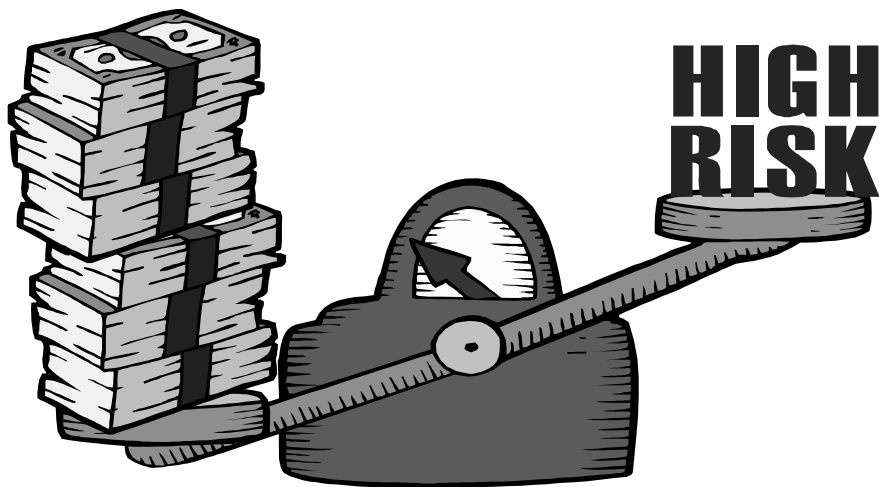


# ***ERM and Integration of Economic Capital Models (ECM) Results into the Rating Evaluation Process***

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Higher the Risk Higher the Capital.

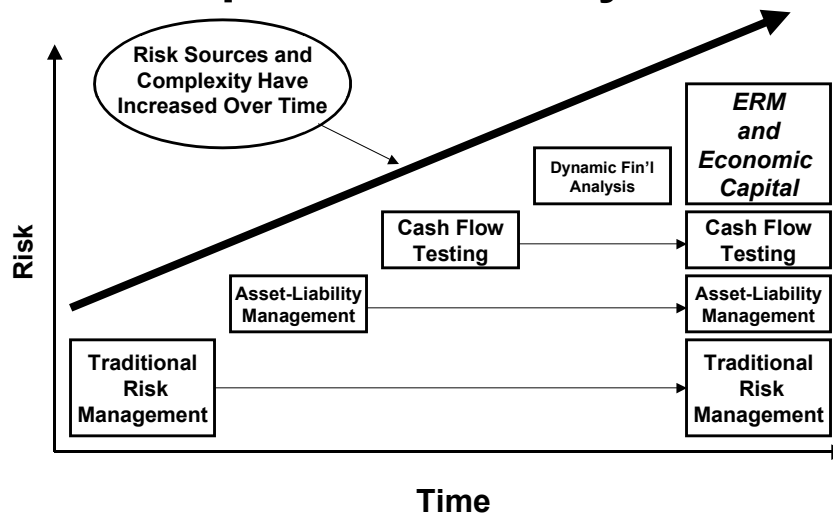


## Discussion Overview

- Overview of Best's ERM Framework
- Role of Best's Capital Adequacy Ratio (BCAR)
- Assessment of Economic Capital Models (ECM)
- Integrating ECM into the Rating Analysis
- Insights into ECM
- What we have seen so far



## Insurance Industry Continues to Respond to Risk Dynamics



## ERM for all companies ?

- Nature and scope of ERM will vary based on:
  - Complexity of a company
    - type of products offered
    - Number of products offered
    - Investments
  - Volatility of Earnings/potential significant capital loss (Risk profile)
  - Financial Flexibility
  - Strength of its Traditional Risk management



## ERM...Embedding Risk Management into your “Corporate DNA”

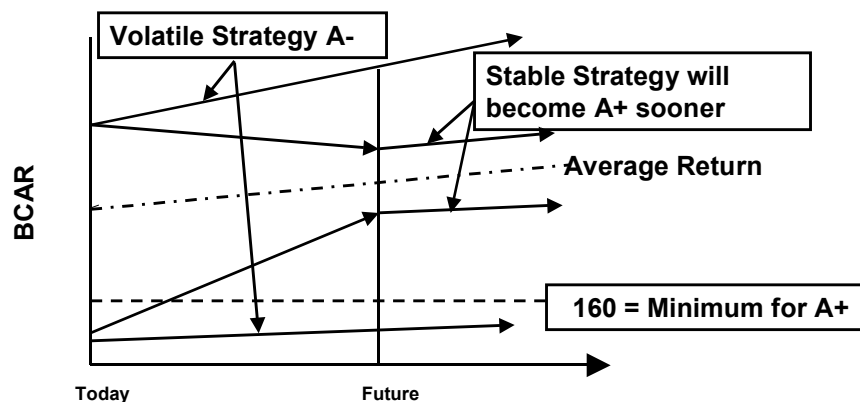
- ERM and Economic Capital model must be an integral part of the management process and decision making culture of the institution
- Risk awareness is properly embedded in the daily operating procedures employed across the organization



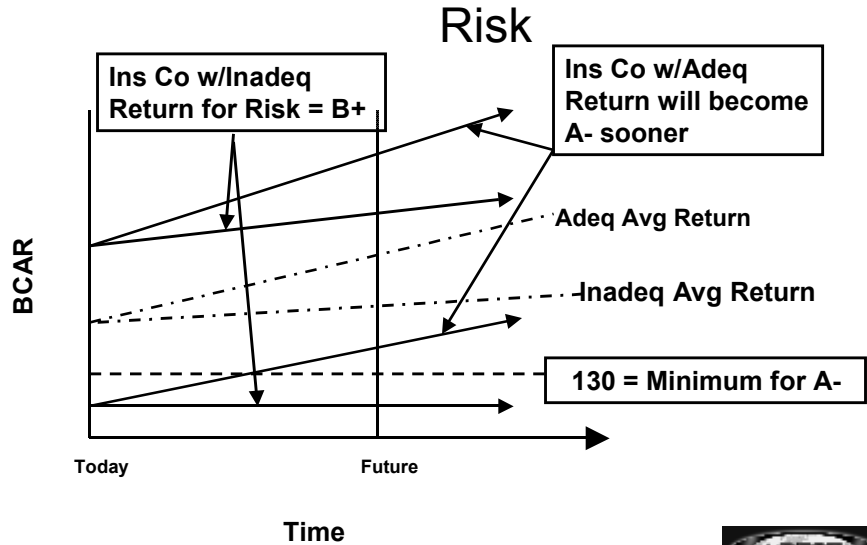
## What is “Strong” Enterprise Risk Management?



### Impact of ERM - Example of Changing Business Strategy From Volatile to Stable Lines

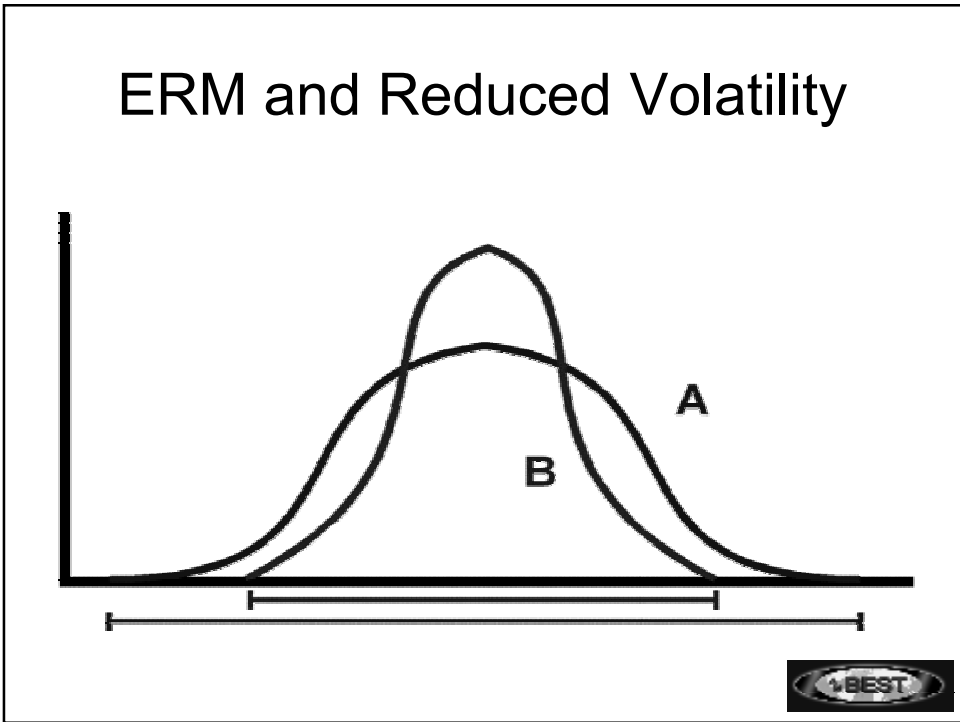
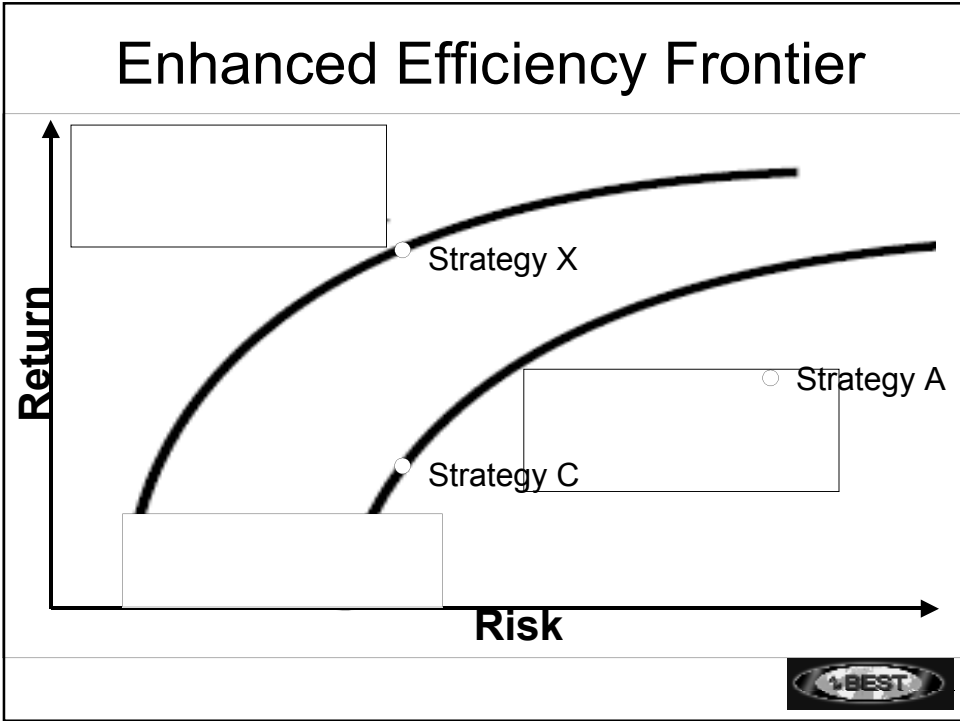


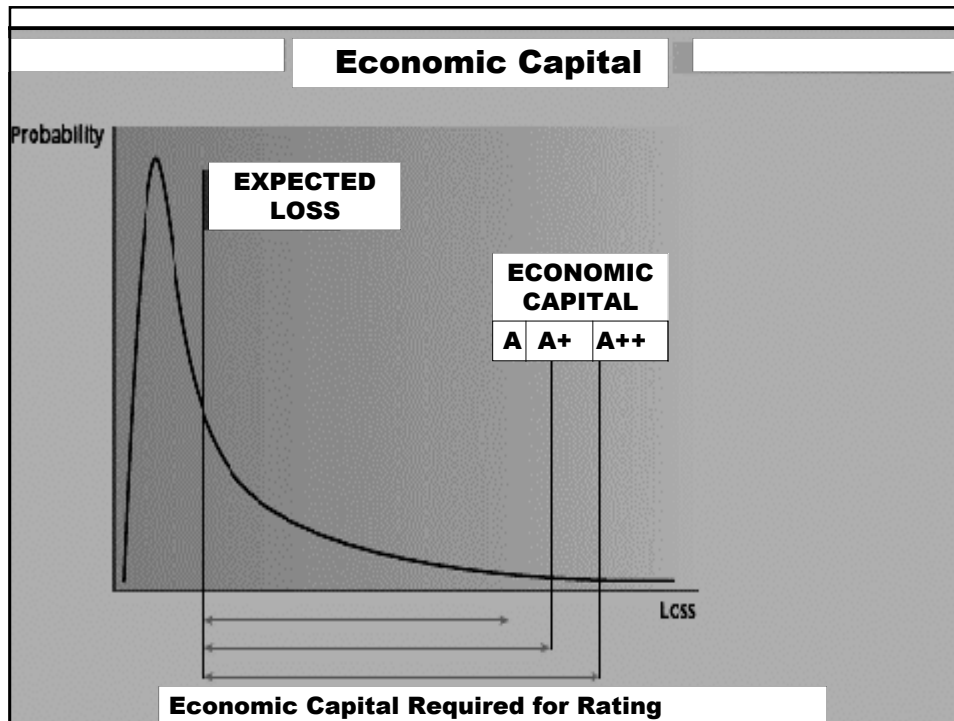
## Impact of ERM - Example of Receiving Adequate Return for Risk



## Efficiency Frontier







## Role of BCAR (cont.)

- **BCAR is still an important tool**
  - Many organizations do not have the scale and sophistication to support an Internal Capital Model
  - Value of BCAR in rating process proven over time through our default statistics



# Capital Models

"A model, of necessity, is an abstraction from the full detail of the real world"

- Alan Greenspan, March 2008

(Abstraction - Generalization; ignoring or hiding details.....)



## ECM and Ratings

### ➤ ERM Methodology

- *"A.M. Best will be expanding the use of company-provided capital models in developing capital requirements within the rating evaluation process."*

### ➤ Next steps are to define:

- How will AMB gain comfort in the integrity of an insurer's ECM process and results?
- How will AMB integrate ECM results in the rating analysis?





**How will AMB gain comfort in the integrity of the ECM process and results?**

- **Two-tier evaluation**
- **(First tier) Independent assessment of an insurer's ECM process and results**
- **AMB believes there is a strong correlation between assessment of ECM and audit of financial statements**
- **Independent assessment is an iterative process to see model performance and it is doing the intended job**



**How will AMB gain comfort in the integrity of the ECM process and results?**

- **Independent assessment of an insurer's ECM process and results**
  - Data integrity (including assurance that baseline financial data is consistent with inputs to audited financial statements)
    - Documentation and reporting
    - Back testing
    - Benchmarking



**How will AMB gain comfort in the integrity of the ECM process and results?**

➤ **Independent assessment of an insurer's ECM process and results**

- Statistical quality test (including appropriateness of methodology and assumptions of model)
- Calibration test (including extent to which stress and scenario testing is used to determine impact of tail events)



**How will AMB gain comfort in the integrity of the ECM process and results?**

➤ **Independent assessment of an insurer's ECM process and results**

- Use test and governance (including evaluation of governance and internal controls in place related to ECM)
  - Performance measurement/compensation
  - Pricing/Reserving
  - Capital allocation
  - Strategic decision making



**How will AMB gain comfort in the integrity of the ECM process and results?**

- **(Second tier) AMB discussion of key elements of ECM process and results**
- **Supplement to the current annual rating meeting and rating evaluation**
- **Some overlap with topics covered in the independent assessment**
  - AMB review not an “audit”
  - Objective is to better understand ECM vs. BCAR or other metrics



**How will AMB gain comfort in the integrity of the ECM process and results?**

- **Objective is to better understand ECM vs. BCAR or other metrics**
  - Compare/contrast “gross” ECM results to BCAR, i.e. pre-diversification benefit
    - In aggregate, by LOB, by major risk type
  - Compare/contrast “net” ECM results to BCAR, i.e. post-diversification benefit
    - In aggregate, by LOB, by major risk type
  - Reconcile results for current time period and understand trends



## How will AMB gain comfort in the integrity of the ECM process and results?

### ➤ AMB discussion points

- Analytical framework and modeling approach for each major risk type, algorithm, formula
- Accounting/valuation method for assets and liabilities
- Time horizons
- Risk metric (VaR...TVaR/CTE)
- Assumptions and assumption development process
- Stress and scenario testing
- Copulas
- Timeliness and availability of data
- Simulation, scenarios



## How will AMB gain comfort in the integrity of the ECM process and results?

### ➤ AMB discussion points (continued)

- Applicability and relevance of data
- Sample length and relevance
- Operational, strategic and emerging risks
- Disclosure (internal and external)
- Parameter error and model error and model implementation error considerations
- Internal and external “audit” findings
- Fungibility of capital
- Next steps in ECM development
- Sensitivity & Key assumptions

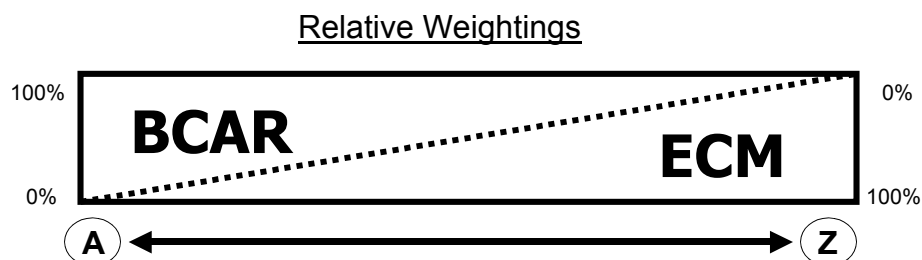


## How will AMB integrate ECM results in the rating analysis?

- Independent assessment of ECM is required to get any “credit” in rating analysis
- Credit will be determined on a case-by-case basis
- Flexible weighting of BCAR results and ECM results based on AMB review (considering audit findings)



## How will AMB integrate ECM results in the rating analysis?

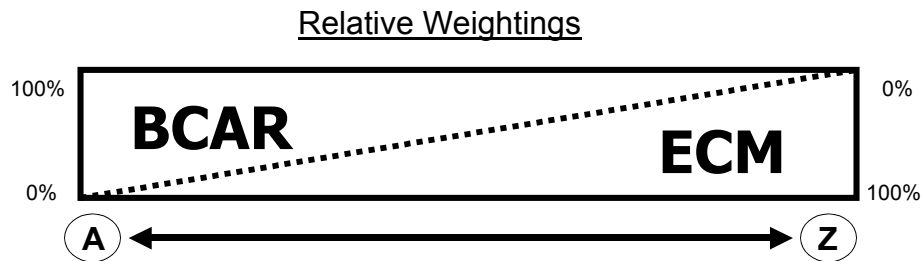


### Items for Discussion:

- What is the basis or metric used for relative weighting?
  - Ratio result, diversification credit, required capital, excess capital
- How do you deal with STAT vs. GAAP vs. Market Value results?



## How will AMB integrate ECM results in the rating analysis?



### Items for Discussion:

- Can the relative weighting reach 100% ECM?
- Can credit be given for “partial” models?
- What detail should AMB disclose about the analysis and weighting?



## DATA

- Data is complete, accurate and adequate
- Internal, external, expert opinions, combination
- Data sampling periods, sampling frequencies,
- Data validation and reconciliation



## Dependencies correlations

- With in risks, across risks, across lines of business, across entities
- Correlation matrix
- Copulas
- Stochastic modeling
- Risk mitigation techniques included
- Management actions taken into consideration

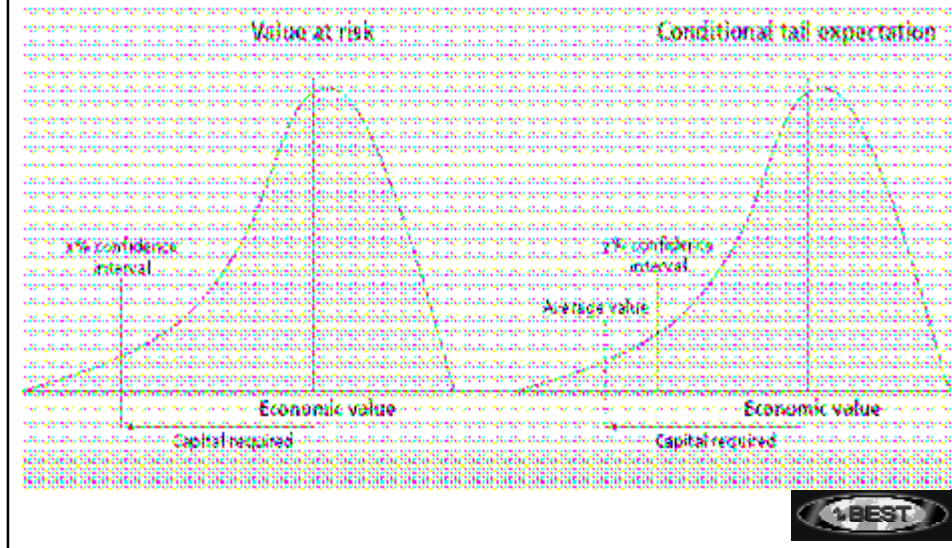


## Risk Metrics and calibration

- VaR , TVar or combination
- The level of confidence
- Time horizon
- Risk metrics for different risks or consistent across the enterprise
- How is aggregation done



# Risk Metrics



# Model Testing

- Back Testing against historical data
- Scenario and Stress Testing
- Model output against generally accepted industry norms
- Model output against available data





## Model documentation

- Model development and structure
- Outline of Technical documentation
- Change documentation
- List and Frequency of Parameter calculations, updates, and model calibration
- Models Sub-Models and Versions if any
- Documentation understandable and accessible
- Public disclosure of the documentation



## Model Validation

- Internal or external
- Procedures to check the calibration and appropriateness of the model
- Validation is iterative
- Qualitative validation
  - Departments, design teams, management teams, risk ownership at all levels, Model design, Data Quality, Use Test
- Quantitative
  - Model calibration, back testing, benchmarking, scenario testing  
Statistical tools and fitness testing, Calibration
- Model output volatilities across cycles, and across different time periods
- Cognizant of model risk, parameter risk, simulation errors and parameter errors
- Transparency



## Use Test

- Degree to which risk management considers ECM results
- ECM is approved by the senior management
- ECM output is reported to Senior management and to be used in strategy setting
- ECM is used for Capital allocation, capital attribution, pricing, reserving, objective setting, product development, performance
- ECM is embedded, instilled and ingrained in enterprise DNA



## ECM - What have we seen so far?

- Re-insurers, large primaries
- Methodologies vary widely
  - Reserves – bootstrap, Mack, percent deviations
  - Aggregation – Correlation matrix, copulas, Stochastic modeling
  - Time horizon – 1yr/ult runoff, 5yr/10runoff, 4yr
  - Risk tolerance – VaRs - 99.9%, 99.5%, 99.95%, 99.97%
  - Risk Metrics – VaR, CTE/TVaR
  - Usage – Risk Capital, Product Pricing, capital allocation
  - Model/parameter updates – qtrly – annual
  - Validation – Internal validation
  - Documentation – Not satisfactory
  - Maintenance and Development of the Model - Nothing
- No explicit credit given so far.....



# Economic Capital Modeling Requirements

- **The following must be determined before calculating the Economic Capital.**
  - **Time period over which the firm is considering it's risk**
  - **All the material risks the firm is exposed to over this time period**
  - **The probability are likelihood that these risks would materialize**
  - **Risk appetite of the Enterprise**
  - **Risk Metrics that are consistently used across the Enterprise**
  - **Correlation between and among risks and how to aggregate them.**
  - **Stochastic or deterministic approach?**
  - **Risk Distributions and aggregate distribution**
  - **Cognizant of the fact that Economic Capital is driven by tails and tail dependencies**

**Reasonable Assumptions, Reliable Data, Robust Modeling, Judgment and Experience are of paramount importance in determining the EC**



## RECAP

- ERM framework needs to include an enterprise-wide view and process on the identification, quantification and management of risks on a holistic basis
- ERM framework should include development of an EC model, at least for large insurers
- Risk management capabilities are a key factor in determining BCAR capital requirement
- A.M. Best will consider allowing companies to have lower BCAR levels for a given rating, but they must exhibit "strong" ERM
- A.M. Best will expand use of company-provided capital models in developing capital requirements with rating evaluation process



# Model Error/Validity/applicability

“ The essential problem is that our models – both risk and econometric models – as complex as they have become, are still too simple to capture the full array of governing variables that drive global economic reality.”

.... Alan Greenspan, “We will never have a perfect model of risk”, Financial Times, March 16, 2008



# Questions/Comments?



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## Appendix

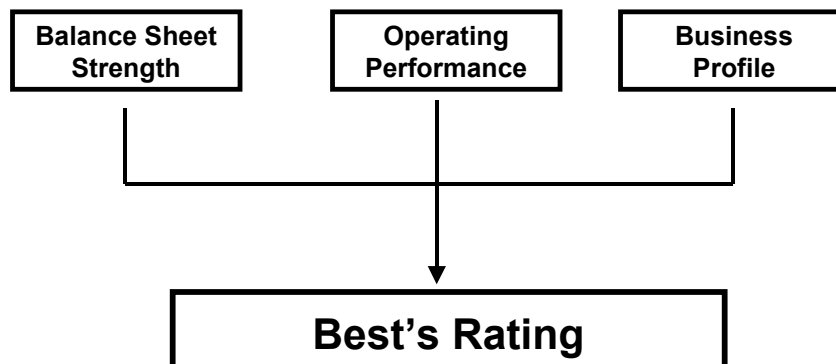


## ERM in the Rating Evaluation

- **Not a separate component**
- **Impacts all three areas of the rating evaluation**
  - Capitalization
  - Operating performance
  - Business profile
- **Integrated into agenda**
- **Clearly the potential to weigh heavily on a rating**



## A.M. Best's Rating Evaluation Key Components

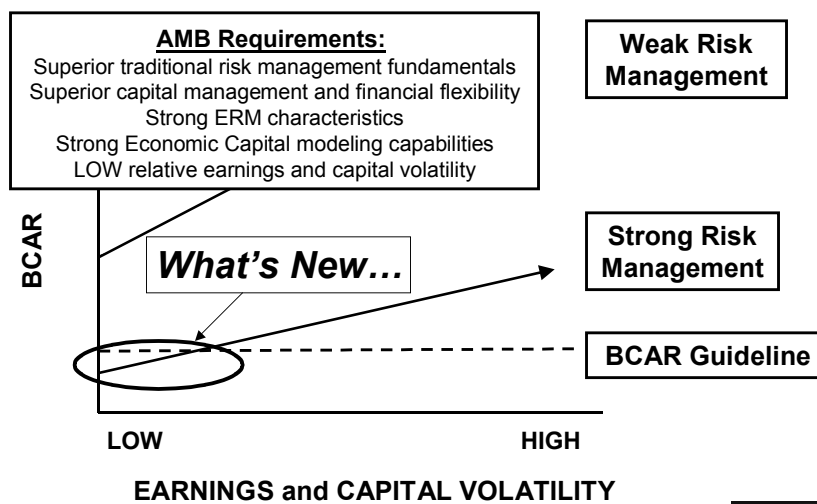


## Enterprise Risk Management

- ERM is the process through which insurers identify, quantify, and manage risk on an enterprise wide, holistic basis
- The underlying premise of ERM is based on increasing value to shareholders and providing financial security to the organization



## Risk Management and BCAR – Best’s Revised Approach



## Economic Capital Models

- Economic capital models have the distinct advantage of combining all material aspects of insurance companies such as underwriting, investments, pricing, taxes, assets and liabilities into one integrated model.
- This in turn might involve analyzing the business plans, future cash flows, future expected operating performance and the impact of all these on Economic or Solvency Capital of the company.

