



Reinsurance and Capital Markets

4º Encontro de Resseguro do Rio de Janeiro

April 15, 2015

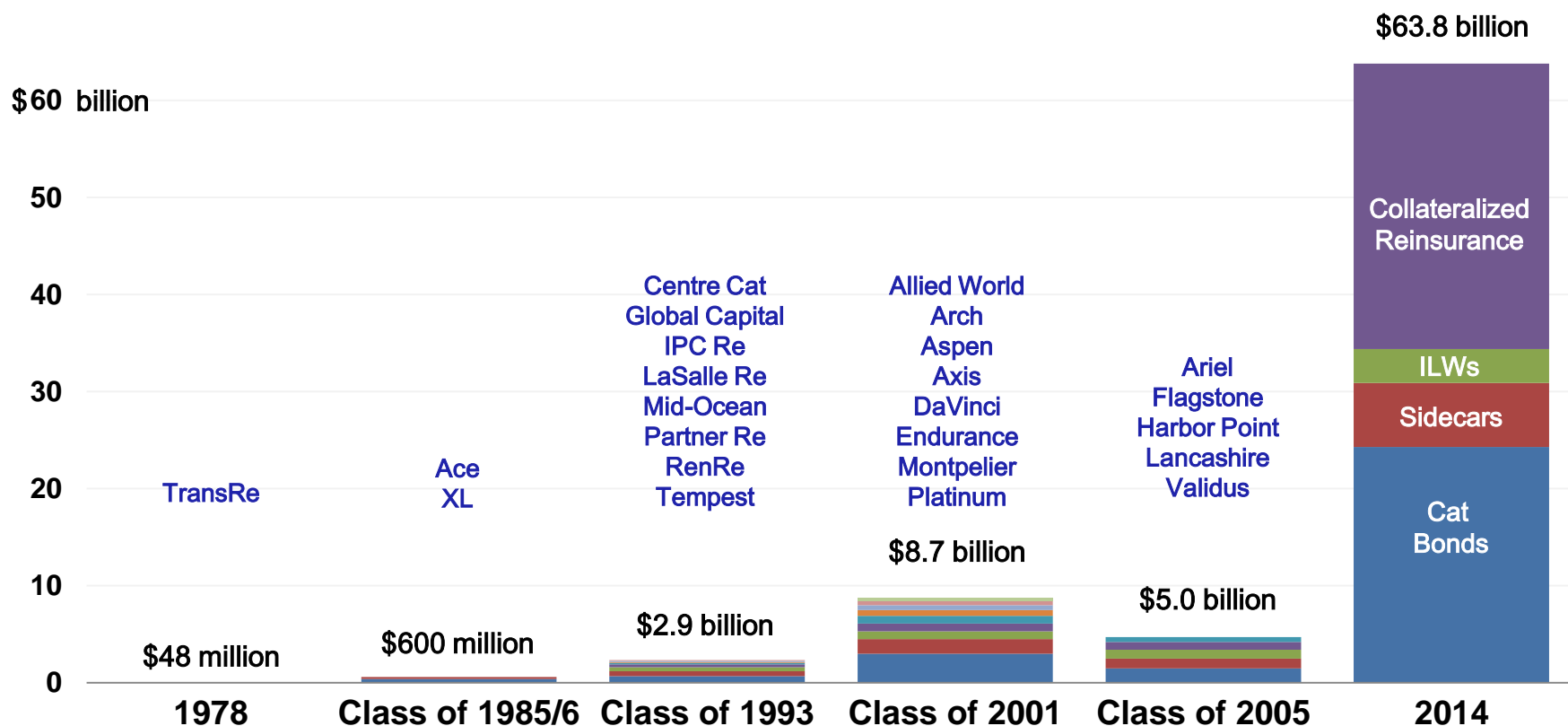
Craig Hupper

TransRe Capital Partners

- Historical perspective on reinsurance and capital markets
- Motivations for investor and sponsor interest in reinsurance and capital markets
- Some reinsurance/risk-linked securities vocabulary and key developments:
 - Collateralized reinsurance* – contract secured in full at inception
 - Industry Loss Warranty (ILW)* – contract triggered by industry financial loss metrics
 - Sidecar* – investor co-investment in sponsor's/manager's underwriting results
 - Catastrophe bond* – security transferring specified risks from reinsurer to investors
 - Hedge Fund Reinsurer* – hybrid combining reinsurance underwriting + alternative asset management
- Tradeoffs among different risk financing structures
- Relevance and applications in Brazil

Capital Markets and Reinsurance – Some Historical Perspective

- Capital markets and reinsurance have long worked together via equity investment
- Recent developments involve direct securitization of catastrophe, other risks

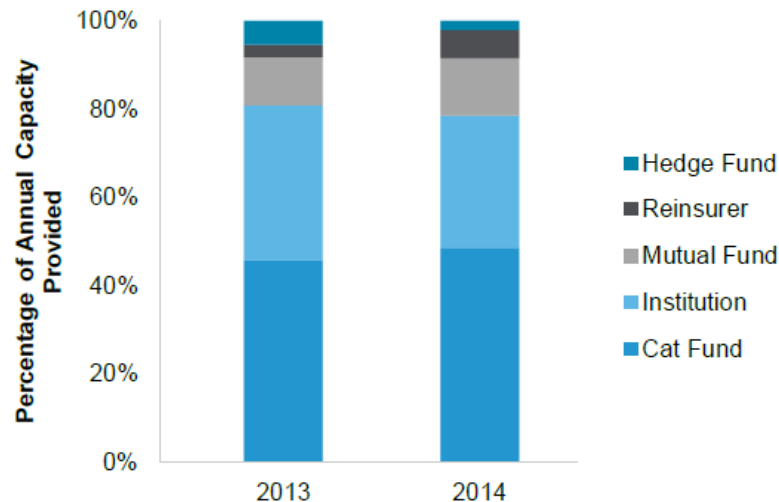


Source: Aon Benfield Securities, Goldman Sachs, Guy Carpenter, TransRe

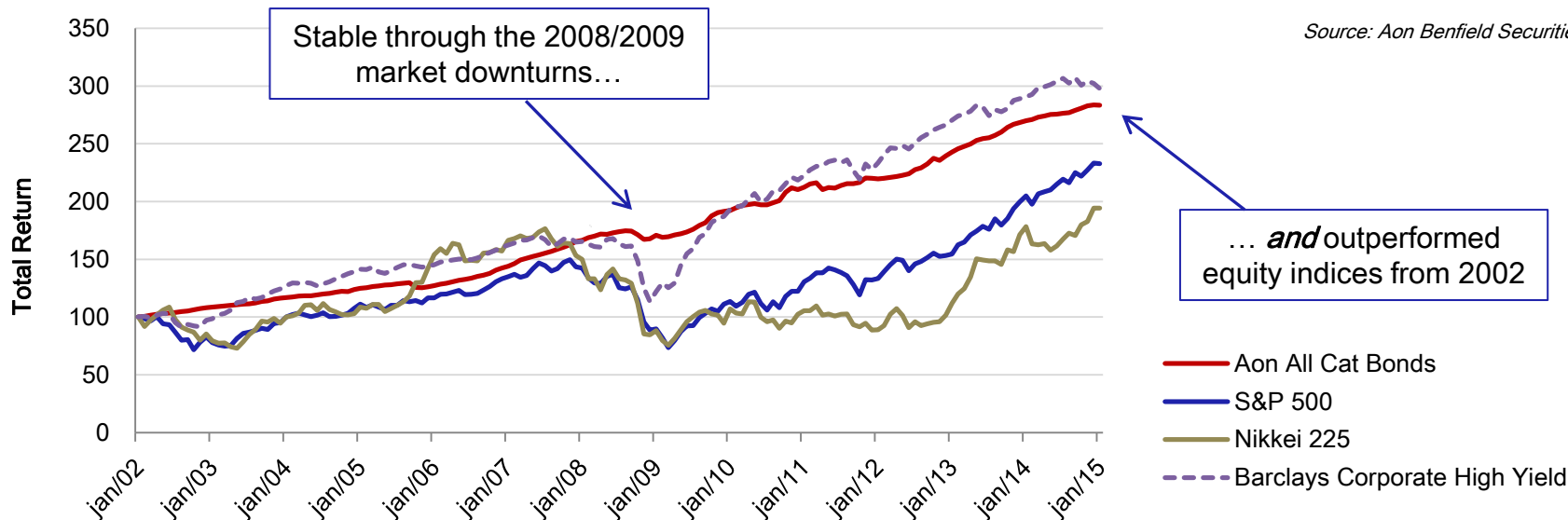
- 1973** *An Inquiry into the Feasibility of a Reinsurance Futures Market*
(Goshay & Sandor, Journal of Business Finance)
- 1990** Chicago Board of Trade announces plan to trade insurance futures
- 1992** CBOT trades catastrophe futures and options following hurricane Andrew
- 1997** USAA places first large catastrophe bond, *Residential Reinsurance Ltd.*
- 1998** First dedicated catastrophe bond fund formed
- 2005** First publicly disclosed loss to a cat bond, Kamp Re 2005 Ltd.
- 2009** Evolution of cat bond collateral structures to reduce credit risk
- 2014** ~\$64 billion of investments outstanding

- Attractive risk-adjusted returns with limited correlation to broader financial markets have attracted a wide range of investors, including pension funds, sovereign wealth funds, endowments, mutual funds, high net worth individuals, and hedge funds
- For cedants, capital markets provide a competitive and diversifying source of capacity, with reduced credit risk through full collateralization of limits

Risk-Linked Securities Capacity by Investor Type

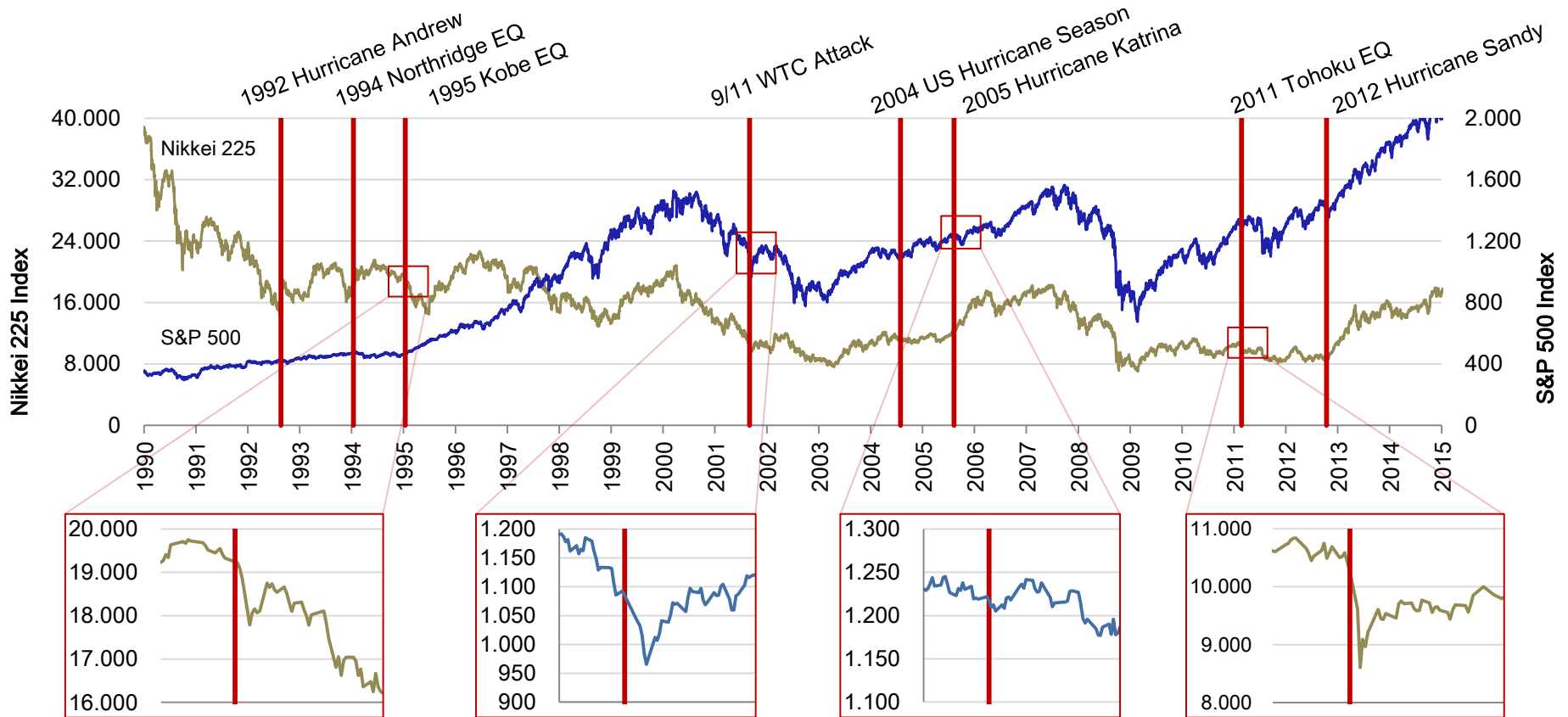


Source: Aon Benfield Securities



Source: Bloomberg

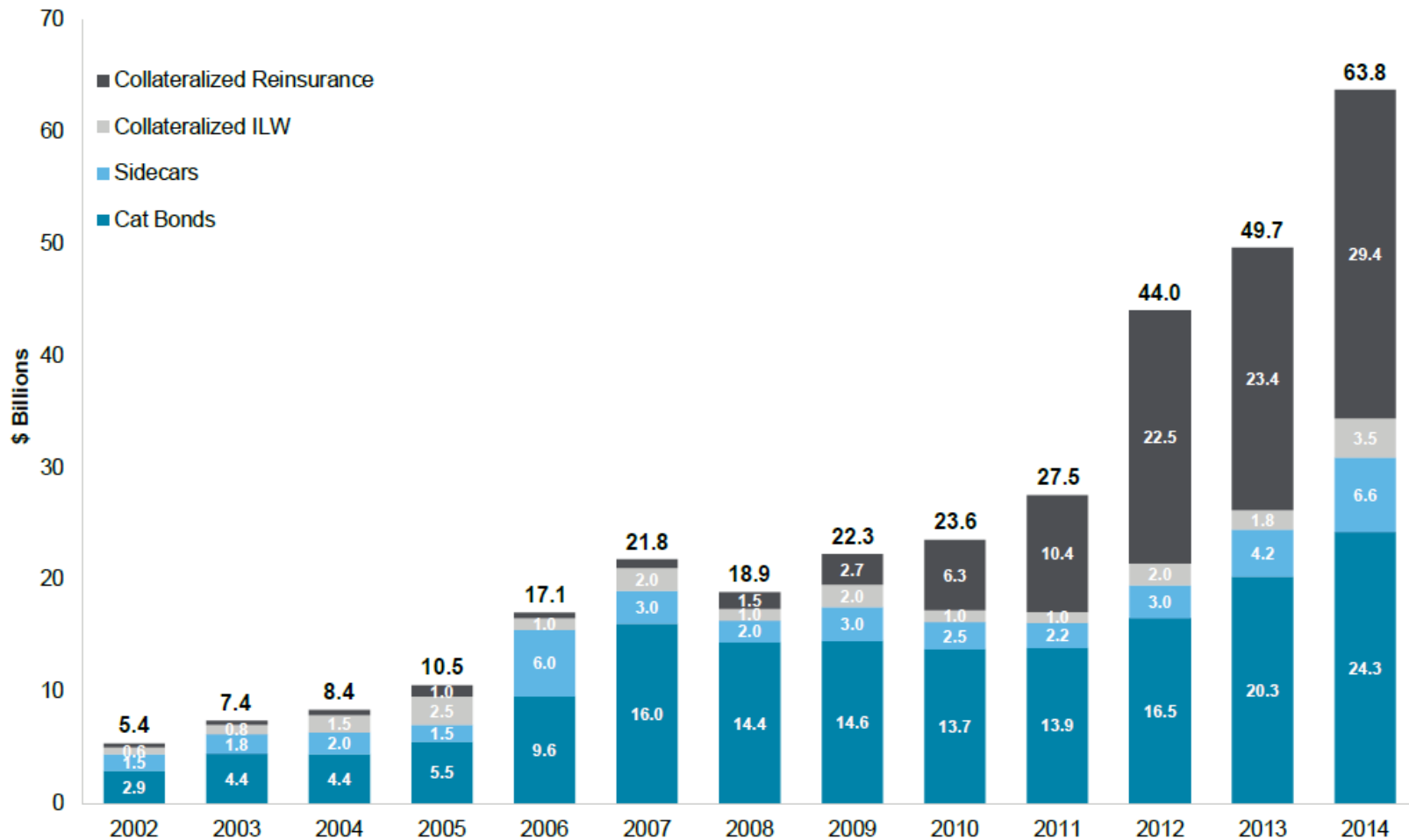
“The results suggest that CAT risks are basically uncorrelated with these other asset classes [stocks and bonds]. . . . Our findings . . . have an important implication for portfolios: adding CAT risk products improves overall portfolio performance.” – Froot et al., July 1995, *The Emerging Asset Class: Insurance Risk*



Source: Bloomberg

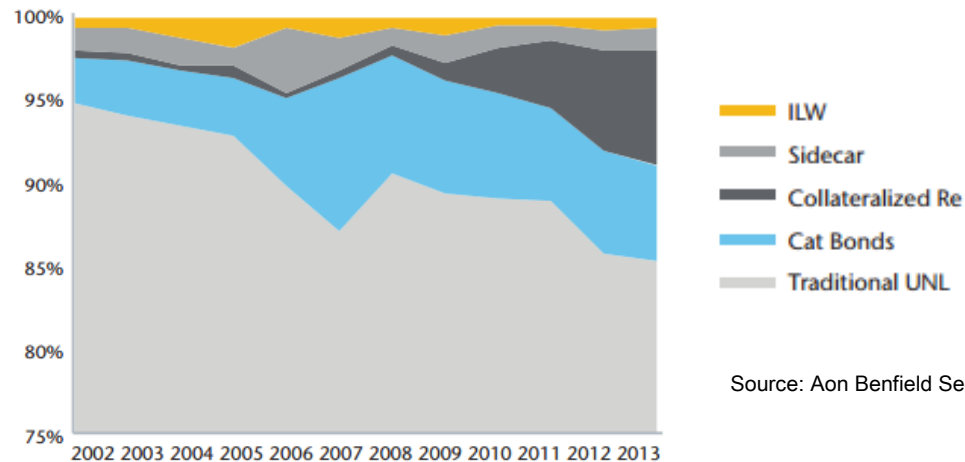
Note: Magnified charts reflect daily data for the period 30 days prior to an event occurrence and 60 days following.

Growth of “Alternative” Reinsurance

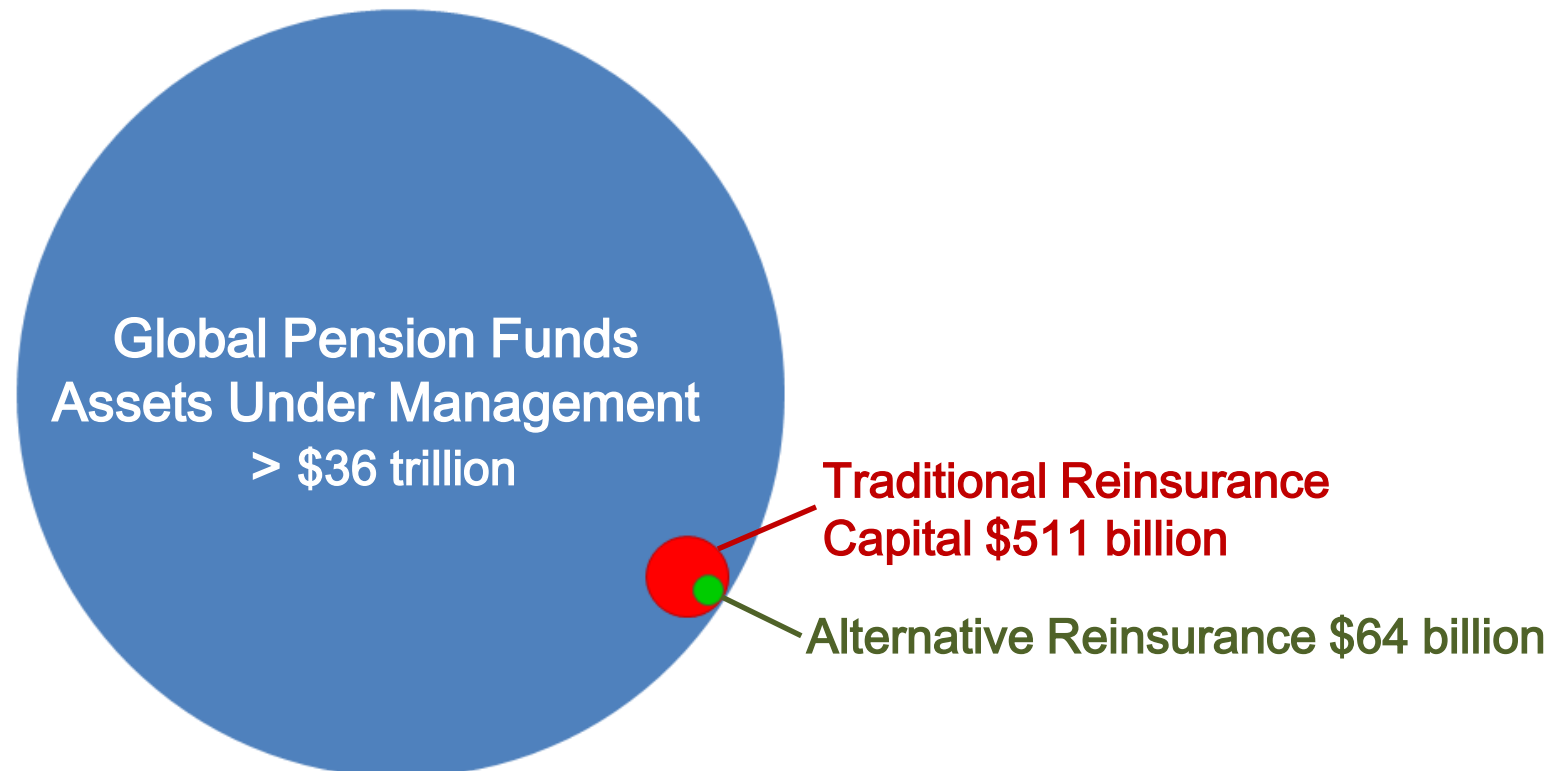


Source: Aon Benfield Securities

Share Of Global Property Cat Reinsurance Market
(2002-2013)

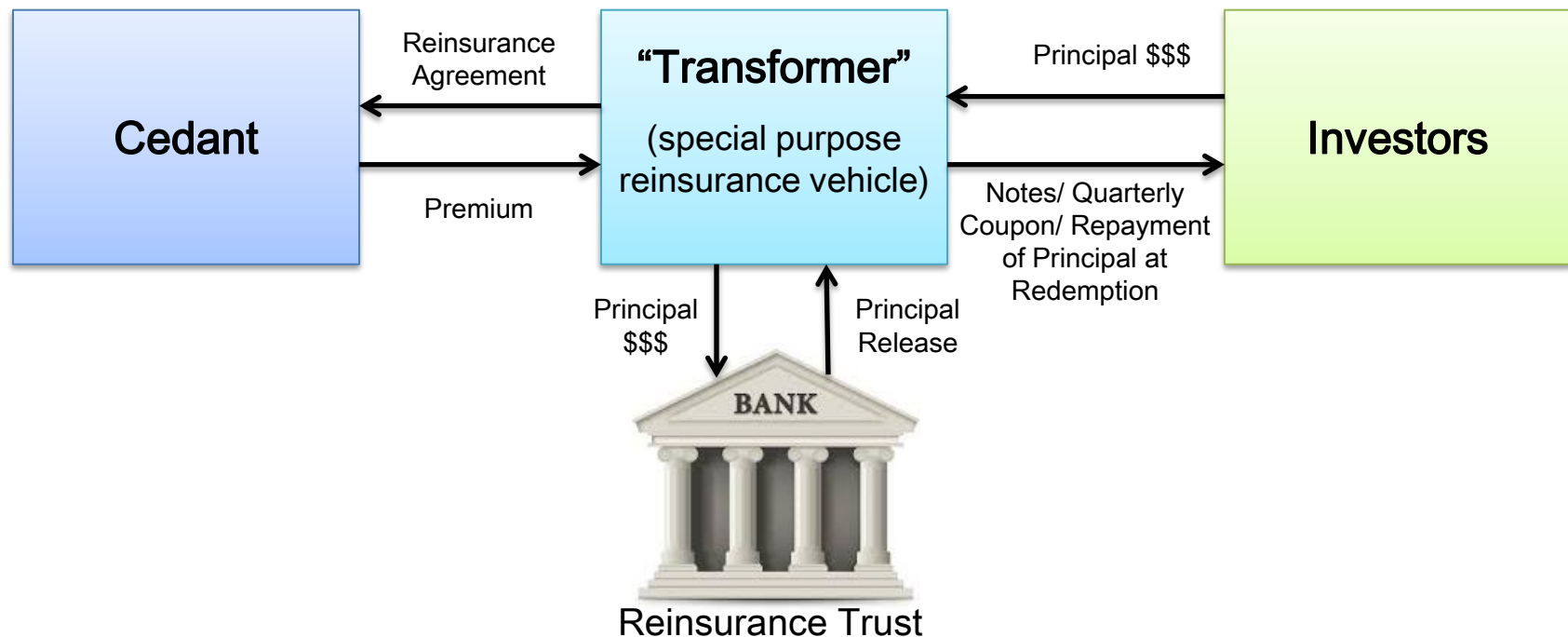


- Collateralized reinsurance has seen the most significant growth over the past several years, now estimated to provide more capacity than the cat bond market
- Collateralized reinsurance usually covers specified natural perils only; investors typically collateralize limit at inception rather than “promise to pay”
- Collateralized structures limit flexibility of coverage design, pose adverse development concerns
- “Traditional” indemnity/ultimate net loss reinsurance still 80% to 85% of cat market

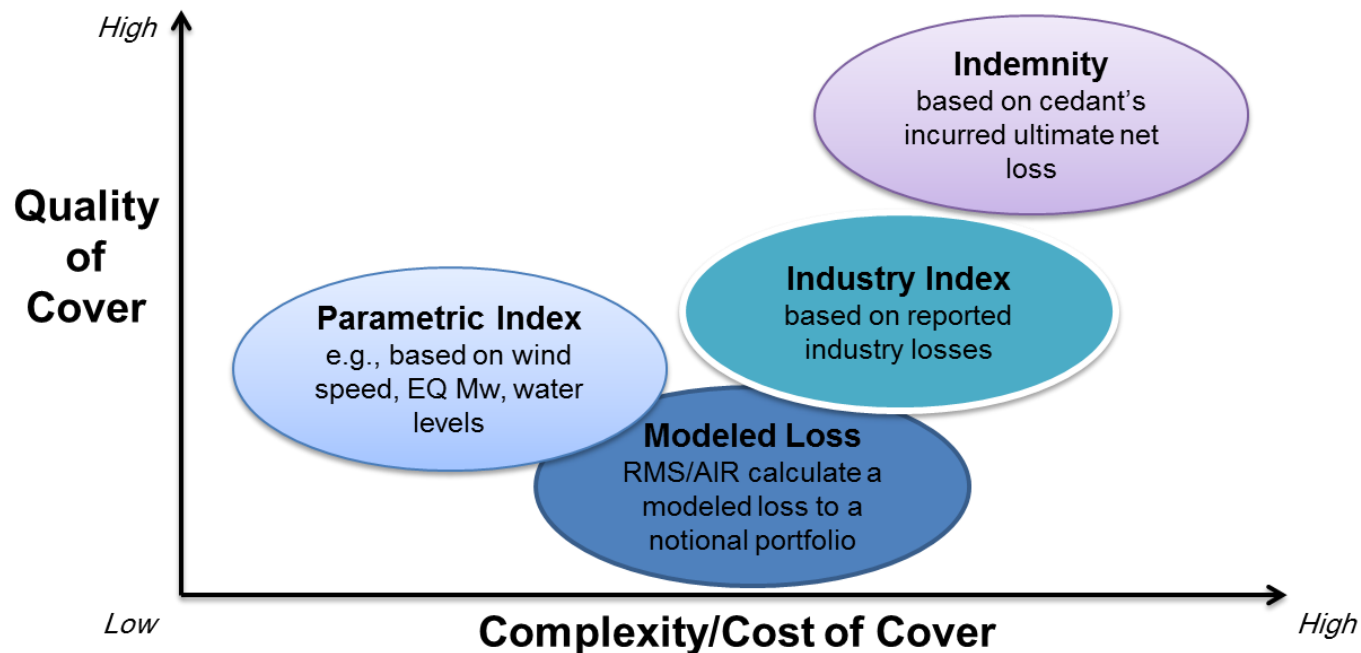


Source: Aon Benfield Securities, Towers Watson

- Structure looks similar to any other bond: investors buy Notes, are paid a quarterly coupon, and are repaid principal at redemption
- Value of Notes erodes or defaults upon occurrence of a specified catastrophe event
- Backbone of every cat bond is the reinsurance agreement, with the structure “securitizing” the transaction cash flows



- Various trigger structures have been developed to address market demands
- Structure ultimately a trade-off between cost and quality of coverage, balancing investors' need for transparency with sponsors' desire for comprehensive protection
- Applications beyond pure property catastrophe risk (e.g., medical benefit loss ratios for pandemic risk)



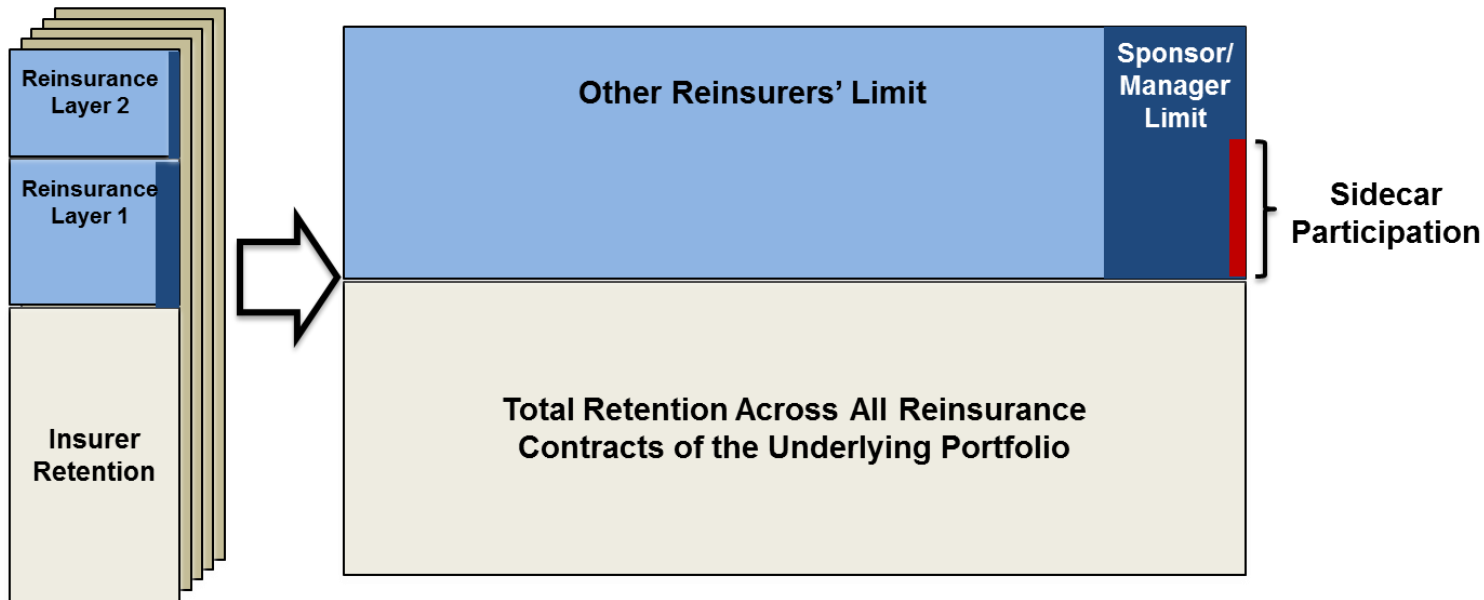
Regional and Unconventional Cat Bonds – Some Examples

Year	Sponsor/Cedant	Issuer	Peril/Coverage	Trigger	Size
2003	FIFA	Golden Goal Finance Ltd.	2006 World Cup cancellation	Event cancellation	\$260M
2005, 2007, 2010	AXA	FCC SPARC	Europe motor	Incurred loss ratio	€200, €412, €100
2006, 2009, 2012	FONDEN (Fund for Natural Disasters)	CAT-Mex Ltd., MultiCat Mexico 2009 Ltd., MultiCat Mexico Ltd.	Mexico earthquake, hurricane	Parametric on event location and intensity	\$160M, \$290M, \$315M
2007	Swiss Re	GlobeCat Ltd.	Guatemala and El Salvador earthquake	Parametric on exposed population	\$85M
2012, 2013	Allianz Argos 14 GmbH	Blue Danube Ltd., Blue Danube II Ltd.	US, Caribbean, Mexico, and Central America hurricane; US and Canada earthquake	Hybrid modeled and industry loss	\$240M, \$175M
2013	Metropolitan Transportation Authority (New York)	MetroCat Re Ltd.	New York area storm surge (USA)	Parametric on tidal gauge readings	\$200M
2014	Caribbean Catastrophe Risk Insurance Facility (16 countries)	Global Debt Issuance Facility (World Bank)	Caribbean hurricane, earthquake	Modeled loss	\$30M

Source: Artemis, media reports



- **Inwards-facing sidecars** - collateralized quota share arrangement on existing book of reinsurance business, offering investors the opportunity to share the operating profit or loss of the book
- **Market-facing sidecars** - customized portfolio of reinsurance risk for participating investors, on which the arranging reinsurer typically participates a small share
- Sidecars enable capital markets to finance complex reinsurance risks; provide reinsurers additional capacity, market power, fee generation, financial efficiency and portfolio optimization



Issuer	Pangaea Reinsurance, Ltd., a Bermuda Special Purpose Insurer
Notes Offered	Series 2015-1 Principal-at-Risk Notes
Ceding Reinsurer	Transatlantic Reinsurance Company and designated affiliates and subsidiaries
Administrator	XXXX Limited
Initial Issuance Date	January 1, 2015
Risk Period	January 1, 2015 to December 31, 2015
Ceded Portfolio	Quota Share of XXXXX reinsurance contracts entered into by XXXXXXXXXXXXXXXXXXXX that are classified as "Property Catastrophe", excluding retrocessional contracts and facultative agreements
Loss Occurrence	Events occurring during the Risk Period that cause loss to the Ceded Portfolio
Quota Share Percentage ¹	XXX %
Original Principal Amount ¹	US\$150,000,000
Gross Earned Premium ²	US\$ XXX,XXX,XXX
Expected Return net of Profit Share ³	XXX% assuming no losses, XXX% assuming mean level of loss
Reinsurance Trust	New York Regulation 114 trust with XXXXXXXXXXXXXXXXXXXX as trustee
Collateral Mechanism	US Treasury Money Market Funds in compliance with Section 1404 of the New York Insurance Law (initially expected to be the XXXXXXXXX Treasury Securities Portfolio)
Ceding Commission ⁴	(i) XXX% of the Original Principal Amount, (ii) XXX% of the Tail Reassumed by the Company ⁵
Profit Share	Up to XXX% of the Net Operating Profit, reduced as applicable by the ratio of actual investment return ⁶ to threshold return of XXX% (the expected profit assuming mean level of loss ³)

1. Intended issuance size subject to final terms. Total face value of Notes and Quota Share Percentage to be allocated pro-rata amongst Noteholders.
2. Estimated Gross Earned Premium for 100% of the Ceded Portfolio, based on ceded contracts in force as of July 1, 2014. Actual Gross Earned Premium is subject to renewal terms and conditions and other adjustments, and may vary, potentially materially.
3. Returns estimated by TransRe using Gross Earned Premium estimates for the Ceded Portfolio as of July 1, 2014, and loss results produced by TransRe using catastrophe risk models from AIR Worldwide in Catrader version 15.0.2. See page xx for additional analysis of estimated investment returns.
4. Allocated pro-rata amongst Noteholders. See page xx.
5. Term as defined in the Reinsurance Agreement.
6. Net Operating Profit gross of the Profit Share, divided by the sum of (a) US \$150,000,000 Original Principal Amount, and (b) US\$ xxx required to fund the Expense Account.

- Permanent, “sticky” capital with fee and float generation
- Diversification from financial assets
- Liquidity (if public); tax efficiency
- Ability to leverage alternative investment expertise?

	Greenlight Re	Third Point Re	Hamilton Re	PaC Re	Watford Re	ABR Re
Sponsors	Greenlight Capital	Third Point	Formerly S.A.C. Capital; now Two Sigma	Paulson & Co. and Validus	Arch Capital Group and Highbridge Principal Strategies	ACE Limited and Blackrock
Domicile	Cayman	Bermuda	Bermuda	Bermuda	Bermuda	Bermuda
Capital Raised	\$258 million	\$780 million	\$1 billion	\$500 million	\$1.13 billion	\$800 million
Commencement of Operations	2004 (underwriting 2006)	2012	2013	2012	2014	2015
Business/strategy	Mix of property, casualty, and specialty reinsurance	Lower volatility property and catastrophe reinsurance	High-margin property catastrophe and low-severity casualty reinsurance	Top-layer property catastrophe	Mix of property, casualty, and specialty reinsurance, with limited property catastrophe	Portion of ACE’s open-market reinsurance placements, with limited property catastrophe

Source: Standard & Poor’s, Artemis

Type	Credit Risk	Basis Risk	Adverse Development Risk	Time to Market	Coverage Flexibility	Time to Payout	Accounting, Rating Agency Benefits	Long-Term Counterparty Commitment
Traditional reinsurance	Low/Moderate	Low	Low	Short	High	Paid as paid	High	Varies
Collateralized reinsurance	Low	Varies	High	Short	Varies	Paid as paid	Varies	Evolving
Industry Loss Warranty	Varies	High	Varies	Very short	Low	Trigger-dependent	Varies	Low
Catastrophe bond - indemnity trigger	Low	Low	Varies	Long	Peril, zone-dependent	Paid as paid	Varies	Evolving
Catastrophe bond -- non-indemnity trigger	Low	High	High	Long	Varies	Trigger-dependent	Varies	Evolving
Sidecar	Low	Low	Varies	Short	High	Paid as paid	High	Evolving

Tradeoffs between structures serve a spectrum of needs

- Direct risk transfer to the capital markets (e.g., via cat bonds) has broadly focused on well-defined short-tailed risks, such as modeled natural perils
- Other types of risks, like many of those experienced in Brazil, have been passed to the capital markets indirectly: risk is underwritten/priced/serviced by reinsurer specialists on behalf of their capital providers (e.g., via equity investment, or sidecar/transformer participation)

