Lehman bankruptcy	\$31 million
Newton Re	Catlin	2008 Lehman bankruptcy	\$4 million
Willow	Allstate	2008 Lehman bankruptcy	\$10 million
Muteki Ltd.	Munich Re for Zenkyoren	2011 Tohoku earthquake	\$300 million
Vega Capital	Swiss Re	2011 Tohoku earthquake	\$16 million
Mariah Re	American Family	2011 tornadoes	\$200 million ¹
Vega Capital	Swiss Re	Superstorm Sandy (2012)	\$7 million
Successor X	Swiss Re	Superstorm Sandy (2012)	\$15 million ²

¹ In litigation

Source: Munich Re.

The catastrophe bond market can only operate with the implied consent of lawmakers, regulators and quasi-regulators like rating agencies. Rating agencies assign grades to catastrophe bonds. A.M. Best, for example, considers the risk characteristics of the perils covered and reviews any models showing the probability of loss. It also looks at the results of any stress tests.¹⁴

In the United States, the National Association of Insurance Commissioners (NAIC) has focused on the purchase of catastrophe bonds by insurers and reinsurers. Previously, insurers and reinsurers investing in the bonds were expected to avoid bonds that covered perils the company was already exposed to. They had been required to file their purchase with the NAIC Capital Markets & Investment Analysis Office, but the NAIC has proposed loosening that requirement for bonds that have been evaluated by a rating organization such as Standard & Poor's.¹⁵

¹⁴ "Rating Natural Catastrophe Bonds" (A.M. Best Company, August 23, 2012), <http://www3.ambest.com/ambv/ratingmethodology/OpenPDF.aspx?rc=197662>.

¹⁵ "Insurance-Linked Securities: Catastrophe Bonds, Sidecars and Life Insurance Securitization," *National Association of Insurance Commissioners*, October 24, 2014, http://www.naic.org/cipr_topics/topic_insurance_linked_securities.htm.

Several governmental and quasi-governmental insurers have tapped the catastrophe bond market or plan to, including the California Earthquake Authority, Louisiana Citizens Property Insurance and the Texas Windstorm Insurance Association. California's State Compensation Insurance Fund, uses a catastrophe bond to cover the earthquake risk borne in its workers compensation policies.¹⁶ The World Bank issued its first catastrophe bond in June 2014, supporting the Caribbean Catastrophe Risk Insurance Facility. Continued government participation may help stabilize the market in leaner times and might forestall laws or regulations that could hurt it.

The largest catastrophe bond to date was issued in May 2014 by a government-related entity, Citizens Property Insurance Corp., Florida's largest homeowners insurance writer. That three-year bond would reimburse 60 cents for every dollar the carrier paid for hurricane losses exceeding \$5.202 billion on residential business in the company's coastal account, up to \$1.5 billion.¹⁷ The largest previous bond was a \$750 million Citizens Property 2012 issue.

Catastrophe bonds have garnered more attention than other alternative deals, thanks to their intriguing structure and the information available about them publicly. Much of the rest of this paper, will analyze the structure and operation of catastrophe bonds as a window onto the entire alternative market, focusing specifically on the 2014 \$1.5 billion Citizens Property bond.

DIFFERENCES BETWEEN TRADITIONAL REINSURANCE, ALTERNATIVE CAPITAL

Alternative capital deals do not perfectly replicate a traditional reinsurance deal.

One difference involves the definition of what triggers a claim. The two most common triggers are the indemnity trigger, usually favored by the ceding insurer, and the parametric trigger, usually favored by investors.

Indemnity triggers: The Citizens Property catastrophe bond has an indemnity trigger. In case of a hurricane, Citizens would be reimbursed when it presented a list of claims demonstrating that it sustained claims that require reimbursement. The reinsurer *indemnifies*, or protects, the ceding insurer for the losses it sustained. Insurers often prefer the indemnity trigger because under such a trigger a company can be sure that it will be reimbursed for the specific losses it wanted the treaty to cover.

¹⁶ Workers compensation covers virtually all injuries suffered at work, regardless of cause, so a worker injured in an earthquake would have a workers compensation claim.

¹⁷ Other reinsurers pledged to pay 29.2 percent of the loss in the layer, using standard reinsurance treaties. Citizens Property would absorb the rest. See Citizens Property presentation by Jennifer Montero, "2014 Layer Charts" (Finance and Investment Committee Meeting, Winter Park, Florida, June 24, 2014), https://www.citizensfla.com/bnc_meet/docs/559/02A_PLACLA_Coastal_Layer_Chart_2014.pdf. Additional details provided by John Rollins, chief risk officer, Citizens Property Insurance Corporation, July 23, 2014.

Other triggers do not have this quality, as we will discuss shortly. The difference between what the reinsurance pays the insurer and what the insurer wanted protection against is known as basis risk, which the insurer naturally wants to minimize. An indemnity trigger nearly eliminates basis risk, because the trigger follows the fortunes of the insured. The Citizens Property bond has an indemnity trigger.

In the investor's view, an indemnity trigger introduces moral hazard. With reinsurance in hand, the insurer might be less vigilant settling claims for which it would be reimbursed anyway. Perhaps more important: The investor wants to know quickly whether the reinsurance has been triggered, and how much it will pay out in losses. It does not want to be involved if the claims process drags on.

Parametric triggers: Investors prefer parametric triggers, where payments are based on objective measurements taken by a third party. A hurricane, for example, at any given moment has a documented position, wind speed and size as measured by the National Oceanic and Atmospheric Administration (NOAA). The size and epicenter of an earthquake are measured by the United States Geological Survey. Both have been used as parametric triggers.

With a parametric trigger, the fate of the reinsurance is straightforward. If the event is big enough, the reinsurance pays. If the event is too small, there is no payment.

The parameters that will trigger reinsurance payments are settled in negotiations before any deal is struck.

In addition to indemnity and parametric, common triggers include:

- **Industry loss index**, in which the trigger is based on actual losses to the insurance industry as a whole. In the United States, this is usually a PCS trigger, as the organization that develops the estimate is the Property Claims Services (PCS) division of Verisk Analytics.
- **Hybrid triggers**. The recovery is based on actual industry losses, as in the industry loss index, but computer models allocate losses at a more granular level.
- **Notional portfolio triggers**, also called a modeled loss trigger. A sophisticated computer model uses the specifics of the event to estimate the insurance company's losses. The repayment is based on the results of the model.¹⁸

¹⁸ David Lalonde and Brent Poliquin, "So You Want to Issue a Cat Bond," *AIR Worldwide*, February 21, 2012, <http://www.air-worldwide.com/Publications/AIR-Currents/So-You-Want-to-Issue-a-Cat-Bond/>.

In the past two years, indemnity triggers have grown more common, with 70 percent of 2014 issuance having an indemnity trigger, up from 49 percent two years earlier.¹⁹ This could be a sign that investors have become more comfortable with indemnity triggers, or that ceding insurers are better able to dictate bond terms in the marketplace.

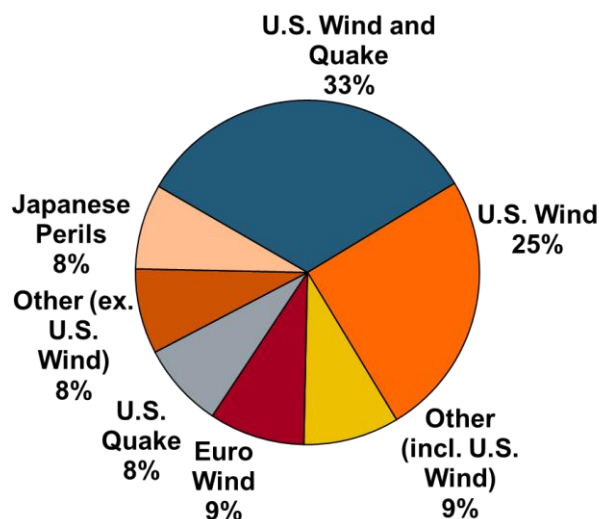
A second difference is what happens after the reinsurance kicks in. In traditional reinsurance, the insurer has the option to automatically buy more coverage in case a second event occurs. This is known as reinstatement, because the original limit of the treaty is reinstated at whatever price the original treaty prescribes.

Alternative deals often lack reinstatement provisions. After a reinsurance payment, particularly a catastrophe bond, there is not always a way to buy coverage for another event. The insurer must go back to the marketplace at a vulnerable moment; if the catastrophe was large, reinsurance rates may already have risen. The Citizens Property bond lacks reinstatement provisions.

Finally, alternative structures often cover longer periods. A traditional reinsurance treaty usually lasts one year. Alternative deals, particularly catastrophe bonds, last two to five years. Investors prefer bonds of that duration. Insurers like being able to lock in terms for more than a year, so marketing costs can be spread over several years. Citizens Property's bond lasts three years.

And like most catastrophe bonds, Citizens Property protects against hurricane risks. Bonds can be written to protect any combination of catastrophes, but **Figure 6** shows that at year-end 2014, 25 percent of bonds outstanding covered U.S. wind. Another 42 percent covered U.S. wind and other perils, mainly U.S. earthquake,

Figure 6
CAT BONDS OUTSTANDING, Q4 2014



Source: Willis Capital Markets.

¹⁹ Steve Evans, "Catastrophe Bonds and ILS Issuance by Trigger and by Year," *Artemis*, January 2015, http://www.artemis.bm/deal_directory/cat_bonds_ils_by_trigger_by_year.html.

meaning about two-thirds of catastrophe bonds were exposed to U.S. wind.²⁰ The data suggest that some portfolios of catastrophe bonds, while uncorrelated with traditional financial market risks, are composed of bonds where losses are potentially highly correlated with one another.

WHY CATASTROPHES?

Alternative markets could, in theory, underwrite any risks within the insurance market. It is the unique aspects of catastrophe risks make them particularly attractive to investors.

First, hurricanes and earthquakes only coincide with rising or falling capital markets by chance. Most other types of investments move in tandem; stock prices often rise as bond prices do. But a catastrophe can hit any time. Stocks and bonds could be rising or falling. Modern investment theory recommends spreading investments among uncorrelated assets to reduce the risk a portfolio bears. Catastrophe reinsurance does this well.

Other insurance lines are more closely correlated to the economy. For example, workers compensation claim frequency fell with the Great Recession of 2008.²¹ Workers hesitated to report injuries, fearing the action would make them more likely to be laid off.

Second, investors in catastrophe lines learn quickly whether their investment is imperiled. After a catastrophe, claims are discovered and settled relatively rapidly. For hurricanes, claims representing roughly 90 percent of losses are often made within one year, and 90 percent are paid in the first three years. After Hurricane Katrina in August 2005, 90 percent of losses were reported by the end of June 2006. By the end of 2008, just over three years later, 90 percent of losses were paid.²² If an investor reinsures, say, hurricane risk and there is no hurricane, the capital can be quickly redeployed when the contract ends.

The claims picture for other lines of business comes into focus more slowly. Most liability lines pay out claims over several years, and it is not unusual for a traditional reinsurer to pay on a treaty 10 or more years after it was struck.

Finally, investors like the precision with which computer models attempt to forecast outcomes. Catastrophe models estimate the probability that disaster will strike—how

²⁰ Willis Capital Markets and Advisory, *ILS Market Update: Reaching New Heights*, January 2015, http://willis.com/documents/publications/Services/WCMA/20150108_WCMA_January_ILS_Market_Update.pdf.

²¹ Data taken from Kathy Antonello, "State of the Line: Analysis of Workers Compensation Results" (Annual Issues Symposium, Boca Raton, Florida, 2014), <https://www.ncci.com/Documents/AIS-2014-SOL-Presentation.pdf>.

²² Reinsurance Association of America, *Catastrophe Loss Development Study: 2013 Edition* (Washington, D.C.: Reinsurance Association of America, 2013), 39.

likely it is an earthquake will hit San Francisco, for example. It also estimates the severity of an event (how big the earthquake will be and how much damage it will do). The model estimates the insured losses, based on the number of insured properties in an area, their precise location (how close to the fault line) and the characteristics of the property that could raise or lower losses (how sturdily each building was constructed).

Applying this information to the reinsurance structure creates estimates of the probability the reinsurer will pay, the amount it will pay and the probability it will pay out all the funds committed to the deal.

At Citizens Property, extensive computer modeling indicated 2.89 percent probability that a storm would be big enough to trigger a payout, no matter how large that payout might be. The same modeling indicated a 1.72 percent probability that a storm would wipe out all the bond's principal. The expected loss of principal is 2.3 percent.²³

This information lets an investor grade the deal against conventional bonds. Most catastrophe bonds have default probabilities that resemble high-yield corporate debt, and the two appear to have similar risk-return profiles.

To date, other property/casualty lines have not been modeled so intricately, so they have attracted fewer alternative investors. Other markets lack detailed information on the exposure, and there is much more detailed information on hurricanes than on other types of catastrophes.

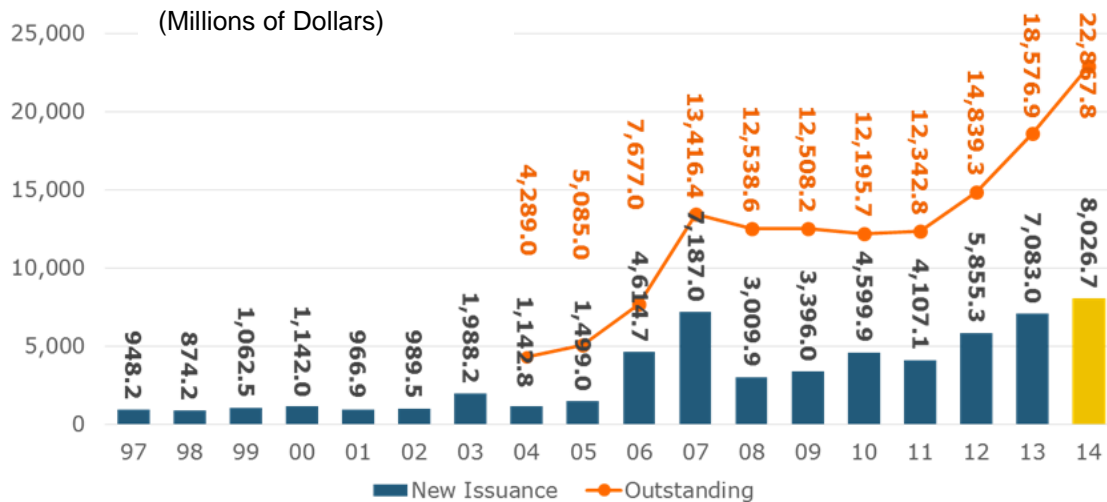
Figure 7 shows the growth in the catastrophe bond market. Issuance fell 64 percent, to \$3.0 billion in 2009 from \$8.2 billion a year earlier, because of the general tightening of free cash in the months following the financial meltdown.

The market began growing again in 2010 but dipped slightly in 2011 when two major bonds were impaired and changes to computer hurricane models created concern among investors.²⁴ The lack of demand also drove interest rates higher, in classic supply and demand fashion.

²³ Steve Evans, "Everglades Re Ltd. (Series 2014-1)," *Artemis.bm*, 2014, http://www.artemis.bm/deal_directory/everglades-re-ltd-series-2014-1/.

²⁴ Willis Capital Markets & Advisory, *ILS Market Update: Strong Close to Year Pushes 2011 Issuance Volume over \$4 Billion*, February 2012, http://www.willis.com/documents/publications/Services/Capital_Markets/ILS_Newsletter_Q4_2011.pdf; Aon Benfield, "Insurance-Linked Securities 2011: Fourth Quarter Update," January 2012, http://thoughtleadership.aonbenfield.com/Documents/201201_ab_securities_ils_q4_2011.pdf.

Figure 7
CATASTROPHE BOND ISSUANCE AND OUTSTANDING BY YEAR



Source: Guy Carpenter.

Bond rates are measured by the difference, or spread, between the yield on a bond and the yield on a comparable risk-free U.S. Treasury security. **Figure 8** shows the spread in catastrophe bonds hit 12 percentage points in early 2012 for bonds exposed to U.S. windstorm. Investors, judging the reward at that point amply compensated the risk, began moving into the market, with 2013 issuance hitting \$7.6 billion and capital outstanding surpassing \$20 billion. Yields fell to record lows in 2014.²⁵ Lower bond yields are the equivalent of lower rates for reinsurance.

LINKING INVESTMENT YIELD, REINSURANCE PRICES

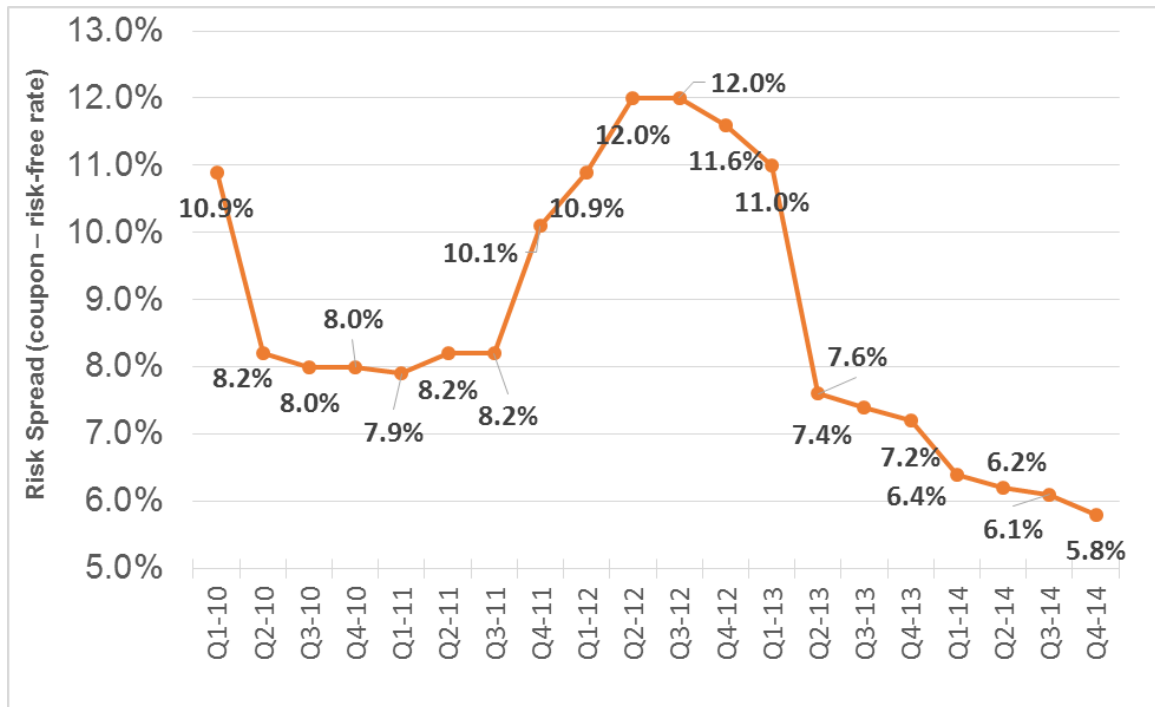
Catastrophe bonds, like traditional bonds, differ in their probability of default. A crude but common way to look at rate trends in the catastrophe bond market is to examine the ratio of the interest rate on a bond to the expected loss, a measure called the multiple.

For example, the 2014 Citizens Property bond bears an interest rate of 7.5 percent, and its expected loss is 2.3 percent.²⁶ Its multiple is the quotient of the two, 3.3. A

²⁵ Willis Capital Markets & Advisory, *ILS Market Update: Breaking Records*, July 2014, http://www.willis.com/Documents/Publications/Services/WCMA/WCMA_July_ILS_Market_Update.pdf.

²⁶ Steve Evans, "Everglades Re Ltd. (Series 2014-1)," *Artemis.bm*, 2012, http://www.artemis.bm/deal_directory/everglades-re-ltd-series-2012-1/.

Figure 8
RISK SPREAD ON U.S. WIND-EXPOSED CAT BONDS*



* Trailing 12-month average
Source: Willis Capital Markets.

2012 Citizens Property bond paid 17.75 percent, and its expected loss was 2.53 percent, so its multiple was 7.0.²⁷ The falling multiple (from 7.0 in 2012 to 3.3 in 2014) indicates rates are lower now, adjusted for the probability of loss.

Looking at multiples over time can give insight into whether the capital market is requiring higher yields. If multiples are rising, it is the equivalent of rising reinsurance prices. Falling multiples are equivalent to falling reinsurance prices.

Figure 9 shows the average multiple for insurance-linked securities by year.²⁸ In the early years, multiples were relatively high, reflecting the relatively small number of bonds issued and a fair degree of investor uncertainty. By 2006, the first year in which issuance passed \$5 billion, a wide range seems to appear, with multiples

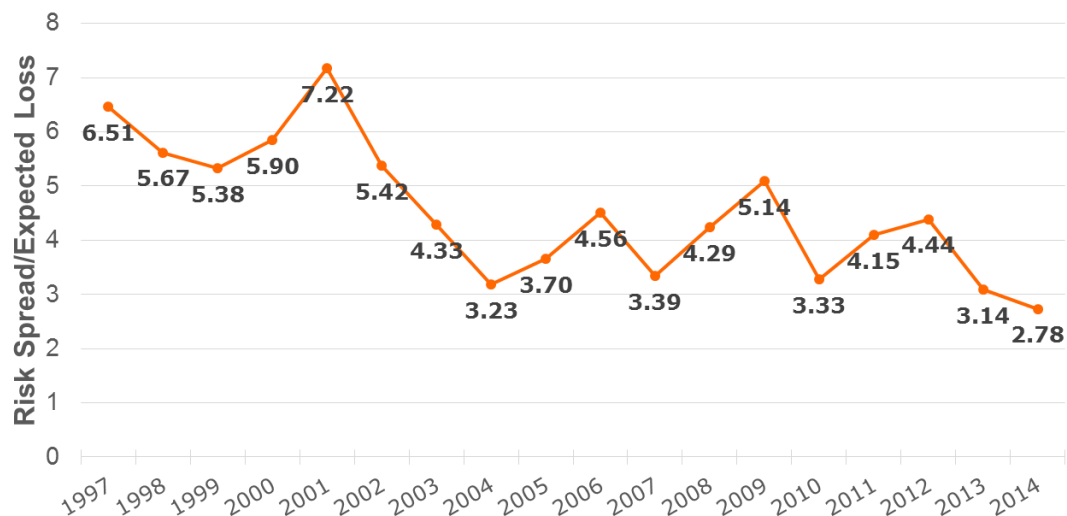
²⁷ Ibid.

²⁸ Steve Evans, "Catastrophe Bonds and ILS Average Multiple by Year," *Artemis.bm*, Q3 2014, http://www.artemis.bm/deal_directory/cat_bonds_ils_average_multiple.html.

ranging between about 3.2 and 5.2. In 2013 and 2014, multiples hit record lows, reflecting how much catastrophe bond rates have fallen.

Catastrophe bonds compete with other bonds for the investor dollar, particularly in

Figure 9
AVERAGE MULTIPLE ON INSURANCE-LINKED SECURITIES



Source: www.Artemis.bm Deal Directory.

the high-yield market, sometimes called the junk-bond market. For example, in 2014 the catastrophe bond spread on most recent transactions was comparable to the spread on high-yield debt, with 3.65 percent on a projected default rate of between 1.5 and 2.3 percent.²⁹ In the U.S. wind market at least, reinsurance rates appear to be linked to catastrophe bond yields, while those are linked to high-yield conventional bonds.

Certainly, in the case of Citizens Property, rates have been falling for both traditional and alternative reinsurance structures. The company in 2014 was scheduled to pay \$300 million for \$3.1 billion coverage. A year earlier it paid about the same amount, but only received \$1.85 billion of coverage.³⁰ So the new structure has 68 percent

²⁹ Jeremy Hill, "Reasons to Fear and Love Junk Bonds," *Forbes*, May 8, 2014, <http://www.forbes.com/sites/jeremyhill/2014/05/08/reasons-to-fear-and-love-junk-bonds/>.

³⁰ Adam Cancryn, "Reinsurers' Pricing Woes Mean Big Bargains for P&C Insurers," *SNL Financial*, June 27, 2014, <http://www.snl.com/InteractiveX/article.aspx?CDID=A-28476324-12586&KPLT=4>.

more coverage for the same price. This effect has spilled into the traditional reinsurance market.

IMPACT ON RATES

The global brokerage Guy Carpenter reported that its Global Property Catastrophe Reinsurance Rate-on-Line Index fell 11 percent for January 1, 2014, renewals. Rates in Europe and the United Kingdom fell 10 percent and 15 percent, respectively. It was the first renewal period in more than a decade in which prices fell in almost all major regions, a phenomenon the brokerage attributed in part to the influx of alternative capital.³¹ It was the steepest fall in the index in 16 years. In the United States, rates dropped 17 percent through midyear, as shown in **Figure 10**.³² Rates fell another 11 percent on January 1, 2015, renewals.³³

There has been anecdotal evidence that capital and rate decreases were moving beyond the catastrophe market. New capital is “pouring” into the casualty market, said Andrew Newman, global head of casualty at Willis Re, as traditional catastrophe reinsurers look for new places to deploy capital. Other brokers noted the capital inflow but were sanguine about its impact on rates.

THE PROS AND CONS OF ALTERNATIVE CAPITAL

A McKinsey & Co. report noted that the main benefit of alternative capital for insurers is that it brings new sources of reinsurance into the market, thereby giving them more bargaining power in the reinsurance market.³⁴ Other potential advantages:

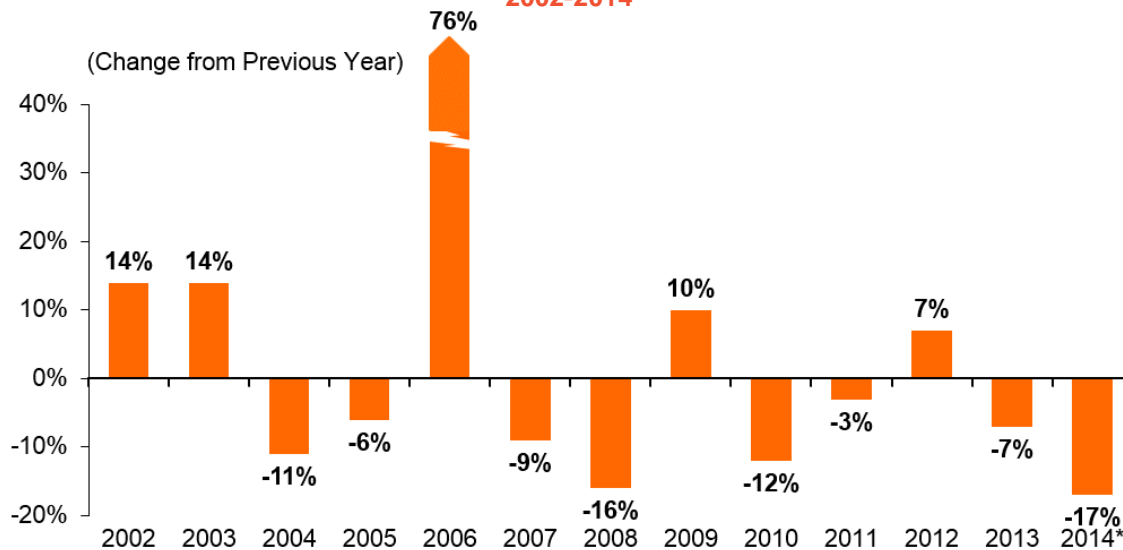
³¹ “Reinsurance Rates Down by 11% for January Renewals: Guy Carpenter Survey,” *Insurance Journal*, December 30, 2013, <http://www.insurancejournal.com/news/international/2013/12/30/315678.htm>.

³² Based on rate-on-line information provided by Guy Carpenter, September 8, 2014. The index fell 18 percent in 1998.

³³ Guy Carpenter & Co., “January 1, 2015 Renewals See Lower Pricing and Broader Coverage for Clients,” *GCCapitalIdeas*, January 2015, <http://www.gccapitalideas.com/2015/01/06/january-1-2015-renewals-see-lower-pricing-and-broader-coverage-for-clients/>.

³⁴ McKinsey & Company, *Could Third-Party Capital Transform The Reinsurance Markets?*, September 2013, http://www.mckinsey.com/~media/mckinsey/dotcom/client_service/Financial%20Services/Latest%20thinking/Insurance/Could_third-party_capital_transform_the_reinsurance_markets.ashx.

Figure 10
GUY CARPENTER U.S. PROPERTY CATASTROPHE RATE-ON-LINE INDEX, 2002-2014



* 2014 data through midyear.

Source: Guy Carpenter.

- Collateralized deals in theory reduce the risk (albeit quite small) that the reinsurer will be unable to fulfill its obligations.
- Insurers can diversify their risk across more markets, rather than being concentrated with just a few reinsurers, many of whom reinsure each other through what are known as retrocessional arrangements.
- Insurers can lock in structures for several years, which is particularly useful when rates are low.

There are several potentially significant drawbacks, however:

- The capital may not be available over the long term. Investors can quickly exit if reinsurance begins looking less attractive than alternatives.
- Alternative agreements do not replicate the traditional treaty perfectly. One mismatch is basis risk, as noted earlier. Another is the lack of reinstatements on catastrophe bonds.
- Insurers also frequently benefit from reinsurers' knowledge of the marketplace. Alternative capital providers often lack this expertise.

THE FUTURE OF ALTERNATIVE CAPITAL

Alternative reinsurance capital could double in size to \$100 billion within a few years, according to the U.S. non-life insurance equity research team at Barclays Capital. Analysts there argue that today's trends constitute a structural shift to the reinsurance market. That estimate implies alternative capital could grow to one-third of the property catastrophe market worldwide. The report does not forecast alternative capital replacing reinsurance entirely, but notes it could cause mergers among Bermudian reinsurers, particularly those with lower returns on equity.³⁵

Citizens Property's hurricane bond, for example, drew interest from "a pension fund for Scottish miners, a mutual fund backed by Japanese middle class savers [and] a fund dedicated to managing royal assets," Chief Risk Officer John Rollins told Bloomberg News in 2014.³⁶

Some ardent advocates suggest alternative capital will one day dominate catastrophe reinsurance. The traditional catastrophe reinsurance model is dying and will disappear in 10 to 15 years, according to Andre Perez, founder of Bermuda insurance management provider the Horseshoe Group.

In June 2014 Perez told catastrophe reinsurers: "You are going to become in the future a servicer to risk capital — no different than an ILS investment manager or a bond fund, an equity fund and other funds. . . . At the end of the day, insurance contracts are just like investment instruments where the bet is on underwriting performance."³⁷

More skeptical observers, like Tad Montross, chief executive officer of Gen Re, suggest a market turn—higher interest rates elsewhere or an enormous catastrophe—will force alternative investors to reconsider. He sees parallels to Risk Capital Re and Unicover—1990s restructurings of the traditional reinsurance arrangement that some thought would transform the industry but ended in debacle.³⁸

In the 1990s Risk Capital Reinsurance Holdings tried to make money by investing its capital solely in insurance companies, then using that knowledge to reinsure those same companies. The strategy worked while stock prices rose but fell apart at the end of the 1990s when underwriting results turned bad at the same time the stock

³⁵ "Alternative Reinsurance Capital to Grow to \$100 Billion: BarCap," *Artemis*, March 28, 2014, <http://www.artemis.bm/blog/2014/03/28/alternative-reinsurance-capital-to-grow-to-100-billion-barcap/>.

³⁶ Caroline Chen, "Buffett Warning Unheeded as Catastrophe Bond Sales Climb," *Bloomberg*, June 17, 2014, <http://www.bloomberg.com/news/2014-06-17/buffett-warning-unheeded-as-catastrophe-bond-sales-climb.html>.

³⁷ David Fox, "'Traditional Reinsurance Model Is Dying,'" *The Royal Gazette*, accessed July 11, 2014, <http://www.royalgazette.com/article/20140625/BUSINESS04/140629855>.

³⁸ Meg Green, "Gen Re CEO Montross Compares Pricing Battle to Unicover Debacle," *BestWeek*, September 22, 2014.

bubble burst.³⁹ Unicover ceded the medical losses from workers compensation, a property/casualty line, to life reinsurance companies. The deal fell apart in 1999, “spun through a convoluted, broker-induced spiral, generating hundreds of millions of dollars in commissions, losses and legal expenses.”⁴⁰

Montross does not predict alternative capital arrangements will end as badly, but he is skeptical they will keep growing so fast. “My advice is to ignore anyone that tells you this is the new normal,” Montross wrote in July 2014. “It probably isn’t. It is a short-term opportunity to buy some cheap reinsurance.”⁴¹

The McKinsey study laid out three possible destinies for alternative capital:

- It could peak at its current level, as yields fall too low to keep investor interest, or until a major catastrophe drives them off. Insurers would still seek alternative arrangements but would prefer the security traditional reinsurers offer. Reinsurers would continue to partner with alternative investors, but these deals would remain a minor piece of overall capital.
- It could double to around 30 percent of catastrophe capital, as alternative investors remain attracted to bonds whose fates do not follow the overall economy and insurers continue to like spreading risk outside a few traditional reinsurers, particularly in structures in which losses are collateralized at the inception of the deal.
- It could grow even larger, dislocating the current markets, as investors grow comfortable enough with the arrangements that they begin to offer terms that more closely resemble the traditional reinsurance contract.

In the more extreme cases, according to McKinsey, traditional reinsurers would become either “friends” of the new capital—restructuring to become underwriting agents for alternative investors—or “foes,” attempting to maintain their niche, some from a weakened position.⁴² A combination of both extremes is also possible.

The catastrophe bond market has the potential to grow as it has only a tiny share of the overall high-yield bond market, which according to one estimate, was valued at \$1.7 trillion.⁴³ That implies the catastrophe bond market, with more than \$20 billion outstanding in 2014, is a bit more than 1 percent of the high-yield market. A doubling of alternative capital could mean that the catastrophe bond market would be about

³⁹ Dan Lonkevich, “Risk Capital Re Might Diversify Portfolio,” September 24, 1999, <http://www.propertycasualty360.com/1999/09/24/risk-capital-re-might>.

⁴⁰ “1999: Unicover Stripped,” *The Insurance Insider*, December 2010.

⁴¹ Tad Montross, “The Battlefield,” *Gen Re Perspective*, July 16, 2014, <http://www.genre.com/knowledge/blog/the-battlefield.html>.

⁴² McKinsey & Company, *Could Third-Party Capital Transform The Reinsurance Markets?*

⁴³ \$1.7 trillion estimate is from “An Appetite for Junk,” *The Economist*, October 19, 2013, <http://www.economist.com/news/finance-and-economics/21588117-companies-have-taken-advantage-investors-growing-willingness-buy-speculative>.

2 or 3 percent of the high-yield market—still a small share overall, but potentially a significant change in the reinsurance marketplace.

The future may depend on how well investors can move from the U.S. wind market to other property risks, and beyond. In the collateralized reinsurer/sidecar market, investor interest appears to be piqued. In March 2014, Arch Capital launched Watford Re, a collateralized reinsurer that intends to focus less on short-tailed property risks and more on medium- and long-tailed casualty business. Principal funding comes from JPMorgan subsidiary Highbridge Principal Strategies, a hedge fund.

Watford Re's business model has Arch ceding business to Watford, while Highbridge handles investments. According to *Reactions* magazine, Watford's launch is "a major sign that alternative capital, having eaten the low-hanging fruit of property-catastrophe, is looking to casualty for greater returns."⁴⁴ Watford Re had written about \$190 million of premium through September 2014, much of it ceded from Arch.⁴⁵

More recently, Credit Suisse, one of the biggest managers of catastrophe bonds, began reinsuring Lloyd's of London's Barbican Syndicate on Jan. 1, 2015. Barbican's book is concentrated in marine, casualty and professional indemnity business as well as property.⁴⁶

Alternative capital arrangements will continue as long as buyers (insurers and reinsurers) and sellers (capital) feel they can operate profitably in a safe legal and regulatory framework. Insurers and reinsurers could leave the marketplace if costs were to grow too high—if rates on catastrophe bonds became significantly more expensive than purchasing a traditional treaty. With rates falling, that possibility seems remote for now. Aside from price, buyers or sellers might exit if the arrangement reveals risks either party had underestimated or had not contemplated.

Fears of litigation could also drive insurers and reinsurers away. After a catastrophe, insurers need cash immediately, and structures like traditional reinsurance are designed to replenish cash quickly. Reinsurers that pay slowly or regularly challenge what they owe fall out of favor.

⁴⁴ "Watford Re Ready to Go," *Reactions*, April 2014, <http://www.reactionsnet.com/Article/3325165/Watford-Re-ready-to-go.html>.

⁴⁵ Arch Capital Group, "FY14-Q3 Form 10-Q for the Period Ending October 31, 2014 (filed November 2014)," November 2014, <http://ir.archcapgroup.com/doc.aspx?IID=103577&DID=29786961>, p. 64.

⁴⁶ Sarah Veysey, "Barbican Gets OK for Special Purpose Lloyd's Syndicate," *Business Insurance*, December 22, 2014, <http://www.businessinsurance.com/article/20141222/NEWS04/141229989?tags=%7C59%7C306%7C76%7C81>.

Reinsurance disputes do not affect the requirement that an insurer pay its claims, so their impact on the typical policyholder is slight. Most alternative arrangements are only part of a much larger reinsurance program, so insurer solvency is unlikely to be an issue.

Most disputes—both traditional and alternative—go into arbitration. That keeps them out of the limelight and makes it impossible to compare whether alternative reinsurance ends in dispute more frequently than a traditional treaty.

One notable case has been moving through the U.S. courts. Mariah Re sued PCS, a catastrophe modeling firm called AIR and American Family Mutual Insurance. The dispute focused on whether 2011 tornado losses triggered a default in a \$100 million catastrophe bond. Mariah Re argued that American Family, PCS and AIR colluded to force a payout. PCS argued the contract gave them discretion to change their estimate and that AIR was contractually obligated to rely on it.⁴⁷ The lawsuit was dismissed in October, but the case is on appeal.⁴⁸

Disputes between cedants and reinsurers occur in traditional reinsurance as well. However the catastrophe bond market would suffer if insurers over time concluded the risk of litigation were considerably higher in alternative structures.

Insurers are not the only ones who could exit. Investors could turn away for several reasons, including unfavorable yields and higher than expected default rates. As described earlier, investors depend on computer models to estimate the probability of default. These models are not perfect.

A model requires inputs—information that tells how powerful and large a hurricane will become, how much storm surge will accompany it or how well a building can withstand winds. Then the model will estimate catastrophe losses. Sometimes the inputs are wrong. Models failed to predict the power of the 2011 Tohoku earthquake because scientists had thought the underlying plate was incapable of slipping with such force.⁴⁹ Sometimes a factor is considered too difficult to model, like the impact

⁴⁷ Ince & Co., “Insurance Linked Securities: Cat Bond, Cat Fight!,” January 2014, <http://incelaw.com/documents/pdf/strands/insurance-and-reinsurance/ils-cat-bond-cat-fight.pdf>.

⁴⁸ Kirin Soar, “The Fat Lady Ain’t Sung yet...Who Are the Real Losers in the Ongoing Mariah Re ILS Dispute?,” *Ince & Co. Knowledge Insights*, January 21, 2015, <http://incelaw.com/en/knowledge-bank/publications/the-fat-lady-aint-sung-yet-who-are-the-real-losers-in-the-ongoing-mariah-re-ils-dispute>. The appeal was filed about October 30 with the 2nd Circuit Court of Appeals.

⁴⁹ Robert Muir-Wood, “Tohoku Earthquake,” *The RMS Blog*, October 9, 2014, <http://www.rms.com/blog/tag/tohoku-earthquake/>.

of an aftershock on an already damaged building. And models cannot model what no one knows: “black swan” events.⁵⁰

Now investors are generally aware of these shortcomings and accept them. The largest catastrophe bond ever triggered was a \$300 million issue from the Tohoku quake. That bond protected the Japanese agricultural mutual Zenkyoren, which returned to the market in May 2014 with another \$300 million issue. Other sponsors of bonds that defaulted have returned to the market, including Allstate, Catlin, Munich Re and Swiss Re.⁵¹ This implies that despite the defaults, insurers and investors found it in their best interest to return to the market. Were investors to change their minds, the supply side of the alternative market could stagnate or shrink.

CONCLUSION

Alternative capital is growing at a faster rate than capital in traditional insurance and reinsurance companies. Most of the growth in alternative capital is in property catastrophe reinsurance, though there are signs that investors may expand into casualty reinsurance. As stated, alternative capital has pushed rates lower in catastrophe markets worldwide. Alternative structures appear likely to maintain a market presence, though a change in economic, financial market or insurance industry circumstances could limit their growth.

⁵⁰ Craig Lough and Ron Kozlowski, “Shake Up Your Thinking on Catastrophe Risk Modeling,” *Towers Watson*, accessed July 23, 2014, <http://www.towerswatson.com/en/Insights/Newsletters/Global/Emphasis/2014/shake-up-your-thinking-on-catastrophe-risk-modeling-lessons-learned-from-the-canterbury-earthquakes>.

⁵¹ “Catastrophe Bond & Insurance-Linked Securities Deal Directory,” *Artemis*, May 16, 2014, http://www.artemis.bm/deal_directory/.

APPENDIX A

WHAT IS REINSURANCE?

Reinsurance is insurance for insurance companies.

More formally, reinsurance is a form of insurance purchased by an insurance company. It reimburses the insurer for some of the losses it has incurred under the policies it has written.

Reinsurance started hundreds of years ago—some point to a 1370 contract. Regardless, the traditional reinsurance company has evolved a structure much like that of an insurance company. Investors contribute original capital to begin writing. Profits are distributed as dividends or retained to fund growth. The company is intended to remain in business indefinitely. The two largest reinsurers, Munich Re and Swiss Re, are more than 100 years old, having been founded in 1880 and 1863, respectively.

Reinsurance contracts are known within the industry as treaties. Two important reasons to purchase reinsurance are to increase the amount of business an insurer can write and to stabilize earnings.

One common form of reinsurance, the property catastrophe treaty, gives an example of both reasons. We look closely at catastrophe reinsurance in this paper because it is the most common form of reinsurance to which alternative capital is deployed.

A catastrophe treaty will reimburse an insurance company for losses stemming from a catastrophic event or events that occur in a particular period, usually one year. As an example, consider an East Coast homeowners insurer that purchases a property catastrophe treaty that protects against catastrophe losses from June 1, 2015, to May 31, 2016. The terms of the contract will stipulate what level of losses will be reimbursed and how much in losses must be paid before the reinsurer begins reimbursement. For our example, suppose the treaty would reimburse the next \$30 million in losses from a catastrophe after the insurer had paid \$20 million.

If a hurricane were to strike on August 30, 2015, the insurer would keep track of all losses resulting from the storm. Once the total exceeded \$20 million, it would bill the reinsurer for reimbursement for the amount above \$20 million. If losses totaled \$25 million for example, the insurer would pay claimants \$25 million, then file its own claim against the reinsurer to recover the amount above \$20 million—\$5 million.

The insurer would keep track and bill the reinsurer until either the insurer paid its last claim or losses exceeded the treaty's limit, \$30 million.

The arrangement allows the insurer to write additional business in an area while reducing its risk if a storm hits. The arrangement also stabilizes earnings. Without reinsurance, earnings would be quite variable, with good results in years with no storms and terrible results in years with them. If the company buys reinsurance, the cost will hurt results a bit in the years there is no hurricane. But in years with a storm, results will be better than they would have been otherwise.

Often an insurer enters into several treaties, with the ensuing structure creating what may look like a crazy quilt but provides an insurer coverage from its most extreme risks.

From the insurer's point of view, reinsurance has the following cash flows:

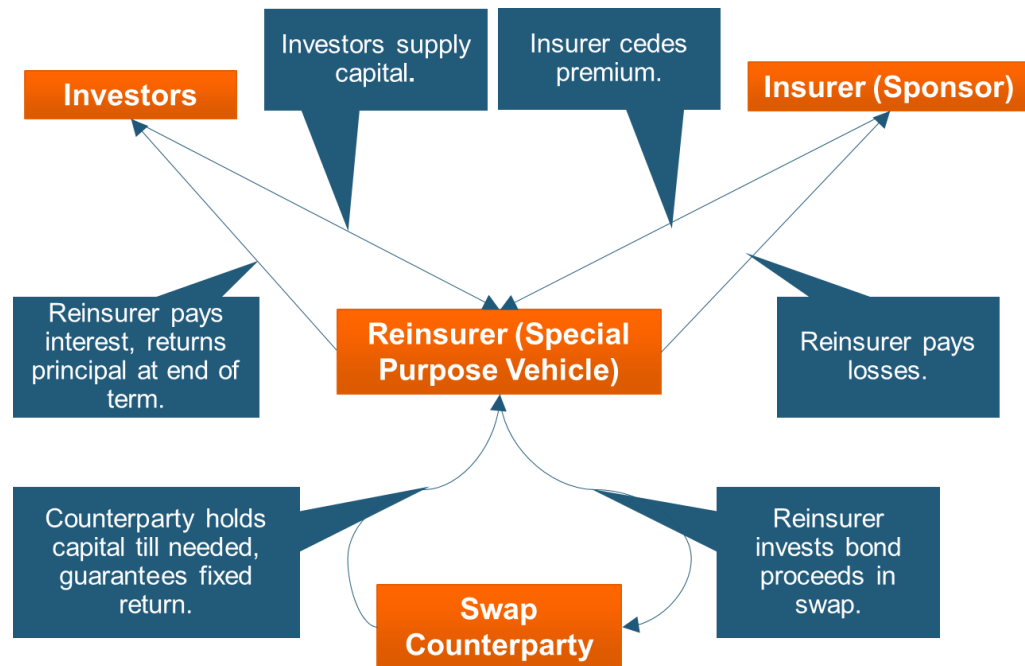
- The insurer pays a premium to the reinsurer.
- It receives reimbursement for certain losses.

From the investor's point of view, reinsurance has these cash flows:

- It receives original capital from the investor.
- It pays a dividend from profits to the investor.

Alternative reinsurance replicates these cash flows in unconventional ways. It often adds an additional step, the return of the original capital to investors after all contracts are settled. In a traditional reinsurer, most capital remains with the reinsurer to support new writings. The ability to enter and exit the insurance market quickly is an important consideration in many alternative arrangements.

APPENDIX B HOW A CATASTROPHE BOND WORKS



The illustration above shows how a catastrophe bond is created:

1. An insurer creates a reinsurance company designed specifically to reinsure the risks that the bond will protect. Because the company is designed for this unique use, it is called a special purpose vehicle, or SPV. The insurer itself is often called the sponsor of the transaction. Eventually, the insurer will cede premium to the SPV, but not before the reinsurer has capital to cover any losses that could occur.
2. Investors purchase the bond, and the SPV receives the proceeds.
3. The proceeds are invested to provide additional return, comparable to the way an insurer or reinsurer invests its capital. Usually this is done by entering into a financial transaction known as a swap. This means a counterparty invests the funds, bearing investment risk and guaranteeing a rate of return. The counterparty agrees to invest in a conservative fashion. Funds remain available on short notice in case of a claim.

4. The insurer cedes premium to the SPV.
5. Investors receive periodic interest payments, usually every quarter, from the premium the insurer ceded.
6. At the end of the bond's term, the remaining principal is returned to investors, provided that there has been no catastrophe.
7. If a catastrophe falls within the terms of the bond—known as a triggering event - the SPV reimburses the insurer for the losses it has pledged to bear. Because the normal operation of the bond has been interrupted, the bond has been triggered.

APPENDIX C

CATASTROPHE BOND DEFAULTS DURING FINANCIAL CRISIS

In 2008, four catastrophe bonds lost significant value after their counterparty manager, Lehman Brothers, declared bankruptcy. At least two fell into technical default, either failing to make a scheduled interest payment or being unable to return principal at the bond's expiration date. One of the bonds linked to the Lehman bankruptcy, Ajax Re, fell to 25 cents on the dollar. Prices of other catastrophe bonds dipped between 5 percent and 10 percent.

Since then, catastrophe bonds have been structured to avoid counterparty risks. Collateral standards were raised. Bond covenants prohibit investments in all but the highest rated instruments, such as Treasury securities. Investments in "hard to price" financial instruments are not allowed. Investments are duration matched, meaning that the investments mature around the same time that the principal comes due. These bonds are also more closely monitored, with securities marked to market more frequently. Some transactions have proceeded without the counterparty; in these, principal is invested directly in low-risk, government guaranteed securities.⁵²

⁵² Towers Perrin, "Catastrophe Bonds Evolve to Address Credit Risk Issues," *Towers Watson*, May 2010, <http://www.towerswatson.com/en-US/Insights/IC-Types/Survey-Research-Results/2010/05/Catastrophe-Bonds-Evolve-to-Address-Credit-Risk-Issues>.