CAPITAL ASSESSMENT

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Importance of Capital

"Capital is Everything"

Basic Financial Economics of Insurance

- Insurance is a viable risk transfer mechanism when cost of the assuming entity's (insurer's) capital is less than that of the transferor
- This will be true if the insurer achieves:
  - Diversification
  - Prevention of adverse selection
  - Prevention of accumulation
- An insurer's capacity to assume risk (i.e. sustain or grow its business) is directly related to
  - Amount of capital available
  - How well it does the Three Things

How is Capital Obtained

Three Sources of Capital

- Share issuance
- Borrowing
  - Debt must be junior to claims of policyholders
  - Debt capital typically takes the form of subordinated debentures
- Retained earnings
  - Accumulated profits not distributed as shareholder dividends
  - Largest source by far except in nascent insurers

Capital Adequacy Assessment

Capital adequacy assessment is done from several different perspectives.

Each perspective places emphasis on different measures

- Time Horizon
  - One year (Solvency II Pillar 1)
  - Multiple years (ORSA)
- Metric
  - Probability of failure
  - Magnitude of failure
  - Extreme adverse results

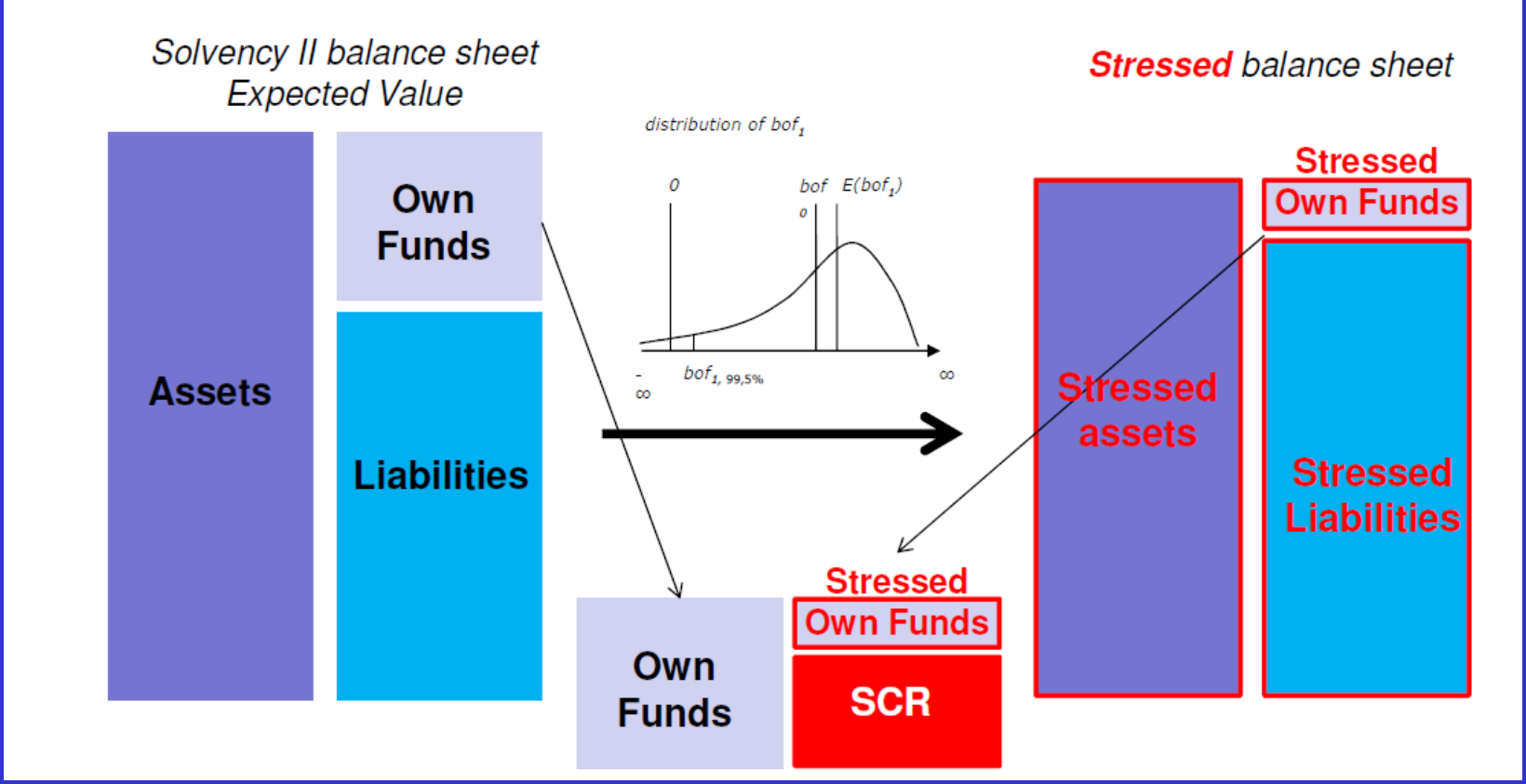
How is Capital Measured

Capital is Excess of Stressed Assets over Liabilities

There are many standards to define “stressed”, and multiple valuation methods:

- IFRS
- GAAP
- Regulatory solvency regime
- Stresses may be stipulated or simulated (or both)

Valuation for Solvency II



Source: European Insurance and Occupational Pensions Authority (EIOPA)

Capital Assessment Model
Key Features

Simulate range of possible outcomes across time

- Responses to externalities
  - Economic factors (interest rates, price indices, growth)
  - Exogenous events (natural phenomena, demographics)
- Stochastic performance of risk processes
- Dynamic response to results
  - Underwriting strategy
  - Investment strategy
  - Capital strategy
- Simulated financial results

Economic Capital Adequacy Metrics

Probability of failure	• Value at Risk (VaR) – quantiles of distribution of stressed capital
Magnitude of failure	• Tail Value at Risk (TVaR) – conditional tail expectation • Expected policyholder deficit
Aversion to extreme outcomes	• Standard deviation • Downside standard deviation

Regulatory Capital Adequacy

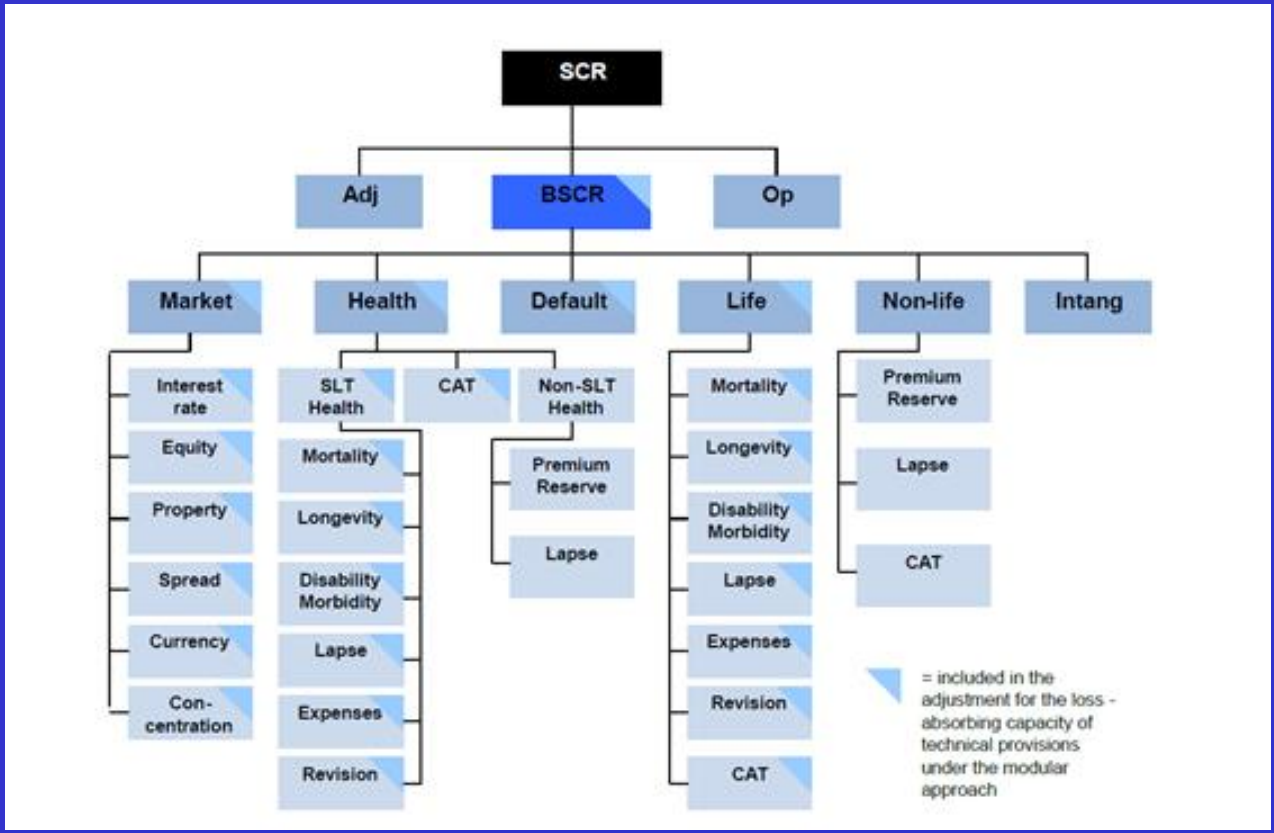
A "Building Blocks" Approach

Regulatory and rating agency capital regimes have an additional objective – uniformity in application

This is well served by a "bottom-up" approach that identifies the key categories of risk and their composition.

Capital charges are assigned for each risk driver, with assumed correlations between factors.

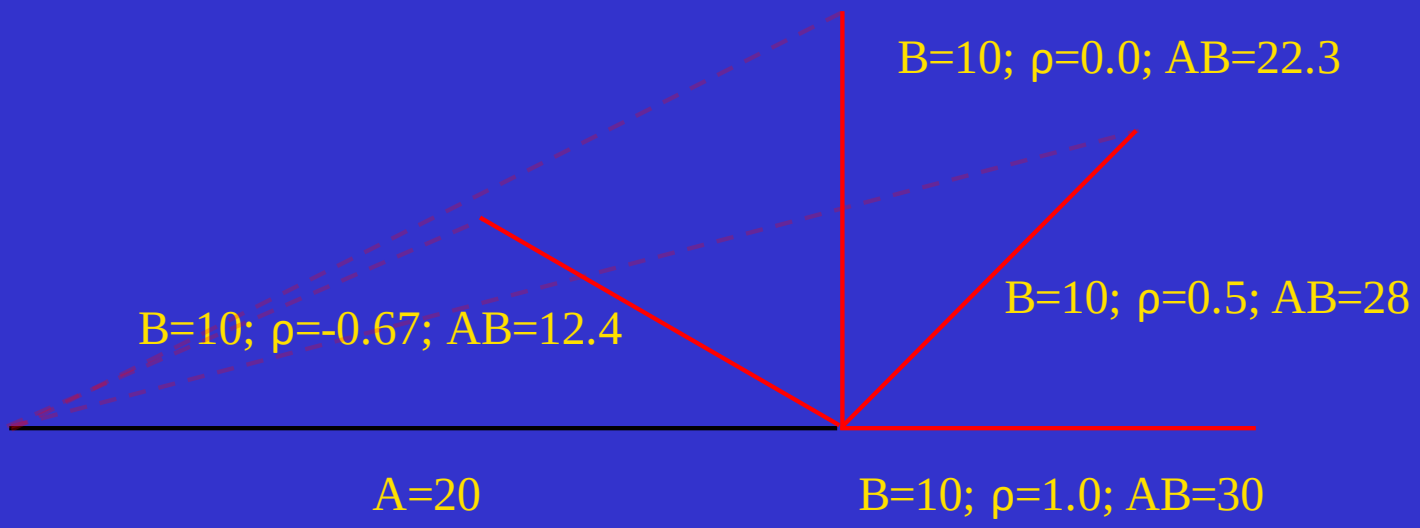
Solvency II SCR Structure



Source: European Insurance and Occupational Pensions Authority (EIOPA)

Diversification and Correlation

$$AB = \sqrt{A^2 + B^2 + 2AB \cos\frac{\pi(\rho + 1)}{2}}$$



Attribution of Capital

Why?

- Assess the performance of business units with different risk profiles on a comparable (and equitable) basis.

- Evaluate the performance of "moves":
  - Addition of a particular account
  - Performance of business units (or individual underwriters)
  - Acquisitions and divestitures

Capital Attribution Methods

Method	Best For
• First in	• Divestiture
• Last in	• Evaluate acquisition • Evaluate new account
• Average in • Contribution	• Risk-adjusted performance analysis

Insights from Comparing Methods

Suppose that a company has four business segments (A, B, C, D). Capital is assessed for all 15 combinations of these segments.

Segments	Capital
A	40
B	30
C	20
D	10
AB	42
AC	52
AD	45
BC	38
BD	35
CD	24
ABC	54
ABD	47
ACD	58
BCD	42
ABCD	60
ABCD undiversified	100
Diversification benefit	40

Insights from Comparing Methods

The total required capital (60) is attributed to segment using first-in (contribution), last-in, and average-in methods.

	First (Contribution)	Last	Average
A	24	28	27
B	18	3	14
C	12	20	13
D	6	9	6

Insights from Comparing Methods

- Segment B is likely negatively correlated with other segments.
  - Last-in and average-in capital for B is far less than stand-alone capital
  - B diversifies the other segments, enhancing the total return on risk-adjusted capital
- Segments C and D are likely highly positively correlated with A.
  - There is little to no diversification benefit observed on a last-in basis.

Questions