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ERM: Issues and Applications

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Joan Lamm-Tennant, PhD
Global Chief Economist and Risk Strategist
Guy Carpenter
Overview

- **ERM: The Basics**
  - What is ERM?
  - Why?
  - What is the Role of Rating Agencies and Regulatory Bodies?

- **ERM: Beginning The Journey**

- **ERM: A Foundation for Capital Models**
  - Using Capital Models to Create Value
    - Capital Adequacy
    - Capital Allocation
    - Capital Structure

- **Current Practices**
ERM: The Basics
What is ERM?

- Embedded in an organization’s “culture”
- Involves a broad identification and assessment of risk
- Allows for enterprise-wide measures of risk
- Links enterprise-wide risk metrics to corporate risk appetite and economic capital
- Allows management to see the impact of strategic alternatives on
  – expected profitability, and
  – organization-wide measures of risk
Why ERM?

- Rating Agencies
- Regulatory Requirements
- Actually, good business discipline that will
  - Design successful business plans
  - Better align management
  - Transparency and awareness with Boards
  - More efficient use of capital
Regulatory View of ERM

- UK FSA mandatory ERM and internal capital modeling began in 2004
- EU Solvency II taking similar tack, targeted for rollout in 2009
- International Association of Insurance Supervisors mirrors Solvency II
  – Likely to propagate around the world, including…
- NAIC
  – Corporate Governance for Risk Management Act and draft Regulation exposed (*board oversight of enterprise risk management*)
  – P&C RBC Working Group following global movement to full internal company modeling
- Conclusion – NAIC will eventually move to IAIS / Solvency II type model – time frame remains uncertain

*Regulation is not the driver of ERM in the U.S.… Rating Agency focus is.*
A.M. Best … Position on ERM

- ERM is not a separate component …
  Impacts all three areas of rating evaluation

  - “Risk management is the common thread that links balance sheet strength (capitalization), operating performance, and business profile.”

- What’s New?
  - Level of Board and Sr. Management focus
  - Greater focus on risk modeling with explicit recognition correlation and the five categories of risk
    - Credit, Market, Underwriting, Operational and Strategic
  - Strategic business opportunities are considered in terms of return potential and their impact on “risk to capital”
  - Will consider allowing companies to maintain BCAR levels below the rating guideline based on the insurer’s overall risk management abilities
Standard & Poor’s … Position on ERM

- In October 2005, S&P began assessing the ERM practices of insurers
  - Separate major rating category
  - All companies will need to have ERM capabilities to limit their risk exposures and losses to within appropriate tolerances.

- As of Dec. 2006, the ERM practices of 160 companies have been reviewed
  - Most attest to having ERM, majority (80%) were considered “adequate”

- A strong ERM process will
  - Identify risk
  - Set risk tolerances
  - Manage processes to limit risk exposures within risk tolerance
  - Set strategy to optimize risk-adjusted returns

- S&P links ERM to economic capital and strategic risk management
  - Only those companies with a “excellent” or “good” ERM assessment will be invited to present their economic capital models in 2007.
ERM: Beginning The Journey
ERM Behavioral and Empirical
Embedded in the Corporate Culture

- By articulating corporate strategy in terms of risk-adjusted returns, corporate risk culture is strengthened
  - Disciplined Decision Making
  - Design Successful Business Plans
  - Corporate Alignment
  - Transparency and Awareness with Boards
Involves a Broad Identification of Risks

Property-Casualty Insurance
Company Enterprise Risk

Credit
Market
Liquidity

Underwriting
Accumulation / Cat Reserve Deterioration

People / Processes / Systems
External Events
Business Strategy
Analytical Process
Allows For Enterprise Measures of Risk

- Economic Factors
- Individual Assets
- Asset Proxy (Duration/Convexity/Credit)
- Individual Loss Events
- Fit Frequency and Severity Distributions
- Correlation
- Simulation
- Enterprise Risk/Return
- Economic Capital

- Catastrophe Event Tables
- Aggregated Losses

- Operational Risk Event Tables
- Aggregated Losses
Simulation gives us a new measure of risk – “Capital-at-Risk”

CaR is the probability of a decline in capital – for example, the probability of a 20% decline in capital is 10% (a 1 in 10 year event)
For example, a capital model allows the users to understand the drivers of the bad events by inspecting specific simulated paths.
ERM: A Foundation for Capital Modeling
From ERM To Capital Modeling
Capital Management

- Three key “value maximizing” questions about capital

  - Manage the Adequacy of Capital
    - How much capital does the firm require?
      - Too much capital will lower the ROEs...
      - too little capital will increase the cost of capital and impose frictional costs of regulation

  - Maximize Return on Capital
    - Allocate capital to drive growth in lines yielding the highest return on risk-adjusted capital (RORAC)
      - Often referred to as RAROC, risk-adjusted return on capital

  - Minimize the Cost of Capital
    - How does management minimize the cost of capital?
      - Minimize the component cost of capital…cost of debt and equity
      - Achieve the optimal capital structure…balance the various sources of capital
Creating “Economic Value”

EVA = [ROC – Cost of Capital] x Capital

↑ Maximize
Capital Allocation
Very hard in a soft market

↑ Minimize
Cost of Capital
Blend all sources of capital to minimize cost

↑ Manage
Capital Adequacy
Carry only what you need
Managing Capital…Three Opportunities to Create Value

- Capital Adequacy
- Capital Allocation
- Capital Structure

EVA
- Maximize Return on Capital
- Minimize Cost of Capital
1. Capital Adequacy

- Capital Adequacy
  - How much capital is needed to back the firm’s risk portfolio.
    - Financial economics suggests that capital adequacy depends on
      - Current Risk Portfolio
      - Business Plan, and
      - Risk Tolerance
    - But, risk tolerance is not static
      - Dynamic tradeoff between the return on the risk portfolio and the cost of capital
Economic Capital – Depends on Risk Tolerance

Risk Appetite
(10% Surplus Decline)

2% Prob.

Required Economic Capital
= Best Estimate
Economic Capital - Depends on Risk Tolerance

Risk Appetite
(10% Surplus Decline)

2% Prob.
5% Prob.

Required Economic Capital = Best Estimate
Economic Capital - Depends on Risk Tolerance

Risk Appetite
(10% Surplus Decline)

- 2% Prob.
- 5% Prob.
- 10% Prob.

Required Economic Capital
= Best Estimate

Expectation

Capital
What Is The Appropriate Amount of Risk?

- The appropriate level to risk is cultural, although externalities will place restrictions at the extreme.
- While there is no magic formula, many factors will affect risk tolerance
  - Ownership structure
  - Owners’ expectations
  - Opportunities for growth
  - Intensity of oversight from regulators and rating agencies
  - Size
  - Access to new capital
  - Persona of management and board
  - Corporate culture and history
- Above all, recall that risk tolerance is a “dynamic” tradeoff between the return on the risk portfolio and the cost of capital
Capital Allocation
Beliefs … And Common Errors

- Capital is really not divisible
  - But when capital is not allocated we experience a classical problem in economics … “Tragedy of Commons”

- Capital is free, in particular internal capital is free
  - But contributors of capital require a return equivalent to what they could earn on the money if it had been paid out
    - Retained profits have an “opportunity cost”

- Less capital given some income stream will result in higher ROEs
  - But line/product managers are running a free default put on the company
  - Causes perverse incentives
So Why Allocate Capital

- Capital allocation becomes a disciplining mechanism
  
  - Avoid overuse … incentive to grow lines/products with highest returns
  
  - Impute a capital charge when pricing products
    - ROE > Cost of Capital
  
  - Establishes “fairness” amongst the line/product managers when establishing performance targets
Capital Allocation Techniques

- Numerous methodologies are considered legitimate for allocating capital
  - Proportional Methods
    - Allocate capital in proportion to the segments contribution to enterprise risk
  - Marginal Methods
    - Equalize the marginal default probability across all lines

![Diagram of Capital Allocation Methods]

- Proportional
  - Variance/Covariance
  - Ruhm Mango Kreps

- Marginal
  - Merton Perold
  - Myers Read
Proportional Methods: Variance/Covariance

- Variance/Covariance
  - Sum of the covariance equals the variance
  - Derive the covariance between the line’s underwriting profit and the total underwriting profit across scenarios
  - Allocate capital proportionally ... line’s covariance relative to the variance of total underwriting profit
Myers-Read utilizes a micro marginal allocation approach by measuring the impact of an incremental increase in a business segment’s liabilities on the overall default value of the enterprise.

- The goal is to allocate surplus so as to equalize the marginal contribution to default for each of the lines.
3. Diversify Our Capital Structure To Minimize The Cost Of Capital

- **Optimal Capital Structure**
  - Diversifying across the various sources of capital will
    - minimize the cost of capital, and
    - maximize the value of the firm
  - The WACC falls initially because of the tax advantage of debt. Beyond the optimal level of debt, the WACC begins to rise because of financial distress costs and agency costs.
  - Using alternative sources of capital may lower the WACC
Capital Structure

- How does management blend various sources of capital to minimize the cost of capital
- Innovations in sources of capital
  - Surplus Notes
  - Catastrophe Bonds
  - Side Cars
  - ILWs
  - And more
Current Practices
An economic capital model assesses how much capital a company needs to stay solvent with a specified probability given the risks to which it is exposed. The results can be different, sometimes very different, from those arrived at by regulators or rating agencies.

Mr Bensinger believes that as this process works through, AIG can significantly improve its return on equity, which was 17 per cent last year. Declining to share the precise number he has in mind, he says: “The overall returns on capital will in our view be considerably increased.” Which

The process involved some outside experts. For the modelling, AIG had help from Risk Management Solutions on catastrophic losses, Milliman on general insurance and Mercer Oliver Wyman on life and retirement services. AIG also plans to get independent validation of its model that will probably involve academic experts.
Framing Reinsurance In “ERM” Vernacular

Engagement #1

Probability Distribution - Not Path Specific
Gross vs. Net

Statistics

<table>
<thead>
<tr>
<th></th>
<th>Gross</th>
<th>Net</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean - Gross</td>
<td>$49,842</td>
<td>$26,526</td>
</tr>
<tr>
<td>Mean - Net</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value at Risk - 95%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gross</td>
<td>($176,199)</td>
<td>($13,302)</td>
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<tr>
<td>Net</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TVaR 95%</td>
<td>($269,808)</td>
<td>($33,334)</td>
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</tbody>
</table>

- Net Underwriting Income
- Gross Underwriting Income
Framing Reinsurance In “ERM” Vernacular
Framing Reinsurance In “Capital” Vernacular
Summary

- ERM is the foundation to capital modeling
- Managing capital leads to value creation
  - Capital Adequacy
  - Capital Allocation
  - Cost of Capital
- Insurers are at the early stages of capital modeling
  - Reinsurance analysis
- In time, capital models will drive many strategic decisions
  - Growth strategy
  - Mergers and acquisitions
  - Compensation schemes
- It is an empirical exercise AND a behavioral exercise
For These Times They Are A Changing

Bob Dylan
ERM: Issues and Applications

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