Agenda

- Operational risk overview
- Quantifying operational risk: approaches and supervisory guidance
- Scenario analysis: traditional vs. structured
- Structured scenario analysis: approach, illustration, lessons learned

Operational risk: an emerging risk pillar at insurance firms

- The Basel Committee defines operational risk as "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events."
- This definition includes legal risk but excludes strategic and reputational risk, market and credit risk.
- Because of its pervasive nature, operational risk often contributes to other risks faced by an institution – such contributions are often referred to as "boundary risks."

Market risk, Underwriting risk, Liquidity, Strategic risk, Credit risk, Operational risk

Increasing regulatory focus

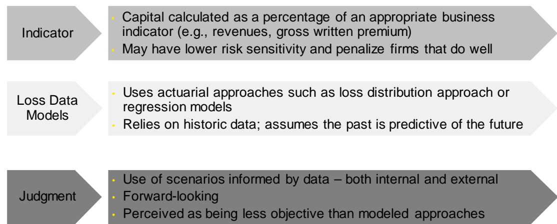
- Depending on the institution, regulators are interested in both the quantification and management of operational risk.

Quantifying operational risk

- The sting is in the "tail." It is often hard to estimate tail exposures due to lack of adequate data.
- The diverse nature of operational risk spans the breadth of an organization, covering its people, process and technology, as well as external events.

Basel operational risk event categories

How is operational risk quantified?



- Typically, a combination of approaches that combine the strengths of different methods is used and some regulators require a robust combination approach.
- Today's focus will be on the scenario-based approaches.

Solvency II approach for operational risk

- Solvency II includes an explicit charge for operational risk based on the final Level-2 implementation measure advice of the CEIOPS.[1]
- Solvency II standard formula applies a factor-based approach similar to the Basel factor-based approaches (BIA[2] and TSA[3]) where the formula incorporates insurance premiums and provisions to calculate a standard operational risk capital. The standard approach does not allow for diversification between the operational risk capital requirements and the remaining capital requirements.
- Solvency II formula may not capture the specific sources of risk for firms with varying risk profiles.

[1] Committee of European Insurance and Occupational Pensions Supervisors; [2] Basic Indicator Approach; [3] The Standardized Approach

Bermuda Monetary Authority: operational risk charge

For *Commercial Insurer's Solvency Self Assessment* (*CISSA*) Submission:

Operational risk capital charge = (1% to 10%)[1] x Group BSCR (after covariance adjustment)

Operational risk is an add-on charge and is assumed to be independent of all other risks.

[1] *The risk charge ranges from 1% to 10% based on each insurer's self-assessment of the Commercial Insurer's Risk Assessment (CIRA) framework. The CIRA framework assesses the quality of the risk management function surrounding the insurer's operational risk exposures.*

Source: Bermuda Monetary Authority, *The Bermuda Capital and Solvency Return, 2013 Instruction Handbook*.

Supervisory guidance on operational risk stress testing for banking organizations

The firm should have transparent and well-supported estimation approaches based on both quantitative analysis and expert judgment, and should not rely on unstable or unintuitive correlations to project operational losses. Scenario analysis should be a core component of the firm's operational loss projection approaches.

Source: Federal Reserve Guidance SR 15-18

What is scenario analysis?

- Scenario analysis (SA) is a systematic and well-reasoned process involving business specialists and relevant support functions to estimate the most severe losses and the likelihood of such occurrences.
- SA involves analyzing events that might occur infrequently but have the potential for significant business impact (i.e., losses) – "the sting is in the tail."
  - Smaller, more frequent losses can be reviewed using internal loss data.
  - Consideration should be given to defining the time horizon that might be reasonable for estimation (e.g., 1 in 20 years, 1 in 50 years).

Risk category	Scenario name	Risk driver
Business disruption and system failure	*Data center outage*	*Super storm*

Scenario description: a severe storm (e.g., Sandy) leading to loss of power; property damage limiting timely access to data

Additional effects: customer compensation, litigation, reputational damage

Scenario estimate
- Severity – $10m
- Probability – 1 in 20 years

Moderate to high risks
Focus of RCSA
Plausible but severe risks
Focus of scenario analysis
Tail risks
Probability
Loss severity

Uses of scenario analysis

- Although SA usage is largely observed for capital estimation purposes, it was intended for broader risk management purposes as well.
- Increases in usage of SA beyond capital purposes include its linkage to risk appetite setting and business planning.

Capital	Noncapital
Loss estimation: ► Regulatory capital / loss forecasting for Solvency II / Basel II and III / CCAR[1] ► Economic capital / internal capital needs	**Risk management:** ► Challenge top operational risks and controls ► Challenge risk control self-assessment (RCSA) ► Prioritization of risk remediation ► Quantify risk appetite
Market perception of risk management: ► Rating agencies	**Business planning – leverage scenarios for:** ► Budgeting ► Sizing opportunity cost or foregone revenues

[1] Comprehensive Capital Adequacy Review

Typical challenges with scenario analysis

Topics	Challenges	Considerations
SA workshops	Meeting regulatory expectations on scenarios being credible, transparent, systematic and verifiable.	► Facilitated sessions vs. voting technology ► Role of first line vs. second line of defense ► Sources of information leveraged (loss data, RCSAs, external losses) ► Documented process or methodology ► Traceability of assumptions and inputs; version control ► Strong rationale for estimates provided and thorough documentation of all post-workshop artifacts
Business buy-in	Effective business leadership participation is a cornerstone of the process.	► Pilot approach within a business unit vs. firmwide rollout ► Clear objective of SA process (e.g., risk management, regulatory, capital allocation)
Biases	Biases can reveal themselves before and during the workshops. Common biases include anchoring, group thinking, motivational (gaming), availability and overconfidence.	► Presence of empowered challenge functions ► Independent facilitator to challenge biased estimates and rationale

Advances in scenario analysis techniques: structured scenario analysis (SSA)

A traditional SA process primarily focuses on deriving reasonable estimates through a workshop process.

- However, the traditional process often lacks the rigor to provide reliable information that businesses can base their estimates upon.

Advances in SA techniques include the use of SSA to enhance the objectivity of the estimation process.

- Instead of pure "guesstimates," subject-matter resources assist in coming up with a formula or a variable that appropriately captures risk exposures.
- Regulators see scope for further development and refinement of the traditional process and suggest banks to explore factor-based models.
- SSA is an evolving process that focuses on categories of impact, risk drivers and non-loss factors to provide a granular view of what can increase the financial impact of a scenario or what factors may increase the likelihood of a scenario materializing.
- SSA also makes it easier to reuse the impact information in other scenarios, making the process more efficient and consistent as well and easier to refresh as the business changes.

Key differences between traditional and structured scenario analysis

While there is much common ground, the essential difference between SSA and traditional SA lies in the objective approach to estimating scenarios (highlighted below).

Rather than the direct estimation of frequency and severity parameters for a scenario, SSA seeks to construct the underlying formulas to quantify the loss outcomes associated with the manifestation of a key operational risk scenario in terms of its underlying factors.

Monitoring:

The focus of the monitoring will be not only on a qualitative assessment of the scenario, but also on the responsiveness to the change in the underlying risk factors or drivers of the scenario. The exposure estimates could be a way to measure the risk appetite. For example, if scenario has % of staff in a location as an exposure factor then an increase in the metric could be used to check against the risk appetite.

Scenario generation
Scenario parameterization
Quantification
Scenario outputs
Monitoring
Scenario analysis

Scenario parameterization:

Use of formulas supported by internal and external data in place of "guesstimates" where possible, to arrive at initial estimates of frequency and severity.

Scenario analysis approach

The scenario analysis approach shown below consists of five stages and uses facilitated workshops as the mechanism by which scenarios are developed and estimated.

	Stage 1 Start-up and planning	Stage 2 Workshop preparation	Stage 3 Workshop execution	Stage 4 Workshop output review and challenge	Stage 5 Quantification and challenge of risk assessments*
	1–2 days at start	**1 week**	**1 week**	**1 week**	**1 week**
Key objectives	• Determine granularity of scenario approach • Define approach and methodology • Select pilot case • Agree on key stakeholders involved • Agree on data inputs required	• Collect all relevant information as input to the workshops; create the scenario • Populate and vet "participant packs" • Collect and structure the information by risk category • Coordinate workshop logistics and circulate finalized participant pack to all attendees	• Hold scheduled workshops to quantify the scenario • Identify which risk categories are the most significant and quantify exposure (determine loss severities) • Estimate likelihood of occurrence • Document rationale and impact and any controls enhancements identified	• Review scenario workshop outputs (severities and likelihoods) with challenge functions and senior management	• Translate inputs into distribution parameters • Translate correlation data into matrix • Agree on assumptions underlying scenarios • Fit frequency, severity to distribution curve; generate aggregate loss distributions • Sense check and recalibrate if required

SA pilot by line of business

Senior management and key stakeholder involvement

**Quantification techniques may vary by scenario and/or risk category*

Illustration of structured scenario analysis output

Scenario description Natural disaster strikes a location where the company has significant presence. Buildings and systems need to be repaired, data needs to be recovered and customers need to be compensated.

Table A: traditional scenario analysis		High	Medium	Low
Severity	Cumulative estimate	$10m	$7m	$3m
Relative likelihood	Workshop participants provide a range of likelihoods	1 in 20 years	1 in 10 years	1 in 5 years

Estimates in traditional SA are typically derived in a workshop setting by building consensus around the estimates, which are often "guesstimates."

Table B: Structured scenario analysis				High	Medium	Low
Severity	Physical damage (primary)	Drivers	% of total replacement value	80%	30%	10%
			Total replacement value of physical assets	$20,000,000		
		Formula	Primary loss estimate (% replacement value x total replacement value)	$16m	$6m	$2m
				High	Medium	Low
	Customer compensation (secondary)	Drivers	% of total customers compensated	10%	5%	2%
			Total customers	1,000,000		
			Compensation per customer	$100		
		Formula	Secondary loss estimate (% customers x total customers x comp. or customer)	$10m	$5m	$2m
				High	Medium	Low
	Cumulative loss (Primary and secondary estimates)			$26m	$11m	$4m
Relative likelihood	Where possible, this will be from external sources relevant to the scenario and may also include internal data (if available). The estimation will be supported by subject-matter resources (e.g., IT, business continuity).			1 in 50 years	1 in 20 years	1 in 5 years

SSA explores the range of loss outcomes through drivers and a formula-based process.

SSA can be extended to identify non-loss impact, e.g., loss in revenue, opportunity cost.

Speaker biographies

Karthik Ramakrishnan

Karthik is a New York-based Senior Manager in the Advisory Services practice of Ernst & Young LLP. Karthik has advised several banks and insurers on different enterprise and operational risk topics including risk governance, capital modeling and stress testing, scenario analysis and risk assessments, metrics, governance, risk appetite and reporting.

Prior to joining EY, Karthik was a vice president in the Operational Risk department at Morgan Stanley, responsible for the development and implementation of several aspects of the Advanced Measurement Approach framework and Stress Testing for operational risk.

Karthik holds an MBA from New York University and an undergraduate degree from the Indian Institute of Technology.

Andy Kramer

Andy is a Charlotte based Managing Director at TIAA. In his current role, he manages the Operational Risk Management Program, which also includes Supplier Risk Management, Business Continuity and Technical Resiliency.

Prior to joining TIAA, Andy was a Senior Vice President at Bank of America where he spent ten years in multiple roles, including Operational Risk Management in their Insurance Services organization and Supplier Risk Management at the enterprise level.

Andy holds an MBA from the University of Missouri in Kansas City with an emphasis in Operations Management, and an undergraduate degree from Saint John's University in Minnesota.

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