Making Risk Models Relevant

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Key Topics

1. *Relationship of ERM & Internal models*
2. *How can internal models be assured of effectiveness?*
3. *How Do Senior Officers Use Them?*
4. *What Strategic Risks Are Incorporated?*
5. *What Communication Issues Do They Address?*

Relationships

ERM 101 Conscious choice to manage risk instead of accept risk.

MBA 101 . Can't manage without measurement

Insurance 101 Can't measure risk without a model

Shareholder Value 101 Need an actuarial control cycle process built around it to build value

Actuarial Control Cycle

1. Specify the problem – Manage risk, not gamble with it (Ruin theory)
2. Develop a solution - An internal model is a hypothesis
3. Review and monitor. – Review hypothesis (via actual to expected) and confirm or improve
4. More simply called a feedback loop.

ERM & Internal Models

Internal model is more than a tool.

It is the fundamental mechanism through which the ERM process can be managed to create value for the firm.

Done right, it sets transparency and accountability for the management of the company's risks.

Two Types of Models

Model by Analogy – Economic Forecasting & CF testing

Scientific Approach – Validation Process

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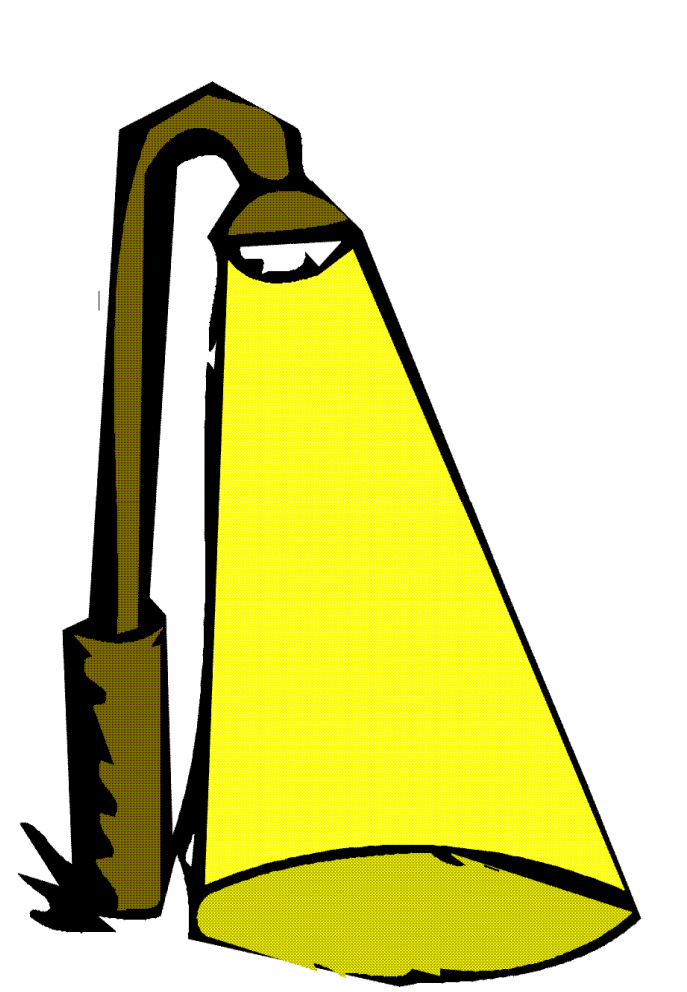
Encourage the financial reporting process to shine its light into the future



Identify All Risks Accepted

Do not accept (or write) risk that is not understood or cannot be managed, hedged or reinsured. This includes an examination of the tail events and options (not just the median or “likely” events) as well as the determination/documentation of the various management options.

Risk Categories

- Financial risk via equity, interest or credit
- Insurance risk
- Policyholder behavior
- Future management decision risk
- Operational risk.

Next Steps

1. Establish independent verification & validation processes (More later)
2. Examine timing and impact of options in the future, to determine when and if the management of that risk becomes unprofitable.
3. Once measured, set appropriate reserves, capital, company action levels and risk limits
4. Consistent Set of Risk Metrics
5. Documentation

Consistent Risk Metrics

Economic and/or regulatory?

IRR, CTE, VAR, MCEV, EGP's

While essential to have, do not produce a magical answer for rule-based decision making

Metrics become the basis for making informed risk decisions about the business.

Consistent Risk Metrics

Metrics allow the implementation of measurable risk limits to be considered and included in growth plans and product designs.

Now a mechanism for the company to safeguard its rating through estimating and setting limits on profit volatility that could impair its rating

Documentation

Is much more than “just” for later verification:

1. Documents internal accountability
2. Final numbers document expectations of the future

Management options include:

- Renewal premiums & rates (dividends/excess interest)
- Investment strategy
- Expenses
- Raise capital
- Quit Selling or Enter new Market

Documentation

Document what decisions will be made based on information from this model

Document whose performance will be judged by these results. (Exec bonuses?)

What risks are included and not included

Validation Steps

1 Sufficiency Tests

- 1.1 Conceptual Sufficiency
- 1.2 Implementation Sufficiency
- 1.3 Assumption Sufficiency
- 1.4 Business-data Validation

2 Calibration Tests

3 Change Control Process (Implementation Step?)

4 Integrity Test (via Scenarios)

Conceptual Sufficiency

1. Clarity about risks that are modeled and not modeled.
2. Are the distributions appropriate for the modeled risks? (e.g. Are the tails fat enough?)
3. What professional source is relied on for the used distribution?

Implementation Sufficiency

Are concepts correctly implemented in model?

1. *Validate component calculations*
2. *Test simple case*
3. *Add complexity incrementally*
4. *Test selected scenarios*
5. *Check individual or extreme cases*
6. *Compare against other models*
7. *Compare to published factor models*
8. *Examine the results of various levels of aggregation*

Assumption Sufficiency

1. Can I validate assumptions to ledger results?
2. Is there a formalized process for updating assumptions and to reflect actual results?
3. Do I have access to industry benchmarks?
4. Compare results using simpler assumption sets
5. Back Testing – Behavior Assumptions & Financial Results
6. Can internal hedging model replicate observed market prices of options and futures

Business Data Validation

- Use of Model Points
  - Validity checks for Each Step in Data Transformation
- Use of Control Total Checks
- Use of different inforce data from projection date

Calibration Tests

Besides Policyholder Behavior Updates

Refreshing Stochastic Sets e.g. Real World & Risk Neutral ESG Sets

- Platonic question of the one vs. the many
- Negative interest rates, mean reversion, etc.

CHANGE TESTS

1. Roll Forward, Source of Earnings Analysis
2. SOX like Change Control Discipline

Integrity (or Sanity) Test

Use of Deterministic Scenarios.

- Does an adverse 1 in 100 year event show up in 99th percentile of results?

Reverse Scenarios

- List needed capital for 80, 95, 99.5 99.9
- Construct an event that could have led to such a loss.

Where Are Models Going?

Process is Fundamental, Output is Secondary

1. SOX Like Production Environment for Economic Capital Model at Allianz by end of 2009 for quarterly results.
2. Needs to integrate with Creation of the “Grammar of Risk Management”
3. Tool to assess competence of Company

Q & A