Using Scenario Analysis in a Risk Management Framework

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November 11, 2014
Disclaimer

- This presentation represents the opinions and views of Neil Drzewiecki & Tim Patria and do not represent our employer MassMutual.
Agenda

- Considerations in Scenario Analysis
- Examples
Introduction

- Scenario Analysis is a means of understanding the impact to your organization in a stress environment using a single or limited set of events

- Scenario Analysis can be useful tool as part of a robust risk management framework
  - Growing trend in using scenario analysis (rating agencies, regulators, management)

- We’re here to explore some considerations in using scenarios

- 2 Specific Examples of Scenario Analysis in a Risk Management Framework
Focus on strategic risk management and integrating risk analyses into decision making

Scenario analysis is not new and has been used in many contexts

What this presentation is not:
  - A recipe on how to do any specific existing analyses such as VAR, CFT, Solvency II

Scenarios are not limited to specific financial events
  - For example, scenario analysis can be utilized to understand operational or reputational risks

ASOP 46 & 47
  - Risk Evaluation in Enterprise Risk Management
  - Risk Treatment in Enterprise Risk Management
Define the objective and desired measurements

- Need to be clear on your objective and what you will be measuring
- What decision are you influencing or considering?
- Examples:
  - Solvency analysis or capital adequacy
  - Set or define a risk appetite
  - Set a risk limit on a specific risk
  - Compliance function
- Measurements:
  - Capital
  - Volatility of Earnings – which accounting basis?
  - Sensitivity of specific metrics
- What scenario are you picking – why does that scenario have value to your analysis
- ASOP 41 disclosures – intended audience, uses of your analysis
Selecting the Scenario

- Be descriptive on the scenario – tell a story

- How far in the tail are you? How adverse should the scenario be?

- Depends on the objective
  - Continuation of strategy
  - Solvency

- Critical that it’s believable and you obtain buy in

- Think through holistically how it would impact the company

- Demonstrate why the scenario was chosen and how it impacts the analysis
Setting the assumptions

- Link to your holistic analysis of impact to the company
- How to calibrate & set assumptions in the tail
  - Might have limited or no experience
  - Consider a range of assumptions
- Gather diverse experts; discuss with peers; use stochastic modeling?
- Reflecting management actions
  - Are there documented policies or actions in specific events
- Existing risk mitigations
  - Hedging? Reinsurance?
  - How are you handling counterparty risk?
- Actuarial judgment will be needed
- Be clear what you did, document and disclose properly
Communicating the results

- Run your model – now what?
- Tailor the communication to your audience
  - Risk maturity of your organization
- Communicating Results
  - Scenarios lend themselves to be communicated
  - Stochastic analyses can be harder to grasp
- Be very clear on the purpose of the analysis and limitations
  - What are your key assumptions?
- Linking to your strategy
- Influencing Decisions
Pros & Cons

- Single scenarios can be easier to understand & communicate
- Easier to model and validate
- Are they too simple?
- Do they fully capture the risks you are analyzing?
The opportunity: purchase a sizeable block of deferred annuity business into a life insurance company that sells predominately life insurance business

Company criteria for a capital investment
- Satisfies strategic plan goals
- Stock price growth
  - Return on capital investments exceeds 12%
  - GAAP income growth and earnings per share growth
  - Maintain or increase the dividend level
- Financial strength rating to support the business strategy
  - RBC ratio greater than 400%
Do You Purchase the Block?

Pricing and capital criteria

- The pricing of the deal is in itself an exercise in scenario analysis

- Sample output may look like
  - Capital can be raised to support the purchase and maintain 400% RBC
  - GAAP income increases in operating plan (and increases EP)
  - Returns
    - 14% - Base case scenario
    - 13% - Rates down but above rate guarantee
    - 6% – Rates down and 50bp below rate guarantee
    - 0% –Rate shock increase of 300bp over two years with higher withdrawals
    - 11% - Expenses are 10% higher than projected
    - This may be weighted in some fashion such that expected return is 12.5%

- Do you move forward with the transaction?
  - All appearances are YES
Do You Have Sufficient Information?

- Then the CEO asks how this transaction affects the company risk level and whether the transaction hindered its ability to continue with the existing business strategy
  - Common answers identify the risks that were taken and “priced for”
    - Credit risk
    - Disintermediation risk
    - Rate guarantee risk
  - Only armed with the return numbers of the transaction (in various scenarios), no one can specifically answer the question
Enterprise Risk Appetite
Provides risk framework to assess a strategic initiative

- Identify risks to the company business strategy
  - RBC level – financial strength ratings (FSR)
  - Liquidity – FSR, regulatory response
  - Decline in GAAP income – shareholder response

- Impacted by pandemics, change in credit markets and interest rates and associated policyholder behavior

- Develop scenarios that stress the inherent risks
  - Stochastic or Deterministic
  - Theoretical scenarios – can tailor a stress
    - Interest rates rise and credit markets are stressed
  - Historical scenarios – captures attention, feels real
    - Depression, 08/09 financial crisis, S&L crisis high interest environment
Scenario 1 – Pandemic and interest rate decline of 150 bps over 1 year period

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<th>Criteria</th>
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Scenario 2 – Rates up 300 bps over 2 years, credit spreads rise 200 bps over 2 years

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Strategic Actions to Support Risk Appetite
Modify portfolio assumption to support scenario two

**Assessment**
- In this case, product portfolio shifts to a much higher % of on-demand $’s
- Pricing based on current portfolio allocation. High policy holder withdrawal behavior cannot be supported in rising rate environment

**Action**
- Increase liquidity of asset portfolio
- Reduces investment income

Pre-Acquisition    Post-Acquisition    With Modified Portfolio

Re-price the opportunity and reassess risk appetite and pricing criteria
What is an adverse scenario?
- Role playing of an unfavorable set of circumstances

Why perform scenario testing?
- To practice responses and identify potential enhancements

When should one be done?
- When a process is mature and the business is confident they will pass the scenario

How perform one?
- Identify the participants, create a realistic script – ideally with “actors” to role play key constituents, and schedule several hours of uninterrupted time to work together

What comes next?
- Perform the test, have someone monitor what worked – and more importantly what didn’t – identify steps/owners/dates to enhance future performance
- Repeat in the future once owners are confident in the revised process
Scenario: Cyber attack creates a significant data theft

Tabletop exercise includes participants from areas such as Corporate Communications, IT, Business units, Risk Management

Facilitator reveals events in a compressed real-time basis to the simulation participants with the “actors” jumping in with role playing demanding answers to hard questions

Potential unexpected findings

- No defined process to communicate amongst groups
- Multiple areas believe they are responsible to deliver communications to employees or the field - potential inconsistent messages
- No relationship exists with credit monitoring services - time to negotiate deal delays calming of constituents and limits power to negotiate price
- No backup facility to process business while systems are “cleaned” – potential regulatory issues, significant expense to perform tasks, angry clients or brokers
Adverse Scenario Example
The quantitative angle

- With knowledge about the implications of an attack
  - What is the cost of potential attack scenarios? and,
  - Is there an action to take now?

- Costs of a breach
  - Credit monitoring services
  - Down-time of employees and executive management diversion from other activities
  - Reputation – lost business/brokers

- Weigh the cost of mitigation against the risk
  - Proactive contracting with credit monitoring services
  - Purchase insurance to reimburse costs
  - Invest in software/hardware to harden defenses (everywhere? or targeted areas?) or create backup capability