FRM Part II

Operational Risk And Resilience

INTEGRATED RISK MANAGEMENT

Learning Objectives

After completing this reading you should be able to:

- ✓ Describe the role of **risk governance**, **risk appetite**, and **risk culture** in the context of an enterprise risk management (ERM) framework.
- ✓ Summarize the role of **Basel regulatory capital** and the process of determining **internal economic capital.**
- ✓ Describe elements of **a stress-testing framework** for financial institutions and explain **best practices** for stress testing.
- ✓ Explain **challenges** and **considerations** when developing and implementing **models** used in **stress testing** operational risk.

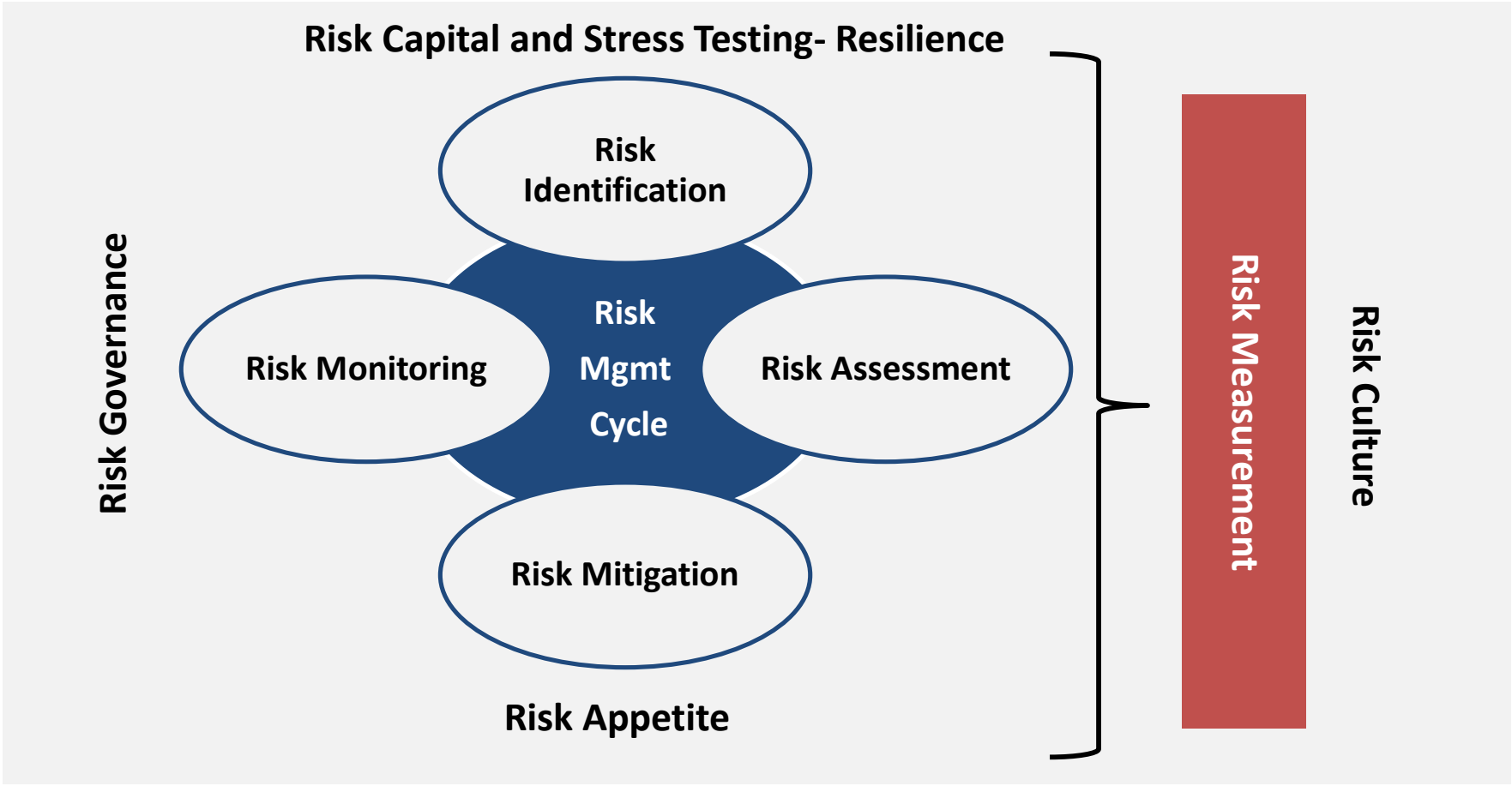
What's ERM?

Describe the role of risk governance, risk appetite, and risk culture in the context of an enterprise risk management (ERM) framework.

- An **integrated approach** to managing risk across an entire organization.
- Provides a **comprehensive view** of an organization's risk profile by considering both internal and external risks.

Quick Recap: What's ERM?

- ERM framework is built around four key stages: **risk identification, risk assessment, risk mitigation, and risk monitoring**.
- To be effective, risk governance, risk culture, and risk appetite must be incorporated.



What is the Purpose of Risk Capital?

Risk Governance

- Set of **structures, processes**, and **practices** used to manage organizational risk.
- Defines **who has the authority** to make decisions about risk and how those decisions will be made.

Risk Appetite

- **Quantitative measure** of an organization's **willingness** to accept risks within a certain level of uncertainty.
- Helps organizations understand the **level of acceptable risk** they are willing to take.

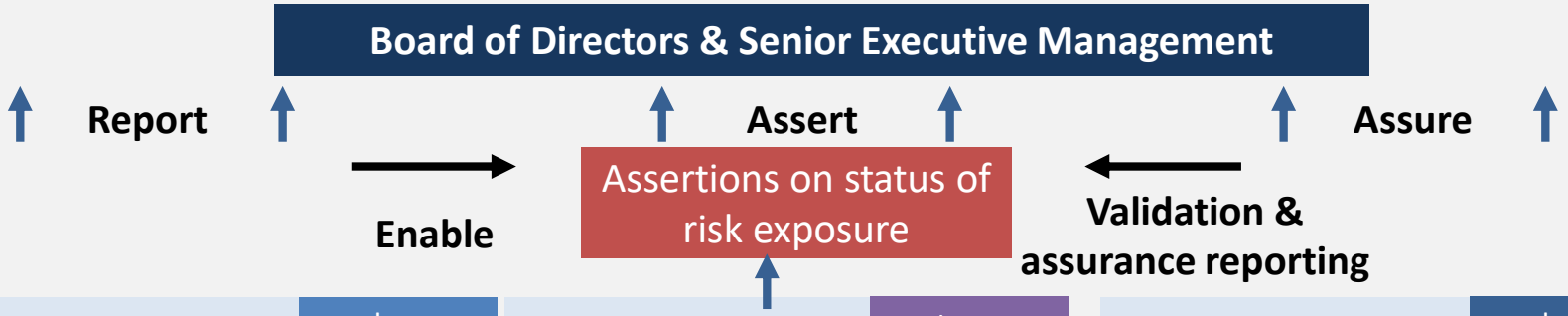
Risk Culture

- Set of **values, attitudes,** and **beliefs** that shape how people view, manage, assess, communicate, and respond to risks.

What is the Purpose of Risk Capital?

Risk Governance

The Three Lines of Defense Model



Risk Oversight — 2nd Line

- Responsible for the framework and oversight of risk management activities in the first line
- Sets policies, tools, models of management, and measurement of all risk type.
- Monitors risk exposure status and report to Board

Risk owners (business unit management and staff) — 1st Line

- Risk identification and assessment
- Actions to exploit, reduce, transfer or avoid risk
- Have the authority to expose the organization to risks within the limits of the firm's risk appetite.

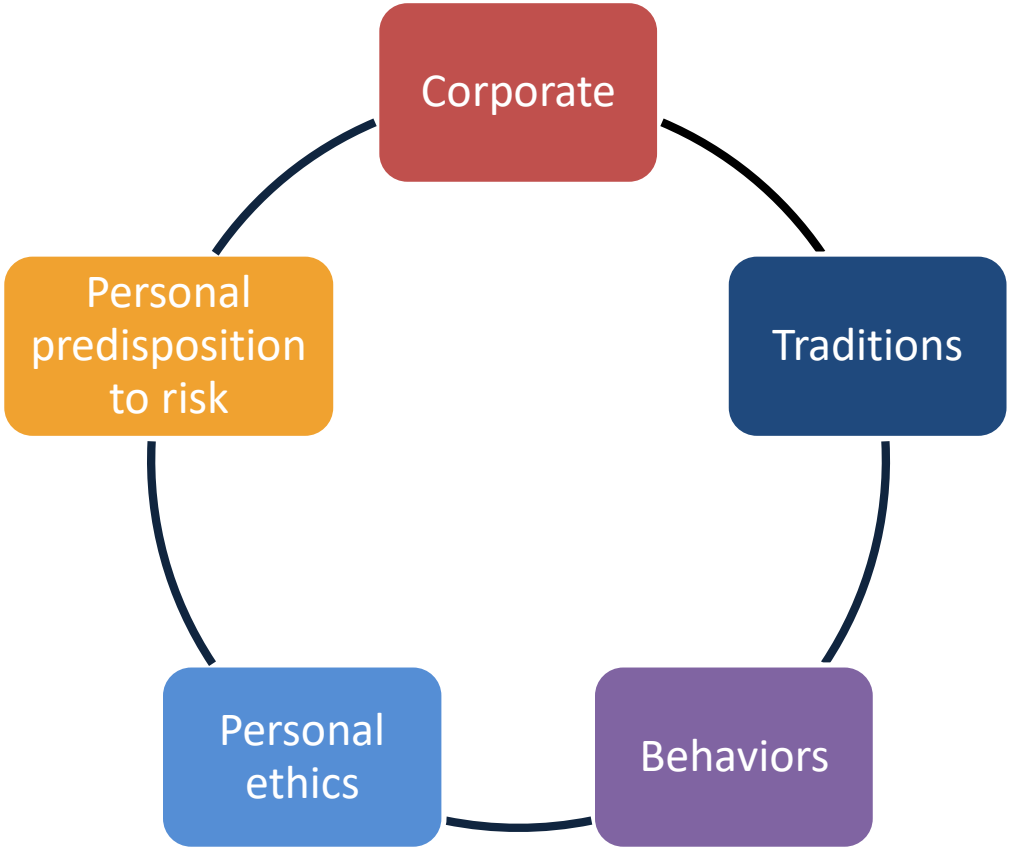
Risk Assurance Internal Audit (External Audit as 4th line) — 3rd Line

- Validation of controls
- Objective review of risk management process
- Assurance to senior executive management and Board on assertions of risk exposure.

What is the Purpose of Risk Capital?

Risk Culture

- Part of a larger corporate culture, and reflects the **values, beliefs, and behaviors** of employees in a firm.
- Primarily determined by **senior managers** and executives, who **lead by example**.
- Dictates how risks are managed within a firm.
- **Extends beyond operational risk incidents** to include sharing lessons learned across the enterprise.



What is the Purpose of Risk Capital?

How Important Are Risk Culture and Risk Governance?

- In 2018, the Australian Prudential Regulation Authority (APRA) **fined** the Commonwealth Bank of Australia (CBA) millions of dollars due to **shortcomings** in CBA's **governance, culture**, and **accountability frameworks.**

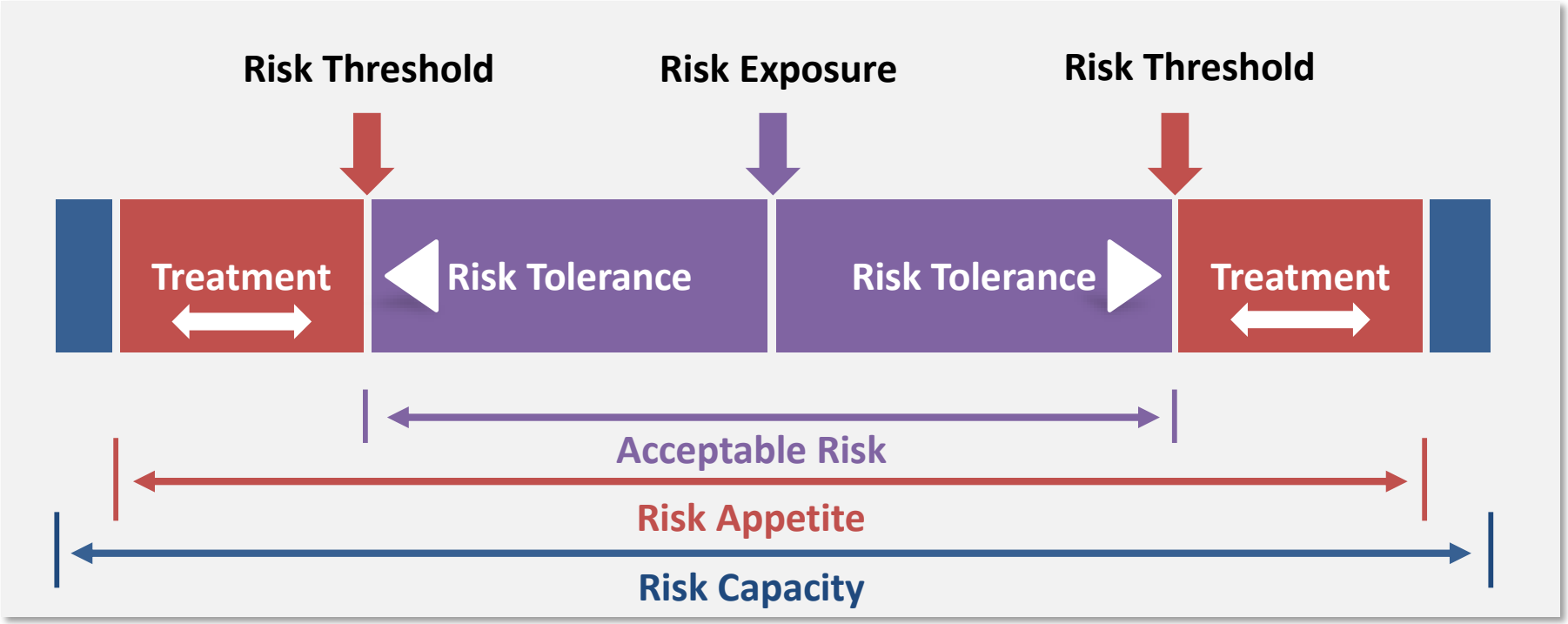
Issues identified included:

- ✓ **Inadequate oversight** of emerging non-financial risks.
- ✓ **Unclear accountabilities**.
- ✓ A **lack of ownership** of key risks.
- ✓ Overly **complex and bureaucratic** decision-making processes.
- ✓ A remuneration framework that effectively **insulated** senior managers from the effects of poor risk management.

What is the Purpose of Risk Capital?

Risk Appetite

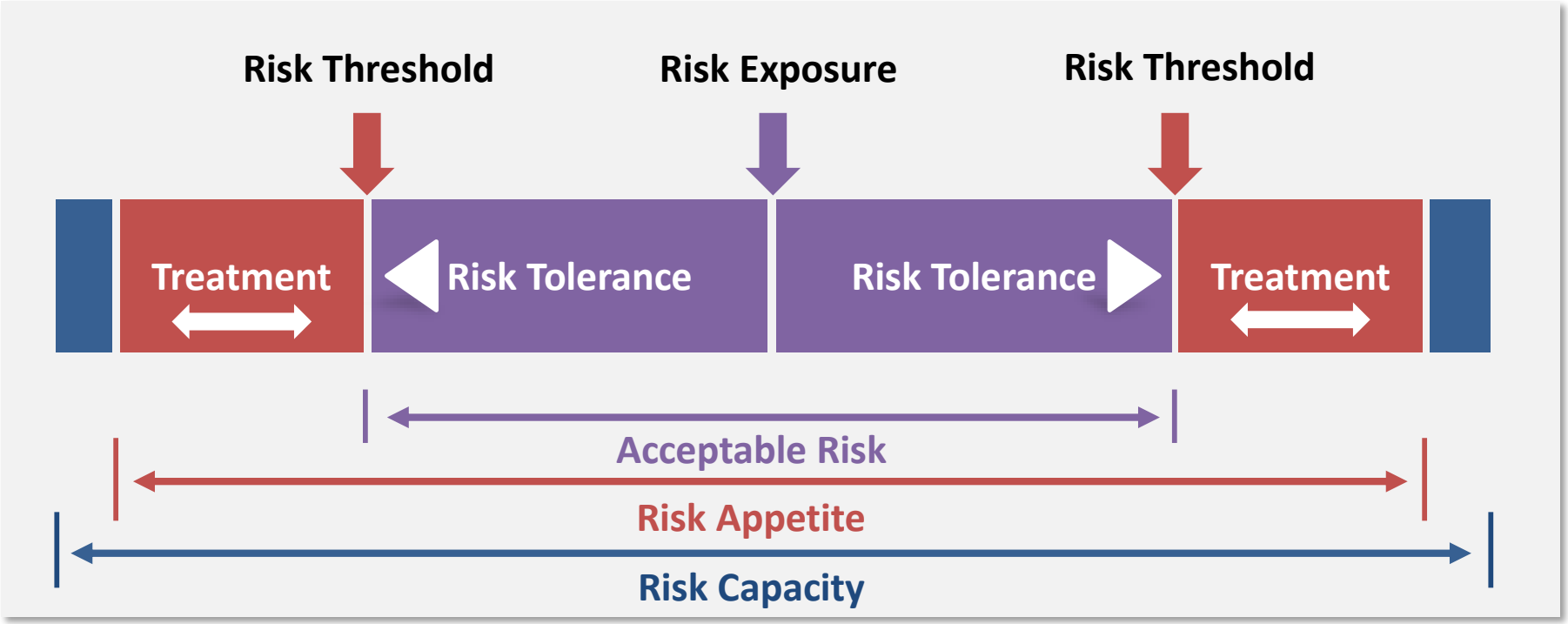
- **Level of risk** an organization is prepared to accept to achieve its objectives.
- Relevant for **credit, market, liquidity**, and **operational** risks.
- To manage risk exposure, organizations typically outline **allowable exposures** and set **parameters** (thresholds) for acceptable levels of risk.



What is the Purpose of Risk Capital?

Examples

- **Credit risk appetite** will define the **maximum lending** per client, industry, currency, or term.
- **Market risk appetite** will define the **VaR, volatility,** and **benchmarks.**
- Operational risk appetite will define key risk indicators, e.g., **systems availability** and **recovery times.**



Capital Elements of the ERM Framework

Summarize the role of Basel regulatory capital and the process of determining internal economic capital.

- Capital and enterprise risk management are **closely interrelated.**
  - By understanding an organization's potential risks, ERM helps assess its **capital needs**.
- Use of capital in an ERM framework is essential for mitigating **unexpected losses** and maintaining **solvency**.
- Key elements of an ERM framework include:
  - **Regulatory** capital.
  - **Economic** capital.
  - **Risk-adjusted return** on capital.
  - **Capital aggregation**/diversification.

Capital Elements of the ERM Framework

Regulatory Capital

- Reflects the amount of **capital that a bank needs**, given regulatory guidance and rules.
- Assures customers that their **investments are protected** in the event of a failure.
- **Basel I** (1988) introduced the **Cooke Ratio**, which stipulates that banks must hold **8% of risk-weighted assets** (RWA) as regulatory capital.
- **Basel II** expanded the coverage of regulatory capital to **market risk** in 1996 but still maintained the 8% RWA level.
- Basel II also introduced regulatory capital for operational risk.
- **Basel III** added minimum regulatory ratios for liquidity risk and a **further 2.5%** of RWA capital requirements for banks.

Capital Elements of the ERM Framework

Key Pillars

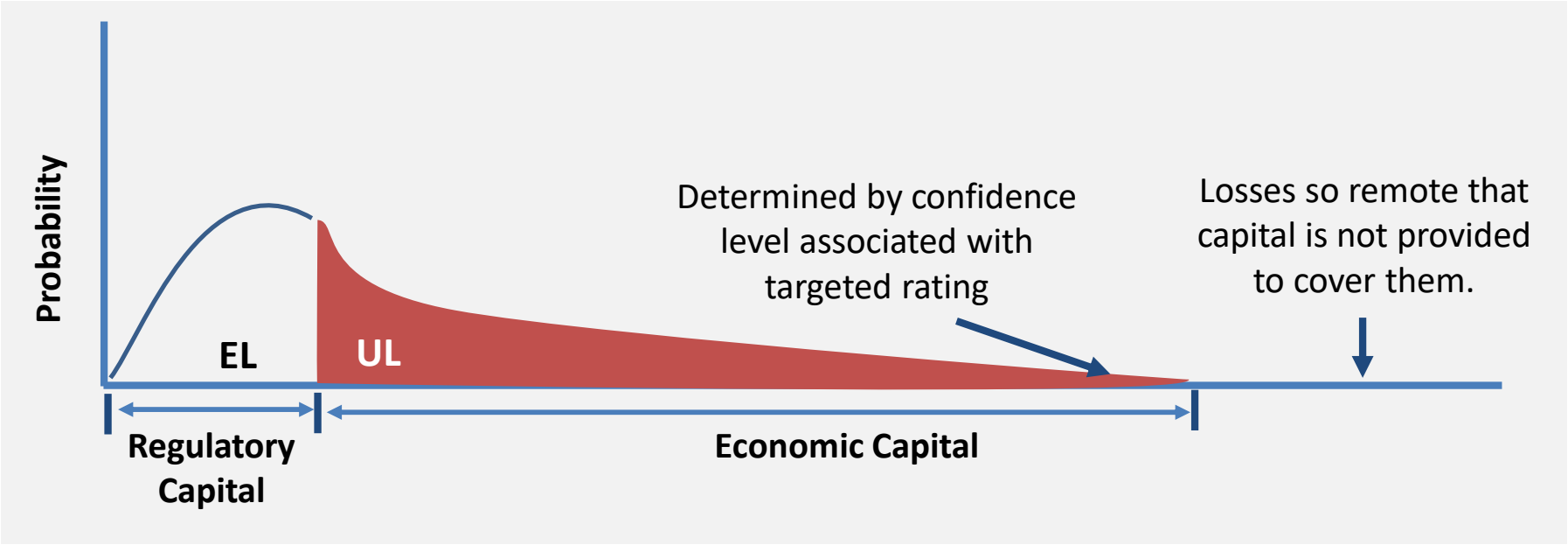
- Basel regulatory framework is composed of three pillars designed to ensure the soundness, stability, and integrity of the global banking system:

Pillar 1 : Regulatory Capital	Pillar 2 : Supervisory Review Process	Pillar 3 : Market Discipline
Include a **minimum capital requirement** to cover market, credit and operational risks.	In addition to Pillar-1 Requirements, adjustments may be made based on **factors unique to each institution**.	Focuses on helping investors make informed decisions by informed decisions by imposing **mandatory disclosures** on financial institutions concerns their risk information and financial situations.

Capital Elements of the ERM Framework

Economic Capital

- Acts as a **buffer** that protects against all the credit, market, operational, and business risks.
- Set at a **confidence level** less than 100% (e.g., 99.9%)
  - It would be too costly to operate at the 100% level.



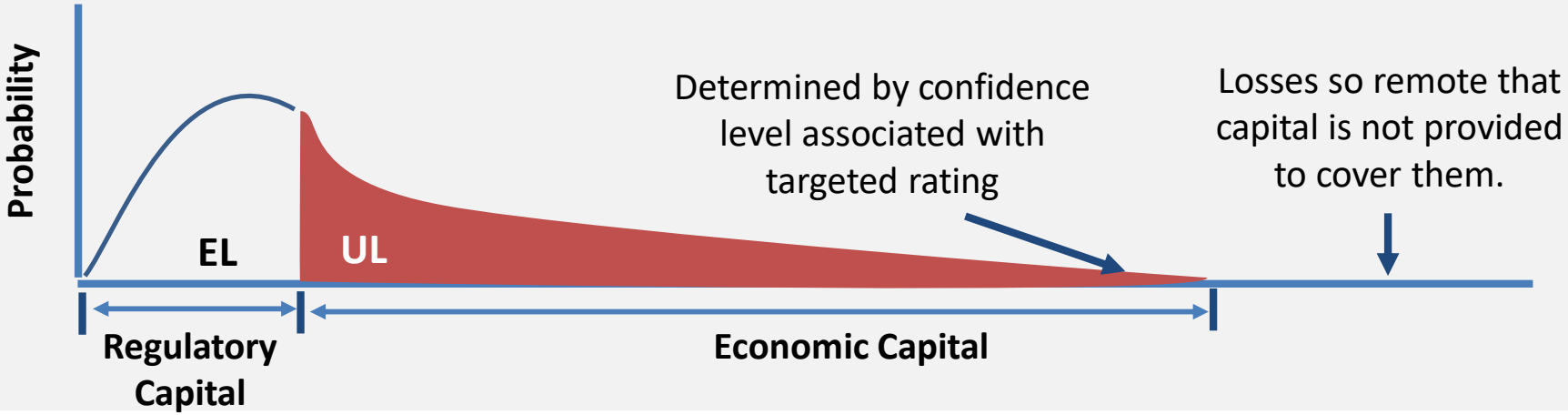
Capital Elements of the ERM Framework

Economic Capital

- Credit ratings are an important factor in determining the level of economic capital.
- **Higher rating** gives access to **lower borrowing costs,** as lenders are more confident that they will be able to recover their investments if the borrower defaults.

Examples

A bank rated AAA (the highest) commonly has a default probability of 0.01%. This implies the bank must ensure its economic capital can cover unexpected losses at a confidence level of 99.99% (= 100% – 0.01%).



Capital Elements of the ERM Framework

Risk-Adjusted Return on Capital (RAROC)

- Measure of efficiency in financial management, calculated as:

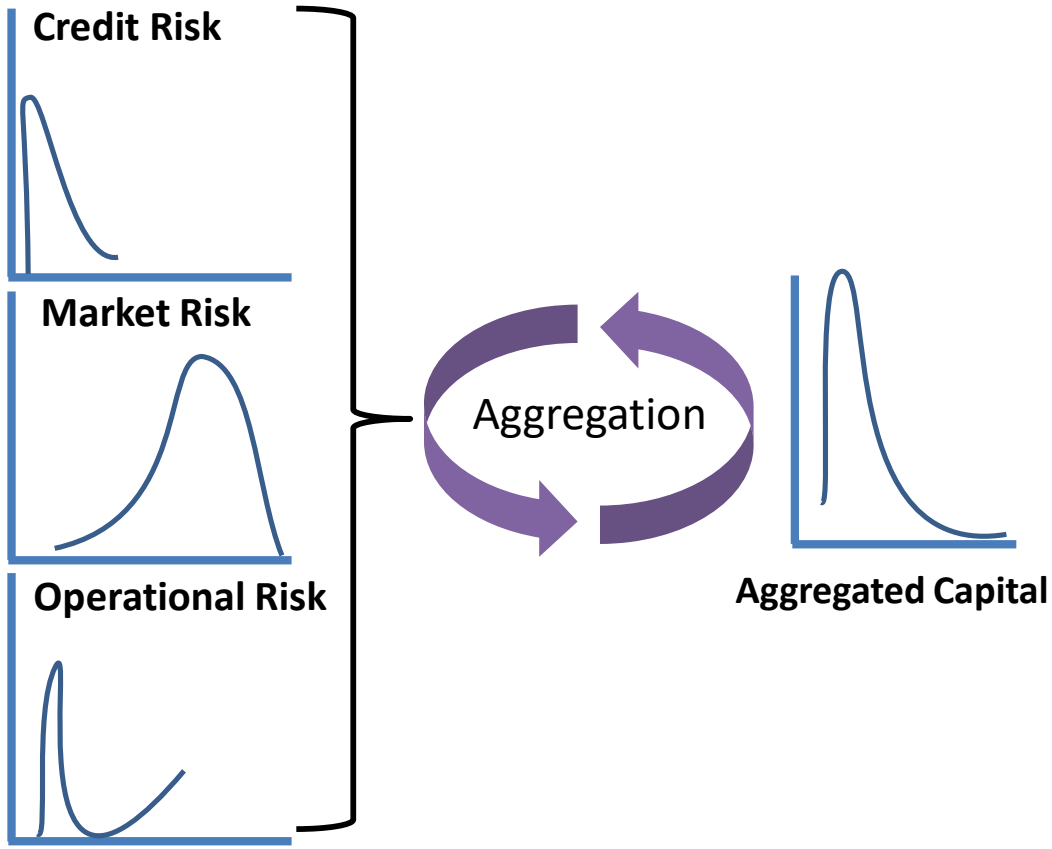
$$\frac{\text{Expected after tax risk adjusted net income}}{\text{Economic capital}}$$

- More suitable for assessing **credit risk** since historical data may be used to estimate expected losses (EL).
  - Often **not used** for operational risks.
- Primarily used to gauge **funding costs**, **manage capital,** and **synchronize activities** with objectives.
- Can be applied at **different levels** such as business line, portfolio, client, or transaction level.

Capital Elements of the ERM Framework

Capital Assessment Risk Aggregation

- After identifying different risk classes, such as credit, market, and operational risks, regulators allows for some diversification measures across these classes.
- This is known as **inter-risk diversification**, which **supplements** the **intra-risk diversification** within each risk class.
- Total aggregated capital to cover all risks is **lower** than the sum of each stand-alone capital amount for individual risks.
  - Why? Each risk class **does not** follow the same dynamics.



Stress Testing Fundamentals

Describe elements of a stress-testing framework for financial institutions and explain best practices for stress testing.

Definition and Purpose

- Form of testing meant to evaluate the **stability** of a system or entity by stressing it **beyond normal operating capacity**.
- Designed to assess how institutions will cope with extreme **macroeconomic** and **market** pressures.
- Tests have been common since 2009 due to regulations implemented after the financial crisis.
- Basel Committee views stress testing as an **essential risk management tool** to help banks assess their **capital adequacy**.
- Helps financial institutions identify and prepare for potential risks and determine **how much capital might be needed** in the event of a **large shock**.

Stress Testing Fundamentals

The Nine BCBS Stress Testing Principles

1. Stress-testing frameworks should have well-defined **objectives**.
2. All associated frameworks should have an effective **governance structure**.
3. Tests should be used as a risk management tool to inform **business decisions**.
4. Stresses applied need to be sufficiently severs to **capture material and relevant risks**.
5. **Organizational structures** should be adequate to meet the objectives of the tests.
6. Tests should be supported by **robust IT systems** and accurate and sufficiently granular data.
7. Models and methodologies used to assess different scenarios should be **fit for purpose**.
8. Stress-testing models, results, & frameworks should be regularly **challenged and reviewed**.
9. Stress testing practices & results should be **communicated** within and across jurisdictions.

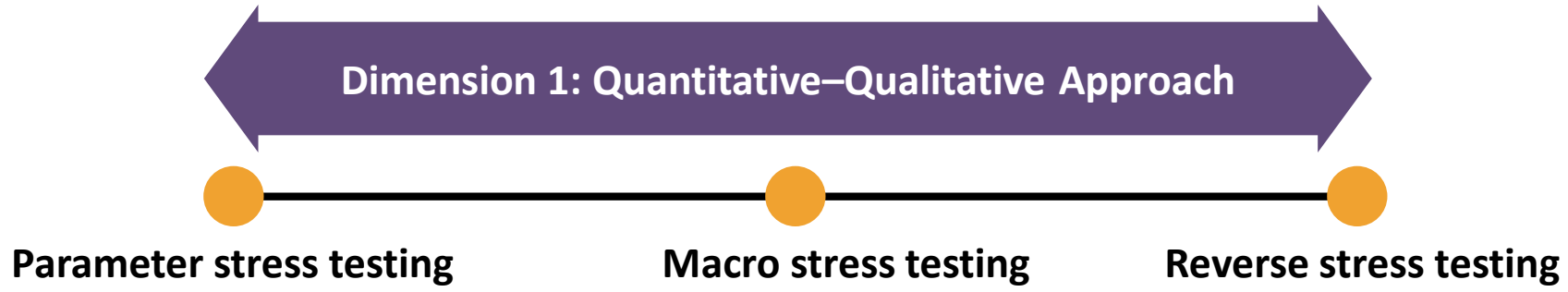
Stress Testing Fundamentals

A Stress-Testing Taxonomy

- The stress-testing taxonomy relies on **two** dimensions:

Dimension 1: Quantitative–Qualitative Approach

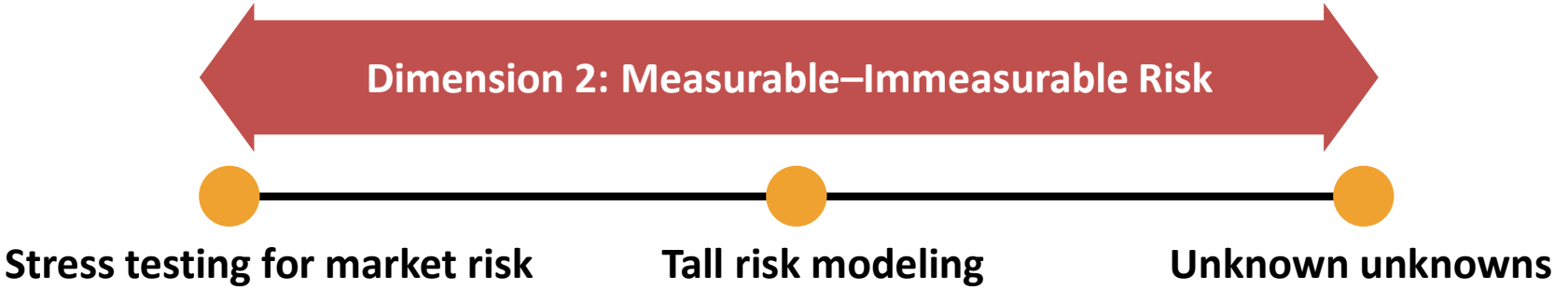
- **Quantitative approaches** relate to the sensitivity of models to **parameter shocks** and have been used for the longest time, especially in market risk and credit risk.
  - **Example:** Stressing a model in production to evaluate its reaction to shocks.
- **Qualitative approaches** focus more on **scenario analysis,** such as **macro stress testing**, and non-model-based evaluations, like **reverse stress testing**.



Stress Testing Fundamentals

Dimension 2: Measurable–Immeasurable Risk

- **Measurable risks** can be analyzed using a probabilistic approach, with the probability of outcomes being calculated.
  - **Examples:** Stress testing for market and credit risk, and tail risk modeling for operational risk.
- **Immeasurable risks** cannot be accurately calculated or estimated and require analytical **methods** to assess **"unknown unknowns."**
  - This type of uncertainty is referred to as **Knightian uncertainty.**



Stress Testing Fundamentals

Types of Stress Testing

Parameter (Model) Stress Testing

- Focuses on **verifying** the **accuracy** and **reliability** of a model's parameters and assumptions.
- Assesses input parameters, initial conditions, boundary conditions, and other relevant factors that could affect the model's results.

Macroeconomic (Macro) Stress Testing

- Assesses a financial institution's ability to withstand **significant macroeconomic shocks.**
- Simulates a wide range of possible **economic scenarios** based on economic indicators such as **GDP growth rate**, **inflation** rate, and **exchange rates.**

Reverse Stress Testing

- Begins by focusing on a **particular outcome** and then **working backward** to identify the circumstances that can lead to such an outcome.
- Examples of shocks that may be considered are **major client losses, portfolio losses,** and **credit rating downgrades.**

Challenges in Stress Testing

Explain challenges and considerations when developing and implementing models used in stress testing operational risk.

Model inadequacy

- The Covid-19 pandemic and the Great Financial Crisis (2007/2009) created macroeconomic and operational shocks that **vastly exceeded any prescribed tests**.

Misconceptions

- Traditional macro stress tests simply move along a loss distribution to higher quantiles.
    - A true macro stress test should result in a **change in the loss distribution itself**.

Operational Risk Stress-Testing Framework

Key Components

Expected Nonlegal Loss forecast module:

Consists of a quantitative model to estimate losses for each risk type, as well as expert refinements that are applied to the output of the model.

Legal loss Module:

Forecasts losses related to immaterial litigation cases and future litigation cases.

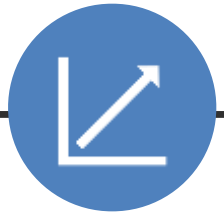
Idiosyncratic Scenario Add-On module:

Focuses on risk exposures unique to each individual bank.

Example : A series of external events might trigger an internal chain reaction that disrupts systems.

Operational Risk Stress-Testing Framework

Modelling Operational Risk Losses



Regression Models

Used to capture the **dependency** between macroeconomic conditions and operational losses.

Loss Distribution Approach (LDA)

Uses **Monte Carlo simulations** to project losses and is a **secondary approach** since it assumes institutional risk exposures **remain constant** over time.

Modified or Conditional LDA

Based on macroeconomic variables, providing a **compromise between full regression-based stress tests and basic LDA modeling.**

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