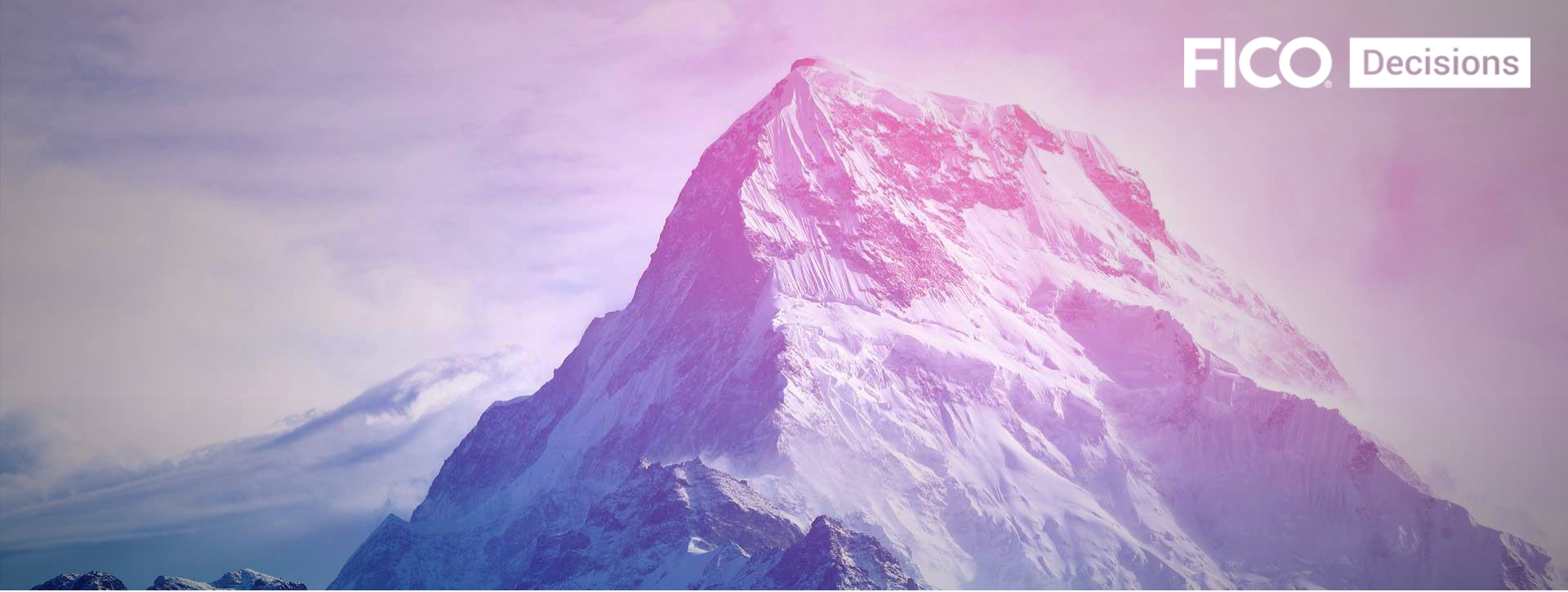

# Stress Testing: Evaluation of Different Approaches for Modelling Credit Portfolios

**Credit Scoring and Credit Control Conference XVI**

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# Agenda

- **Stress Testing Overview**
  - Introduction
  - Regulations and Requirements
  - Modelling Framework and Structure
- **Modelling Approaches**
  - Top Down
  - Bottom-Up
- **Modelling Methodologies**
  - Scenario Test
  - Simulation Methods
- **Outcomes and Benefits**

# Stress Testing Introduction

**Stress Testing** - Simulations of unexpected events and losses aiming to assess the robustness of a financial institution under rare, but not unrealistic circumstances.

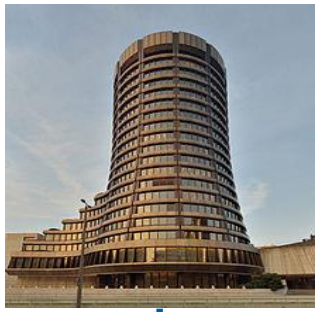
The Basel Committee on Banking Supervision (BCBS) consider Stress Testing to be a critical element of risk management for **banks** and a core tool for **regulators** and macroprudential authorities.

- **Banks (Micro)** : identify vulnerabilities, corroborate that the bank maintains a robust capital position, provide insights to the bank's decision makers about their resilience to economic recessions.
- **Regulators (Macro)**: identify vulnerabilities of the economic system as a whole, support macro-economic scenarios and give indications of potential fragilities to correct them ahead of an economic recession.

# Stress Testing Regulations and Requirements

# Stress Testing Regulations and Requirements

**BCBS** is constantly updating and enhancing regulatory policies that will support and improve performance of the global economy and prepare for eventual economic crises



Each national authority has the responsibility to interpret the guidelines provided by BCBS and apply them with the necessary adjustments to protect the regional economy








# Stress Testing Overview

## Regulations and Requirements - BCBS

### Pillar I – Minimum Capital Requirements;

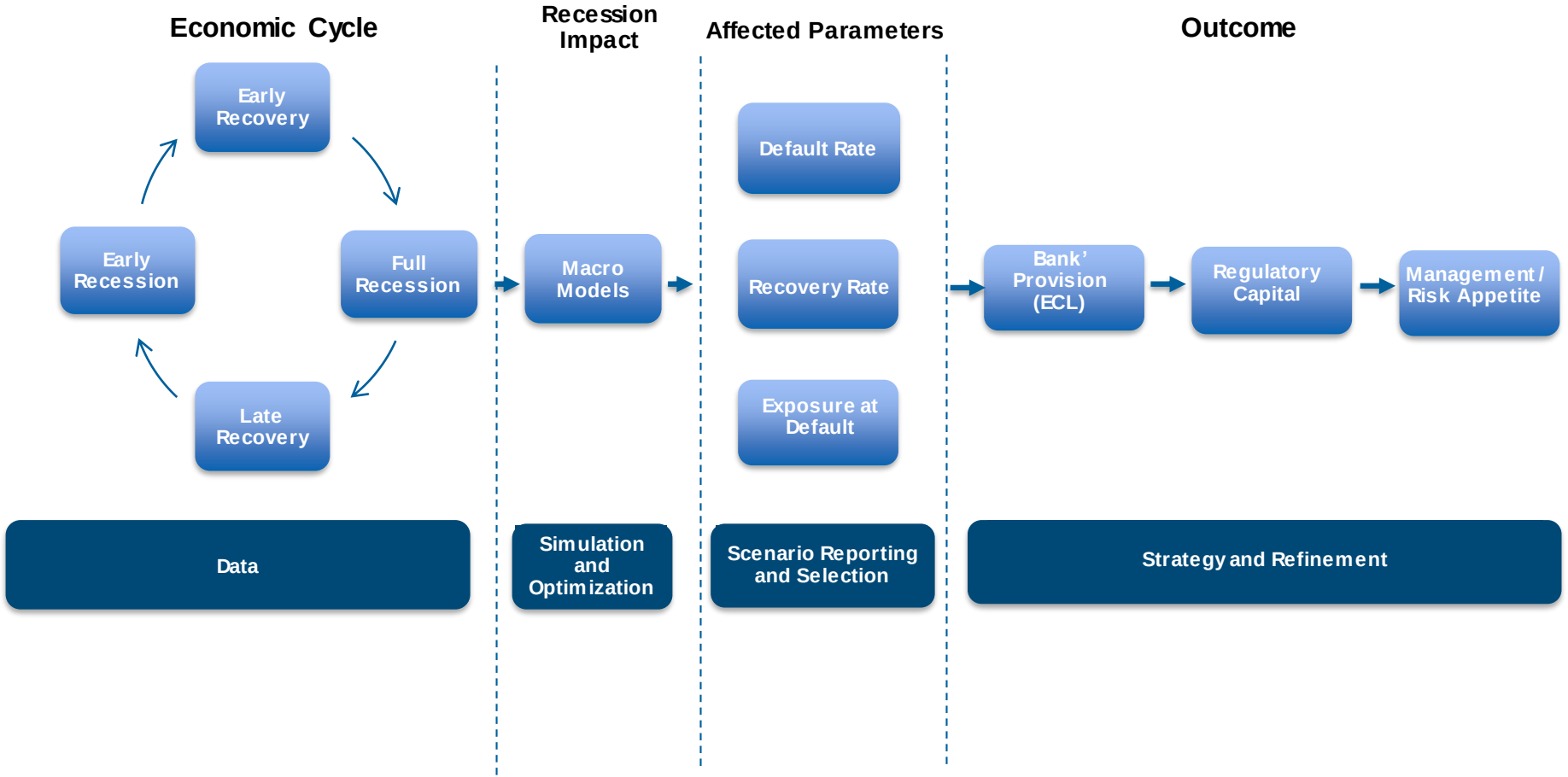
*"An IRB bank must have in place sound stress testing processes for use in the assessment of capital adequacy. Stress testing must involve identifying possible events or future changes in economic conditions that could have unfavourable effects on a bank's credit exposures and assessment of the bank's ability to withstand such changes. Examples of scenarios that could be used are:*

1. *economic or industry downturns;*
2. *market-risk events; and*
3. *liquidity conditions."*

### Pillar II – Supervisory Review Process;

*"National supervisors may wish to issue guidance to their banks on how the tests to be used for this purpose should be designed, bearing in mind conditions in their jurisdiction. The results of the stress test may indicate no difference in the capital calculated under the IRB rules described in this section of this Framework if the bank already uses such an approach for its internal rating purposes.(…)"*

# Stress Testing Modelling Structure



# Stress Testing - Principles

**Clear Objectives -** *Relevant high-level objectives should be aligned with the bank's risk appetite and risk management framework.*

**Governance** - *specify the roles and responsibilities of senior management, oversight bodies and those responsible for the ongoing operation of the stress testing framework.*

**Risk Management Tool -** *Results should be reported to the senior management on a regular basis, at relevant levels of aggregation. The reports should include the main modelling and scenario* ***assumptions*** *as well as any significant* ***limitations****.*

***Capture Material and Relevant Risks -*** *Comprehensive assessment of risks, including both on- and off-balance sheet exposures, earnings vulnerabilities, operational risks, and factors that affect the solvency or liquidity position.*

# Stress Testing - Principles

**Resources and Organisational Structures -** *Governance processes should ensure the adequacy of resourcing for stress testing, including ensuring that the resources have the appropriate skill sets to execute the framework.*

**Infrastructure** - *In order for risks to be identified and the results of stress tests to be reliable, the data used should be accurate and complete, and available at a sufficiently granular level and in a timely manner.*

**Models and methodologies should fit for purpose -** *The models and methodologies used to derive stress estimates and impacts should fit the purpose and intended use of the stress tests.*

**Model Supervision and Review; improving the reliability –** *Assess the limitations, identify areas where the stress testing approach should be improved and ensure that the stress test results are being used in a* ***consistent way****.*

**Communication -** *This will help to reduce the risk that market participants draw ill-informed conclusions about the resilience of banks with differing or negative results.*

# Stress Testing Modelling – Model Design

<table>
<tr><th colspan="3">Stress Testing</th></tr>
<tr><td rowspan="2">Approach</td><td colspan="2">Bottom-Up</td></tr>
<tr><td colspan="2">Top-Down</td></tr>
<tr><td rowspan="3">Methodology</td><td rowspan="2">Scenario Test</td><td>Historical Data</td></tr>
<tr><td>Hypothetical Data</td></tr>
<tr><td colspan="2">Simulation Methods</td></tr>
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## Selecting the best Approach

- Who is conducting the stress test exercise?
- Who is responsible for developing the assumptions/scenarios?
- Data Quality/Granularity (Link to the Principles).
- Will the outcome be used for Benchmarking?
- Are my homogeneous portfolios easily identified?
- Size of the Institution.

# Stress Testing Modelling – Model Design

## Top-down Modelling

Regulators (central banks or supervisory authorities) apply the economic shock – either to individual institutions data or to an aggregated banking system level – and analyse its results on the banking system as a whole.

**Key Notes:**

- **Comparability** of results;
- Depends **critically** on data availability by national authorities;
- Relatively **simpler** but their accuracy tends to be lower;
- **Less accurate** – especially when carried out on aggregated systemwide data.

**Example of Usage :**

- Central Banks and Regulator aiming risk identification and communication purposes

# Stress Testing Modelling – Model Design

## Bottom-Up Modelling

Regulators define the macroeconomic impact (or a set of shocks), let the institutions evaluate its own impact on their balance sheets and then consolidate the bank-level results aiming to report the overall outcome.

**Key Notes:**

- Banks creates shock on its **own portfolio** (**accuracy**);
- **Better data simulations**, possibility of loan-level models and sub-portfolios;
- **Hard to compare** across industry different methodologies and modelling assumptions;
- **Interdependencies** across institutions.
- May significantly **underestimate** the true total risk.

**Example of Usage:**

- EBA Guidelines on Institutions' Stress Testing - EBA/GL/2018/04
- PRA Stress testing the UK banking system: 2019 guidance for participating banks and building societies

# Stress Testing Modelling – Model Design

## Scenario Test

### Historical Data

- The use of historical data to assess the common variables to understand its relationship with historical recessions.
- Its based on past experience as embodied in historical data, which may not be relevant to the next stress event. Moreover
- Covers relatively small or incomplete time periods, missing information on important drivers of loss.

### Hypothetical Data

- Data inputs depend on hypothetical stress scenario.
- A risk driver which was not incorporated in the model can be included in a hypothetical stress scenario.
- Hypothetical scenarios are more flexible to include information which were not tested before.

## Simulation Methods

- A large number of scenarios is generated through data simulation methods (I.e. Monte Carlo Simulations)
- Risk factors are set to their stressed values and the remaining risk factors are drawn from the joint risk factor distribution.

# Thank You!

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