



Educational Conference & Business Show
June 7-10, 2015 ♦ Mandalay Bay, Las Vegas, NV



Educational Conference & Business Show
June 7-10, 2015 ♦ Mandalay Bay, Las Vegas, NV

ORSA Part 3 – Understanding Modeling and Stress Testing

Session 704

Presenters



- Kim Piersol, Consulting Actuary, Huggins Actuarial Services, Inc.
- Lisa Cosentino, Managing Director, SMART DEVINE

Objectives



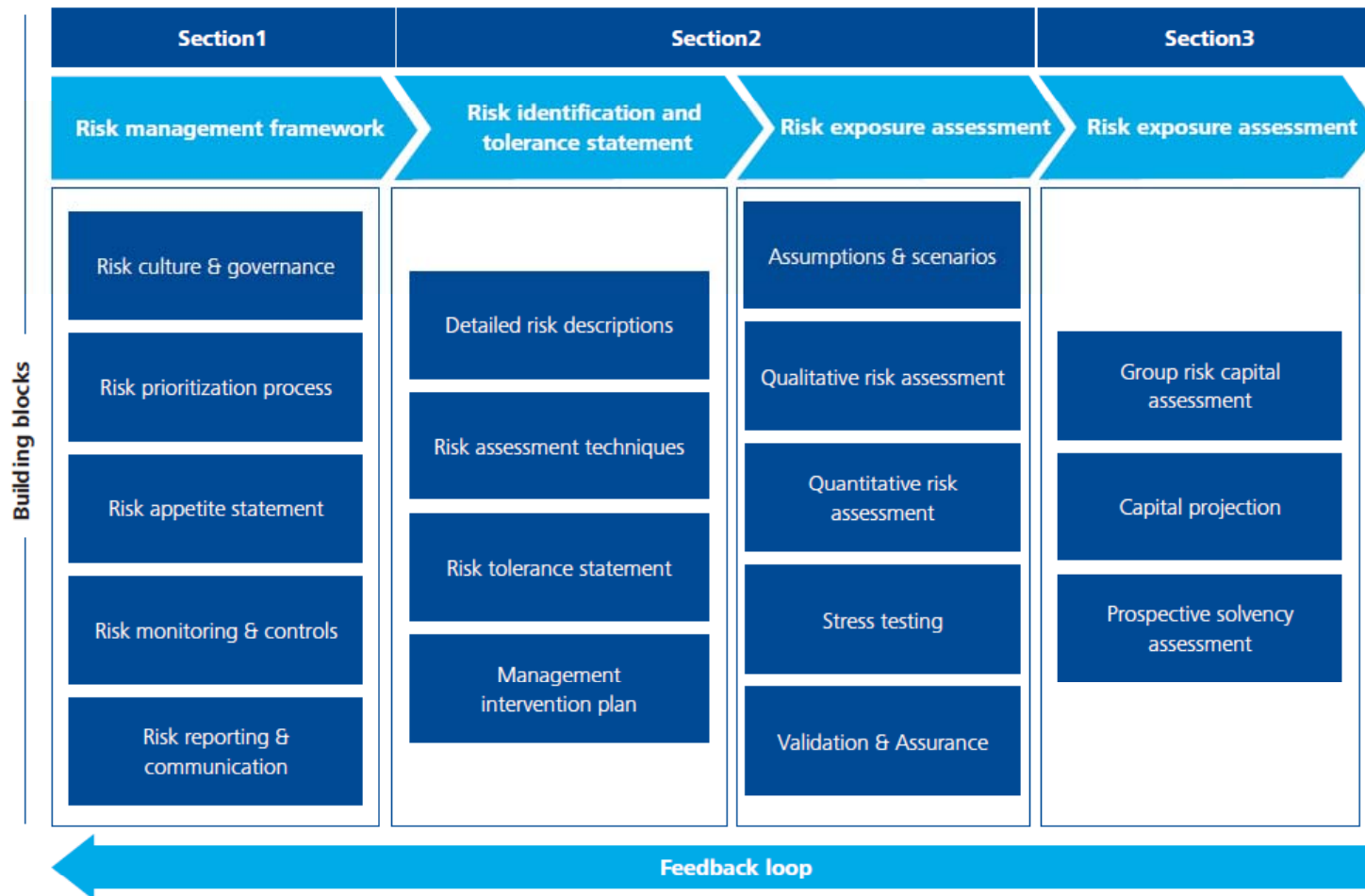
- Understanding ORSA Part 3
- Modeling risks under ORSA Part 3
- Understanding how to translate qualitative considerations of risk to quantitative considerations

The ORSA Report



- Section 1 – Description of the Insurer’s Risk Management Framework
- Section 2 – Insurer’s Assessment of Risk Exposures
- Section 3 – Group Assessment of Risk Capital and Prospective Solvency Assessment

Sections of ORSA Report



Source: Deloitte

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ORSA Section 3

- should document how the company combines the qualitative elements of its risk management policy and the quantitative measures of risk exposure in determining the level of financial resources it needs to manage its current business and over a longer term business cycle, such as the next 2-5 years.
- The information provided in Section 3 is intended to assist regulators in forming subjective assessments of the quality of insurer's risk and capital management.

Section 3 Focus & Objective



- The focus should be on various quantitative aspects of measuring group-level capital adequacy relative to the various risks to which the enterprise is exposed.
- The objective is to measure the capital needs of the enterprise given the scale and complexity of the risks within the group.

Capital Adequacy



- The accounting framework should be defined
 - GAAP
 - STAT
 - IFRS

- The modeling framework should be defined
 - Internal economic capital model
 - Rating agency capital adequacy model
 - Regulatory capital adequacy model
 - Other

- The Risk Metric Utilized

Prospective Solvency Assessment



- Expectation is that a group needs to have a robust capital forecasting ability that can support financial planning and risk management functions.
- Includes the ability to project their expected financial position over a 3 to 5 year time horizon in both normal and stressed environments.
- Projections should be able to demonstrate the group has the financial resources to execute on their plan and stay within their risk tolerances, while operating in accordance to their stated risk appetite.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Considerations – Description - Examples

- Definition of Solvency - How the insurer defines solvency for the purpose of determining risk capital and liquidity requirements - Cash flow basis, balance sheet basis, etc.
- Accounting or Valuation Regime - Basis for the measurement of risk capital requirements and/or available capital - GAAP, Statutory, Economic or Market Consistent, IFRS, Rating Agency model.
- Business Included - The subset of business included in the analysis of capital - Positions as of a given valuation date, New business assumptions, etc.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Considerations – Description – Examples (cont'd)

- Time Horizon - Horizon over which risks were modeled and measured - One-year, multi-year, lifetime, run-off, etc.
- Risks Modeled - Risks included in the measurement of risk capital including a comment about whether all relevant and material risks have been considered - Credit, market, liquidity, insurance, operational, etc.
- Quantification Method - Method used to quantify the risk exposure - Deterministic stress tests, stochastic modeling, factor-based analysis, etc.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Considerations – Description – Examples (cont'd)

- Risk Capital Metric - Measurement metric utilized in the determination of aggregate risk capital - Value-at-risk or VAR (quantifies the capital needed to withstand a loss at a certain probability), Tail-value-at-risk or TVAR (quantifies the capital needed to withstand average losses above a certain probability), Probability of Ruin (quantifies the probability of ruin given the capital held), etc.
- Defined Security Standard - Defined security standard utilized in the determination of risk capital requirements, including linkage to business strategy and objectives - AA solvency, 99.X% 1- year VAR, Y% TVAR or CTE, X% of RBC, etc.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Considerations – Description – Examples (cont'd)

- Aggregation and Diversification - Method of aggregation of risks and any diversification benefits considered or calculated in the group risk capital determination - Correlation matrix, dependency structure, sum, full/partial/no diversification.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Prospective Solvency Assessments

- The insurer's capital assessment process should be closely tied to business planning. To this end, the insurer should have a robust capital forecasting capability that supports its management of risk over the planning time horizon in line with its stated risk appetite.
- The forecasting process should consider relevant and foreseeable changes to the insurer's internal operations and the external business environment. It should also consider the prospect of operating in both normal and stressed environments.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Prospective Solvency Assessments (cont'd)

- The company's prospective solvency assessment should demonstrate it has the financial resources necessary to execute its multi-year business plan in accordance with its stated risk appetite. If the insurer does not have the necessary available capital (in terms of quantity and/or quality) to meet its current and projected risk capital requirements then it should describe the management actions it has taken or will take to remediate any capital adequacy concerns, These management actions may include or describe any modifications to the business plan or identification of additional capital resources.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Definition of Economic Capital

- Economic Capital is defined as:
 - Sufficient surplus to cover adverse outcomes or to meet a business objective
 - With a given level of risk tolerance
 - Over a specified period of time

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Definition of an Economic Capital Model (ECM)

- One primary tool to assess risk in an insurance organization
 - Simulates the internal operations of the company relative to the external environment within which it is operating
 - Indicates future levels and volatility of profitability, and
 - Estimates appropriate amounts of capital to hold

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Can

- Model
 - Company or Product Risk Profiles
 - Risk Tolerance, Constraints & Strategies
 - Insurance Pricing & Business Strategies
 - Performance Measurements
 - Capital Adequacy & Budgeting
 - Incentive Compensation
 - Investment & Risk-Adjusted Rates of Return
 - Merger & Acquisition Pricing Details
 - Capital Allocation Among Business Units

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Benefits of an Economic Capital Model

More to gain from ECM than compliance

- Improves risk awareness at all levels
- Enables better risk/reward decision making
- Facilitates linking strategy with planning
- Empowers firm to improve value for stakeholders
- Provides a competitive advantage including reduced cost of capital (University of Georgia Study 2013)

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



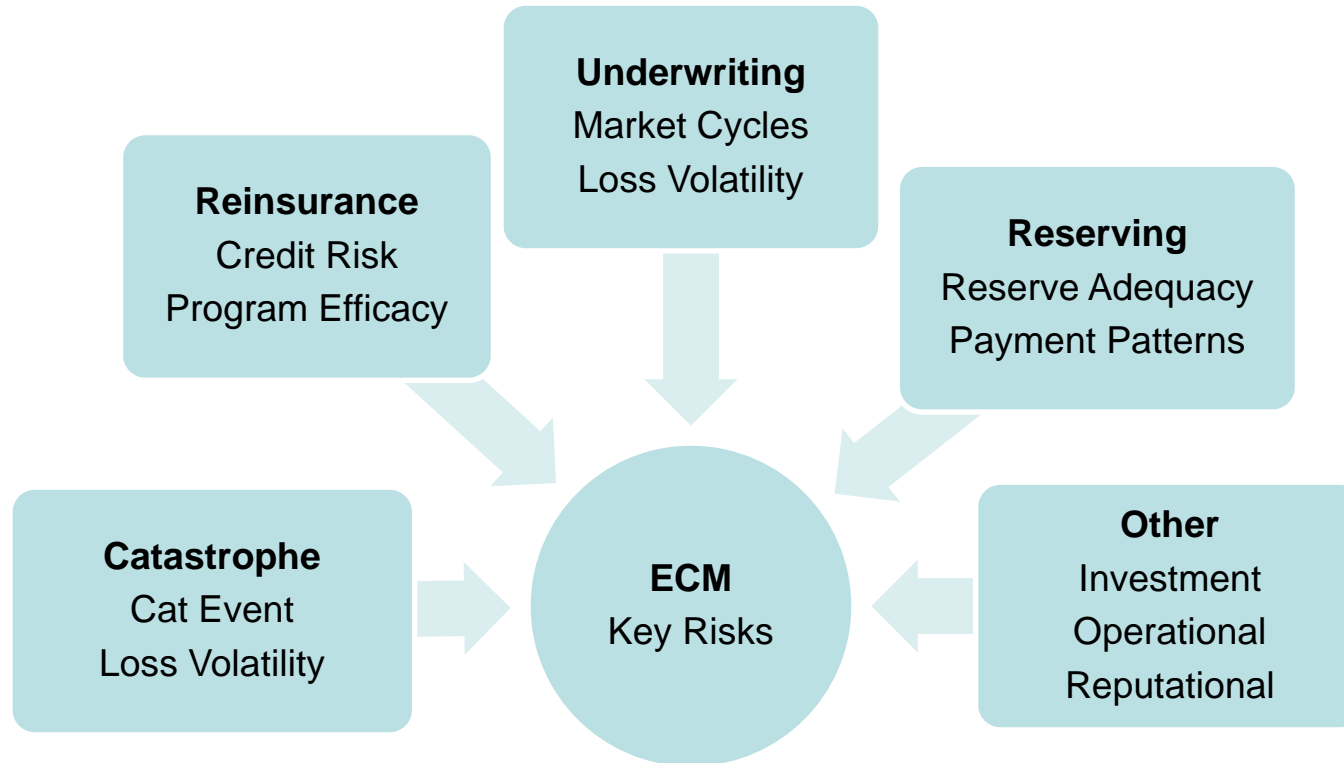
Insurance Companies & ECM

- Economic Capital Models (ECM's)
 - Simulation based
 - Direct calculation of Economic Capital needed
 - Many other uses in addition to Economic Capital measure

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Key Risks Being Measured by a Comprehensive Economic Capital Model



ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



MetaRisk® Overview

- MetaRisk® compares favorably to other industry models
- Guy Carpenter holds periodic Enterprise Risk Management seminars in connection with the software
- Periodically enhanced and updated
- Excellent customer support
- Broad variety of frequency and severity distributions “built- in”
- Variety of copulas available for use with aggregate loss distributions to estimate correlations and interactions
- Excellent Economic Scenario Generator interface
- Excellent catastrophe modeling results (i.e. AIR, EQECAT, RMS) interface

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Preliminary Steps for Preparation of ECM

- Prepare report for each company / group to include:
 - Risks to be analyzed (not an exhaustive list)
 - Underwriting & Pricing Risk
 - Underwriting cycle
 - Casualty pricing
 - Aggregation of exposures
 - Asset & Investment Risk
 - Fluctuations in investment returns
 - Asset liquidity
 - Asset ratings

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Preparation of ECM (cont'd)

- Risks to be analyzed
 - Catastrophe Risk
 - Wind and earthquake
 - Systemic casualty losses
 - Measure potential losses above the company's risk appetite (1 in 100, 1 in 1000)

- Reserve Risk
 - Payout patterns
 - Interface with other types of risk
 - Biggest effect on capital and earnings

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Preparation of ECM (cont'd)

- Risks to be analyzed include:
 - Operational Risk
 - Failed controls or processes
 - Reputational risk
 - IT risk
 - Fraud
 - Regulatory risk

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs

- Balance Sheet Inputs:
 - Assets
 - Cash
 - Bonds
 - Common Stock
 - Other Asset Classes

- Liabilities
 - Loss and Loss Adjust. Reserves by Line / Subline
 - Payment Patterns for Existing Reserves
 - Unearned Premium Reserve
 - Other Liabilities

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs (Line of Business Inputs)

- Direct Written Premium
- Claim Payout Pattern for Newly Generated Loss
- Underwriting Expenses
- Earnings Pattern
- Operational Risk – Lognormal Distribution

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs (Cause of Loss)

- Frequency and Severity Model – Frequency of Individual Claims with No Correlation
 - Claim Frequency Distribution - Examples
 - Poisson – often selected
 - Negative Binomial
 - Binomial

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs (Cause of Loss)

- Frequency and Severity Model – Severity of Individual Claims with No Correlation
 - Claim Severity Distribution - Examples
 - Lognormal – often selected
 - Exponential
 - Gamma
 - Generalized Pareto
 - Normal
 - Uniform
 - Weibull

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs (Cause of Loss)

- Aggregate Loss Model – Aggregate claims model can incorporate copulas (i.e., correlation between lines of business)
 - Aggregate Loss Distribution Examples
 - Lognormal
 - Generalized Pareto
 - Normal
 - Uniform
 - Weibull

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs (Cause of Loss)

- Aggregate Loss Model - Selection of Copulas to add correlation between lines of business
 - Normal Copula – linear correlation coefficient
 - Student's T Copula – varies weight of coefficients in tail of distribution
 - HRT Copula – more weight in right tail of distribution
 - Partial Perfect Copula – mixes perfect correlation with uncorrelated

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs (Reinsurance Inputs)

- Reinsurance Contract Terms
 - Per Risk
 - Excess
 - Corridors
 - Ceded Premium
 - Ceded Reinsurance Attachment Point
 - Ceded Reinsurance Limit
 - Specific Catastrophe Reinsurance Terms
 - Reinsurance Catastrophe Modeling Results (i.e. AIR, EQECAT, RMS)

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs Economic Scenarios

- Economic Scenario Generator (ESG):
 - Enables insurance and financial services companies to model possible future states of the global economy and capital markets for the purposes of portfolio and risk management.
 - Uses a stochastic distribution of possible economic futures including unexpected but plausible outcomes
 - Permits a detailed understanding pertaining to:
 - Risks a firm faces and
 - Relationships between those risks and the potential rewards in retaining them.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Inputs - Economic Scenarios

- Economic Scenario Generator -
 - Estimates inflationary changes, wage & CPI
 - ECM uses the following estimates of investment returns and default risk:
 - US Treasury bonds
 - US, United Kingdom, and Euro stock markets
 - Emerging Markets stocks
 - Blue Chip Stocks
 - Corporate and Municipal bonds of varying quality
 - Master Limited Partnerships
 - Real Estate Investment Trusts (REITs)
 - Mortgage Backed Securities

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Conning & Company's GEMS® Economic Scenario Generator (ESG)

- GEMS ® from Conning & Company
 - Stand-alone ESG for use in conjunction with risk modeling application
 - Leading edge economic models, providing full market risk and asset class coverage
 - Correlations among economies are rigorously maintained.
 - Continually updated to reflect changing political, economic, and capital market environments.
- Variables modeled by GEMS® include
 - Interest Rates,
 - Inflation,
 - Corporate Credit Risk,
 - Equity Markets and Foreign Exchange ,
 - GDP, and
 - Unemployment.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Basic Outputs

- Outputs include but are not limited to:
 - Over 180 customizable reports
 - Cumulative Probability Density Functions
 - Compare results from differing assumptions
 - Include effect of catastrophe losses
 - Calculates Value at Risk (VaR) & Tail Value at Risk (TVaR)
 - Pro Forma Financial Statements
 - Balance Sheet
 - Income Statement
 - Number of projected years is flexible

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



ECM Output - Key Risk Metrics

- Value at Risk (VAR) – Maximum loss at no more than one minus the confidence level
- Tail Value at Risk (TVaR) – Expected loss in worst X percentage of distribution; also called CTE
- Risk Adjusted Performance – Measure risk adjusted returns on some established capital amount
- Return on Equity – Simple accounting performance metric

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Stress Testing and Scenario Analysis

- A scenario describes a consistent future state of the world over time, resulting from a plausible and possibly adverse set of events or sequences of events. A stress test provides an assessment of an extreme scenario, usually with a severe impact on the firm, reflecting the inter-relations between its significant risks.
- Together, they complement the use of economic capital models that apply probabilities to possible future scenarios to determine appropriate capital needs of a firm. In contrast to internal models, scenario analysis and stress testing assess the financial effect of the events or sequence of events that lead to specific scenarios in adequate detail so that their causes can be identified and their effects on the firm can be understood. Thus, they can be used to enhance the understanding of if and why a firm is vulnerable to highly uncertain tail risks.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Definitions

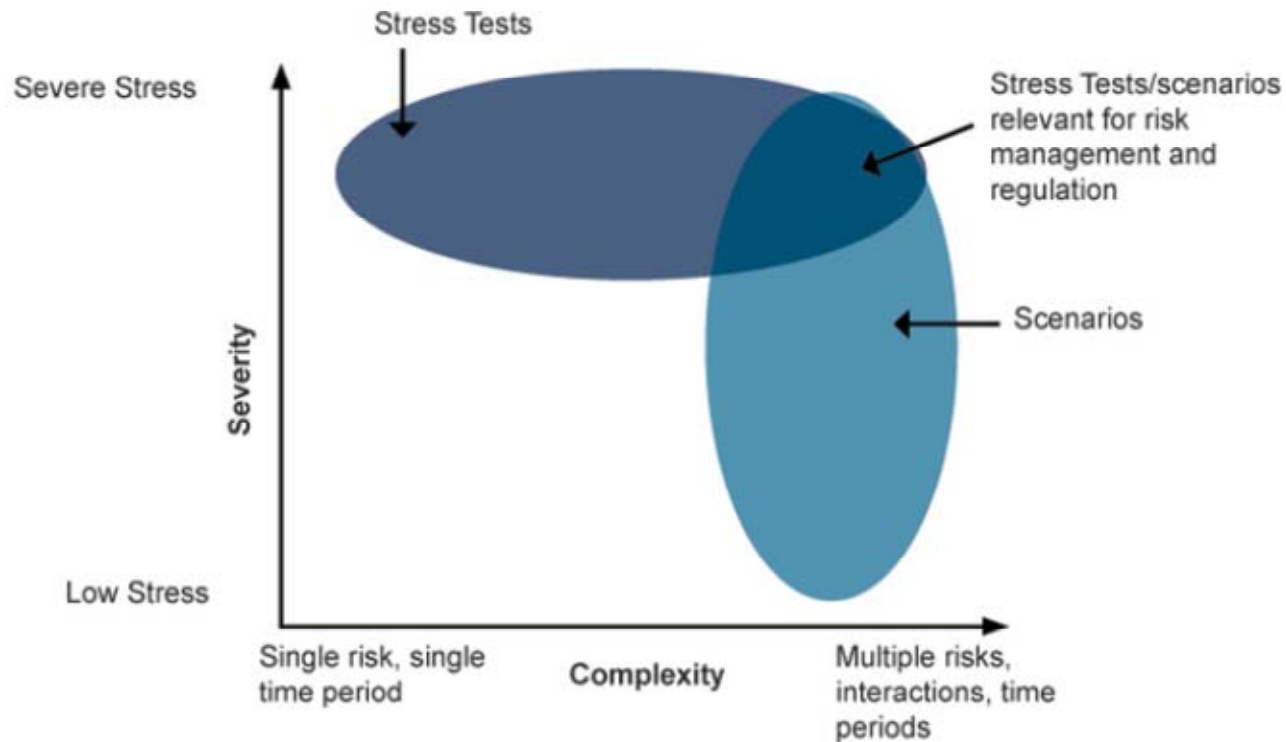
- A scenario is a possible future environment, either at a point in time or over a period of time. A projection of the effects of a scenario over the time period studied can either address a particular firm or an entire industry or national economy.
- A *sensitivity* is the effect of a set of alternative assumptions regarding a future environment.
- A stress test is a projection of the financial condition of a firm or economy under a specific set of severely adverse conditions that may be the result of several risk factors over several time periods with severe consequences that can extend over months or years. Alternatively, it might be just one risk factor and be short in duration⁵. The likelihood of the scenario underlying a stress test has been referred to as extreme but plausible.

ORSA Section 3 – Group Risk Capital and Prospective Solvency Assessment



Definitions (cont'd)

Figure 1



Contact Information



Lisa Cosentino
Managing Director
267.670.7320
lcosentino@smartdevine.com



Kim Piersol
Consulting Actuary
610.892.1808
kim.piersol@hugginsactuarial.com



Educational Conference & Business Show
June 7-10, 2015 ♦ Mandalay Bay, Las Vegas, NV

**Please Complete the Session Evaluation Form on the
Conference App**