



Economic Capital

**Actuaries' Club of the Southwest
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Today's session is a broad overview of Economic Capital: what, how and why?

What is Economic
Capital?

Methods for
calculating EC

Using EC in
decision making

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WHAT?

What is Economic Capital?

- EC is about determining the right amount of capital
 - For your business
 - For your risk profile
- Typical definition:
 - Sufficient surplus capital to cover potential losses, at a given tolerance level, over a given time horizon
 - E.g., amount of capital required to protect market value of liabilities, with 99.5% confidence, over a one year time horizon

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WHAT?

Variables are time horizon and tolerance

- 99.5% - 99.95% emerging as a common range
 - 1:200 to 1:2000 events
- Tolerance is linked to risk appetite and target financial strength rating
- One year time horizons also common
 - Longer horizons mean lower tolerance can be used (e.g., AA over 5 years vs AA over 1 year)

EC is about developing the tools and metrics to make informed business decisions

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WHAT?

What about risk-based capital?

- Traditional RBC is uniform, formulaic
- Many reasons for move to PBA also apply to EC
 - Factor based approaches can't detect emerging risks
 - Increased acceptance / demand by external parties
 - Increasing demands for capital → pressure to optimize capital structure / utilization
- EC may be higher or lower than statutory capital

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HOW?

Four major steps to calculating EC

- Develop an economic view of the business
 - Projection of assets and liabilities
- Identify key risks and determine level of stress to be applied
- Apply stresses to economic balance sheet
- Aggregate individual risk capital results, allowing for correlation effects

But, there is no "right" or "wrong"
approach to calculating EC

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HOW? – STEP 1

Develop an economic view of the business

- Assets are measured at market value
- Liabilities are measured on best estimate basis

SAP/GAAP Balance Sheet

Assets	Liabilities
[Bar]	[Bar]

Mix of market and book values

→

Economic Balance Sheet

Assets	Liabilities
[Bar]	[Bar]

Market value Best estimate (No margins)

Excess assets
EC

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HOW? – STEP 2

Calculation should include all material risks

Overall Risk Profile

Risk Aggregation

Market Risk	Credit Risk	Liquidity Risk	Insurance Risk	Operational Risk
Interest Rates Equities Real Estate ...	Defaults Spreads Counterparty ...	Asset/Liability Risk Hedging Programs ...	Mortality Lapses Reserves ...	Distribution Systems People ...

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HOW? – STEP 3

Apply stresses to economic balance sheet

- Difference in net assets between normal conditions and stressed conditions
- Stress tests calibrated to chosen probability level

The diagram illustrates the process of applying stresses to an economic balance sheet. It shows two scenarios: 'Normal conditions' and 'Stressed conditions'. In both, 'MV Assets' and 'BE Liabs' are represented as vertical bars. 'Net assets' is shown as a box between them, representing the difference. In the 'Normal' scenario, the 'Net assets' box is larger. In the 'Stressed' scenario, the 'Net assets' box is smaller. A dashed line between the two 'Net assets' boxes is labeled 'Economic Capital', indicating the difference in net assets between the two conditions.

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HOW? – STEP 3

Run stress tests for each risk identified

- Example stresses:
 - Fixed interest yield +/- 200 bps
 - Mortality: sample size volatility $3.29 / \sqrt{\text{\# dths}}$
 - Lapse +200%
- Run cash flow model for each stress
- Determine capital required to cover each stress

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HOW? – STEP 4

Aggregate results, allow for correlation

- Individual risks are imperfectly correlated
 - Opposite risks
 - Unconnected risk
 - Risks that are less than 100% interdependent
- Need to consider correlation of types of risks (e.g., mortality and credit risk), and between different business units
- Leads to diversification benefit for enterprise
 - Diversification critical for risk management
- Two principal approaches to aggregation
 - Statistical correlation approach
 - Structural scenario approach

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HOW? – STEP 4

Statistical correlation approach

- Define statistical distribution for each risk
- Describe linkages between risks via covariance matrix
- Correlations based on empirical evidence, informed judgment, conservatism
- Covariances usually assumed to be constant

<p>Advantages:</p> <ul style="list-style-type: none"> ■ Transparent ■ Can be simpler ■ Generally consistent with US regulatory, rating agency, banking approaches 	<p>Disadvantages:</p> <ul style="list-style-type: none"> ■ Can't capture complex, non-linear loss functions ■ Certain combinations not practical ■ Individual scenarios limited information / causal value
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HOW? – STEP 4

Structural risk model

- Each risk described by stochastic equation in scenario generator
 - Linkages between risks also built into equations
- Generate scenarios, each represents plausible set of future conditions
- Approach delivers aggregate EC, results by risk category require “disaggregation”

Advantages:

- Capture complex loss functions
- Focus on linkages
- Each scenario is a plausible path

Disadvantages:

- More complex
- Disaggregation required for capital by risk

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WHY?

Some external factors encouraging use of EC

- Regulatory developments
 - UK / Europe: Basel II, Solvency II
 - US: Principles-based approaches
- Multinationals are leading the charge
 - Assists in risk management across different regulatory regimes
 - Puts pressure on others to follow
- Demands and increased scrutiny from rating agencies

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WHY?

Using EC for business decisions

- Value of EC comes from integrating into business decisions
 - Relate risks accepted to capital required
 - How much capital?
 - What type of capital?
 - Actively allocate capital
- Pricing
 - Compare statutory capital to EC - adjust required hurdle rates?
 - Focus on maximizing value, not just return