AMERICAN ACADEMY *of* ACTUARIES

ANNUAL MEETING AND PUBLIC POLICY FORUM 2019

NOVEMBER 5-6

CAPITAL HILTON | WASHINGTON, D.C.

#ACTUARIES2019

Insurance-Linked Securities

Today's Presenters

- Shawna Ackerman, Moderator
  - President, American Academy of Actuaries
- Bill Dubinsky
  - Managing Director & CEO, Willis Securities Inc.
- Achille Sime-Lanang
  - Co-Chair, Academy Work Group on ILS

Role of Alternative Markets and Reinsurance: Purpose, Marketplace and Risk Transfer

Bill Dubinsky
Managing Director & CEO, Willis Securities Inc.
William.dubinsky@willistowerswatson.com

The Wake Up Call: Hurricane Andrew (1992) / Northridge (1994)

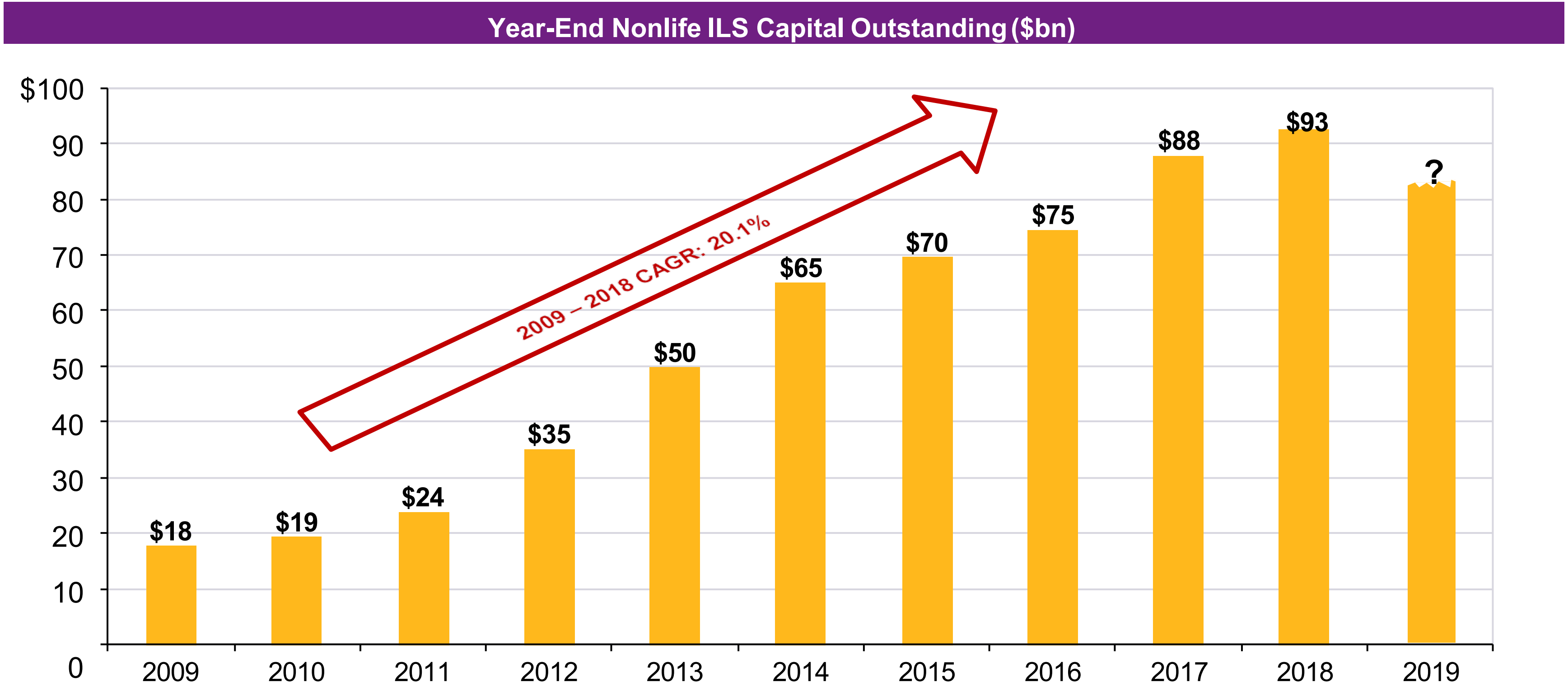
ILS emerged out of disasters: If the (re)insurance capital base is too small, where is more available?

Hurricane Andrew (1992)	Northridge (1994)
	
Nominal Losses: $15.5 Billion **Inflation-Adjusted Losses:** $27.9 Billion	**Nominal Losses:** $12.5 Billion **Inflation-Adjusted Losses:** $22.5

Note: Inflation-adjusted losses based on Consumer Price Index as published by the Bureau of Labor Statistics; data as of 02/28/19

Source: AIR Press Releases

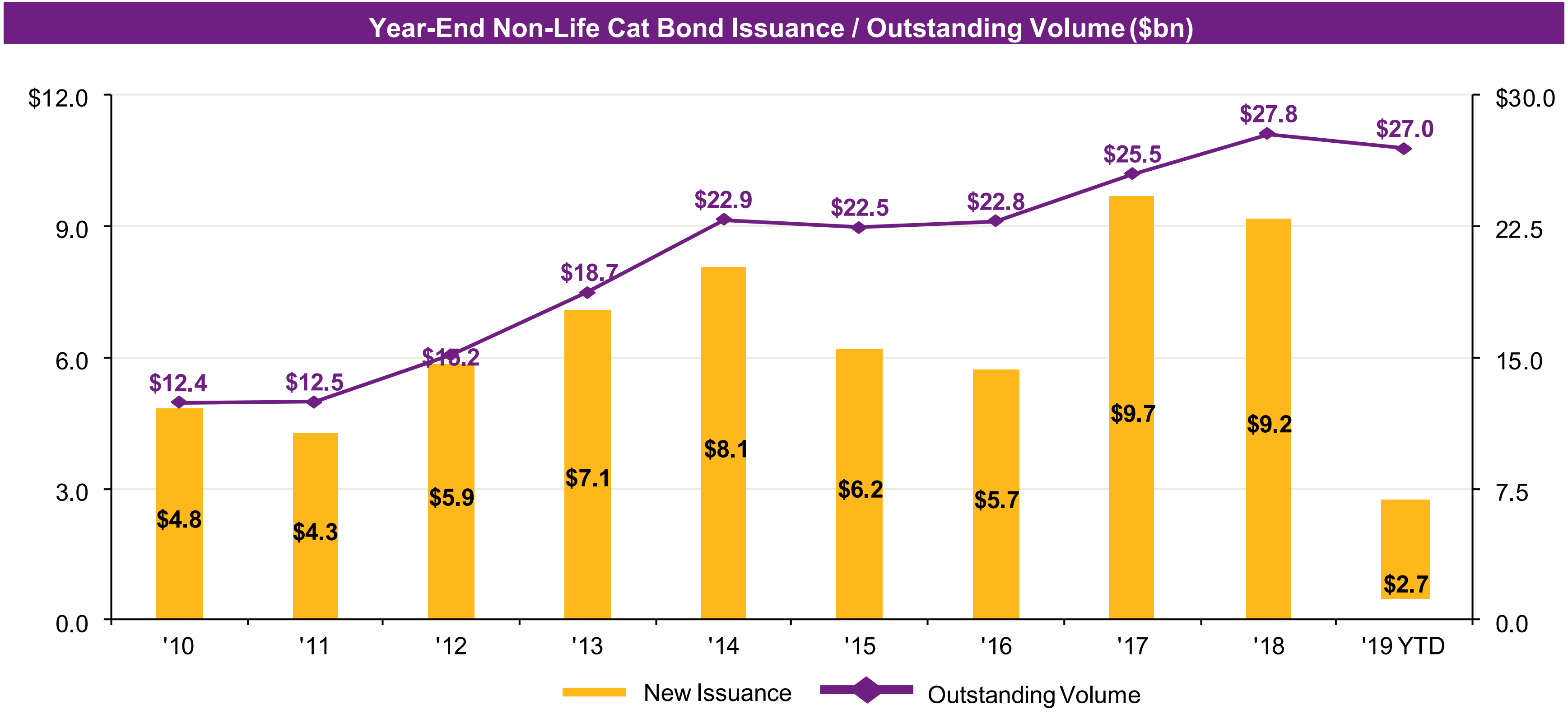
Influence of Alternative Capital



Source: Industry research and Willis Re Securities Transaction Database

State of Non-Life Cat Bond Market

2018 was a strong year for new issuance following a record-setting 2017

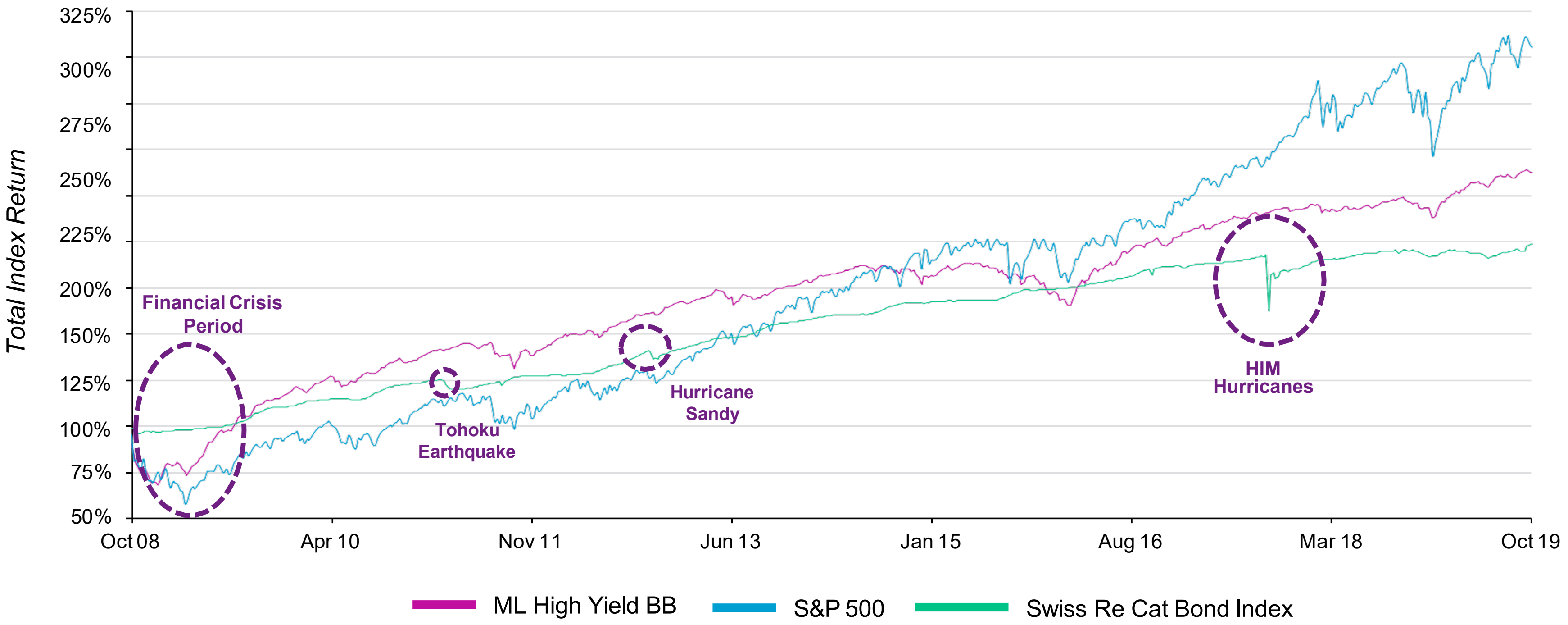


Source: Industry research and Willis Re Securities Transaction Database as of 10/25/19

Market Context

ILS Investment Opportunity - Relative performance vs. other asset classes

Insurance-linked securities offer stable, uncorrelated returns



Source: Bloomberg, Federal Reserve Economic Data and Factset as of 10/25/19

Securitization As A Model?

Mortgage Obligations

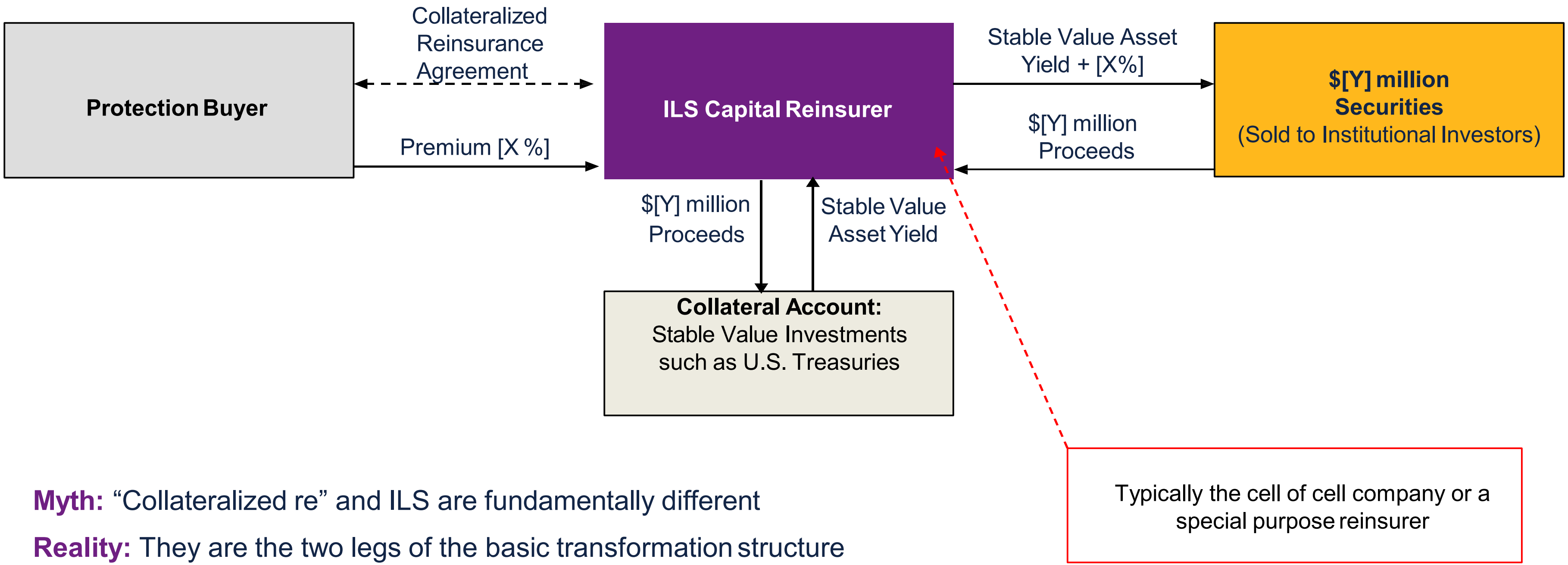
Auto Loans

Credit Card Receivables

(Re)insurance

Liquid Investment Vehicles

ILS Structure



Myth: "Collateralized re" and ILS are fundamentally different

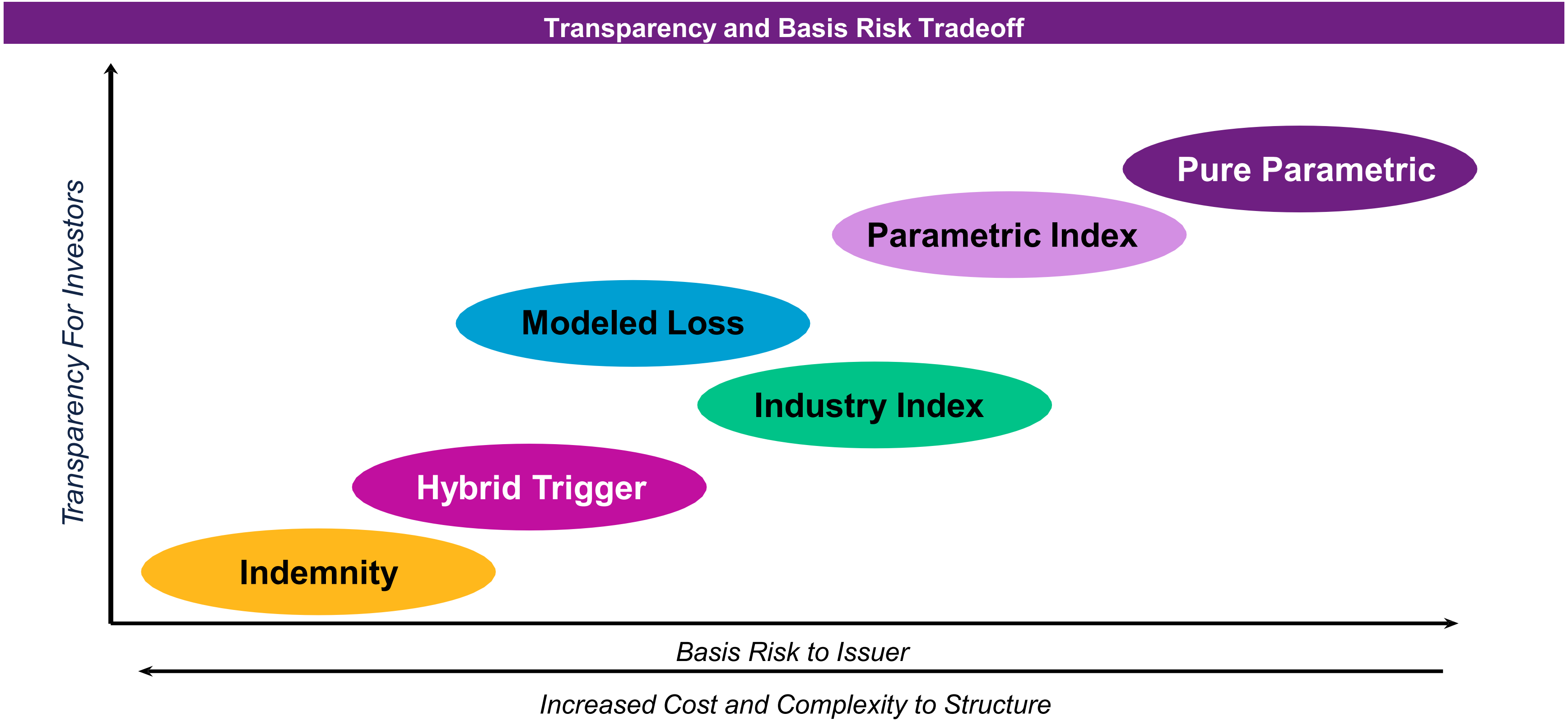
Reality: They are the two legs of the basic transformation structure

Common to all structures:

- Collateralized reinsurance contract
- Insurance-linked security for funding

Note: Sometimes other risk transfer alternatives are used and the transformer is not technically a reinsurer.

Triggers


Transparency and Basis Risk Tradeoff
Transparency For Investors
Pure Parametric
Parametric Index
Modeled Loss
Industry Index
Hybrid Trigger
Indemnity
Basis Risk to Issuer
Increased Cost and Complexity to Structure

Introduction to Catastrophe Bonds

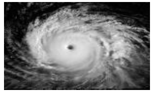
Catastrophe Bond Basics

- **Catastrophe bonds offer multi-year reinsurance capacity for fixed income investors**
  - Banks, hedge funds, specialist funds
- **Sponsors (issuers) are typically insurers and reinsurers**
  - Can also be corporate or government entities

Catastrophe Bond Benefits

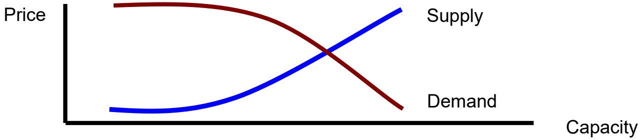
Expedited Recoveries

Mechanistic recoveries possible with non-indemnity triggers



Diversification of Capacity

Can have lower marginal cost in an absolute sense



Full Collateralization

Hedge of systemic credit risk inherent in (re)insurance markets

Full Syndication

Pay less with broadest investor group

Multi-year Reinsurance Protection

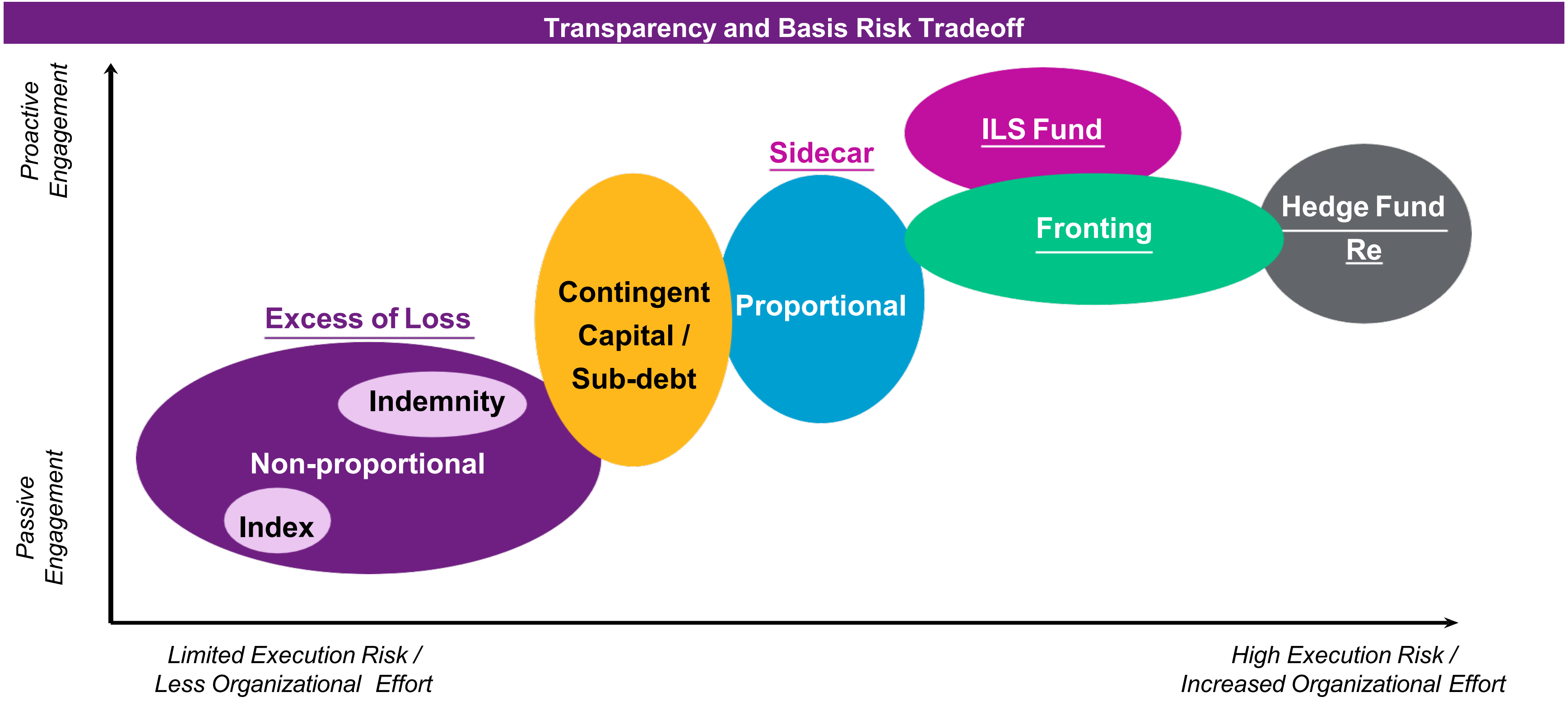
Ability to lock-in terms typically between 3 – 5 years

2019

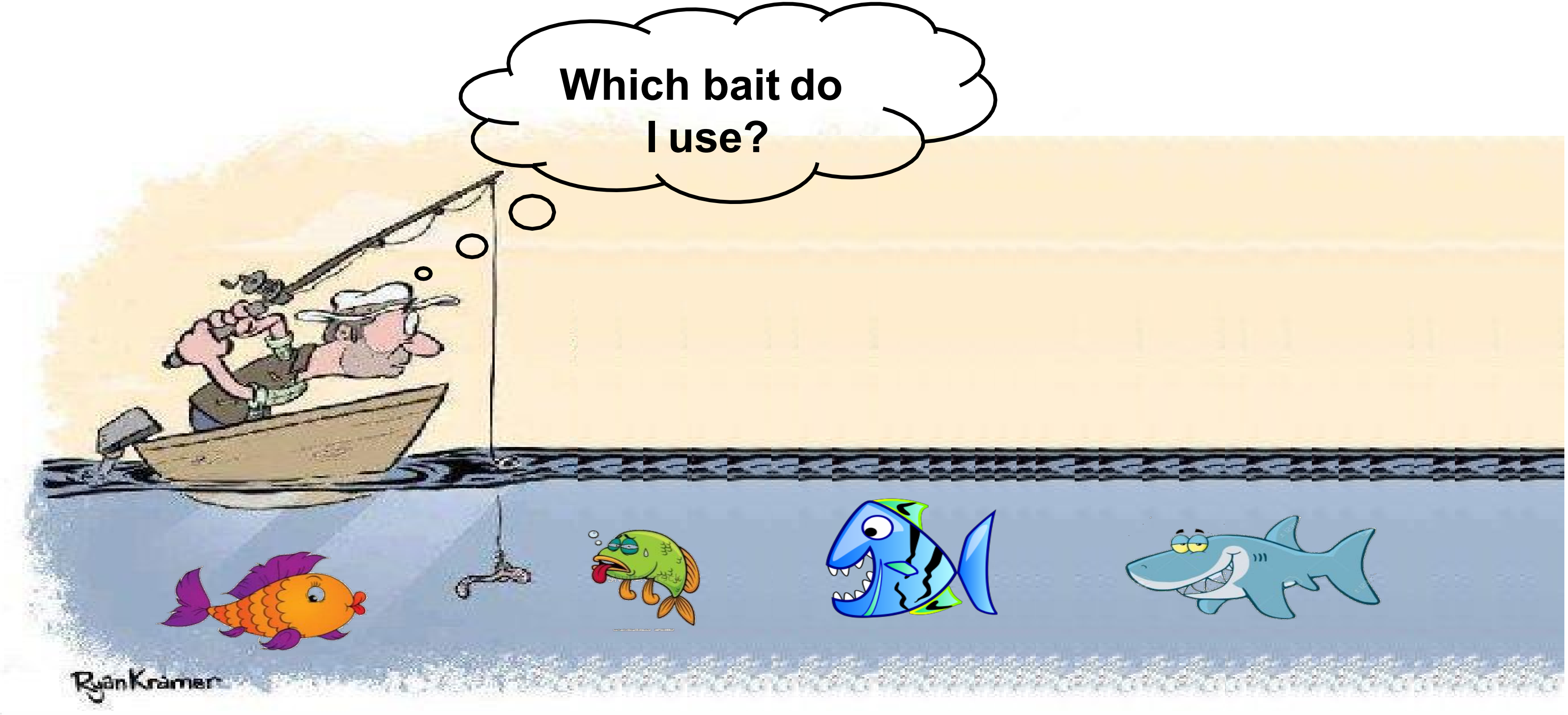
2020

2021

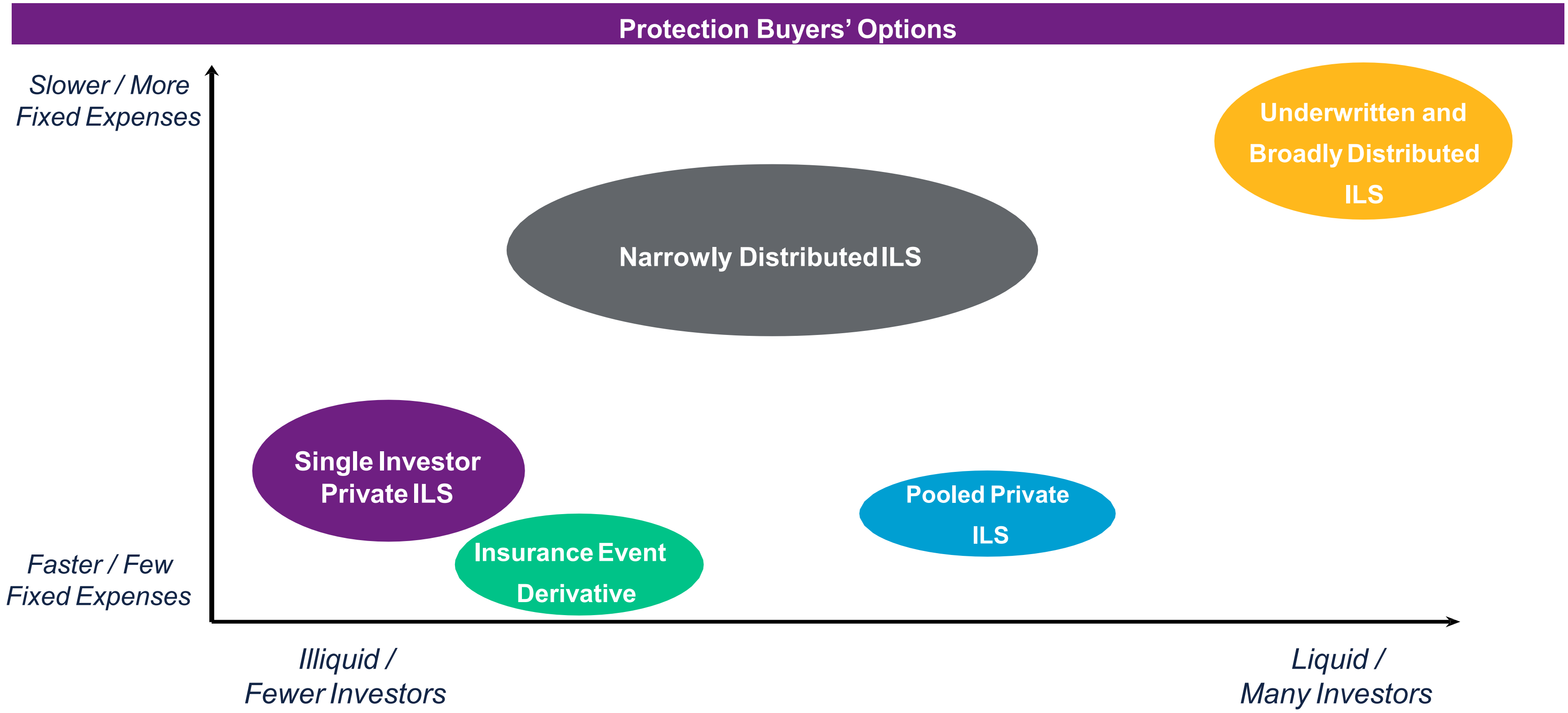
Spectrum Of Possibilities Available To Engage With Alternative Capital



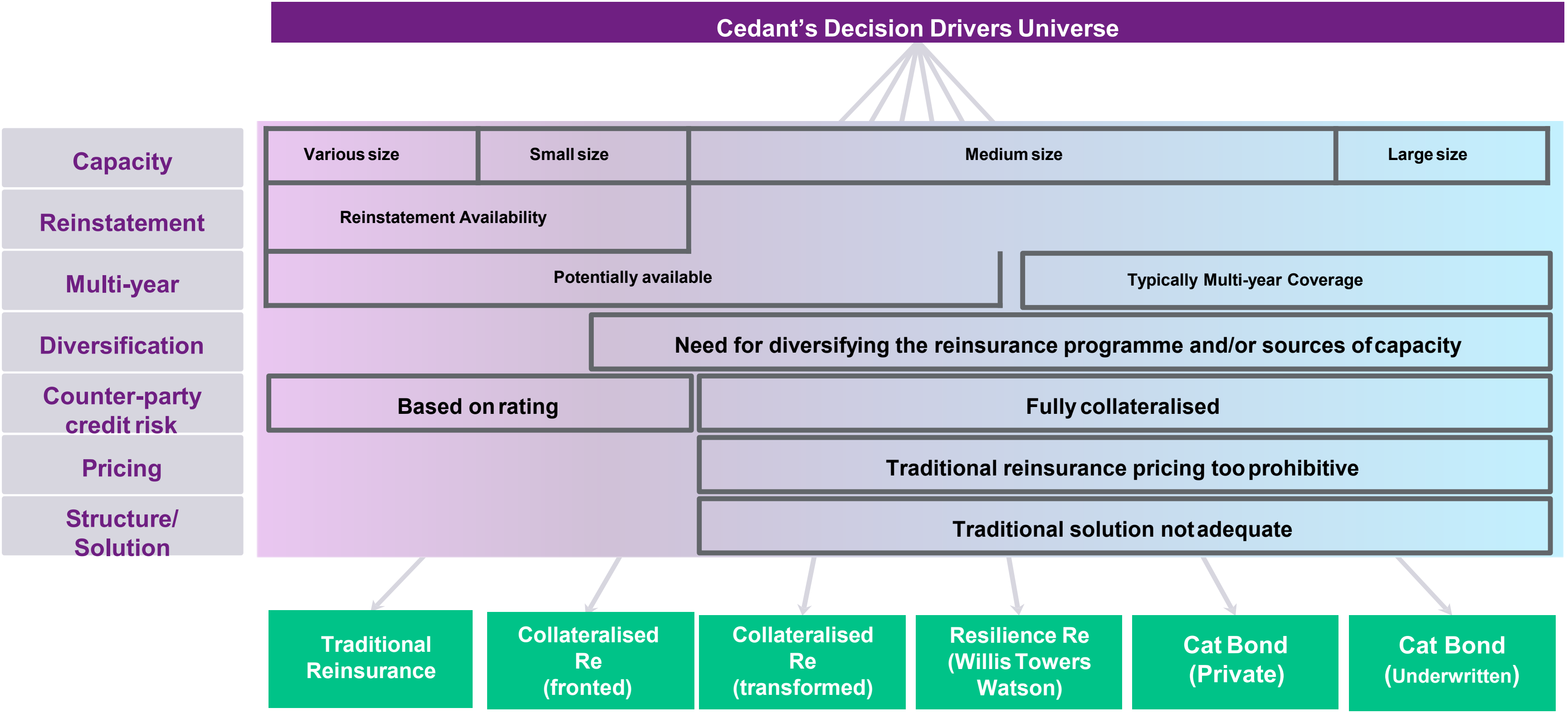
How to Choose the Optimal Product?



Range of Options



Non-Proportional ILS Choices

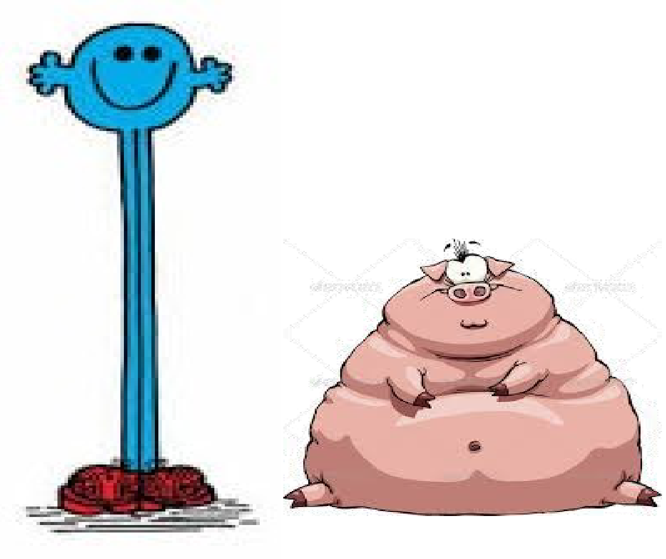


Illustrative Cost of Capital

Both the amount and the rate matter

	Florida Hurricane	Western Australia Cyclone
Industry PML	~$150 Billion	~$2 Billion
Reinsurer View		
Capital / Limit	50.0%	5.0%
Required Return	10.0%	10.0%
Cost of Capital	5.0%	0.5%
ILS Investor View		
Capital / Limit	100.0%	100.0%
Required Return	2.5%	2.5%
Cost of Capital	2.5%	2.5%

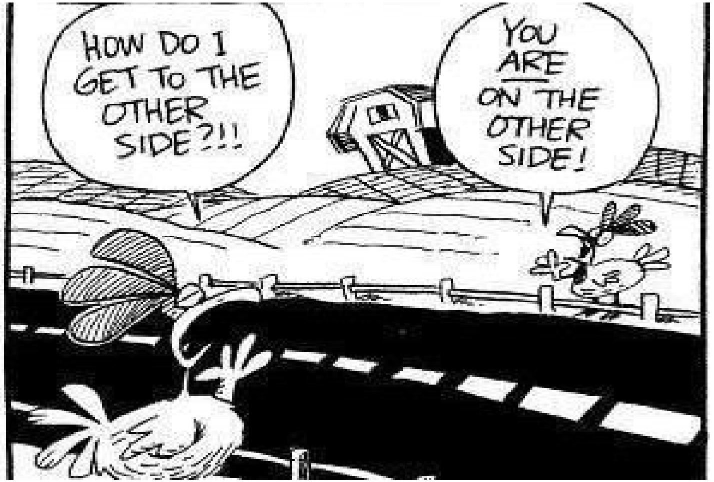
Who is bigger?



Convergence 2.0

	Public Equity / Traditional (Re)insurer	Fixed Income / Alternative Capital
Leverage	Highly Levered Balance Sheet	Little or No Leverage
Capital	Lower Amount of Capital	Higher Amount of Capital
Return	Higher Required Rate of Return	Lower Required Rate of Return
Result	*Adding Alternative Capital to Lower Required Return to Write Business*	*Adding Leverage to Lower Amount of Capital Required to Write Business*

Blended Models Converging



…Innovation in Alternative Capital

Improved data collection / access driving innovation in alternative capital sector

Improved Models

- Data Collection
- Data Standardization
- Data Access / Integration

New Capital Markets Products

- New Risk Classes
- New Geographies
- Primary Insurance

Changing (Re)insurer Value Proposition

- Private ILS Fronting
- Providing Leverage
- Broker Dealer
- Liquid Fronting
- Ancillary Risk Taking
- Other Ancillary Services

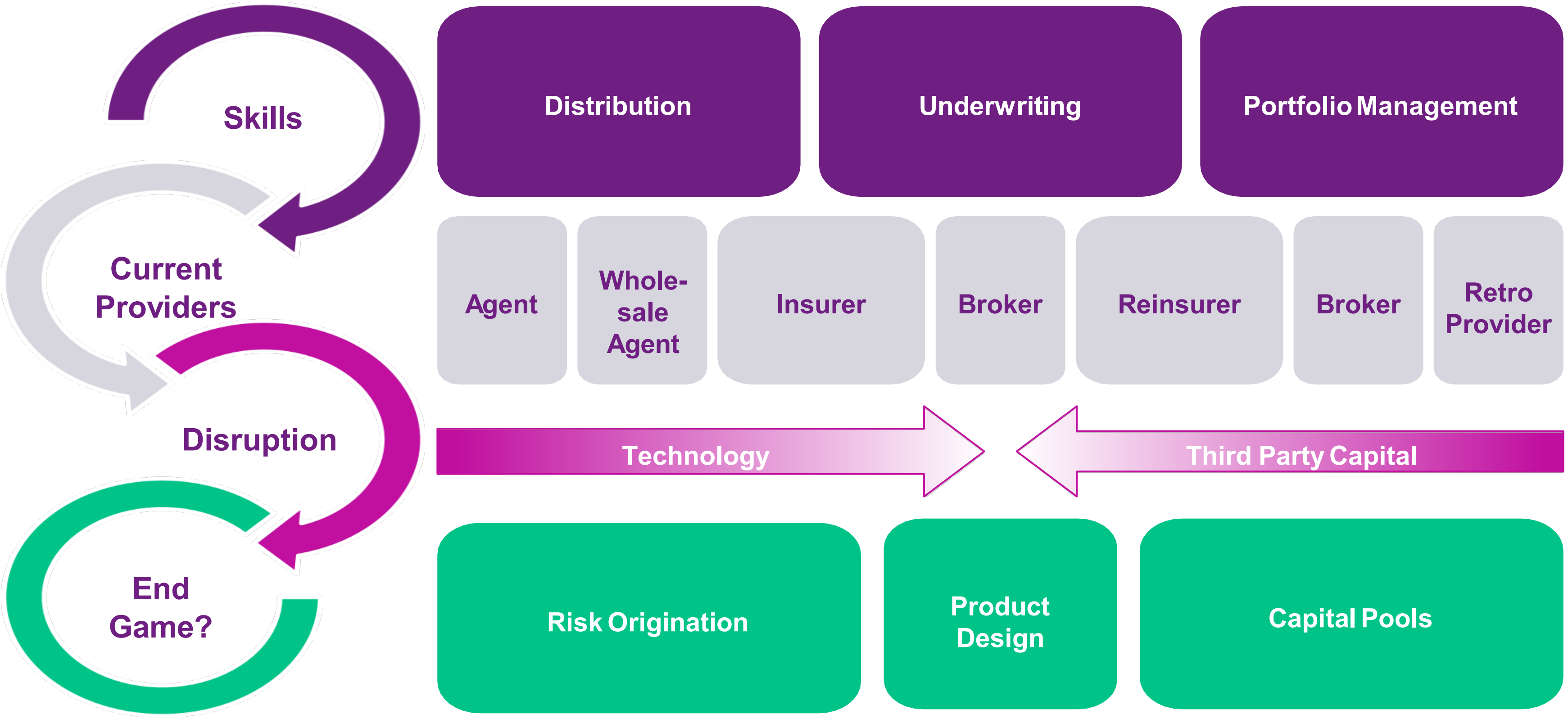
(Re)insurers looking to capitalize on investor demand while exploring new opportunities to engage

Spotlight on Actuaries in Alternative Capital

Actuaries play many roles including these particularly important roles:

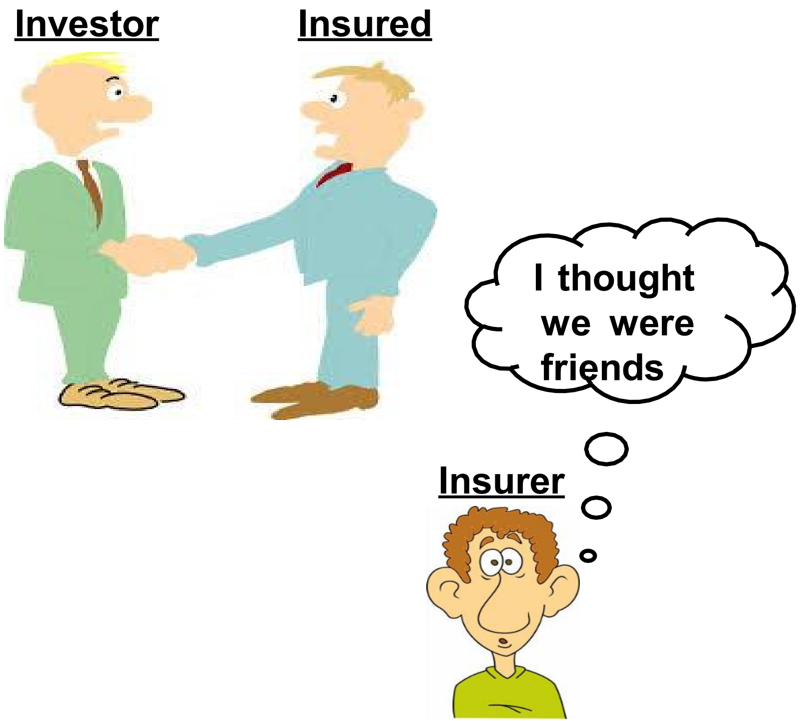
- Risk modeling: e.g., build models to analyze certain risk structures both to facilitate a transaction or by working the buy-side
- Reserving: e.g., work for investors to help value potentially loss affected positions or to facilitate commutations on an individual position or portfolio basis
- Capital management: work with cedants, rating agencies and regulators to assess the solvency capital impact of innovative alternative capital transactions and with investors to manage portfolio risks

Pressured Insurance Value Chain

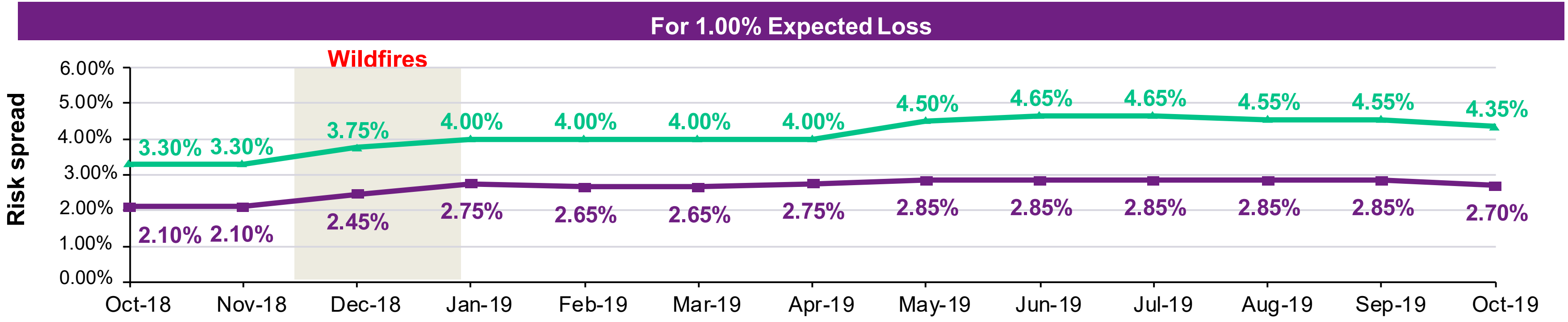


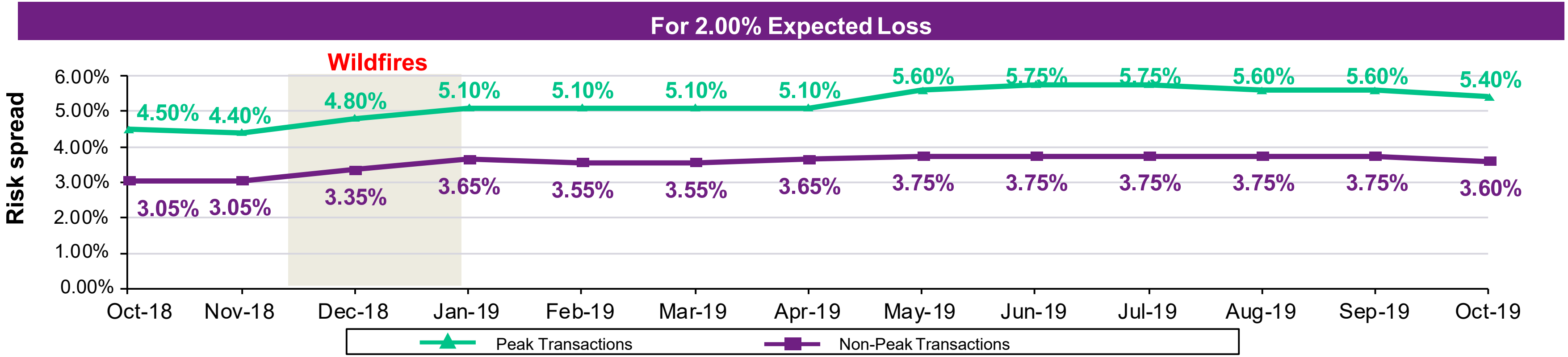
Disruption of Value Chain through Disintermediation

Is the value chain too long and expensive?



Monthly Cat Bond Pricing Indications





Note: Peak transactions include coverage against U.S. hurricane risk.

Willis Re Securities – Selected ILS Transactions

Our team is experienced in executing across the ILS spectrum

$100 million May 2019
$100 million April 2018
Armor Re II Ltd. 2018-1 / 2019-1 Sole Structuring Agent & Bookrunner

Undisclosed March 2019
157 Re
Lead Structuring Agent

€45 million Jan 2019
Atmos Re
Sole Structuring Agent & Bookrunner

$88 million Jan. 2019
Resilience Re
Placement Agent

$210 million Dec. 2018
$250 million Sept. 2014
Golden State Re II Ltd.
Sole Structuring Agent & Bookrunner

$37 million June 2018
$150 million April 2018
$60 million Jan. 2018
$53 million Jan. 2018
Resilience Re
Placement Agent

€90 million Dec. 2017
Hexagon Reinsurance DAC Lead Structuring Agent & Bookrunner

$100 million July 2017
Fortius Re II Ltd. 2017-1
Sole Structuring Agent & Bookrunner

$37 million June 2017
$173 million April 2017
$187 million Jan. 2017
$63 million Jan. 2017
Resilience Re
Placement Agent

$165 million March 2017
Buffalo Re Ltd. 2017-1
Sole Structuring Agent & Bookrunner

$67 million Dec. 2016
$66 million Jan. 2016
Altair Re IV Ltd. / Altair Re V Ltd.
Structuring & Placement Agent

€255 million Dec. 2016
Horse Capital I DAC
Sole Structuring Agent & Bookrunner

$200 million Dec. 2016
$200 million March 2014
Bonanza Re Ltd. / Gator Re Ltd. Sole Structuring Agent & Bookrunner

$25 million Aug. 2016
Undisclosed May 2014
Undisclosed April 2013
Mona Lisa Re Ltd. 2016 / 2014 / 2013
Sole Placement Agent

$34 million June 2016
$85 million April 2016
$57 million Jan. 2016
Resilience Re
Placement Agent

$250 million Feb. 2016
$278 million April 2015
$200 million April 2014
Citrus Re
Sole Structuring Agent & Bookrunner

€200 million June 2015
Azzurro Re
Sole Structuring Agent & Bookrunner

$85 million Dec. 2014
$95 million Dec. 2013
$95 million April 2013
Altair Re / Altair Re II / Altair Re III
Sole Structuring & Placement Agent

$200 million May 2014
$183 million May 2013
Armor Re
Sole Structuring Agent & Bookrunner

$300 million Oct. 2013
Galileo Re Ltd.
Sole Structuring Agent & Bookrunner

Disclaimers

Willis Re Disclaimer

- This analysis has been prepared by Willis Limited and/or Willis Re Inc. and/or the “Willis Towers Watson” entity with which you are dealing (“Willis Towers Watson” is defined as Willis Limited, Willis Re Inc., and each of their respective parent companies, sister companies, subsidiaries, affiliates, Willis Towers Watson PLC, and all member companies thereof) on condition that it shall be treated as strictly confidential and shall not be communicated in whole, in part, or in summary to any third party without prior written consent from the Willis Towers Watson entity with which you are dealing.

- Willis Towers Watson has relied upon data from public and/or other sources when preparing this analysis. No attempt has been made to verify independently the accuracy of this data. Willis Towers Watson does not represent or otherwise guarantee the accuracy or completeness of such data nor assume responsibility for the result of any error or omission in the data or other materials gathered from any source in the preparation of this analysis. Willis Towers Watson shall have no liability in connection with any results, including, without limitation, those arising from based upon or in connection with errors, omissions, inaccuracies, or inadequacies associated with the data or arising from, based upon or in connection with any methodologies used or applied by Willis Towers Watson in producing this analysis or any results contained herein. Willis Towers Watson expressly disclaims any and all liability, based on any legal theory, arising from, based upon or in connection with this analysis. Willis Towers Watson assumes no duty in contract, tort or otherwise to any party arising from, based upon or in connection with this analysis, and no party should expect Willis Towers Watson to owe it any such duty.

- There are many uncertainties inherent in this analysis including, but not limited to, issues such as limitations in the available data, reliance on client data and outside data sources, the underlying volatility of loss and other random processes, uncertainties that characterize the application of professional judgment in estimates and assumptions. Ultimate losses, liabilities and claims depend upon future contingent events, including but not limited to unanticipated changes in inflation, laws, and regulations. As a result of these uncertainties, the actual outcomes could vary significantly from Willis Towers Watson’s estimates in either direction. Willis Towers Watson makes no representation about and does not guarantee the outcome, results, success, or profitability of any insurance or reinsurance program or venture, whether or not the analyses or conclusions contained herein apply to such program or venture.
- Willis Towers Watson does not recommend making decisions based solely on the information contained in this analysis. Rather, this analysis should be viewed as a supplement to other information, including specific business practice, claims experience, and financial situation. Independent professional advisors should be consulted with respect to the issues and conclusions presented herein and their possible application. Willis Towers Watson makes no representation or warranty as to the accuracy or completeness of this document and its contents.
- This analysis is not intended to be a complete actuarial communication, and as such is not intended to be relied upon. A complete communication can be provided upon request. Subject to all terms of this Disclaimer, Willis Towers Watson actuaries are available to answer questions about this analysis.
- Willis Towers Watson does not provide legal, accounting, or tax advice. This analysis does not constitute, is not intended to provide, and should not be construed as such advice. Qualified advisers should be consulted in these areas.

- Willis Towers Watson makes no representation, does not guarantee and assumes no liability for the accuracy or completeness of, or any results obtained by application of, this analysis and conclusions provided herein.
- Where data is supplied by way of CD or other electronic format, Willis Towers Watson accepts no liability for any loss or damage caused to the Recipient directly or indirectly through use of any such CD or other electronic format, even where caused by negligence. Without limitation, Willis Towers Watson shall not be liable for: loss or corruption of data, damage to any computer or communications system, indirect or consequential losses. The Recipient should take proper precautions to prevent loss or damage – including the use of a virus checker.
- This limitation of liability does not apply to losses or damage caused by death, personal injury, dishonesty or any other liability which cannot be excluded by law.
- This analysis is not intended to be a complete Financial Analysis communication. A complete communication can be provided upon request. Subject to all terms of this Disclaimer, Willis Towers Watson analysts are available to answer questions about this analysis.
- Willis Towers Watson does not guarantee any specific financial result or outcome, level of profitability, valuation, or rating agency outcome with respect to A.M. Best or any other agency. Willis Towers Watson specifically disclaims any and all liability for any and all damages of any amount or any type, including without limitation, lost profits, unrealized profits, compensatory damages based on any legal theory, punitive, multiple or statutory damages or fines of any type, based upon, arising from, in connection with or in any manner related to the services provided hereunder.
- Acceptance of this document shall be deemed agreement to the above.

Willis Re Securities Disclaimer

Willis Re Securities is a trade name used by Willis Securities, Inc., a licensed broker dealer authorized and regulated by FINRA and a member of SIPC (“WSI”) and Willis Towers Watson Securities Europe Limited (Registered number 2908053 and ARBN number 604 264 557), an investment business authorized and regulated by the UK Financial Conduct Authority and exempt from the requirement to hold an Australian Financial Services License under ASIC Class Order [03/1099] (“WTW Securities Europe”). Each of WSI and WTW Securities Europe are Willis Towers Watson companies. Securities products and services are offered through WSI and WTW Securities Europe and. Reinsurance products are placed through Willis Re Inc. in the United States and through Willis Limited in the UK, both also Willis Towers Watson companies.

These materials have been prepared by Willis Re Securities based upon information from public or other sources. Willis Re Securities assumes no responsibility for independent investigation or verification of such information and has relied on such information being complete and accurate in all material respects. To the extent such information includes estimates and forecasts of future financial performance, Willis Re Securities has assumed that such estimates and forecasts have been reasonably prepared on bases reflecting the best currently available estimates. No representation or warranty, express or implied, is made as to the accuracy or completeness of such information and nothing contained herein is, or shall be relied upon as, a representation, whether as to the past, the present or the future. The information contained herein is not intended to provide the sole basis for evaluating, and should not be considered a recommendation with respect to, any transaction or other matter. Willis Re Securities is not providing any advice on tax, legal or accounting matters and the recipient should seek the advice of its own professional advisors for such matters. Nothing in this communication constitutes an offer or solicitation to sell or purchase any securities and is not a commitment by Willis Re Securities (or any affiliate) to provide or arrange any financing for any transaction or to purchase any security in connection therewith. Willis Re Securities assumes no obligation to update or otherwise revise these materials. This communication has not been prepared with a view towards public disclosure under any securities laws and may not be reproduced, disseminated, quoted or referred to, in whole or in part, without the prior written consent of Willis Re Securities. Information contained within this communication may not reflect information known to other employees in any other business areas of Willis Towers Watson and its affiliates.

Extreme Event Committee – ILS Monograph

Achille Sime, MAAA, FIAF, FSA, MAAA, CERA
Principal and CEO, SL FINANCIAL Inc.

ILS Work Group

- Composed of 12 persons of which 2 are co-leads
- Purposed to write a monograph that provides actuarial perspective on ILS
- Monograph proposed sections:
  - Introduction
    - Identify and describe major types of instruments
  - History
    - Market development over time
  - Purchase Decision
    - Reasons for purchase in comparison to traditional risk financing mechanism
  - ILS Transaction Timeline
    - Shop & Price
    - Purchase & Record
  - Trigger and Expiration
    - Trigger of payout
    - Final commutation settlement

Actuarial Perspective

- Actuarial Perspective
  - ILS Impact on Traditional Reinsurance
  - Case for Actuaries Involvement
  - Continuous Involvement of Actuaries

Achille Sime, MAAA, FIAF, FSA, MAAA, CERA
Principal and CEO, SL FINANCIAL Inc.

ILS Impact on TraditionalReinsurance

-
    - Reinsurers write policies whose potential losses are multiples of capital in their balance sheets (levered balance sheet)
    - Leverage is accepted as part of business due to diversification, risk management and credit rating
-
    - Securitized risk holds cash and liquid securities equal to full limit of coverage
    - This reduces or eliminates credit risk and makes liquid trading possible
-
    - From levered to unlevered (collateralized) balance sheet
    - From managing to hedging insured risks

Case for Actuaries Involvement

- Factors supporting actuarial involvement in ILS:
  - Transparency: Net Asset Value (NAV) of funds published monthly
  - Independence: investors demand independent third-party reviews
  - Rating agencies or regulators perspective:
    - Assess creditworthiness and policyholders' security
    - Actuarial work-product is key to rating agencies' and regulators' reviews
- NAV is the fair value of ILS instrument:
  - $FV(t) \cong \underbrace{[Collateral\ Balance(t) + Earned\ Premium(t)]}_{FV(Assets)=FVA} - \underbrace{P(t)}_{FV(Liabilities)=FVL}$
  - $P(t)$ is the price a rational risk taker would charge to assume the risks
    - The lack of active market necessitate a mark-to-model approach
      - ✓ Mark-to-model is pricing method for a specific investment position or portfolio based on internal assumptions or financial models
    - $P(t) \cong PV\big(Loss\ Reserve(t)\big) + Risk\ Magin(t) - Repricing\ Unrealized\ Value\ (t)$
      - ✓ $Repricing\ Unrealized\ Value \cong Unearned\ Premium\ (t) - Repricing\ of\ Unexpired\ Exposure\ (t)$
      - ✓ FVL methodology is subject of significant actuarial research

Continuous Involvement of Actuaries

- Actuarial risk analysis and pricing at inception
- Revenue recognition according to seasonal earning of premium
- Actuarial opinion on unpaid claim liabilities (i.e. reasonableness of $Loss\ Reserve\ \ t$)
- Actuarial estimate of FVL (i.e. $P\ \ t$)
- Portfolio risk management (e.g. independent review of underwriting and risk metrics)
- Collateral release and commutation analysis
- Service provider (e.g. loss reserve specialist, calculation agent, peril modeler, etc.)
- Independent valuation peer reviewer
- Investors education

Discussion