Review & Preview

AM Best's 31st Annual *Review & Preview* Conference
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AM BEST CELEBRATING 125 YEARS

The Critical Function of Stress Testing

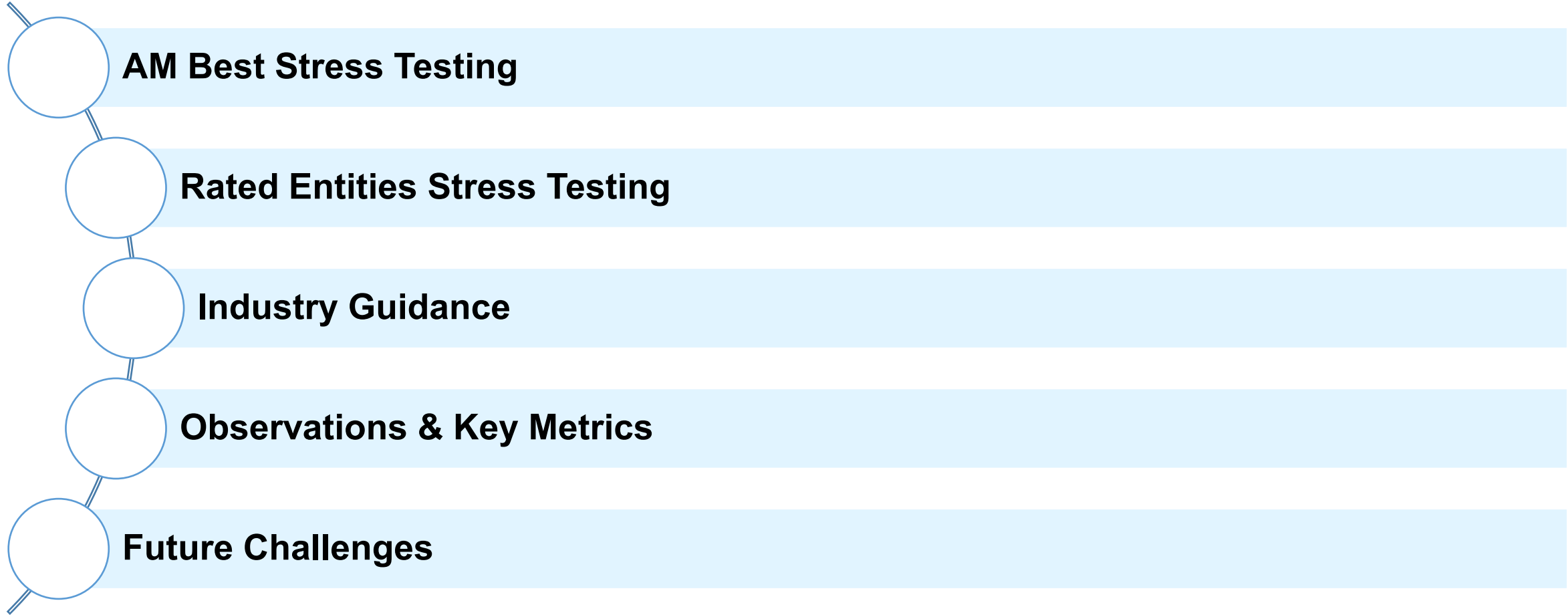Joseph Burtone – Director, AM Best
Maura McGuigan – Managing Director, AM Best
Tom Mount – Senior Director, AM Best

This session has live Q&A – please submit questions via the "Ask A Question" icon in the session navigation bar

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Agenda

AM Best Stress Testing

Rated Entities Stress Testing

Industry Guidance

Observations & Key Metrics
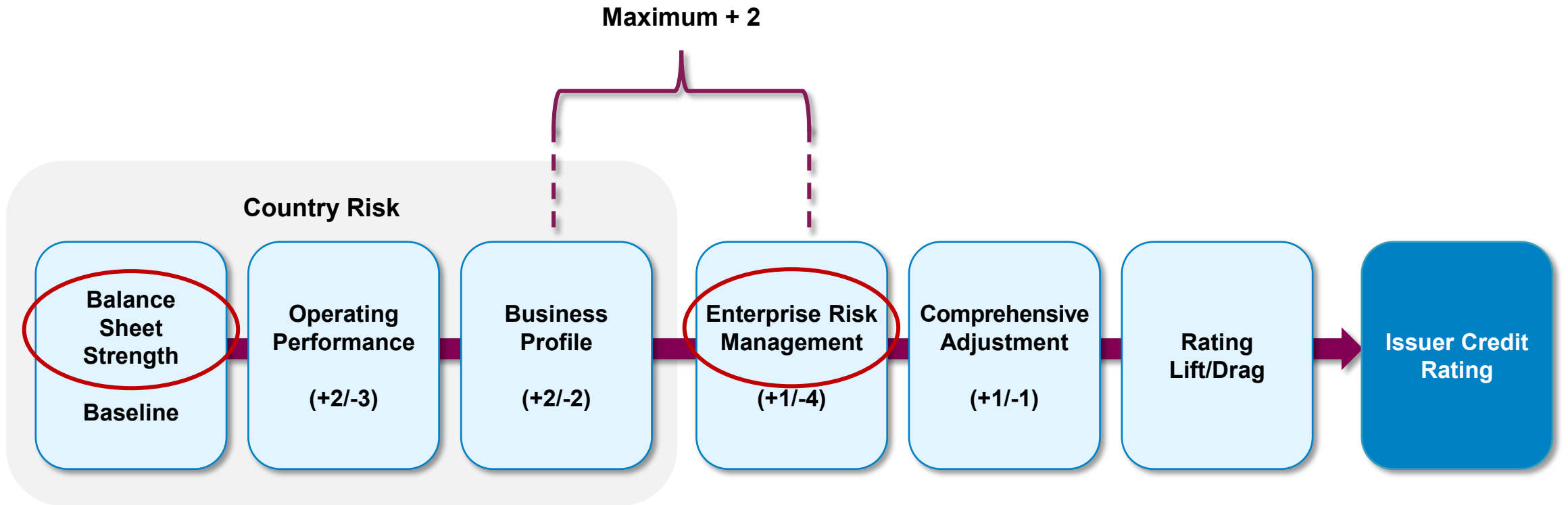
Future Challenges

What Is Stress Testing?

- Quantitative & qualitative process

- Use various scenarios
  - Lower probability
  - Higher severity
  - "Normal"

- Measure potential financial impact on:
  - Balance sheet strength
  - Operating performance
  - Cash flow/liquidity
  - Business plans/strategy

Where Do We Consider Stress Testing in the Rating Process?

Maximum + 2

Country Risk

Balance Sheet Strength	Operating Performance	Business Profile	Enterprise Risk Management	Comprehensive Adjustment	Rating Lift/Drag	Issuer Credit Rating
Baseline	(+2/-3)	(+2/-2)	(+1/-4)	(+1/-1)		

Best's Credit Rating Methodology (BCRM) - Balance Sheet Strength

Rating Unit Review Components	
BCAR	Quality of Capital
Stress Tests	Quality of Reinsurance
Liquidity	Reinsurance Dependence
Asset Liability Management	Appropriateness of Reinsurance Program
Internal Capital Models	Fungibility of Capital

AM Best's Stress Testing → (Stress Tests)

Insurance Holding Company Review Components	
Consolidated BCAR	Operating Leverage
Financial Flexibility/Liquidity	Financial Leverage
Coverage	Intangible Assets

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AM Best Stress Testing

Threat

- Sudden & severe
- Natural or man-made
- Balance sheet strength
- Ability to pay claims
- Ability to operate

Quantify Impact

- Balance sheet
- Income
- Liquidity
- Business plan

Discuss

- Perils/risks
- Accumulations
- Correlations
- Risk management
- Risk transfer mechanisms

Evaluate

- Appetites/tolerance
- Net exposure
- Multiple events
- Reinsurance structure & dependence
- Liquidity

AM Best Stress Testing

Considerations
Aggregate exposure
Largest exposure
Concentration of exposure
Historical losses
Deterministic scenarios
Modeled PMLs
Management's view

Examples
Natural catastrophes
Terrorism exposure
Casualty clash
Cyber catastrophe
Largest principal default
Pandemic

AM Best Stress Testing

Assess Potential Impact on Balance Sheet Strength

- Stress and sensitivity analyses using BCAR

- BCAR can be adjusted for business plans, capital transactions, cat events, etc.

- Market and economic adjustments can also be made (US downgrade, financial crisis, COVID-19, etc.)

- Compare "standard" and "stressed" BCAR scores

- Consider level of deterioration and potential for recovery

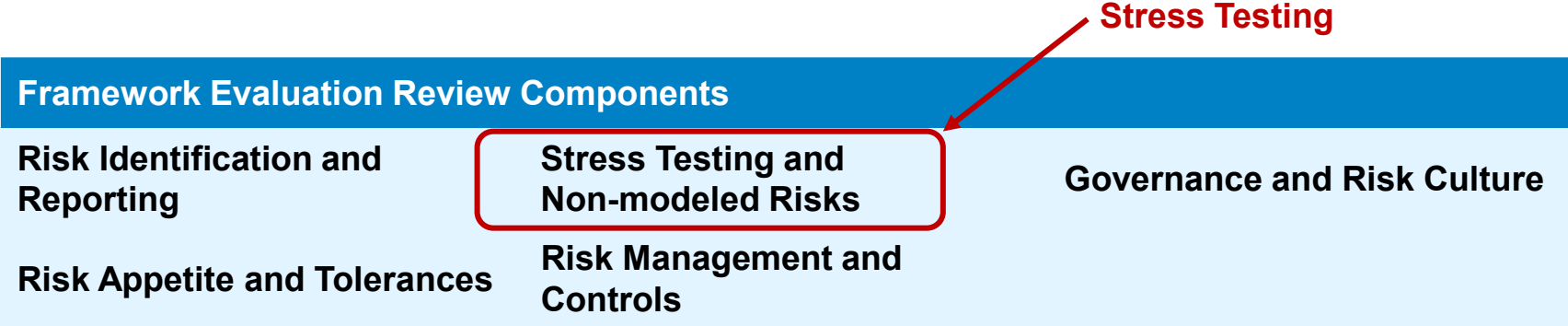# AM Best Stress Testing

Sample Drop in BCAR from Standard to Stressed
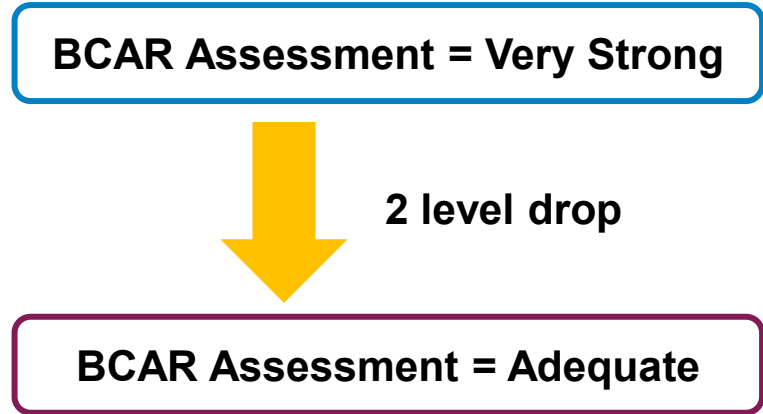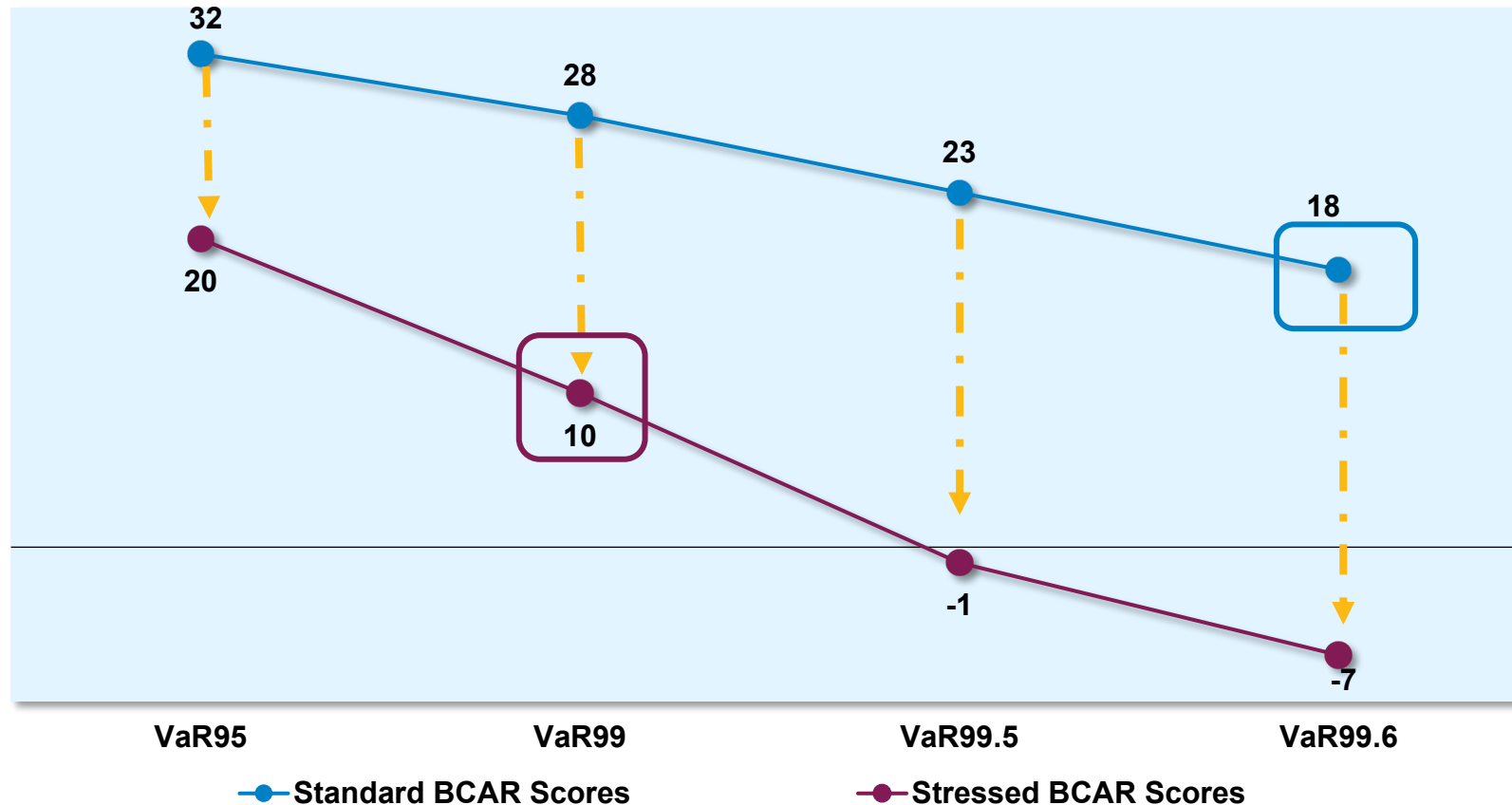
Natural Catastrophe Stress Test

Typical Tolerance for Drop in BCAR Assessment		
Standard BCAR Assessment	**Without Financial Flexibility**	**With Financial Flexibility**
Strongest	**1 Level Drop**	**2 Level Drop**
Very Strong	**1 Level Drop**	**2 Level Drop**
Strong	**1 Level Drop**	**2 Level Drop**
Adequate	**1 Level Drop**	**1 Level Drop**
Weak	**0 Levels**	**0 Levels**

Terrorism Stress Test

Typical Tolerance for Drop in BCAR Assessment			
Standard BCAR Assessment	Concentration Test	Without Financial Flexibility	With Financial Flexibility
Strongest	Pass Fail	1 Level Drop 0 Levels	2 Level Drop 1 Level Drop
Very Strong	Pass Fail	1 Level Drop 0 Levels	2 Level Drop 1 Level Drop
Strong	Pass Fail	1 Level Drop 0 Levels	2 Level Drop 1 Level Drop
Adequate	Pass Fail	0 Levels 0 Levels	1 Level Drop 0 Levels
Weak	Pass Fail	0 Levels 0 Levels	0 Levels 0 Levels

Best's Credit Rating Methodology (BCRM) – Enterprise Risk Management

Stress Testing

Framework Evaluation Review Components		
Risk Identification and Reporting	Stress Testing and Non-modeled Risks	Governance and Risk Culture
Risk Appetite and Tolerances	Risk Management and Controls	

Risk Evaluation Review Components		
Product and Underwriting Risk	Reserving Risk	Concentration Risk
Reinsurance Risk	Liquidity and Capital Management Risk	Investment Risk
Legislative/Regulatory/Judicial/Economic Risk	Operational Risk	

Best's Credit Rating Methodology

- ERM Framework Assessment used for stress testing assessment:

Embedded

Developed

Evolving

Nascent

Unrecognized
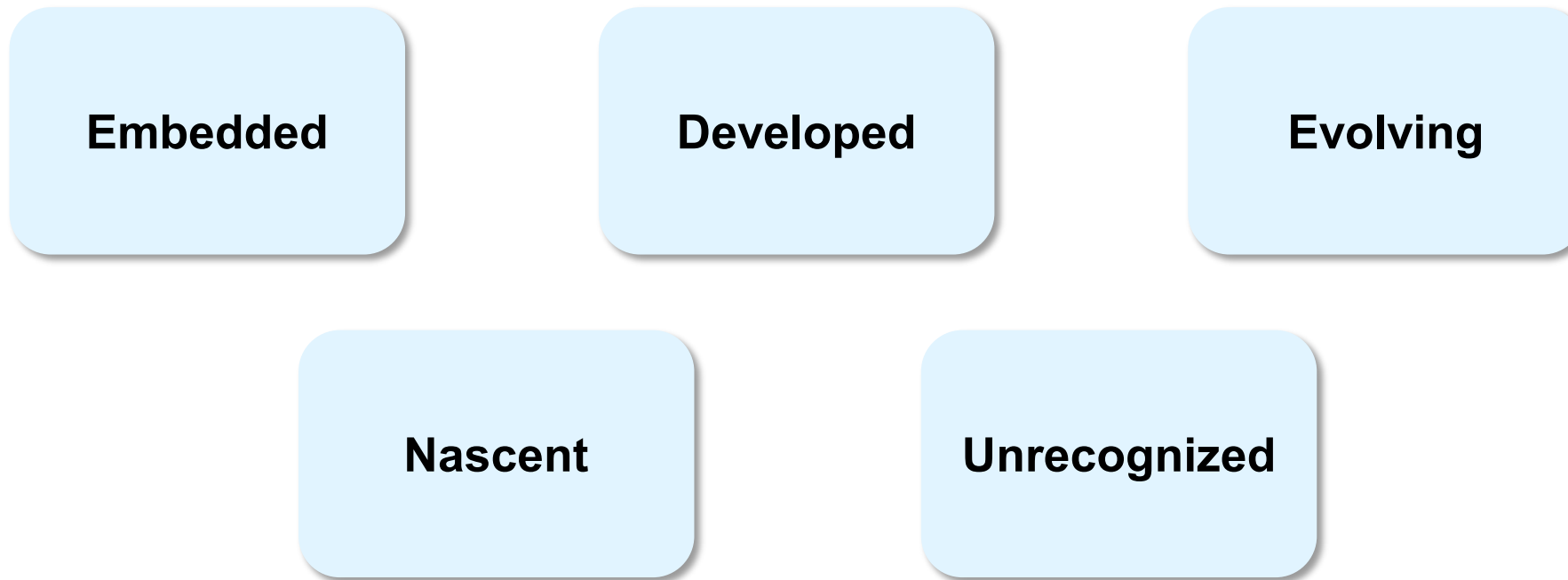
Best's Credit Rating Methodology

ERM – Stress Testing and Non-Modeled Risks

• Stress testing for all critical risks
 	
• Quantitative and qualitative
 	
• Actionable contingency plans to remediate stress
 	
• Assess the appropriateness of stress testing vs insurer's risk profile
 	
• At a minimum, reflect historical worst-case scenario severities and correlations
 	
• Back testing, reverse stress testing
 	
• Benchmarking internal models
 	
    – vs. external models
 	
    – vs. BCAR scores at the 99.8 confidence level

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Why Should Companies Stress Test?

Determine financial flexibility

Determine robustness of the balance sheet and ability to absorb shocks

Identify risks/scenarios that may cause insolvency

Determine need for reinsurance

Develop action plans

Regulatory requirements (for some)

How Should Companies Stress Test?

International Association of Insurance Supervisors (IAIS)	**Prudential Regulatory Authority (PRA)**
National Association of Insurance Commissioners (NAIC)	**European Insurance and Occupational Pensions Authority (EIOPA)**
Office of the Superintendent of Financial Institutions (OSFI)	**Individual Capital Assessment (ICA) and Solvency II**
Bermuda Monetary Authority (BMA)	**CRO Forum**

IAIS ICP 16 – ERM for Solvency Purposes

ERM Guidance to Regulators Related to Stress Testing

Regular assessment using quantitative techniques	- Level of risk, appropriate, forward-looking - Risk modeling, stress testing, reverse stress testing and scenario analysis
Range of adverse circumstances and events	- Significant threat to financial condition - Significant threat to business plan
Range of methods	- Simple stress testing of events - Complex stochastic modelling
Reverse stress testing	- Identify scenarios that could result in failure - Cause financial position to fall below a predefined level
Liquidity stress testing	- Reveals vulnerabilities in the insurer's liquidity profile - Provides information on its ability to meet liabilities as they fall due

NAIC ORSA Guidance Manual

Guidance to Insurers Related to Stress Testing

Summary of the quantitative and qualitative assessments of risk exposure in both normal and stressed environments for each material risk

Each insurer should use assessment techniques (e.g., stress tests) applicable to its unique risk profile

Relevant material risk categories may include credit, market, liquidity, underwriting, and operational risks

Evaluate risk combinations that could cause an insurer to fail

Consider the likelihood and impact that each material and relevant risk identified will have on balance sheet, income statement and future cash flows

Prospective Solvency Assessment – both existing risks likely to intensify and emerging risks with the potential to impact in the future

CRO Forum: ORSA Stress and Scenario Testing –
Best Practice for Assessing Risk

The objective of stress and scenario testing encourages management and the board to think about what might happen and to assess how adverse developments might impact the company's business planning.

Stress Tests	Management Actions
• Single and multi-risk factor stress tests	• Pre-emptive vs. reactive
• Reverse stress tests	• Actions to reduce capital resources outflow
• Quantitative scenario analysis	• Actions to source new capital
• Qualitative scenario analysis	• Actions to de-risk the balance sheet
• Exploratory stress tests	• Actions to adjust capital deployment

Importance of Reverse Stress Testing

What is reverse stress testing and why is it used?

- Examines scenarios that would cause a company to fail

- Identifies gaps and vulnerabilities in the business model

- Helps to develop a plan to manage and mitigate key weaknesses

- Used to complement sensitivity and scenario analyses

- Expected by some insurance regulators

Relevance to rating assessment?

- Explicitly captured in AM Best's ERM framework evaluation

- Events – helps to see how far they are in the tail and how they are managed

- Allows better risk quantification

- Risk correlations – helps with understanding and asking relevant questions

- Allows for better comparability across insurers

- A sign of maturity of the overall ERM of the company and the market

Observations on Stress Testing

Covers key risks and provide challenge

Forward-looking and subject to refinement

Incorporates various events/levels of severity

Produces clear outputs

Helps set capital requirements

Stress Testing in the ERM Framework

ERM Framework – Stress Testing
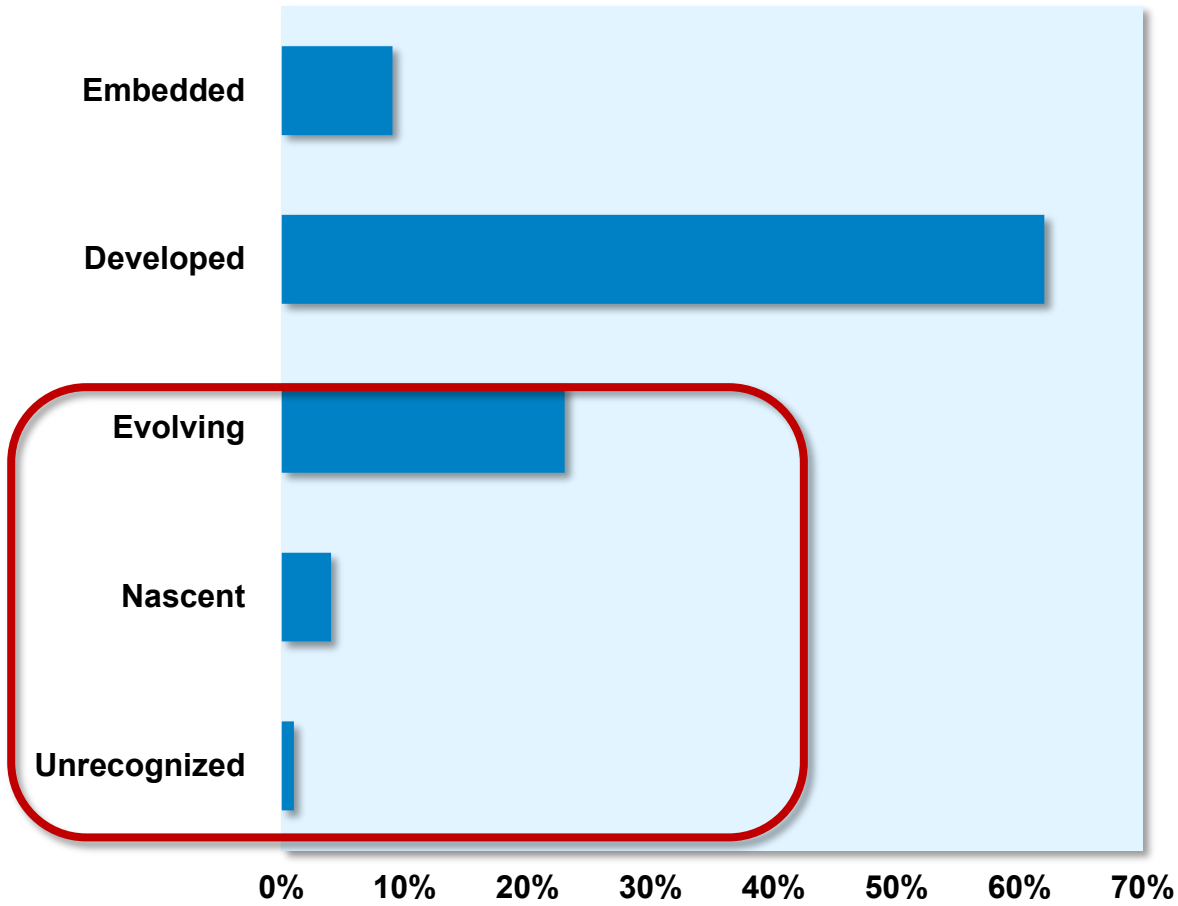
ERM Framework – Risk Appetite/Tolerance

Source: AM Best data and
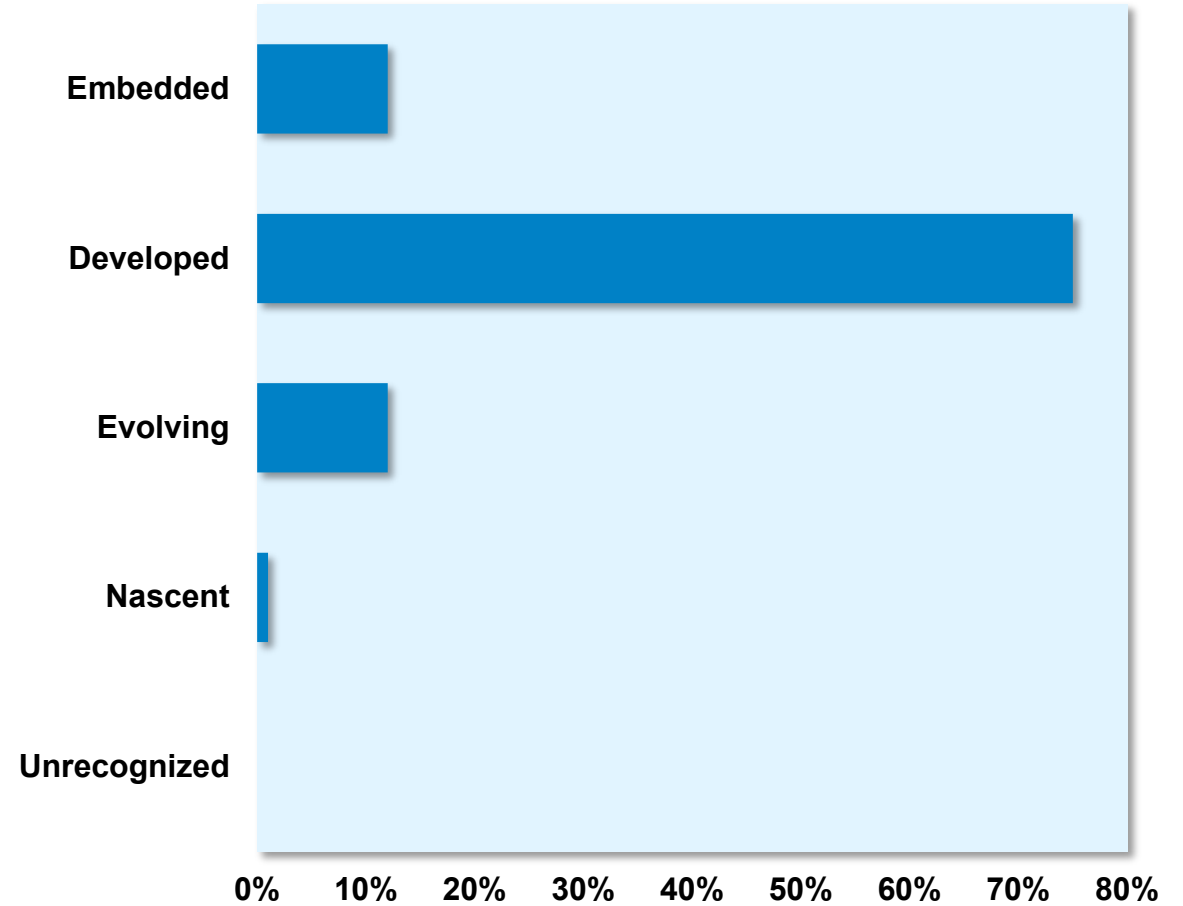
Practices of Companies Where Stress Testing Is Deemed To Be Embedded

Stress scenarios proven, use long periods, include multiple events and various crises

Regular use of models

Routine scenario testing

Risk tolerances set and closely monitored

Integrated for verification of capital

Conducted at company and group levels

Reverse stress tests identify scenarios where losses exceed capital or have a significant impact on financial soundness

Reported at management meetings and to board of directors

Polling Question #1

Do you believe insurers are doing a good job of stress testing?

a)   Yes

b)   No

c)   Some do it well and some do not

?

ERM Assessment – Global Risk Framework Evaluation

Stress Testing – Remains a Weakness
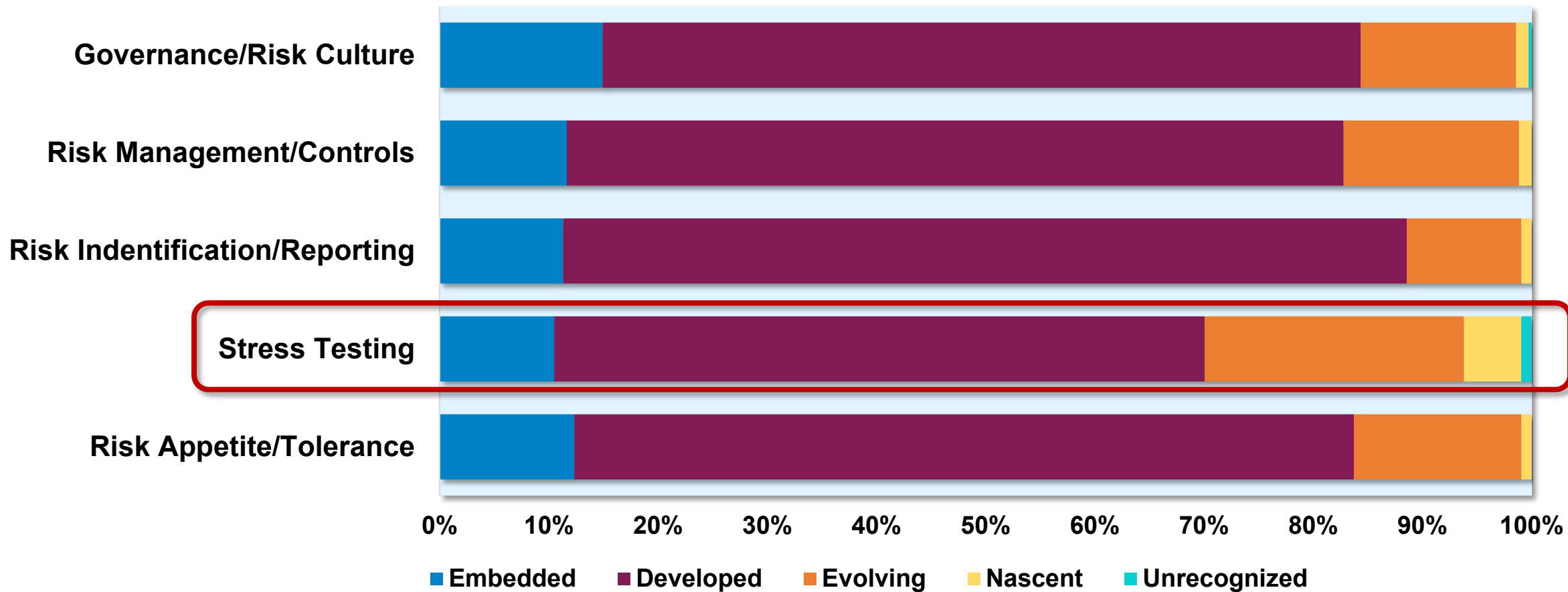
Observed Successes

Deterministic events

Actual events

Multiple events

Multiple models

Increasing limits

Observed Failures

Not understanding true exposure

Not considering all plausible scenarios

Heavy dependence on reinsurance

Higher net retentions

Increased frequency & severity

Secondary perils problematic

Stress Test – Median Drop in BCAR
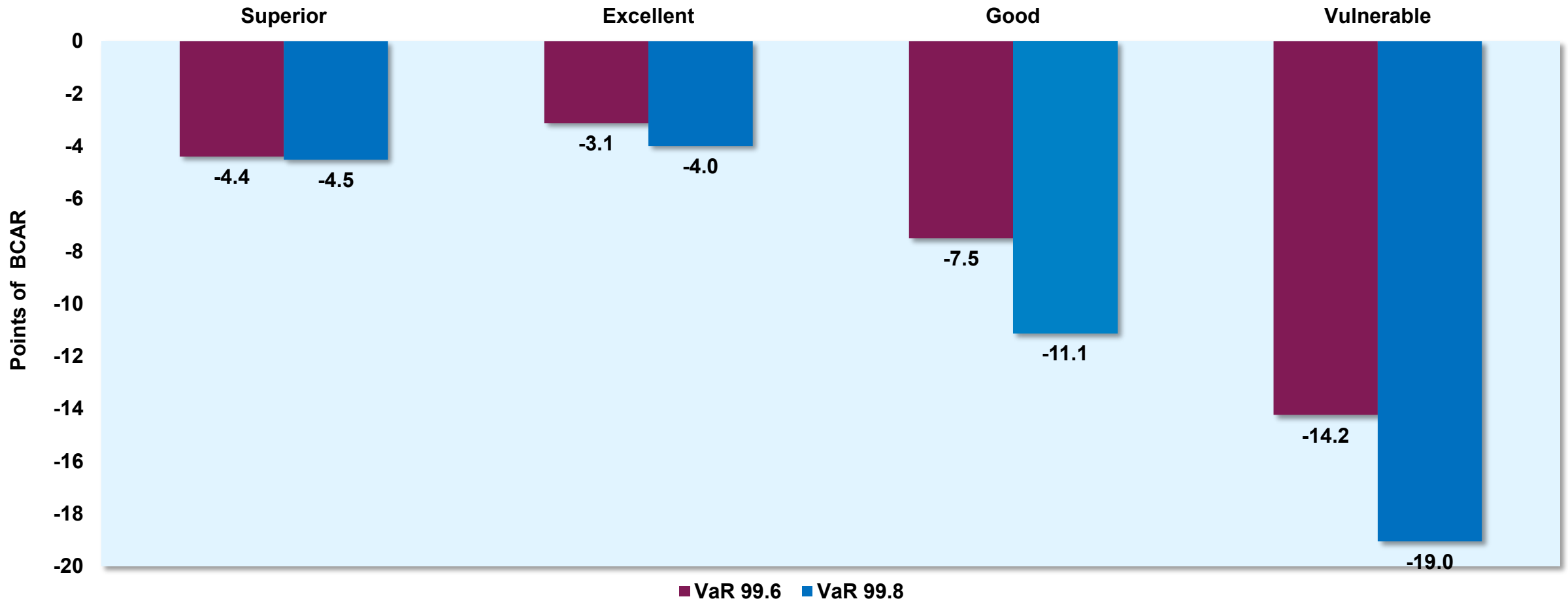
All property-exposed companies assessed as developed in stress testing.

Stress Test – Drop in BCAR Score at the 75th Percentile

Key Metrics

**Personal Lines Composite
Median PML/PHS**

Line chart with % on y-axis (0 to 70) and x-axis categories: VaR 95, VaR 99, VaR 99.5, VaR 99.6, VaR 99.8.

Gross: 11.4, 30.3, 43.9, 50.3, 68.1
Net: 6.2, 8.9, 10.9, 12.2, 20.3

Legend: Gross, Net

**Personal Lines Composite
Net PML/PHS**

Line chart with % on y-axis (0 to 70) and x-axis categories: VaR 95, VaR 99, VaR 99.5, VaR 99.6, VaR 99.8.

75th Percentile: 10.2, 13.1, 21.6, 26.6, 60.2
Median: 6.2, 8.9, 10.9, 12.2, 20.3
25th Percentile: 4.3, 5.3, 7.1, 7.5, 11.1

Legend: 75th Percentile, Median, 25th Percentile

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Key Metrics (Cont'd.)

Commercial Casualty Composite Median PML/PHS

Gross: VaR 95: 6.9, VaR 99: 16.7, VaR 99.5: 24.5, VaR 99.6: 27.0, VaR 99.8: 36.7

Net: VaR 95: 3.7, VaR 99: 5.8, VaR 99.5: 6.9, VaR 99.6: 7.7, VaR 99.8: 12.0

Commercial Casualty Composite Net PML/PHS

75th Percentile: VaR 95: 6.3, VaR 99: 8.9, VaR 99.5: 10.4, VaR 99.6: 14.8, VaR 99.8: 30.9

Median: VaR 95: 3.7, VaR 99: 5.8, VaR 99.5: 6.9, VaR 99.6: 7.7, VaR 99.8: 12.0

25th Percentile: VaR 95: 1.8, VaR 99: 3.4, VaR 99.5: 4.1, VaR 99.6: 4.1, VaR 99.8: 4.5
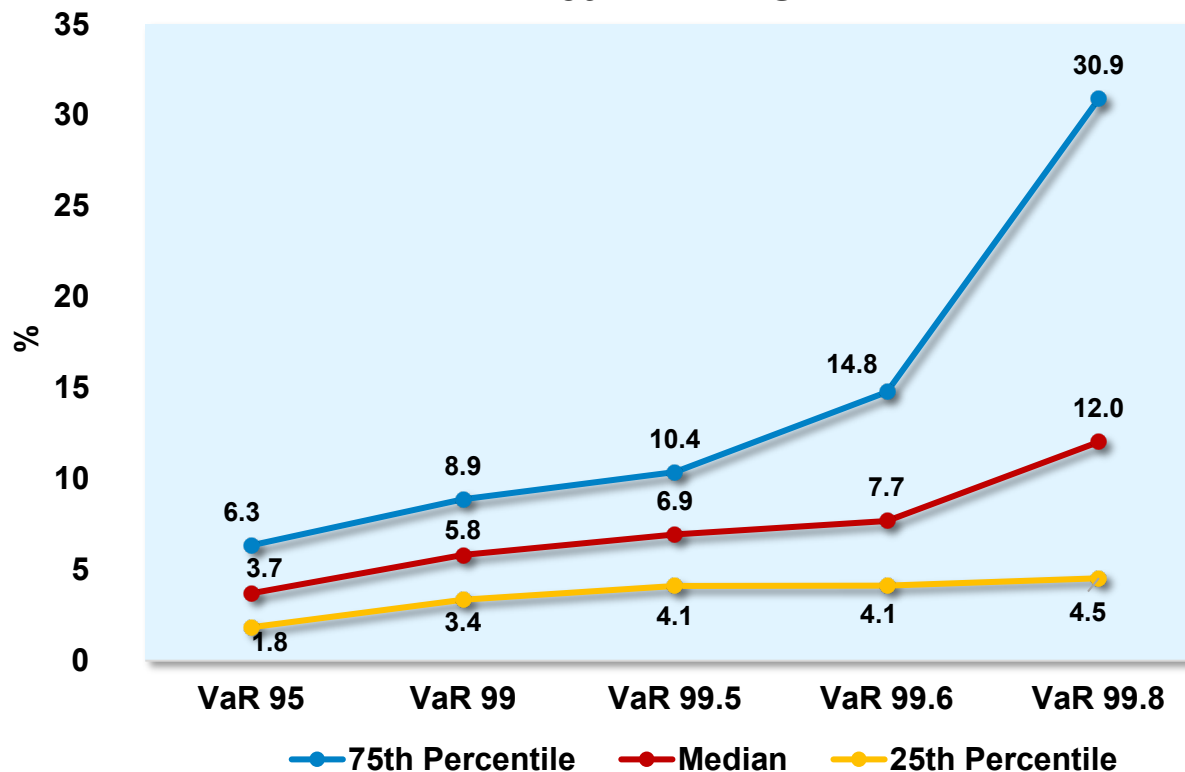
Key Metrics (Cont'd.)

Personal Property Composite
Median PML/PHS
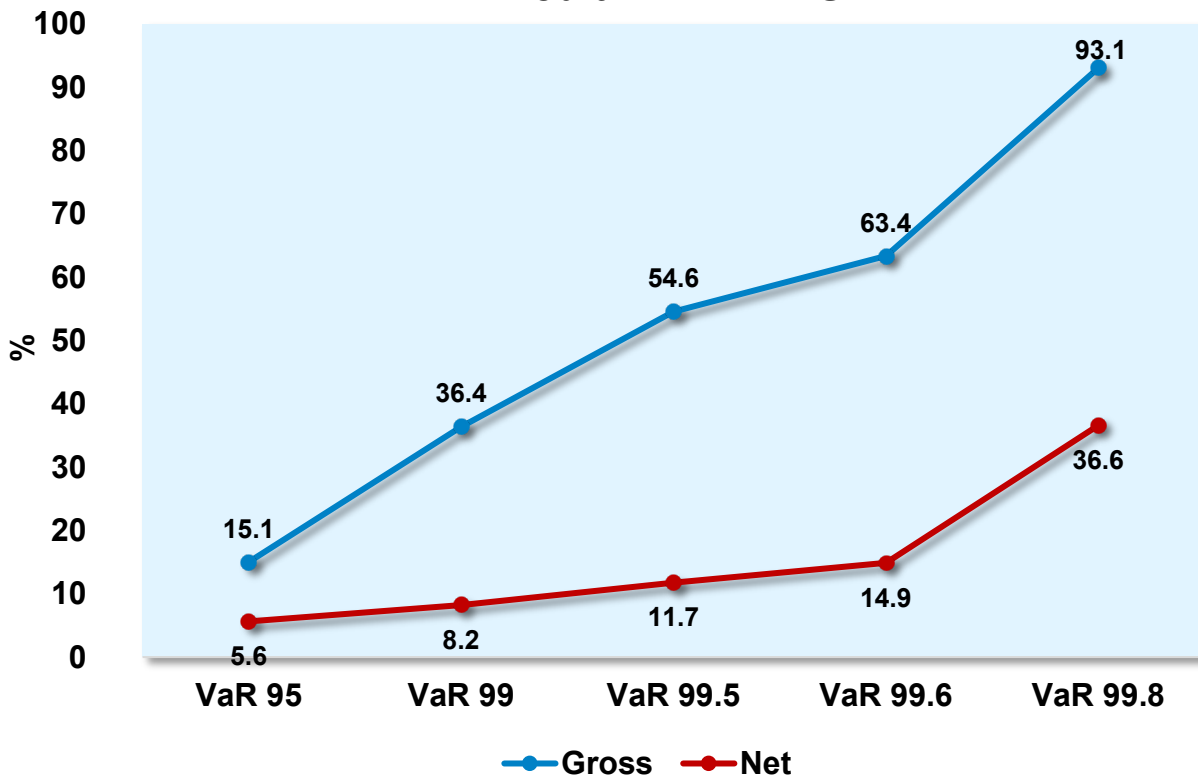
Personal Property Composite
Net PML/PHS
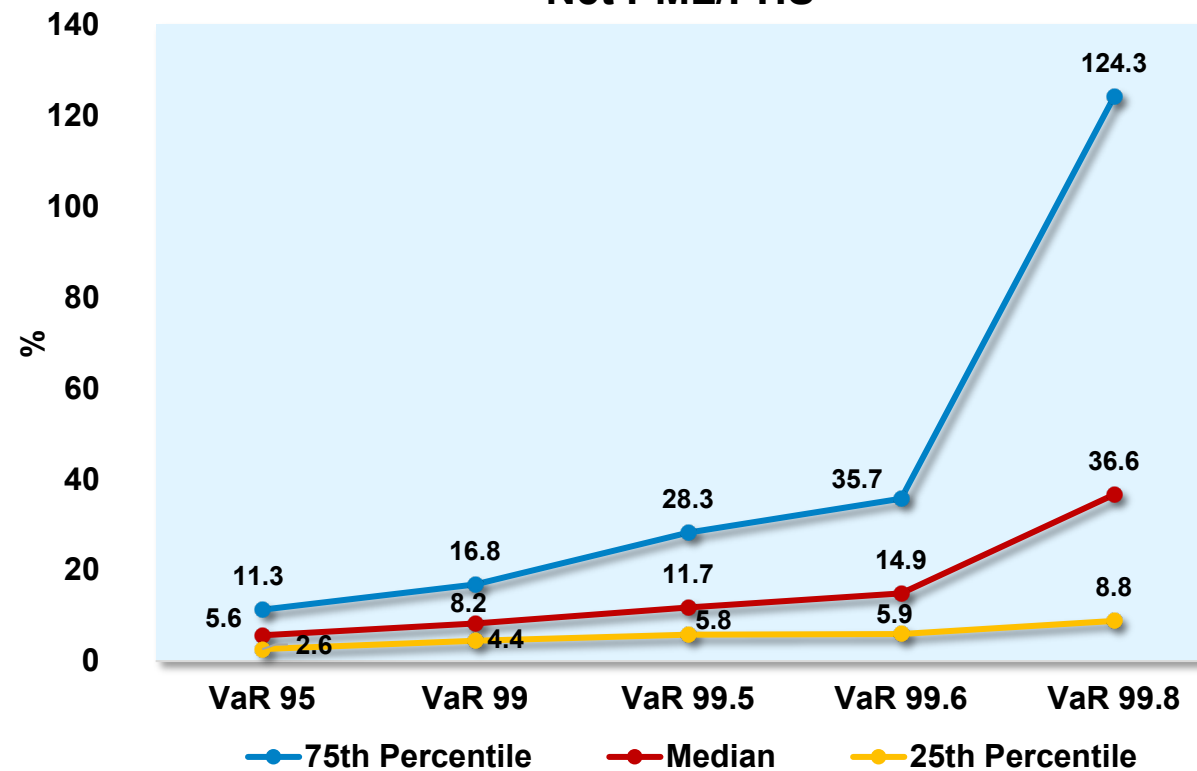
Key Metrics (Cont'd.)

Commercial Property Composite Median PML/PHS Ratio

Gross: VaR 95 = 14.3, VaR 99 = 29.0, VaR 99.5 = 41.3, VaR 99.6 = 44.3, VaR 99.8 = 67.4

Net: VaR 95 = 5.1, VaR 99 = 8.8, VaR 99.5 = 11.6, VaR 99.6 = 15.1, VaR 99.8 = 21.8

Commercial Property Composite Net PML/PHS

75th Percentile: VaR 95 = 13.0, VaR 99 = 15.3, VaR 99.5 = 23.7, VaR 99.6 = 27.1, VaR 99.8 = 62.1

Median: VaR 95 = 5.1, VaR 99 = 8.8, VaR 99.5 = 11.6, VaR 99.6 = 15.1, VaR 99.8 = 21.8

25th Percentile: VaR 95 = 2.4, VaR 99 = 4.0, VaR 99.5 = 4.0, VaR 99.6 = 4.4, VaR 99.8 = 5.0

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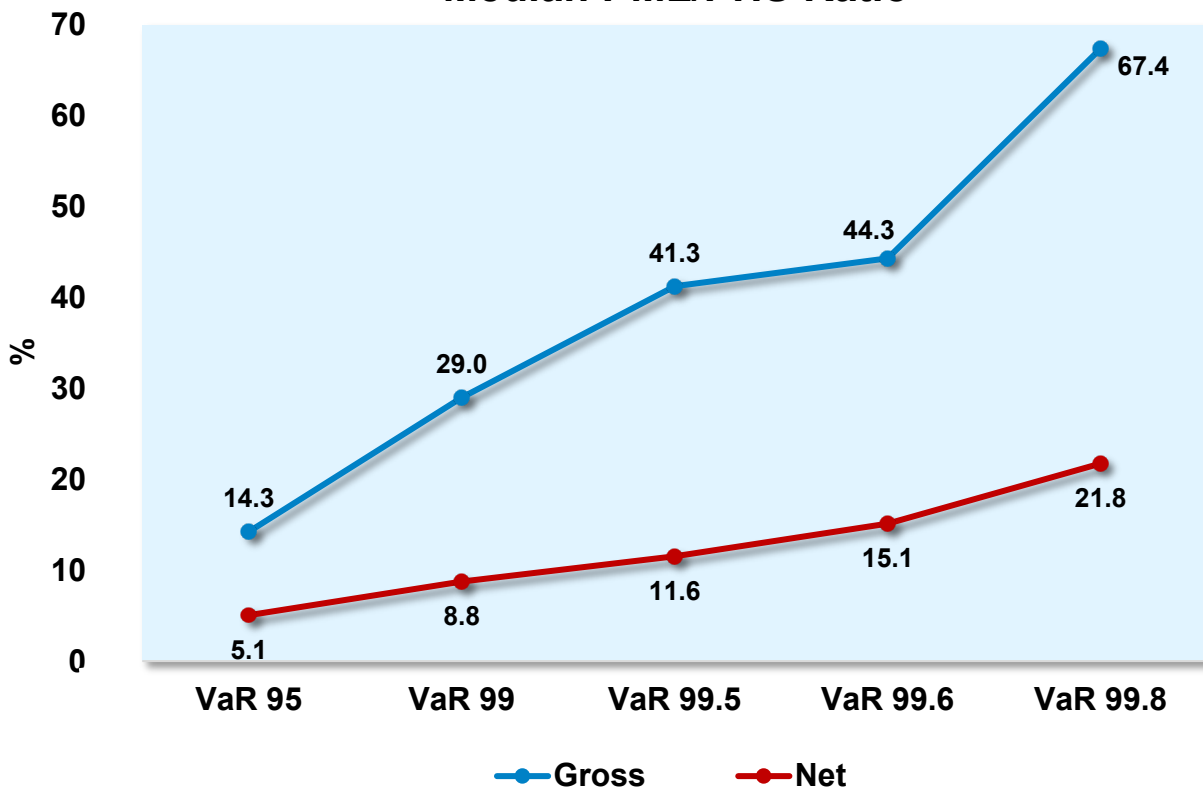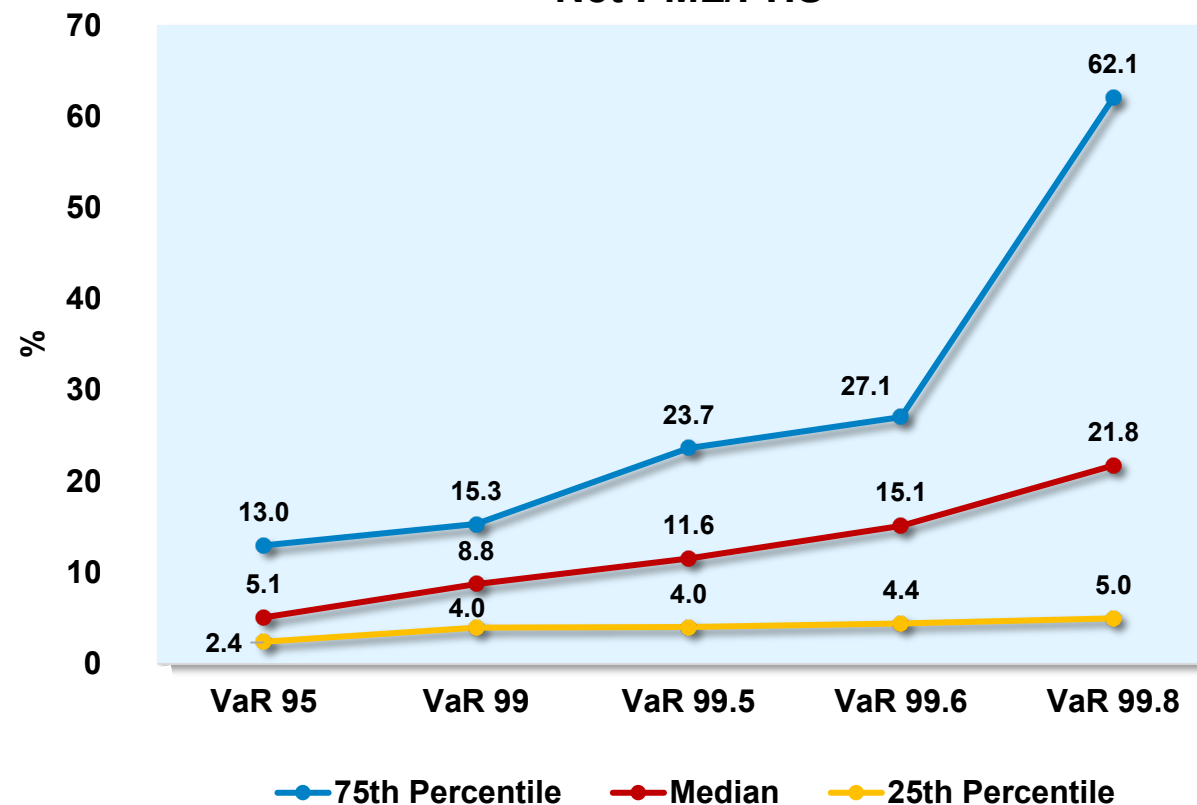
Change in Median PML/PHS Ratios from 2015 to 2022

Composite	Net of Reinsurance (%)					Gross of Reinsurance (%)				
	V95	V99	V99.5	V99.6	V99.8	V95	V99	V99.5	V99.6	V99.8
Personal Lines	1.1	1.8	0.0	-1.6	-4.7	1.0	-4.6	-6.6	-4.6	-7.9
Commercial Casualty	1.3	1.2	0.4	0.4	-4.0	0.4	-4.3	-4.6	-5.5	-10.9
Personal Property	0.2	1.0	-1.5	0.2	3.9	0.6	-9.8	-17.5	-19.4	-17.0
Commercial Property	1.6	1.7	0.1	-1.6	-11.3	4.0	-20.7	-31.6	-37.3	-42.3

Polling Question #2

Would it be appropriate to assume two severe losses in the natural catastrophe stress test (i.e., assume two 1-in-100 losses incurred, instead of just one)?

a)   Yes – for all nat cat-exposed companies. The frequency of severe losses is increasing everywhere and should be reflected in stress testing.

b)   Yes – but only for companies exposed only to secondary perils. The frequency of severe losses is only impacting secondary perils.

c)   No.

?

United States Billion-Dollar Disaster Events 1980-2023 (CPI-Adjusted)
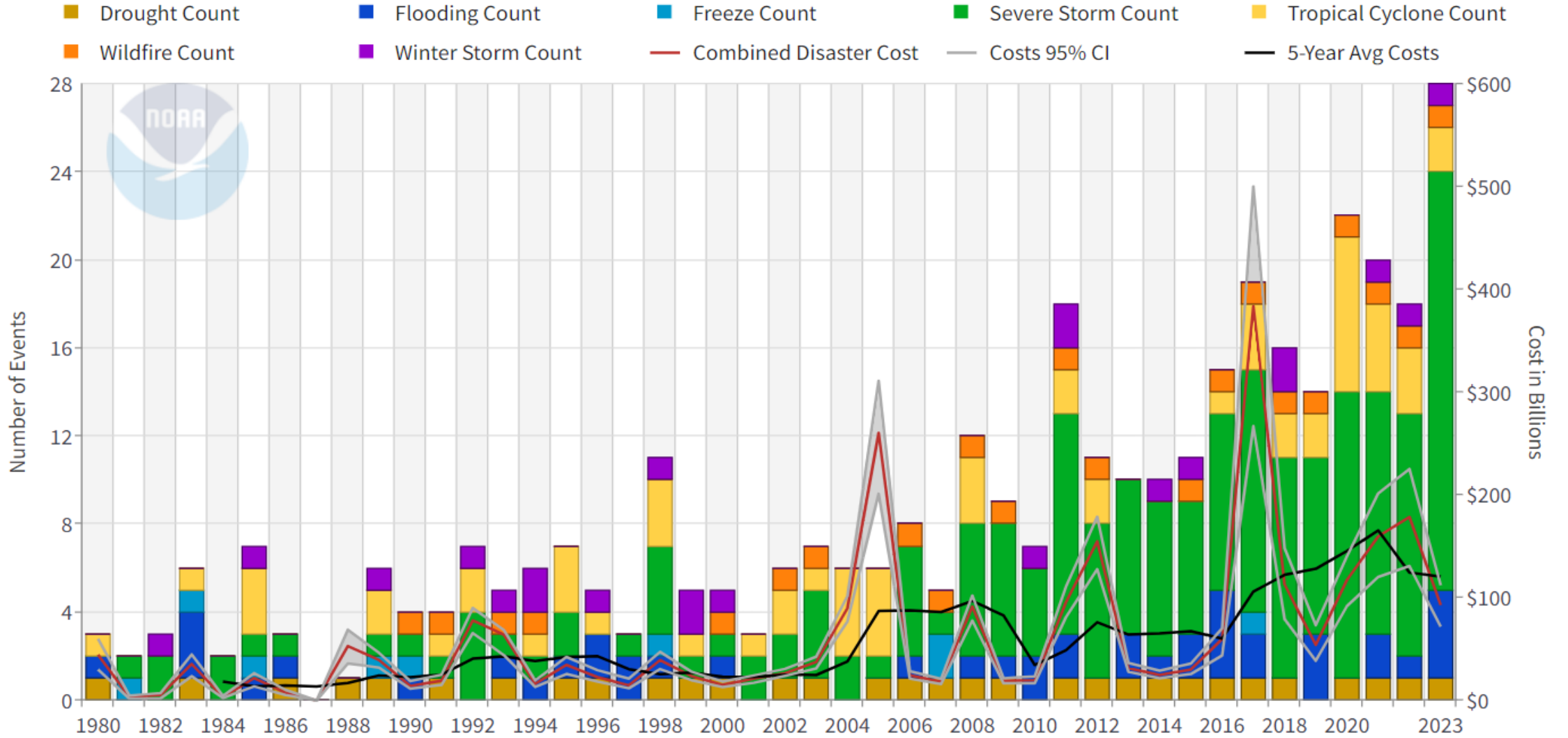
Future Challenges for Stress Testing/Potential Changes/New Stress Tests

Emerging Risks and Climate Risk
Longer time horizon = higher uncertainty
Qualitative/explorative vs. quantitative
Quantitative impact on balance sheet and business model
Scenario should have conclusion that will be actionable in the business planning horizon
Risk-aware vs. mitigating the risk via actions
Reflect the most material risks (short term and long term)
Focus on illiquid investments
Many elements may be similar to other risks insurers already observed

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Future Challenges for Stress Testing/Potential Changes/New Stress Tests

Maintain a solvency and capital position in extreme but possible scenario

Cyber catastrophe models

Cyber

Cyber catastrophe is a shock loss

Cyber questionnaire

Similar stress treatment as natural catastrophe
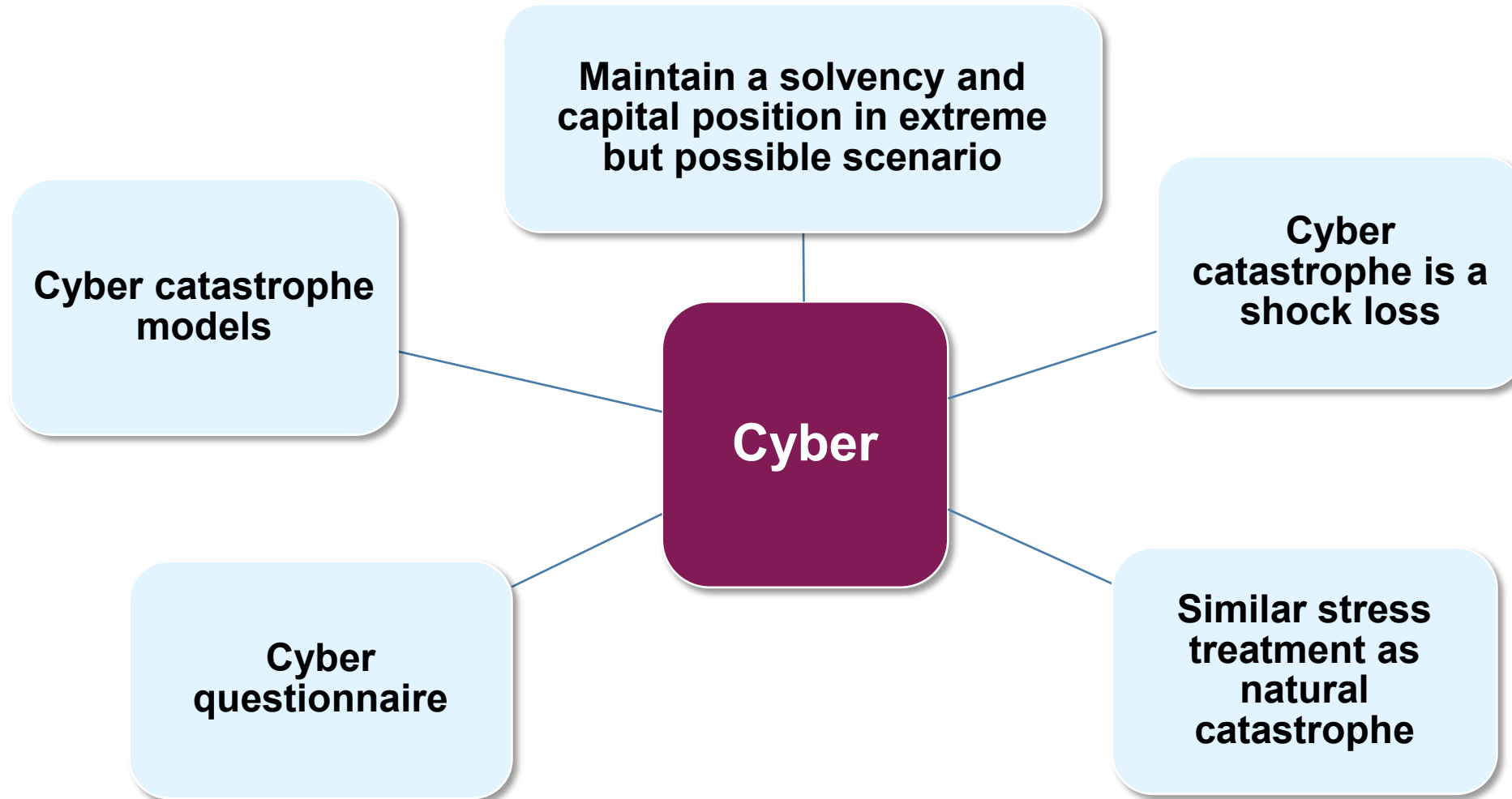
Cyber PMLs

Industry Catastrophic Cyber Losses (as Exceedance Probability loss ratio) – US only
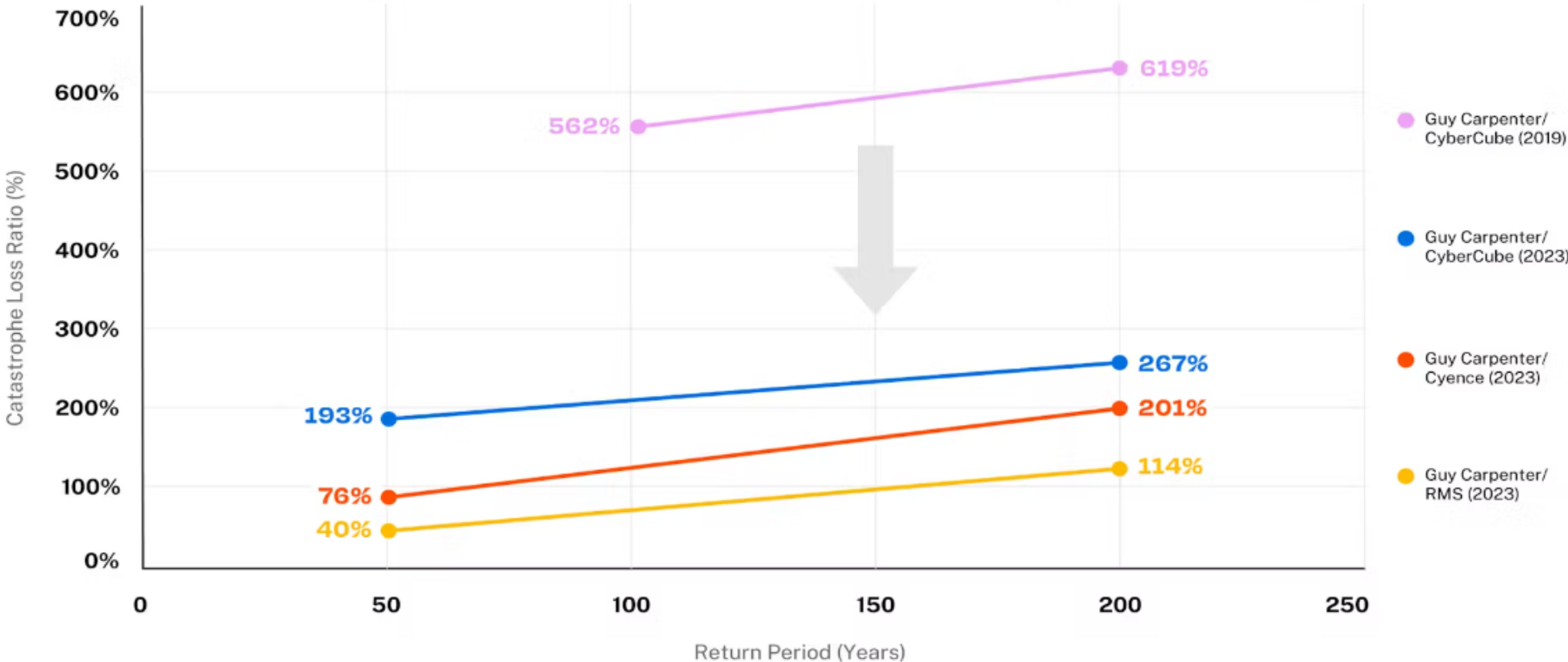
Source: coalitioninc.com

Cyber PMLs
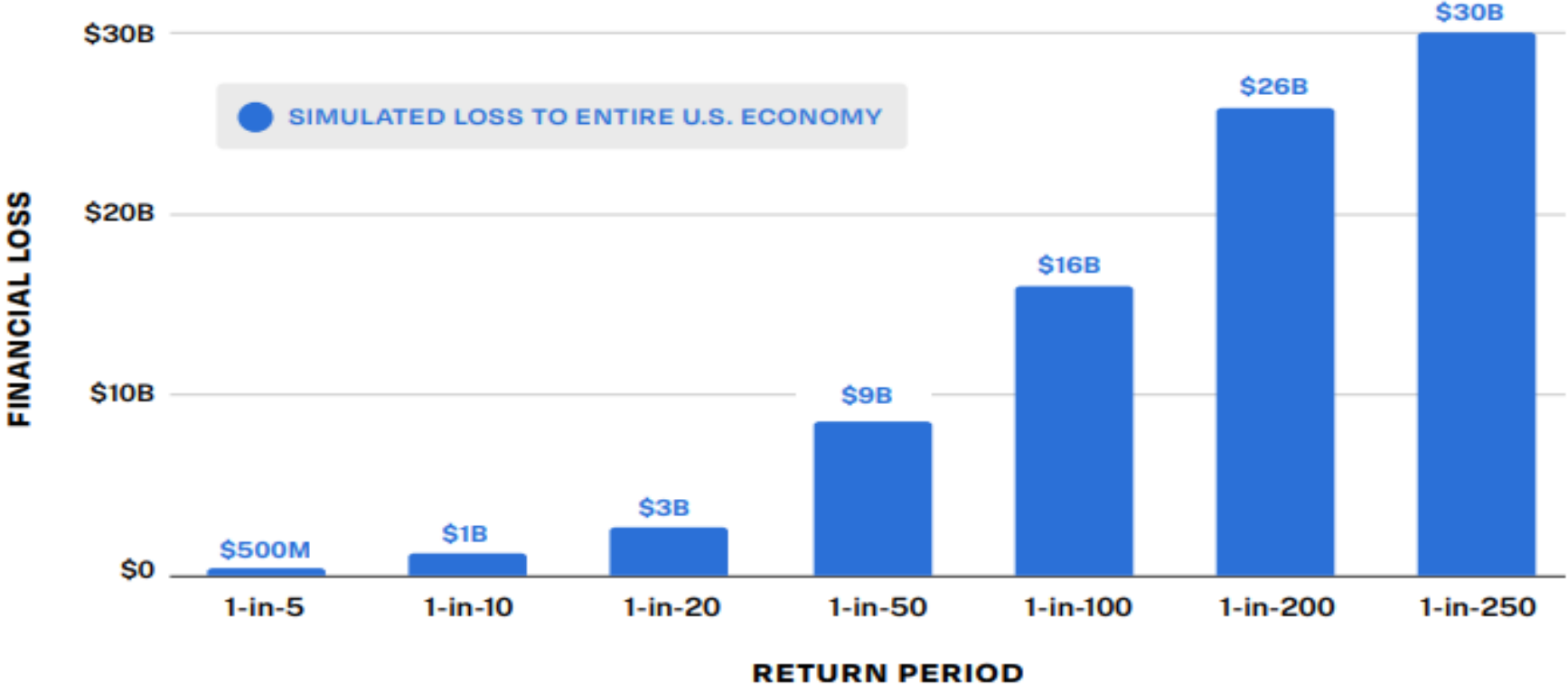
Source: Active Cyber Risk Modeling Report – Coalition Inc 2023

Interconnectivity of Risks
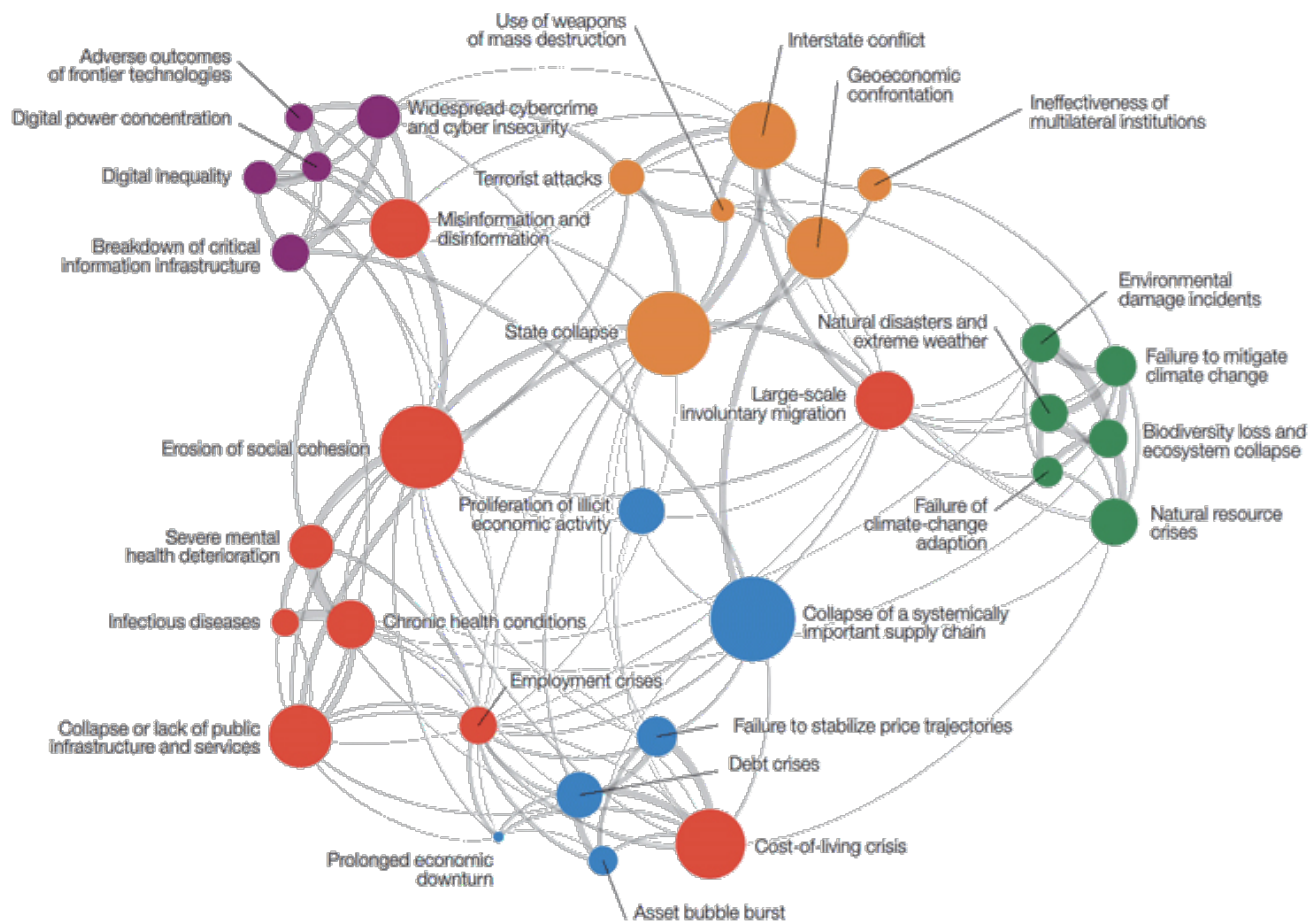
Market environment – increasingly interconnected between risk categories, with a higher degree of contagion

Legend:
- Economic
- Environmental
- Geopolitical
- Societal
- Technological

Source: World Economic Forum - Global Risks Report 2023

Key Takeaways

Analysts

- Will consider which stresses are appropriate to perform in the BCAR

- Will review company's stress testing

Insurers

- Should perform relevant stress testing and explain the scenarios and their impact on operations

- Should look outside the box to assess emerging risks and any potential correlations

- Important to get a view on reverse stress testing

- Prepare contingency plans and protocols to restore capital

Q&A

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Appendix

Key Metrics

Personal Lines Composite Gross PML/PHS
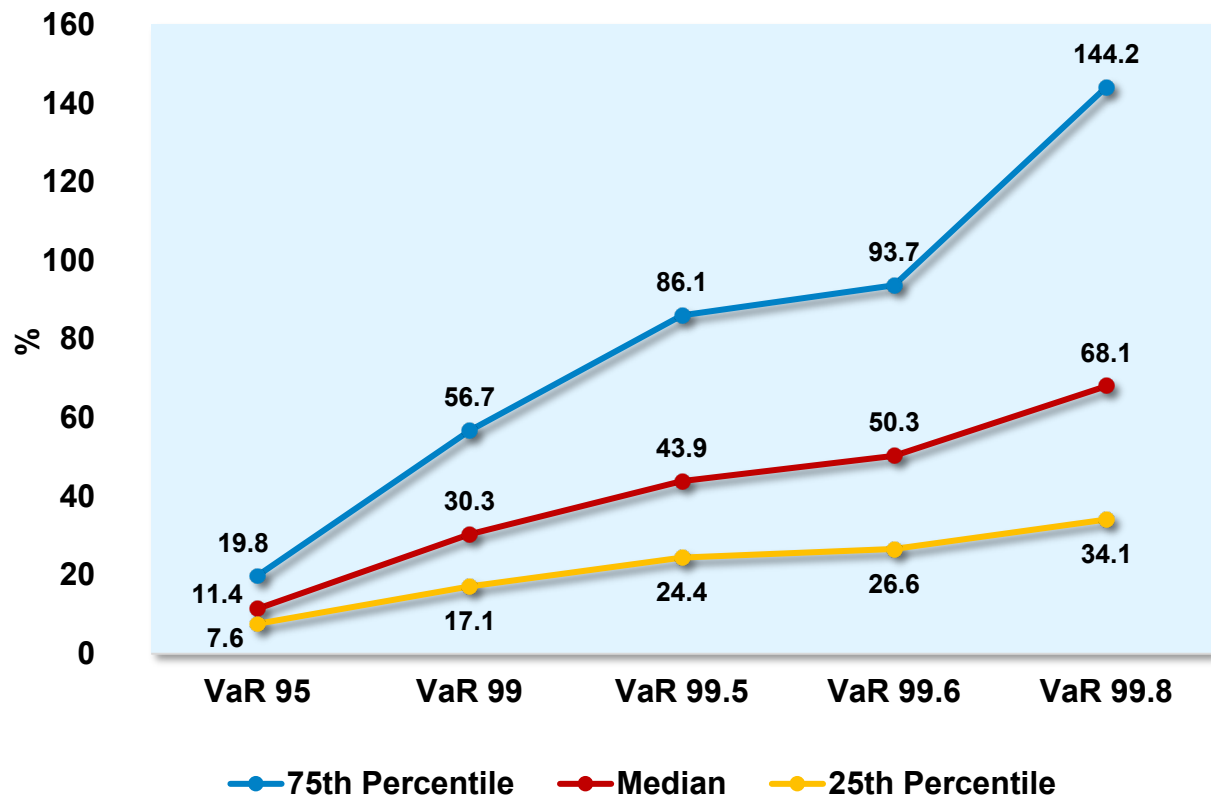
Commercial Casualty Composite Gross PML/PHS
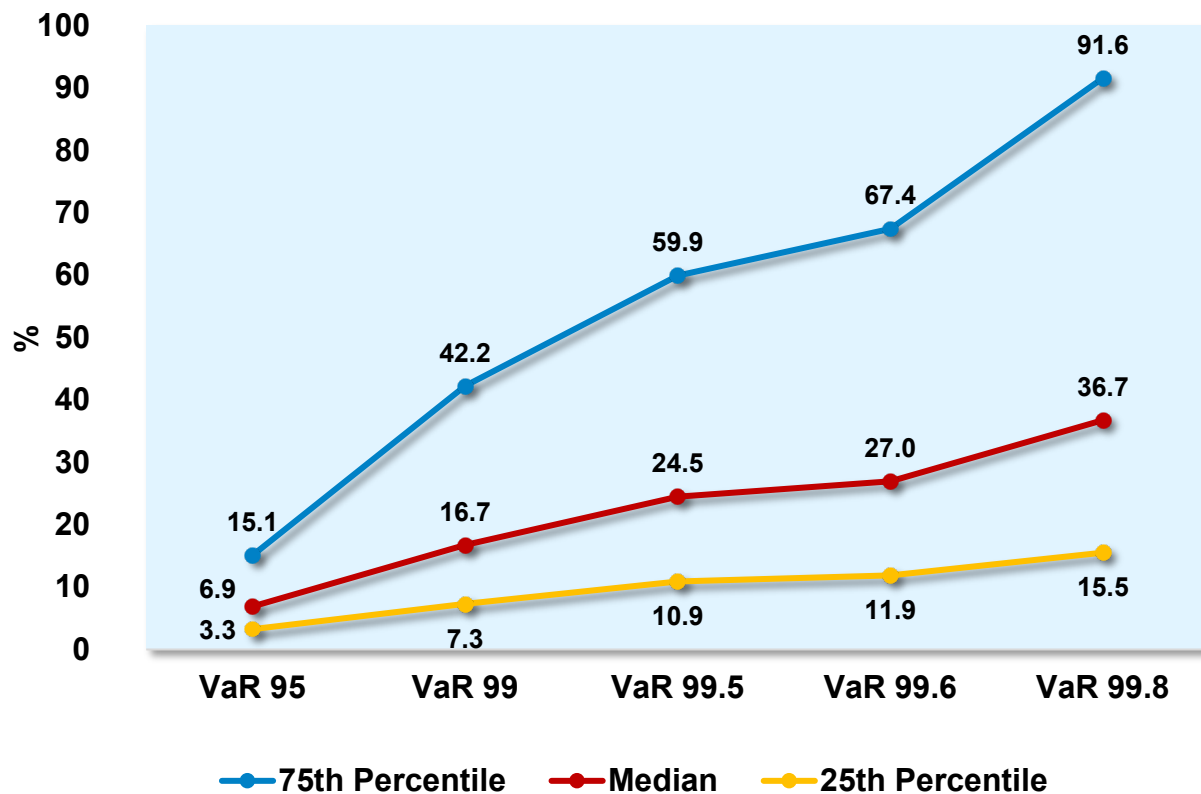
Key Metrics

Personal Property Composite Gross PML/PHS Ratio
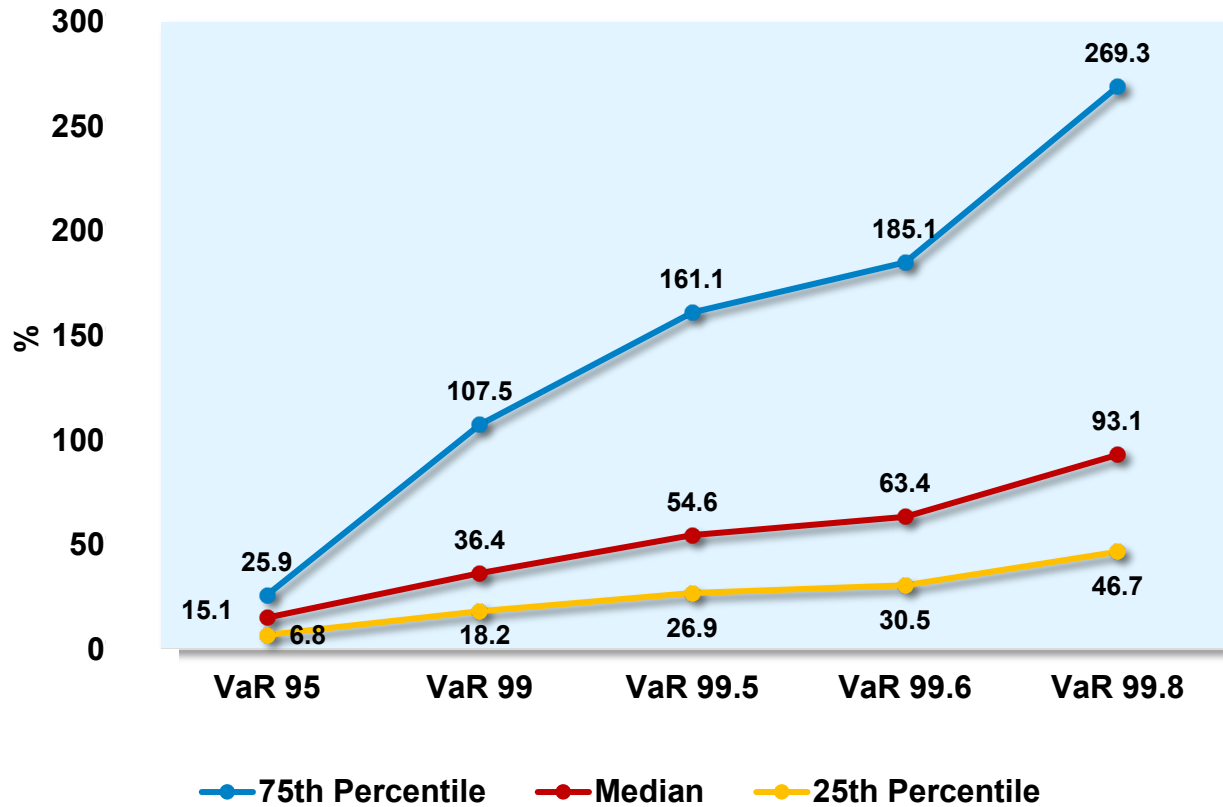
Commercial Property Composite Gross PML/PHS
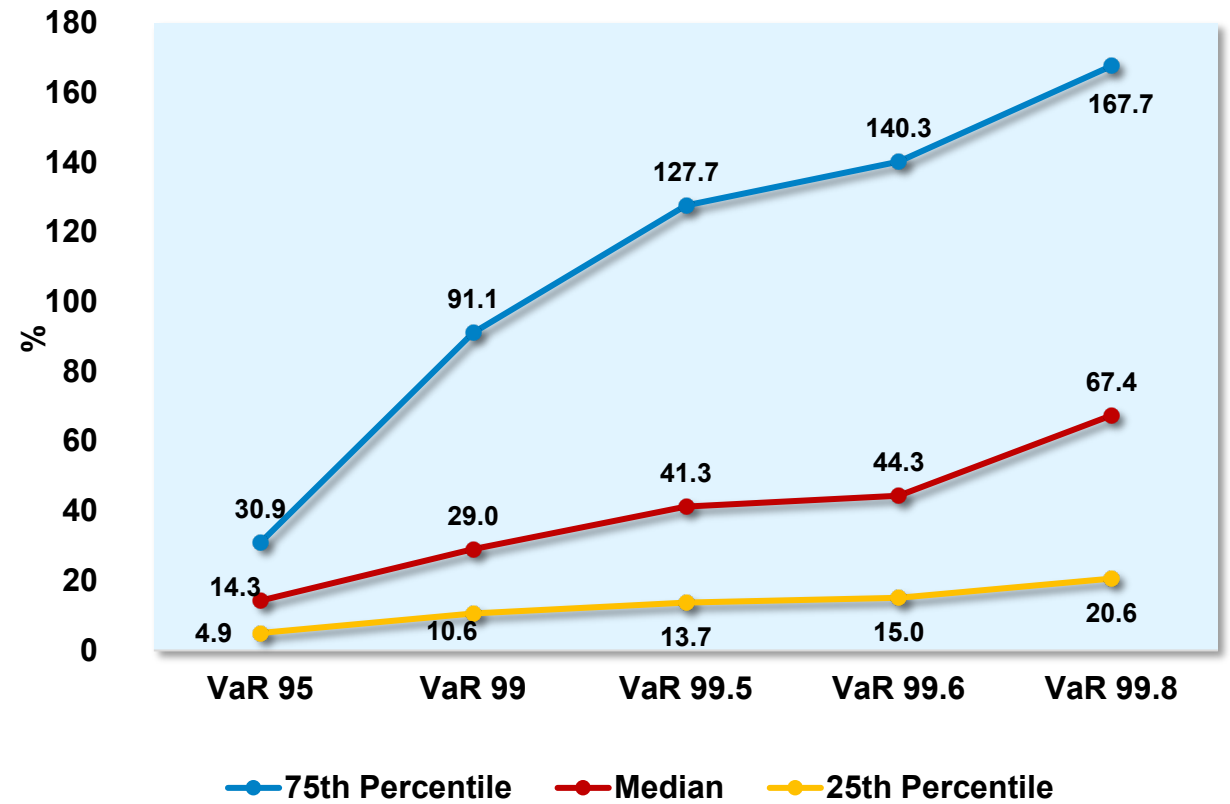
Key Metrics

Composite		Net PML/PHS Ratios						Gross PML/PHS Ratios				
		Var 95	**Var 99**	**Var 99.5**	**Var 99.6**	**Var 99.8**		**Var 95**	**Var 99**	**Var 99.5**	**Var 99.6**	**Var 99.8**
Personal Lines	**2015 Median**	5.0%	7.1%	10.8%	13.8%	25.1%		10.4%	34.9%	50.4%	55.0%	76.0%
Personal Lines	**2022 Median**	6.2%	8.9%	10.9%	12.2%	20.3%		11.4%	30.3%	43.9%	50.3%	68.1%
Change		1.1%	1.8%	0.0%	-1.6%	-4.7%		1.0%	-4.6%	-6.6%	-4.6%	-7.9%
		Var 95	**Var 99**	**Var 99.5**	**Var 99.6**	**Var 99.8**		**Var 95**	**Var 99**	**Var 99.5**	**Var 99.6**	**Var 99.8**
Commercial Casualty	**2015 Median**	2.4%	4.6%	6.5%	7.2%	16.0%		6.5%	21.0%	29.1%	32.5%	47.6%
Commercial Casualty	**2022 Median**	3.7%	5.8%	6.9%	7.7%	12.0%		6.9%	16.7%	24.5%	27.0%	36.7%
Change		1.3%	1.2%	0.4%	0.4%	-4.0%		0.4%	-4.3%	-4.6%	-5.5%	-10.9%
		Var 95	**Var 99**	**Var 99.5**	**Var 99.6**	**Var 99.8**		**Var 95**	**Var 99**	**Var 99.5**	**Var 99.6**	**Var 99.8**
Personal Property	**2015 Median**	5.5%	7.2%	13.2%	14.7%	32.7%		14.4%	46.2%	72.1%	82.8%	110.0%
Personal Property	**2022 Median**	5.6%	8.2%	11.7%	14.9%	36.6%		15.1%	36.4%	54.6%	63.4%	93.1%
Change		0.2%	1.0%	-1.5%	0.2%	3.9%		0.6%	-9.8%	-17.5%	-19.4%	-17.0%
		Var 95	**Var 99**	**Var 99.5**	**Var 99.6**	**Var 99.8**		**Var 95**	**Var 99**	**Var 99.5**	**Var 99.6**	**Var 99.8**
Commercial Property	**2015 Median**	3.5%	7.0%	11.4%	16.7%	33.1%		10.3%	49.7%	72.9%	81.7%	109.8%
Commercial Property	**2022 Median**	5.1%	8.8%	11.6%	15.1%	21.8%		14.3%	29.0%	41.3%	44.3%	67.4%
Change		1.6%	1.7%	0.1%	-1.6%	-11.3%		4.0%	-20.7%	-31.6%	-37.3%	-42.3%