



IT TAKES VISION

The Recent ERM Landscape

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If we listened to our intellect, we'd never have a love affair. We'd never have a friendship. We'd never go into business.

A blurred background image showing a person in mid-air, jumping over a cliff edge. The person is silhouetted against a bright, hazy sky. The cliff edge is visible in the lower-left foreground, and the background is a soft, out-of-focus landscape.

If we listened to our intellect, we'd never have a love affair. We'd never have a friendship. We'd never go into business.

Well, that's nonsense.

A man in a dark suit is captured mid-jump, falling off a rocky cliff edge. The background is a dense cityscape with numerous skyscrapers under a cloudy sky. The overall tone is dramatic and metaphorical.

If we listened to our intellect, we'd never have a love affair. We'd never have a friendship. We'd never go into business.

Well, that's nonsense.

You've got to jump off cliffs all the time and build your wings on the way down

Ray Bradbury

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Ray Bradbury

(probably not talking about ERM)

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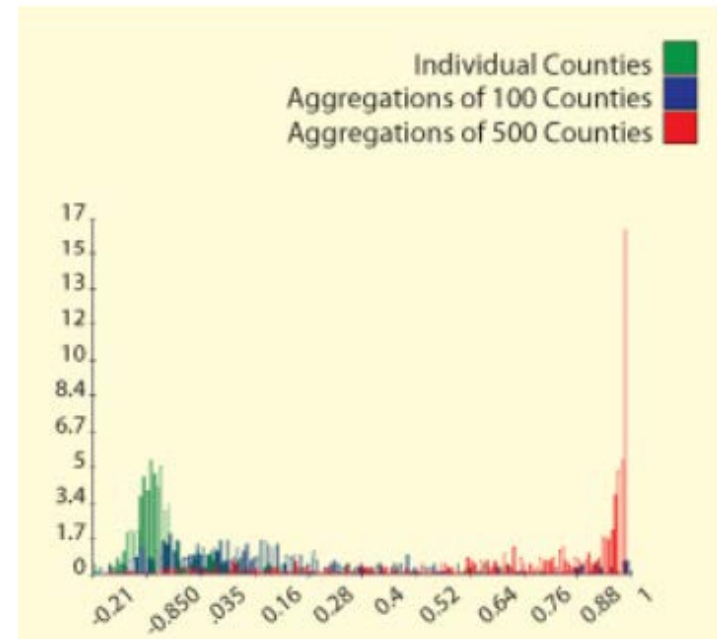
- Risk Aggregation & Diversification, April 2016
- 2015 Survey of Enterprise Risk Management in the U.S. life and annuity industry, June 2016
- ORSA Process Implementation for Internal Stakeholders, September 2015
- 2015 Emerging Risks Survey, August 2016

Risk Aggregation & Diversification

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Risk Aggregation & Diversification

- Backtesting and Robustness
- Aggregation
- The benefit of diversification
 - The fallacy of only using correlation
 - Insufficient to describe the complex interactions among risks
- The impact of Micro-correlation
 - “Close to zero” correlations do not count as zero, for diversification benefits
 - The law of large numbers fails when risks are not independent
 - The impact may be severe in catastrophic events.
 - Aggregation amplifies the micro-correlation

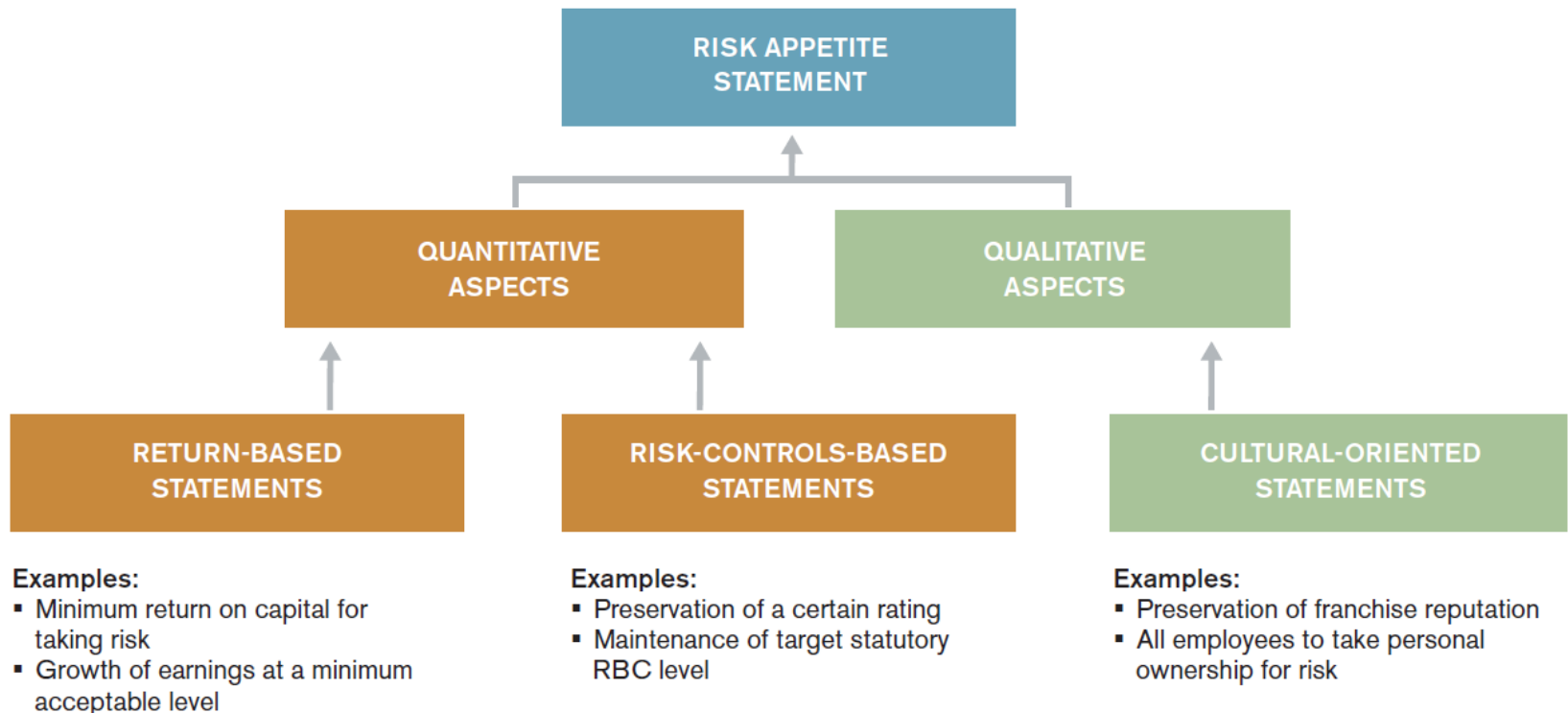


**2015 Survey of
Enterprise Risk
Management in the U.S.
life and annuity industry**

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2015 Survey of Enterprise Risk Management in the U.S. life and annuity industry

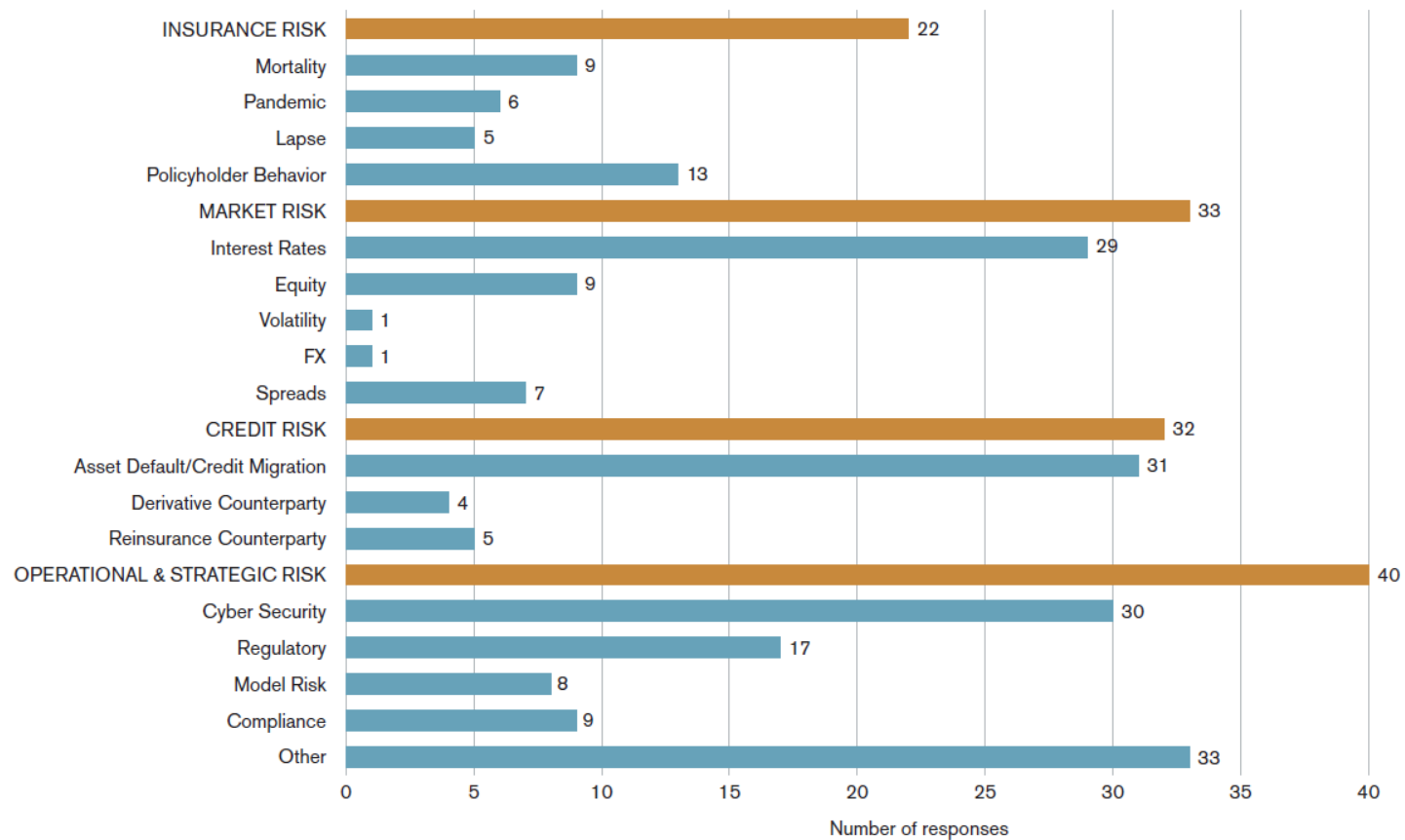
- Interview of senior management at 47 life / annuity writers
- The beginning: a risk appetite statement for each business objective



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2015 Survey of Enterprise Risk Management in the U.S. life and annuity industry

FIGURE 2: PARTICIPANTS' KEY RISK EXPOSURES (NET OF RISK MITIGATION STRATEGIES)



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2015 Survey of Enterprise Risk Management in the U.S. life and annuity industry

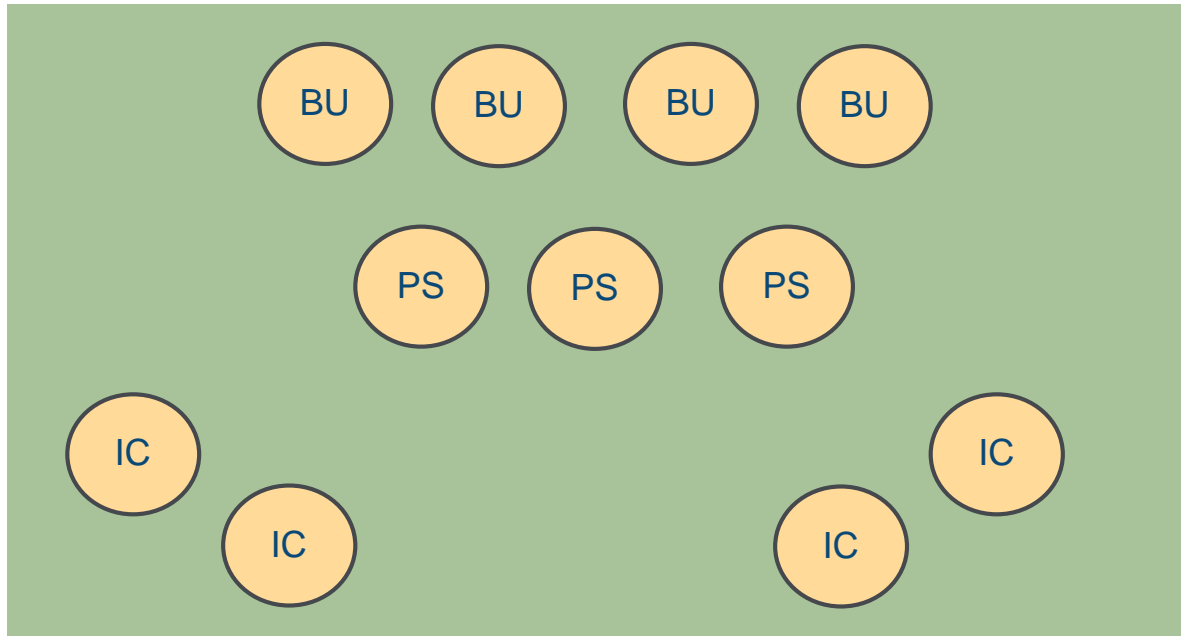
Key ingredients for an **operational and strategic risks** program

- A rigorous process (and monitoring) to capture all risk exposures
- Active, ongoing, internal dialogue
- Retroactive operational risk reports, losses by categories
- Operational and strategic risk stress testing
- Putting a number to operational and strategic risks

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2015 Survey of Enterprise Risk Management in the U.S. life and annuity industry

The three-lines-of-defense model



- 1st Line { • Business Unit Owners
- 2nd Line { • Policy Setters
- 3rd Line { • Independent Challenge

ORSA Process Implementation for Internal Stakeholders

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ORSA Process Implementation for Internal Stakeholders

- Goal: to advance ORSA process implementation
- Benchmark information to satisfy internal stakeholders in conducting / implementing an ORSA
- Cross-disciplinary: life, P&C (aka “general” or “non-life”)
- Global basis: Europe, North America, Asia
- 141 respondents
 - 72% Life

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ORSA Process Implementation for Internal Stakeholders

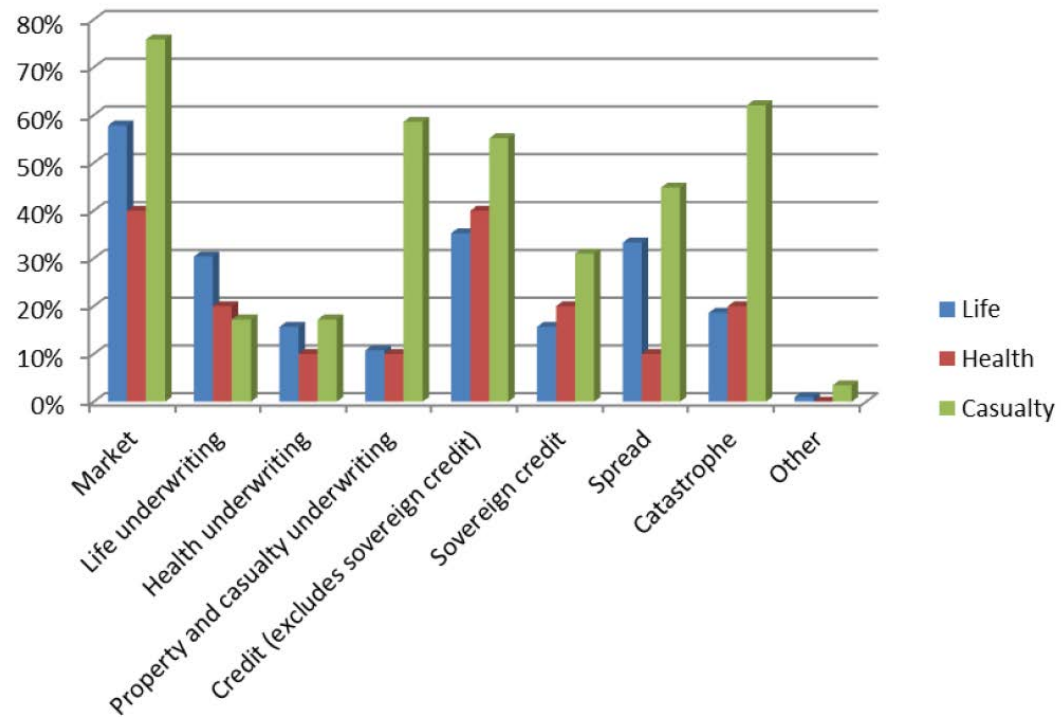
Report focus

- Stress and scenario development processes
- Incentives, governance, and other behavioral aspects
- Evaluating the impact of the ORSA on a company's overall results
- Evaluating the level of buy-in of the ORSA within an organization
- Board involvement
- Implementation
- Challenges faced by companies in the ORSA process

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ORSA Process Implementation for Internal Stakeholders

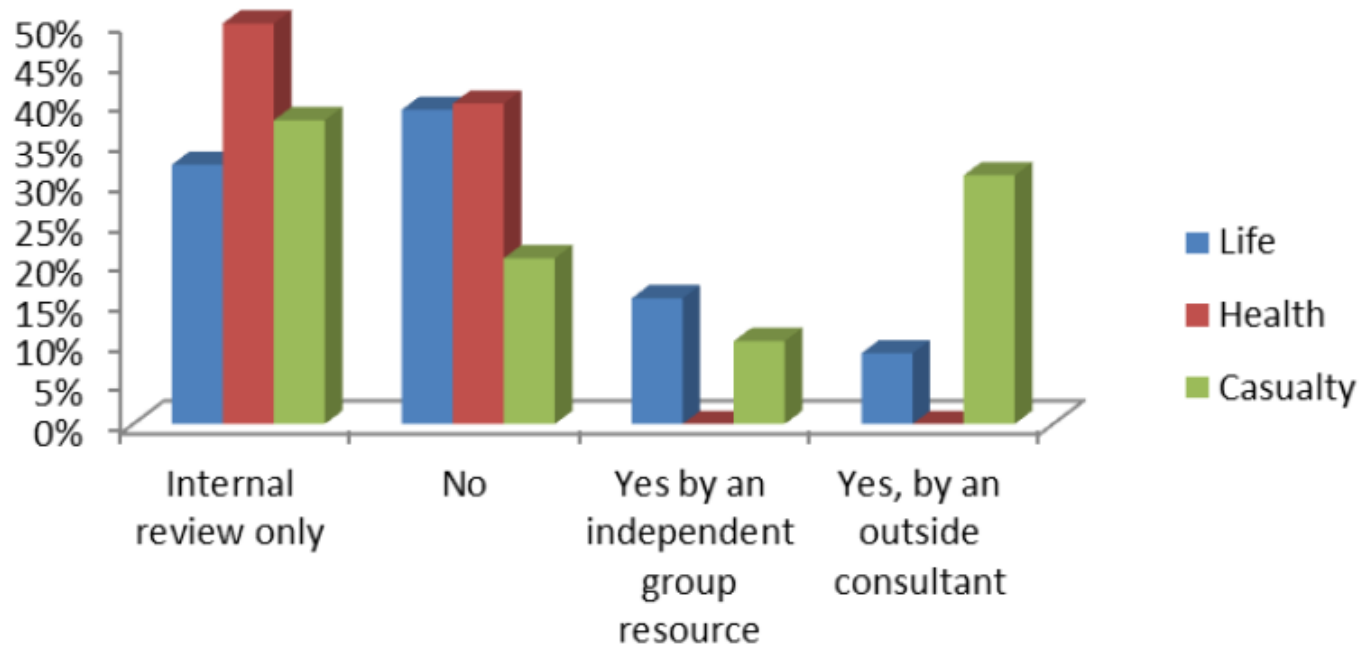
Risk modeling – stochastic stress testing



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ORSA Process Implementation for Internal Stakeholders

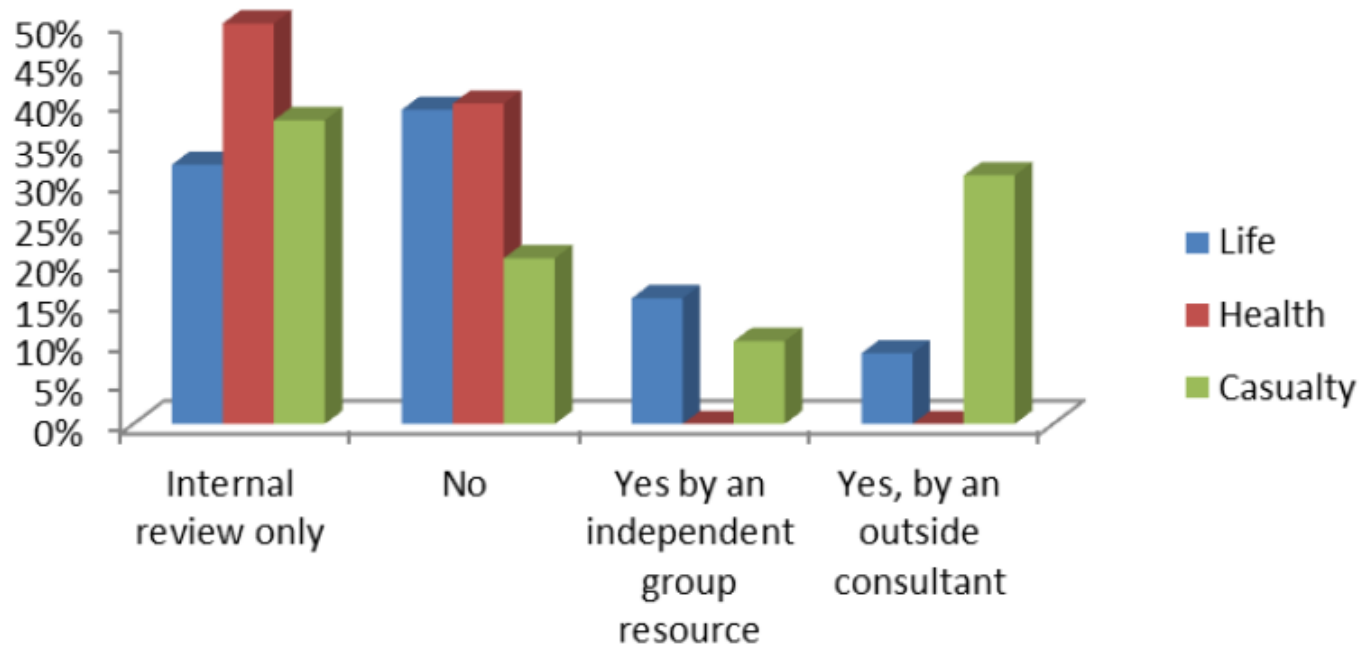
Review of Process by Business Line



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ORSA Process Implementation for Internal Stakeholders

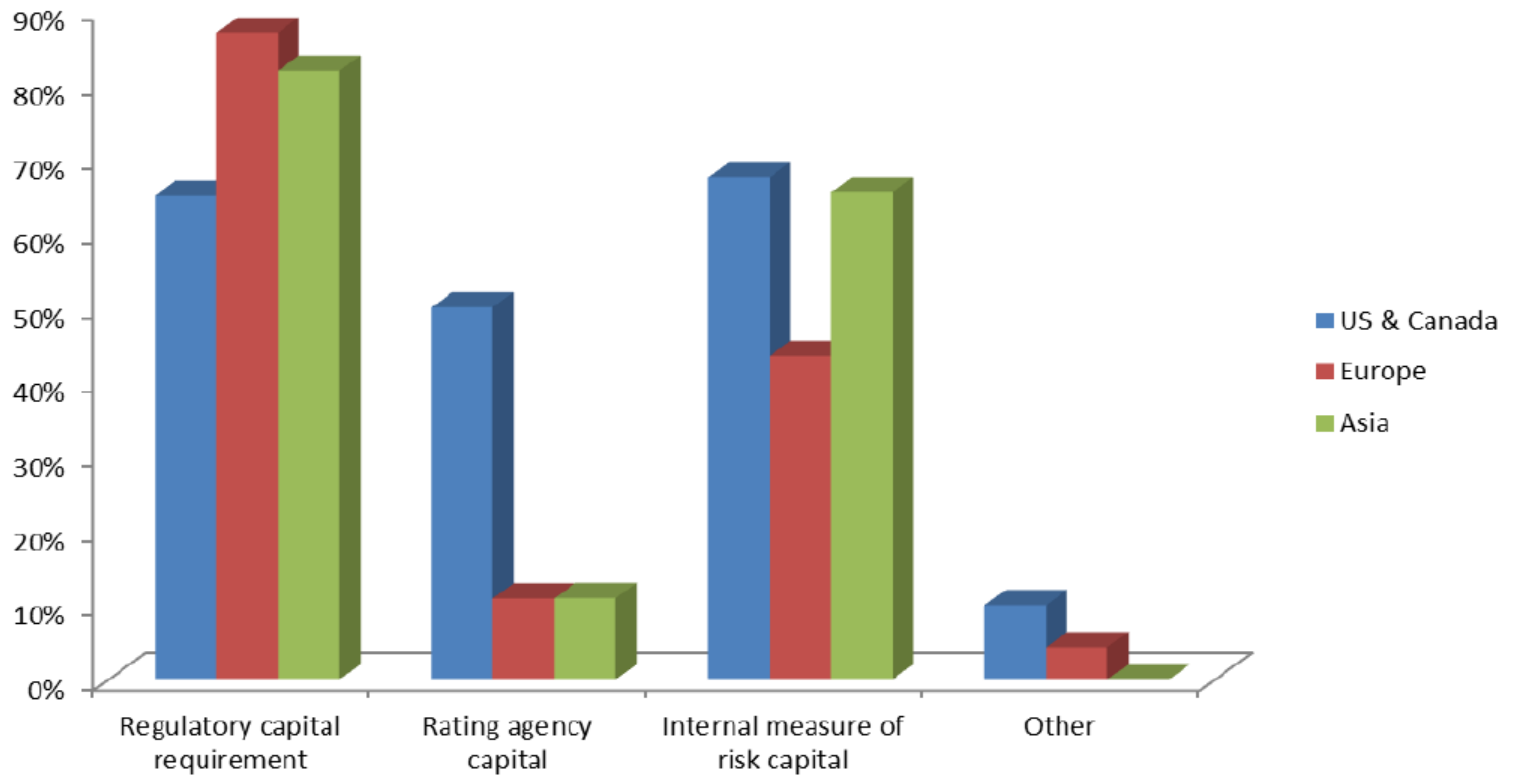
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ORSA Process Implementation for Internal Stakeholders

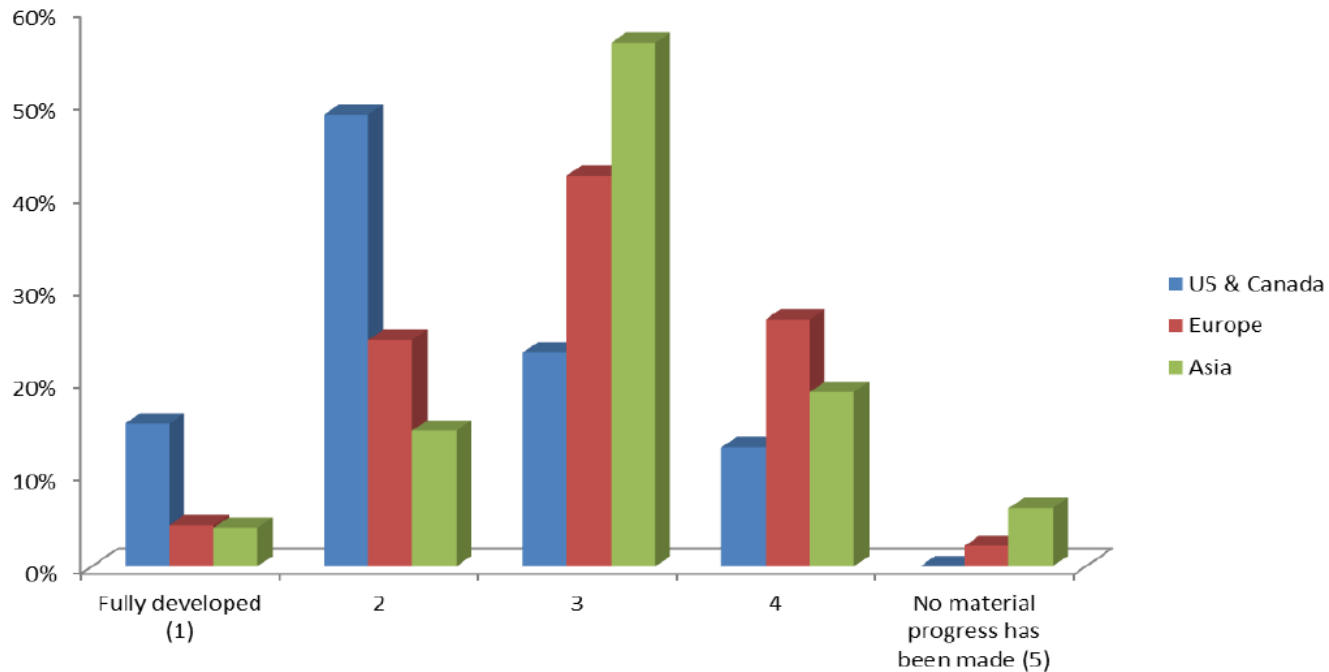
Capital measure used in ORSA



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ORSA Process Implementation for Internal Stakeholders

How well documented is your ORSA?



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ORSA Process Implementation for Internal Stakeholders

Which processes use ORSA?

- Capital management (80%)
- Business planning (70%)
- Determining reinsurance and risk mitigation (53%)
- Determining investment policy (50%)
- Product development (39%)
- Contingency planning (38%)
- Mergers & acquisitions (19%)

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ORSA Process Implementation for Internal Stakeholders

▪ Encouraging responses

- ORSA is used in key strategic business decisions (80%)
- ORSA brings companies to a higher ERM standard (64%)
- Costs viewed as manageable (69%); non-financial costs negligible (~ 50%)

▪ Surprising responses

- US / Canadian companies more likely to indicate that ORSA process is complete (Solvency II in Europe)
- Many companies (~30%) do not model management actions assuming adverse conditions
- Many companies (~33%) do not review their ORSA
- Only 23% of companies use stochastic or proxy models. Others use factor-based models

2015 Emerging Risks Survey

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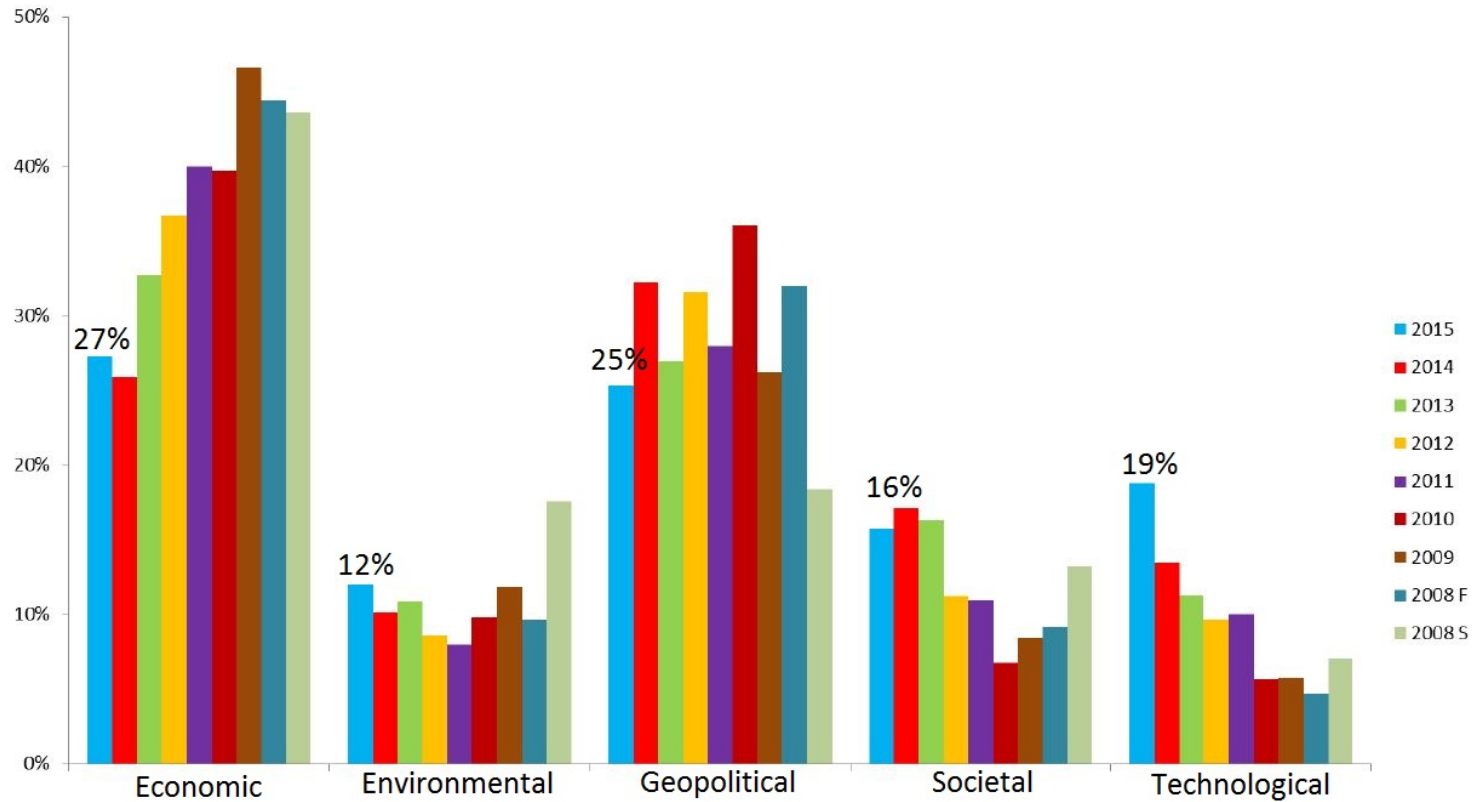
2015 Emerging Risks Survey

“Emerging risks can provide a competitive advantage for those who acknowledge their presence in advance and proactively consider outcomes that may or may not occur.”

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2015 Emerging Risks Survey

Emerging Risks by Category
(up to five risks chosen per survey)



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2015 Emerging Risks Survey

Top 5 **current** risks in (November 2015)

- Cybersecurity / interconnectedness of infrastructure (15%)
- Financial volatility (12%)
- Asset prices collapse (10%)
- Climate change (8%)
- Terrorism (6%)

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2015 Emerging Risks Survey

Top 5 **emerging** risks (November 2015)

- Cybersecurity / interconnectedness of infrastructure (23%)
- Financial volatility (13%)
- Liability regimes / regulatory framework (7%)
- Chinese economic hard landing (7%)
- Terrorism (6%)

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2015 Emerging Risks Survey

“Anticipate and predict are, in my view, quite different. Anticipate allows you to prepare to mitigate a crisis without predicting that it will happen—just that it may happen.”

“Prediction actually distracts from risk imagination.”

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2015 Emerging Risks Survey

Risks as opportunities

- Precious metals as a form of currency insurance
- Demographic shifts, regulatory changes, asset price collapse
- Autonomous cars, GMOs, drones, the internet-of-things
- Supply chain disruption, space weather, dislocation caused by emerging technologies
- New technologies to manage climate change and to create new energy sources

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2015 Emerging Risks Survey

Conclusions

- The ultimate success of ERM stems from using long time horizons
- Combined analysis (quantitative and qualitative techniques) helps to overcome cognitive biases and build a more resilient process
- **Climate change, demographics, and technology** are prioritized over **geopolitical** and **pandemic** risks.

Links and Sources

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Links and Sources

- Risk Aggregation & Diversification
 - April 2016
 - Canadian Institute of Actuaries (CIA) Committee on Risk Management and Capital Requirements (CRMCR)
 - Bernard and Vanduffel
 - <http://www.cia-ica.ca/docs/default-source/2016/216037e.pdf>
- 2015 Survey of Enterprise Risk Management in the U.S. life and annuity industry
 - June 2016
 - Milliman insight research report
 - Berezovskaya and Dardis
 - http://www.milliman.com/insight/2016/ERM-in-the-U_S_-life-and-annuity-industry-2015-survey/
- ORSA Process Implementation for Internal Stakeholders
 - September 2015
 - CAS / CIA / SOA Joint Risk Management Section
 - Bradley, Motiwalla, O'Malley, Phelan
 - <https://www.soa.org/Files/Research/2016-09-orsa-process-implementation.pdf>
- 2015 Emerging Risks Survey, August 2016
 - August 2016
 - CAS / CIA / SOA Joint Risk Management Section
 - Rudolph
 - <https://www.soa.org/Files/Research/research-2015-emerging-risks-survey.pdf>

QUESTIONS?