



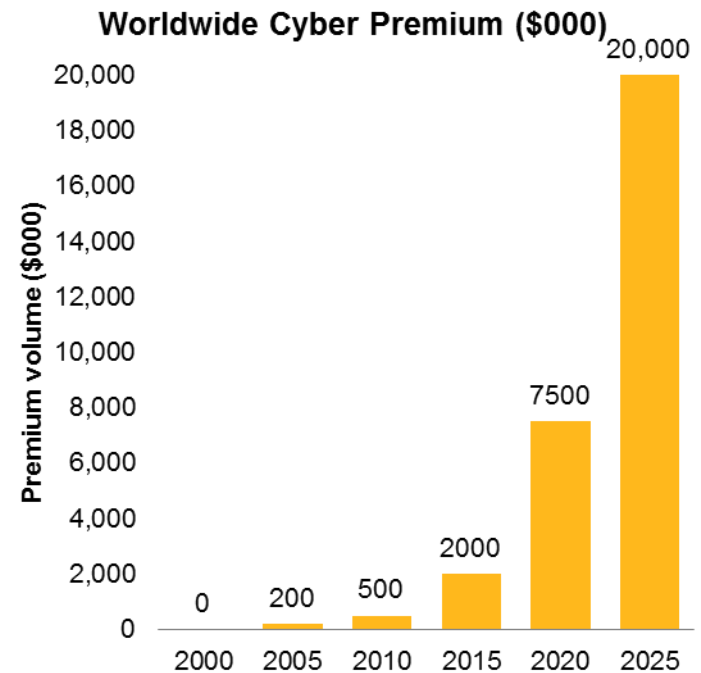
Understanding and Analyzing Cyber Risk

ICMIF MORO Conference
April 25, 2018

Cyber – opportunity or threat?

Fastest growing insurance market segment

- However, little available claims data to help determine cyber pricing
- Despite some headline data breach losses in recent years, cyber appears to be a profitable line
- ULRs ratios in 40-60% range depending on composition of book
- This is based largely on data breach experience and exposures are changing rapidly
- Yesterday's claims may therefore be a poor guide for the claims of tomorrow



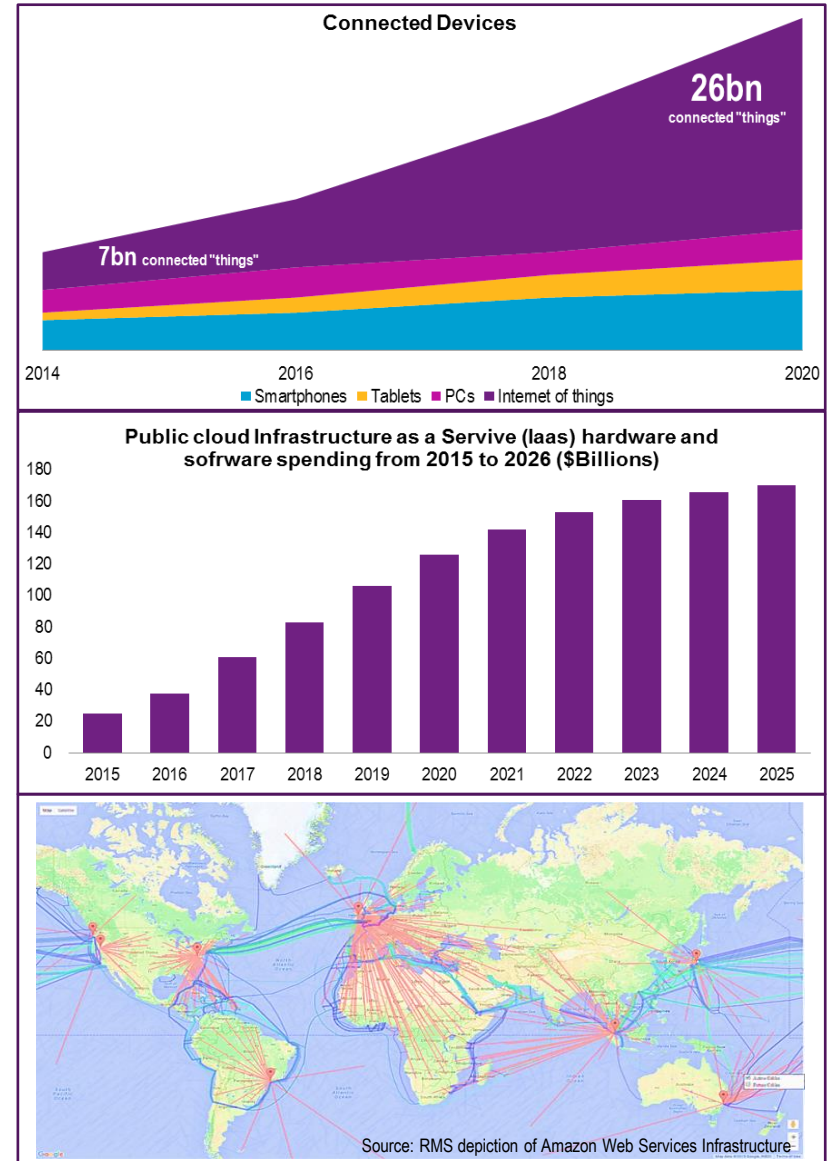
Source: Various, incl. Willis, Advisen, PWC, Allianz

Audience voting question

- What is your organization's number one reason behind writing cyber policies (stand-alone, blended or endorsement)?
 - A. Increase in customer demand
 - B. Stay ahead or on par with competition
 - C. New line of business for growth opportunities
 - D. Other reasons
 - E. We are not writing or planning to write cyber policies in the near future

Growing cyber accumulation risk

- Increasing inter-connectivity and societal dependence on the internet, networks and clouds
- Growth in CBI coverage **dramatically increases accumulation exposure given limited ability to track third party vendors / supply chain**
- Unquantified indirect cyber embedded across P&C lines
- Events such as “NotPetya” illustrate potential for widespread exposure
 - Impacted companies as diverse as
 - Merck: Pharmaceuticals
 - Maersk: Shipping
 - DLA Piper: Legal
- Given wide range of potentially impacted lines, *silent* cyber could be much more of an issue than *affirmative* cyber



Affirmative vs. silent cyber

Affirmative cyber

Standalone cyber policies

Endorsement on traditional policies

Examples

Breach Response Coverage

Privacy liability

Network security liability

Silent cyber

Implicit cyber coverage from non-cyber policies

Policy gaps in existing cyber exclusions

Examples

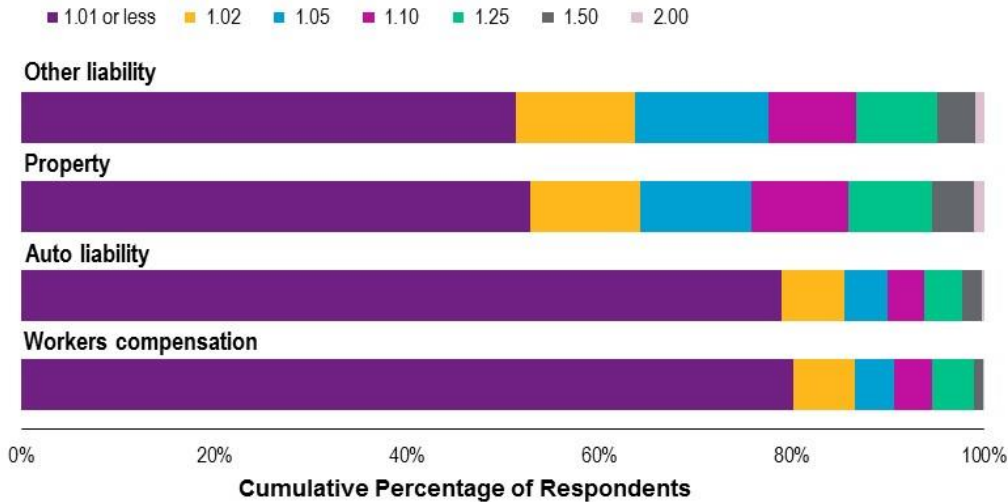
Property

Professional Liability

Marine & Energy

Willis Re 2017 Silent Cyber Survey results

Silent cyber risk factor by line of business



- Silent cyber risk factor:
 - 1.01 = one cyber-related loss for every 100 non-cyber related losses
 - 1.50 = 50% more covered losses due to cyber

- Significant uncertainty over silent cyber exposure potential:
 - >50% respondents estimated silent cyber risk factor to property as 1.01 or less
 - >1% respondents estimated additional property loss due to silent cyber to be 100%
- Material variation in degree of anticipated silent cyber risk between lines:
 - AL, WC: more than 75% respondents estimated the risk factor as 1.01 or less
 - Property, Liability: around 50% respondents estimated the risk factor to be 1.02 or more

Conventional arguments for not modeling Cyber risk

“No-one else is measuring cyber catastrophe risk so our underwriting flexibility will be compromised if we do”

A company cannot effectively manage its enterprise risk without being able to quantify its cyber accumulation and more and more insurers are doing this voluntarily or are being required to do so

“The data doesn’t exist yet, we will model cyber when the data gets better”

There are many third-party cyber incident and cybersecurity assessment data providers and there is a growing body of data to guide decision-making

“Prior events such as cloud provider outages and zero day vulnerabilities have had minimal insurance impact so far”

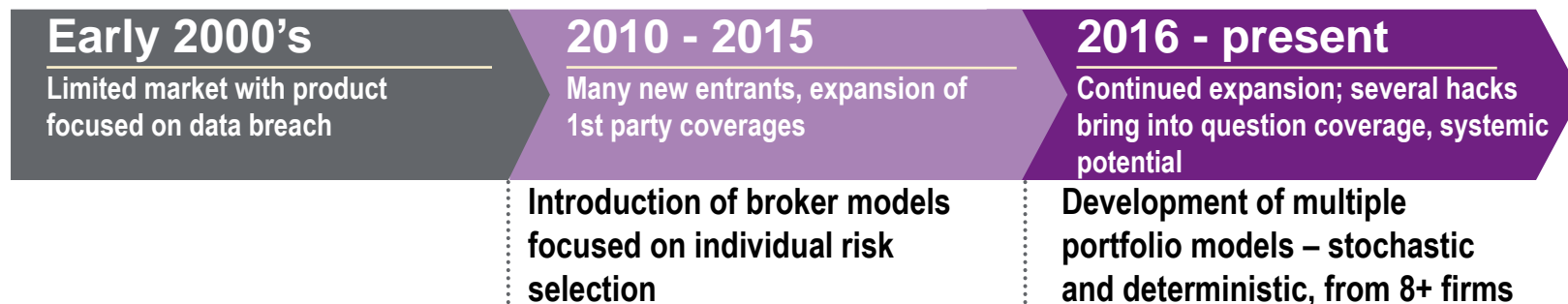
Exposures are growing exponentially and without quantifying the accumulation risk potential of a range of downside events across all lines, it’s impossible to conclude the insurance impact is minimal

Framework for measuring cyber risk

- Cyber business warrants a Group-level approach given its potential to span the spectrum of P&C lines
 - Requires a framework for measuring direct and indirect exposure in order to establish risk tolerance
 - Fundamental approach is akin to property cat modeling – exposure-based framework required to quantify tail risk
- Multi-model view is essential
 - Cyber modeling is in its infancy with many different approaches to quantifying risk, some of them providing partial answers (e.g. cat vs. attritional)
 - Multiple perspectives necessary to begin to build framework for analyzing portfolio and developing strategy
- Focus on calculating PML as a more practical measure of risk quantification than absolute max downside (TIV or TEAL*)

Evolution of cyber modeling

- Early cyber models have been around for several years but the last 12-24 months has seen “analytics arms race” as focus has shifted

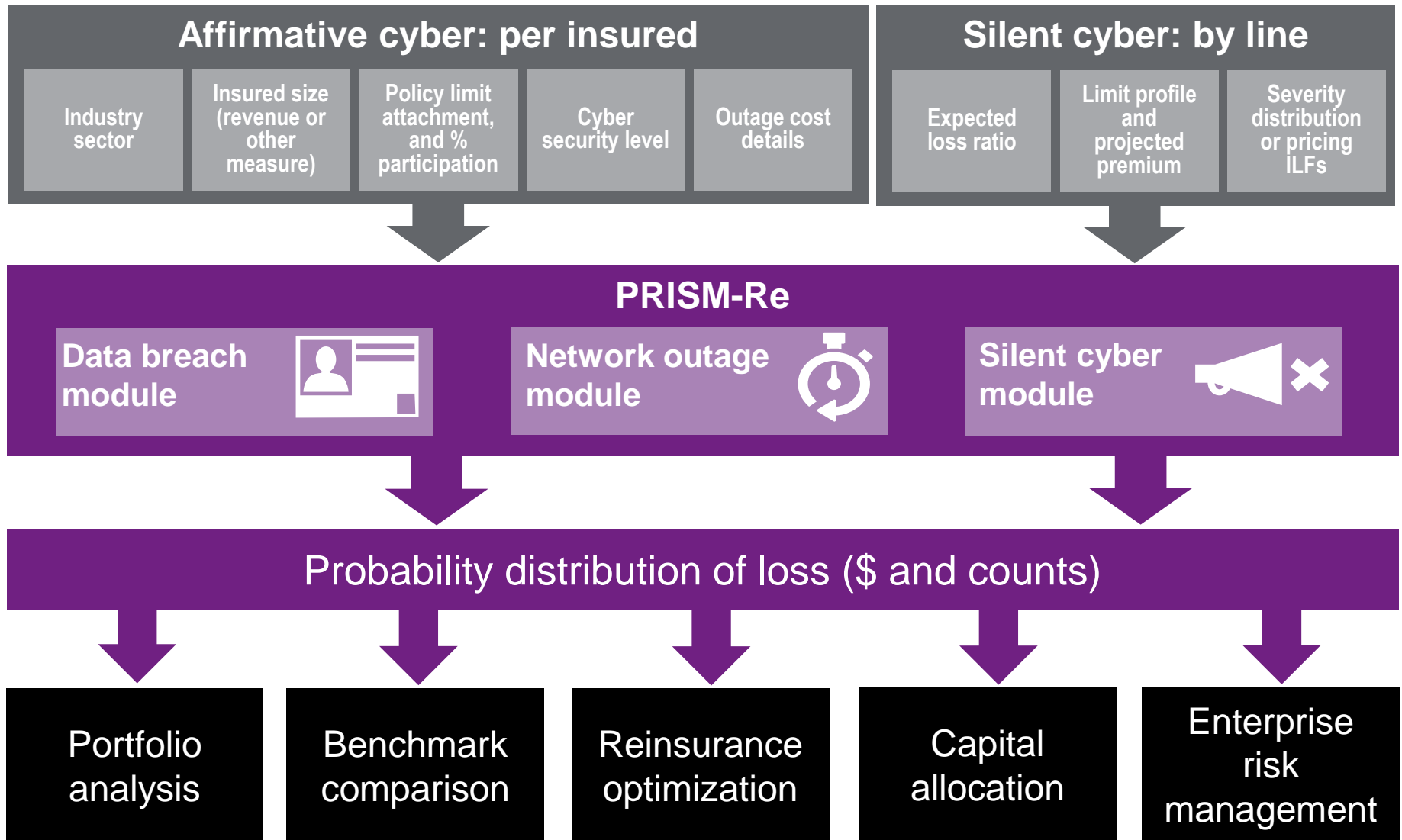


- Individual risk scoring models:
 - **BitSight**, **SecurityScorecard**, **FICO**, etc. rate individual companies using external nonintrusive threat assessment
- Portfolio accumulation models:
 - Willis Re's **PRISM-Re** generates full probabilistic loss distributions for data breach, business interruption, and silent cyber
 - **Cyence** and **Corax** examines the downside loss potential arising from affirmative cyber exposures
 - Willis Re's **eNTAIL**, **RMS**, **AIR** and **CyberCube** are scenario based models that focus on the systemic cyber cat events

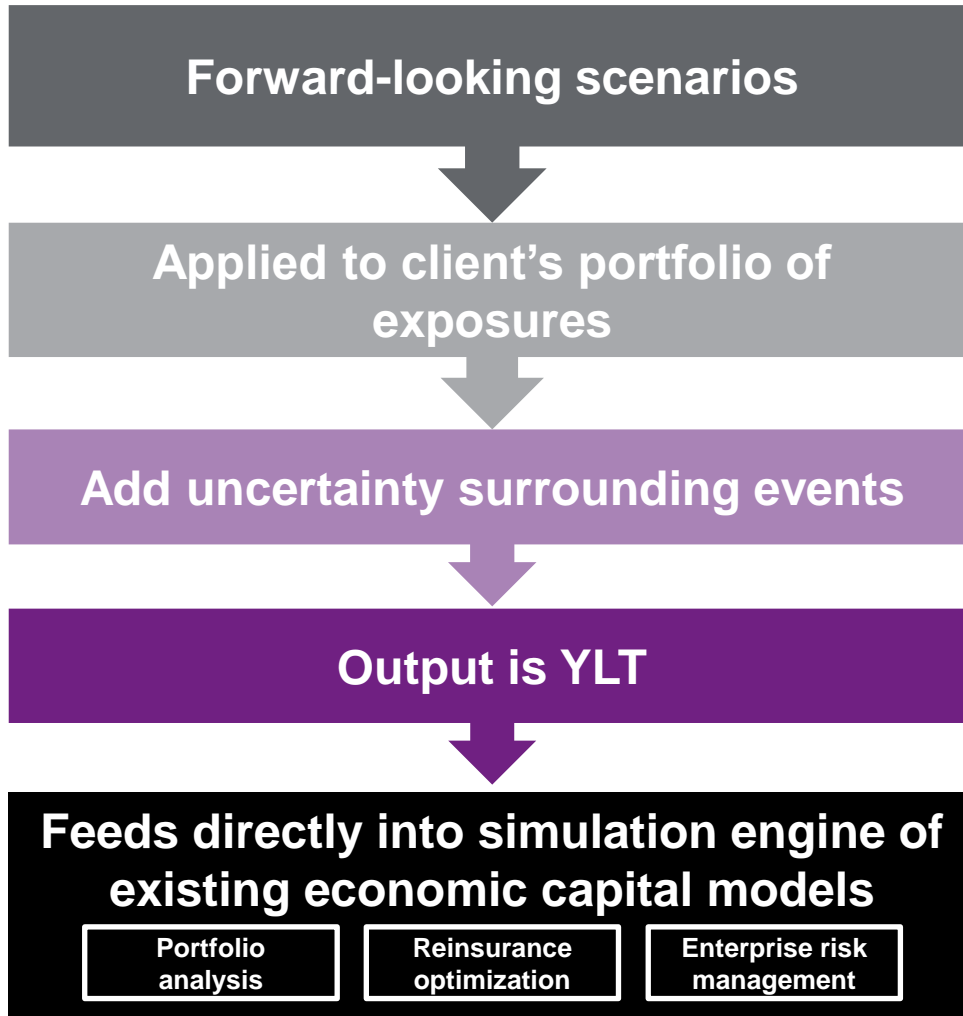
Audience voting question

- What approach does your organization use to monitor cyber exposure accumulation, both affirmative and silent across all P&C lines?
 - A. Policy language clarification
 - B. Loss estimate using disaster scenarios
 - C. Portfolio modeling using internal or external cyber models
 - D. Not currently monitoring

Cyber accumulation model case study: PRISM-Re

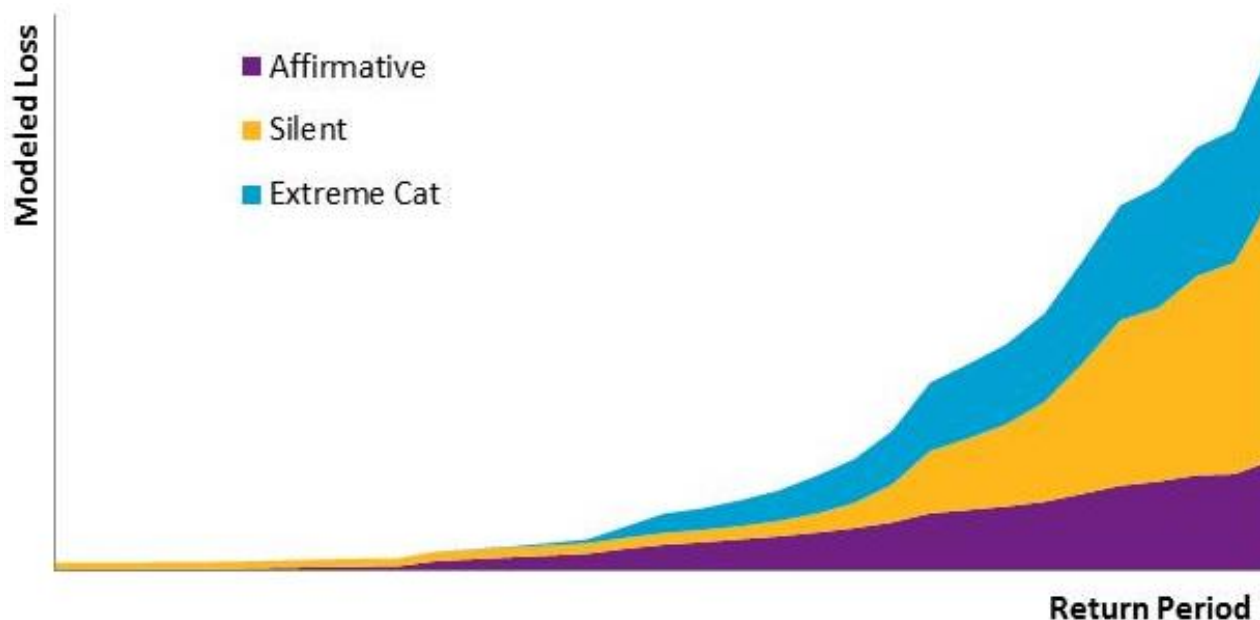


Cyber accumulation model case study: eNTAIL



- Incorporate scenarios from Willis Re, Lloyd's, or the client's own
- Model responds to changes in portfolio
- Quantify situations where the client has a larger or smaller share of an industry event
- Seamless entry into capital model
- Easy to capture the same PMLs and other metrics evaluated in Property Cat

Holistic view of portfolio cyber risk



- Comprehensive view of a company's total cyber loss potential, arising from cyber specific policies as well as accumulating across non-cyber portfolios
- Monitor changes in cyber exposure composition at different probability levels
 - Affirmative cyber tends to outweigh silent cyber at lower return periods
 - Silent cyber's proportional impact at the tail becomes much more pronounced due to its systemic, correlated nature
 - Cyber cat models add severity to the tail by reflecting rare and extreme events that may not have occurred in history

In summary

- Cyber is a growing line but can pose significant threat to insurance companies
- Silent cyber affects all P&C insurers, not only the ones who are actively writing cyber policies
- Conventional arguments for not measuring cyber risk should not prevent companies from starting to create a cyber quantification strategy now
- At the current early stage of cyber modeling, a multi-model approach is recommended (and there are a lot of models to choose from)
- Both probabilistic and scenario-based models can be used to quantify cyber PML
- A holistic view of a company's cyber risk encompass 3 elements:
 - Affirmative
 - Silent
 - Extreme cat
- Continued rapid expansion of digital technology means exposures are only going to grow so doing nothing is not an option

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