Moody's Analytics

Better Faster Decisions

West Africa Webinar Series: Banks' Stress Testing: Linking Credit Risk Capital and Liquidity Requirements

November, 2020

Agenda

1. **Introduction: RIMAN**
2. **Enterprise Stress Testing Framework**
   - Recent regulatory guidance on the adequacy of capital and liquidity resources
   - Best practices in modelling for stressed credit risk losses, capital impact and liquidity risks
3. **Managing Liquidity Risk Under Regulatory Constraints**
   - Daily liquidity management
   - Solving reporting issues for CFMR (Cash Flow Mismatch Report)
   - Optimizing your balance sheet in a stressed environment
4. **Leveraging Existing Tools and Technologies for Compliance and Management**

Speakers

- Dr Biodun Adedipe - Chief Consultant, BAA Consult
- Nicholas Kunghehian, Director, Moody’s Analytics
- Wasim Karim, Director, Moody’s Analytics
- Metin Epozdemir, CFA – Director, Moody’s Analytics

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Introduction by RIMAN

Stress Testing of Banks' Assets and Liquidity

Underlying Issues and Imperatives

Dimensions to COVID-19 Disruptions
From Complicated to Complex to Chaos

Source: Torsten Pistor: Decision Making in a Crisis (June 2020)

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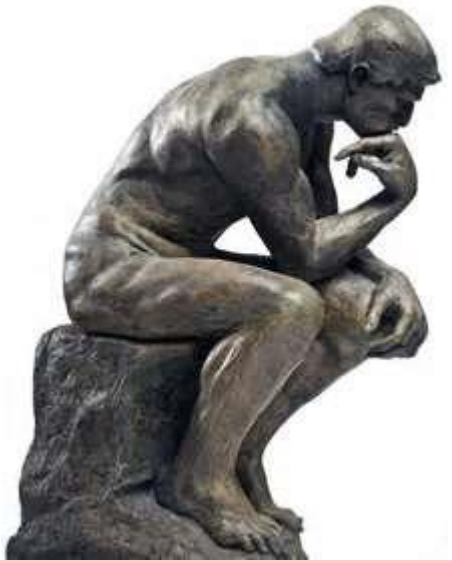
AKADEMIE International

Dimensions to COVID-19 Disruptions (contd.)

Acronym	Element	Characteristics
V	Volatility	❑ Unexpected, unstable events/issues ❑ Unknown duration
U	Uncertainty	❑ Lack of critical information ❑ Knowledge of cause and effect
C	Complexity	❑ Some information is available ❑ Interconnected variables and parts
A	Ambiguity	❑ Vague issues ❑ Unclear relationships ❑ Unknowns



From **complicated** to **complex** to **chaos**!

Welcome to the **new normal**.

But get ready for the **next normal**.

❑ "When **everything** is no longer what it used to be, its time to rethink everything."

BAA Consult

Resulting Economic Challenges and Implications

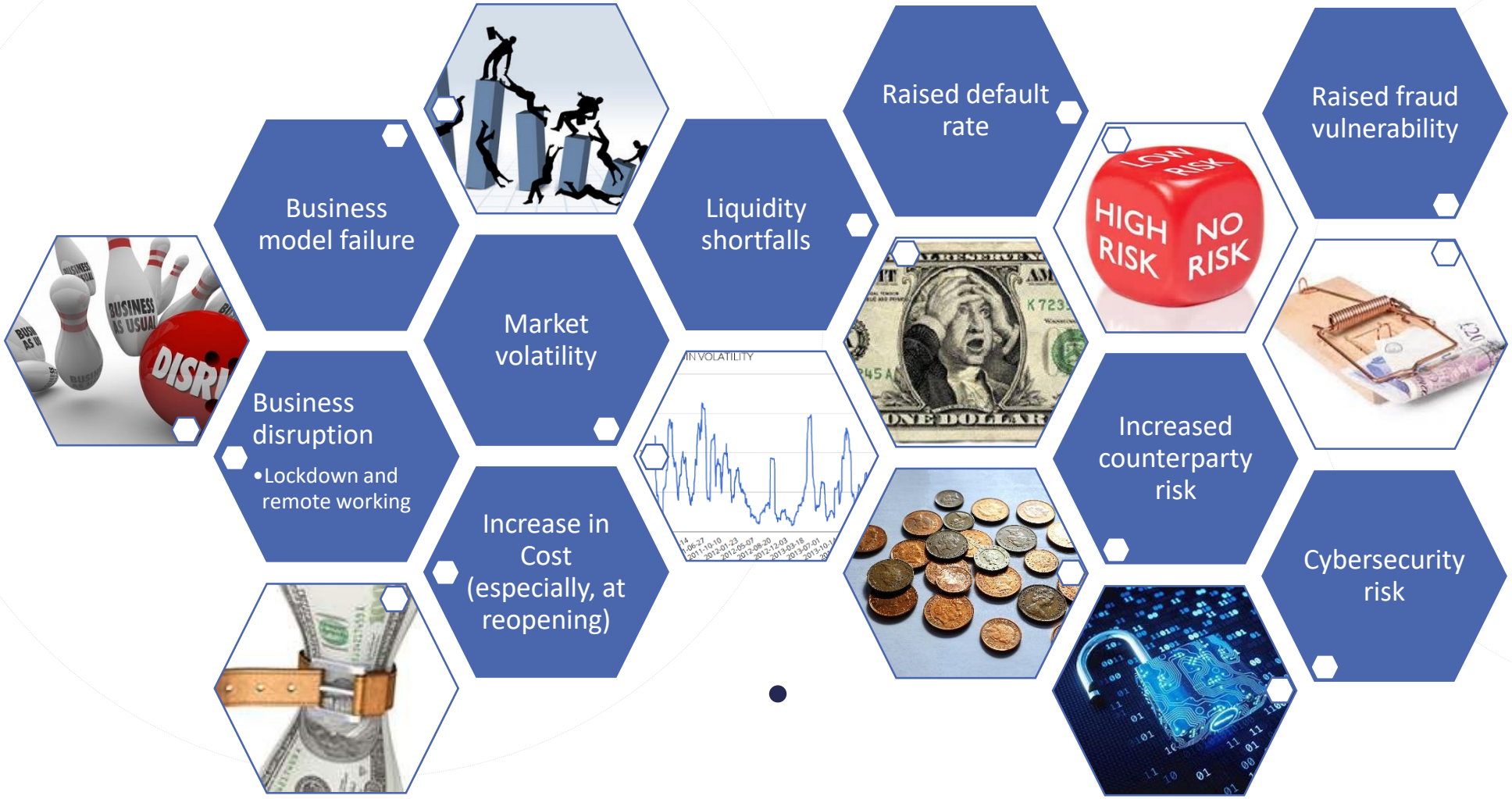
- Pervasive **VUCA disruptions**.
  - **Demand shock**.
  - **Supply shock**.
  - ***Inflation shock***.
  - **Deflation shock**.

- Total or partial collapse of global **supply chains**, whole economic **sectors** (hospitality, tourism, aviation, luxury goods, etc.) and **businesses** (with job losses and diminished capacity to meet maturing obligations).

- Global economic **recession**.
  - Global GDP to fall by **-4.4%** (IMF October 2020).
  - USA by **-4.3%**.
  - China by **1.9%**.
  - Euro Area by **-8.3%**.
  - Nigeria by **-4.3%**.
  - South Africa by **-8.0%**.

- A seeming beginning of the reversal of **globalization**.
  - Japan's BoJ, Nigeria's CBN and several other central banks introduced **stimulus packages** to strengthen domestic manufacturing.
  - Particular emphasis on **domestic production** of face masks and PPE (UAE and USA, for example)

COVID-19 Impact on the Banking/Finance
The Critical Nine



Inferences

Stress Scenarios
(Minor; Moderate; Major)

Credit risk capital

Liquidity

Thank for listening

God bless you

B. Adedipe Associates Limited

Lateef Jakande House (3rd Floor), 3/5 Adeyemo Alakija Street,
PO Box 73983, Victoria Island, Lagos.
+234-9021150255, 90217371000
info@baaconsult.com.ng

'Biodun Adedipe, Ph.D., FCIB, MIoD
+234-8023061981
bioduna@baaconsult.com.ng;
biodun_adedipe@yahoo.com

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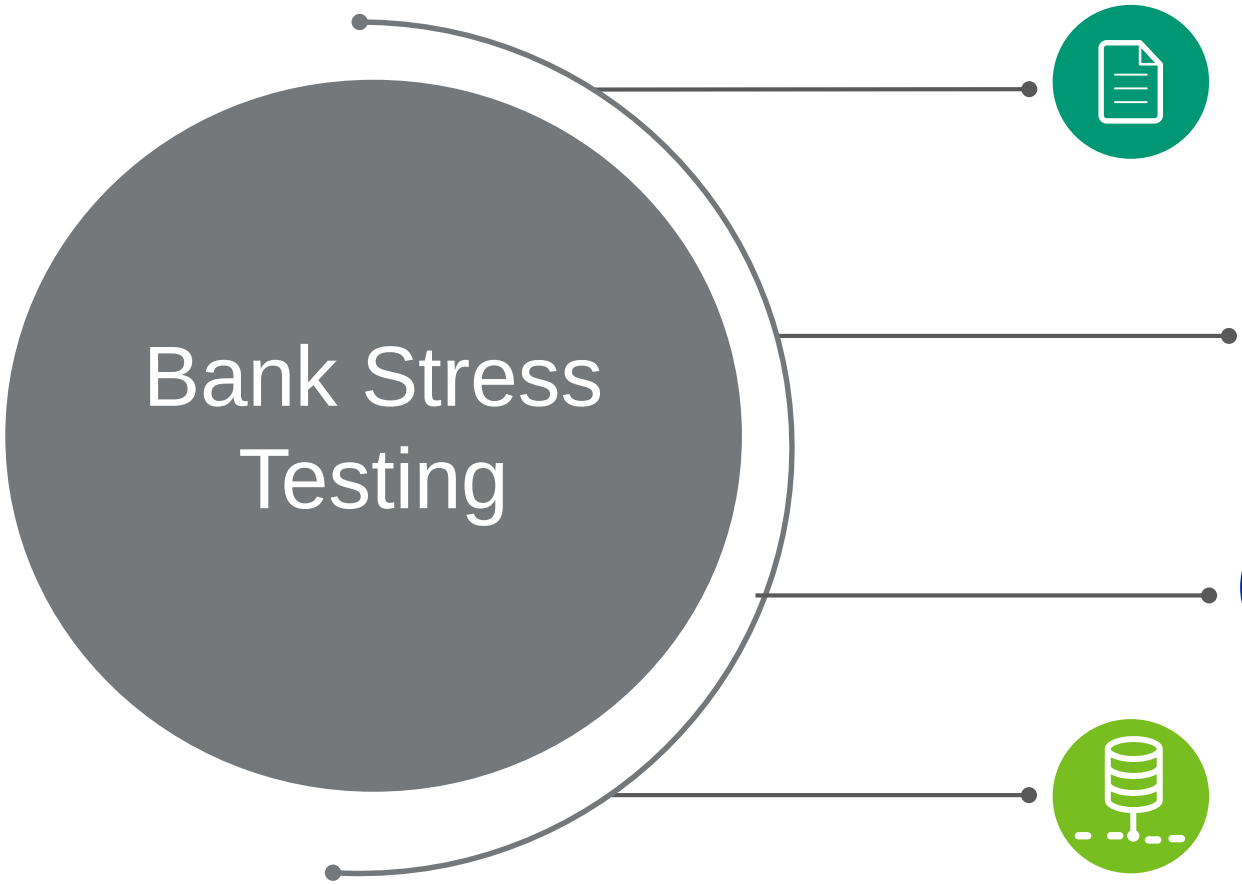
Enterprise Stress Testing Framework

Regulatory Guidance from CBN

Guideline on Stress Testing for The Nigerian Banks – Effective 03/2019



Framework, Governance, Procedure

Documented procedures, stress adequacy of internal capital and expected credit losses. Assess vulnerability to different risks and external shocks. Report to regulator and to board within ICAAP report at least annually. Project the impact on NII and P&L. **Independent** assessment of components, **benchmarking,** regular maintenance and update of the framework. Model inventory and its management. Link to Risk Appetite.

Scope and Coverage

Cover a range of risks. **Appropriate level of granularity.** Interaction among risk factors. Identify, monitor and control **concentration risk.** Impact on asset values, P&L, RWA, Internal Capital and **Liquidity.** Reverse Stress Testing. **Consider capital Supply and Demand.**

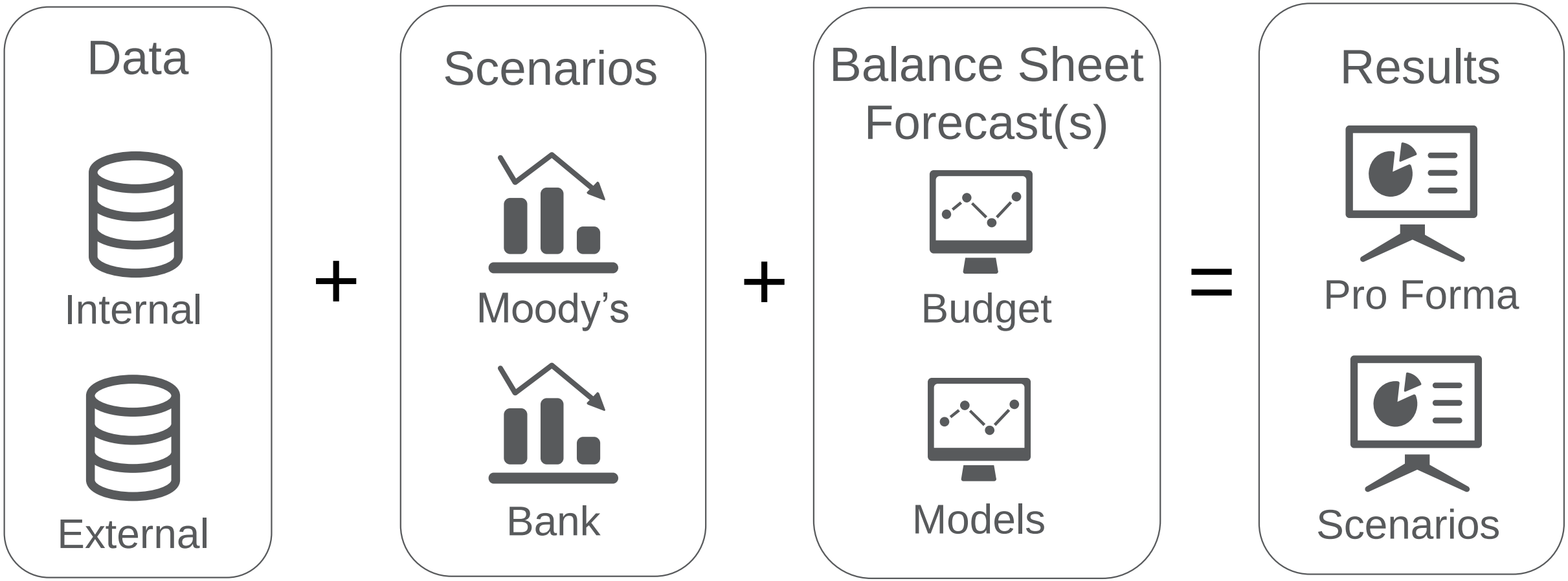
Scenarios

Plausible yet a serious challenge to profitability and capital. Bank wide and comprehensive. Consider sharp decrease in global oil price. Assess impact on the rest of the economy e.g. GDP, FX, IR, inflation, corporate income, real estate prices etc.

Robust Infrastructure

Sufficiently flexible to accommodate different types of ST and granularity. Ensure data quality and appropriate granularity. Ease of modification of methodology and scenarios. Aggregation and Reporting of outcome.

Simplified Process Overview



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Global Stress Testing Framework

CBN Guidance reflects on SREP aligned with best practice

Top-down

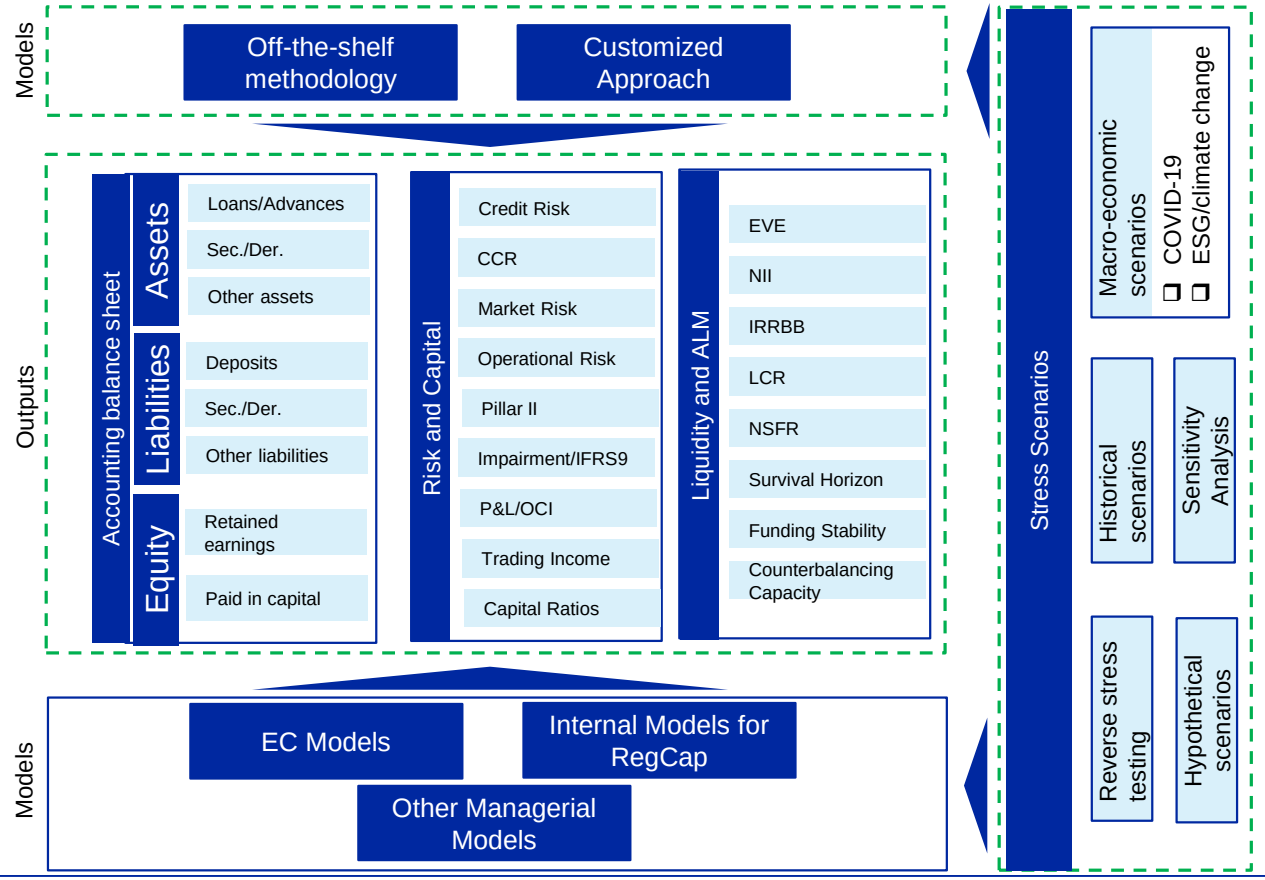
Bottom-up

Objective

- ❑ Quick response to strategic decision
- ❑ Quick scenario analysis in crisis management/major macro-economic scenario changes (i.e. COVID-19)
- ❑ Facilitate risk dialogue among top management
- ❑ Based on general or systemic assumptions / scenarios and aggregate institution data

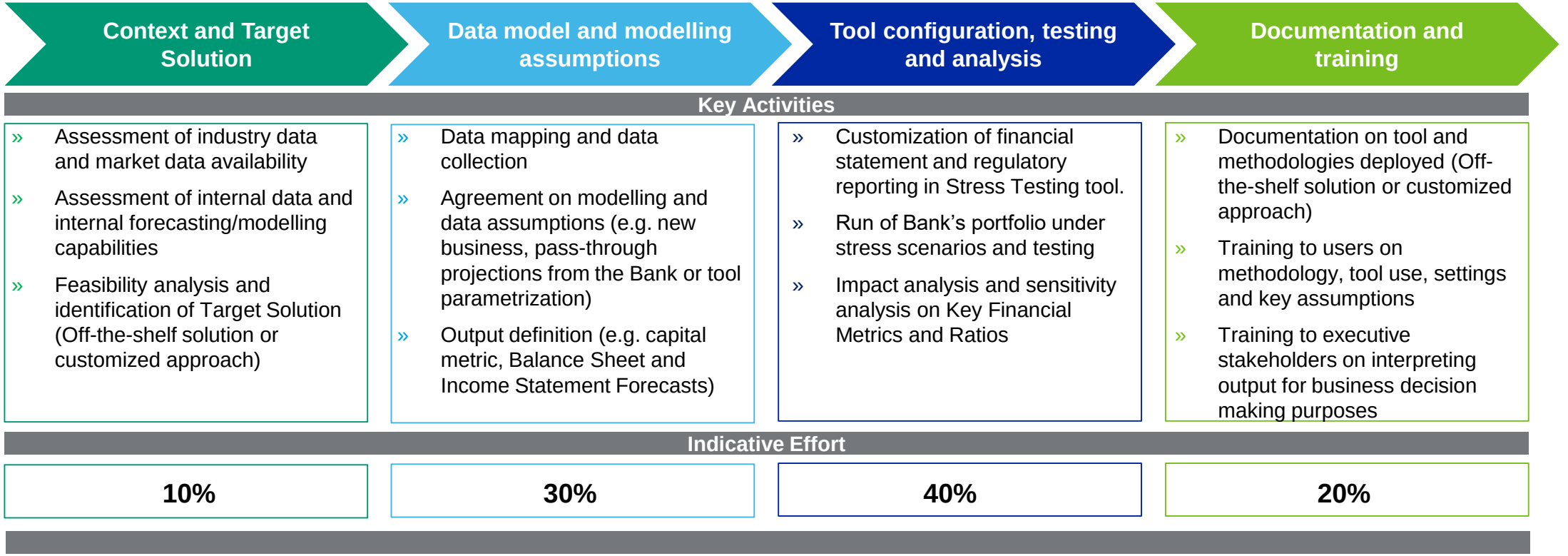
- ❑ Internal Risk-specific stress testing (i.e. Regulatory, ICAAP, ILAAP, IFRS9, RRP, etc…)
- ❑ Institution's own models, assumptions or scenarios
- ❑ Own data and high level of data granularity, possible use of external data and benchmarks
- ❑ Detailed results on the impact of exposure concentrations, linkages and contagion probabilities

Methodological approach

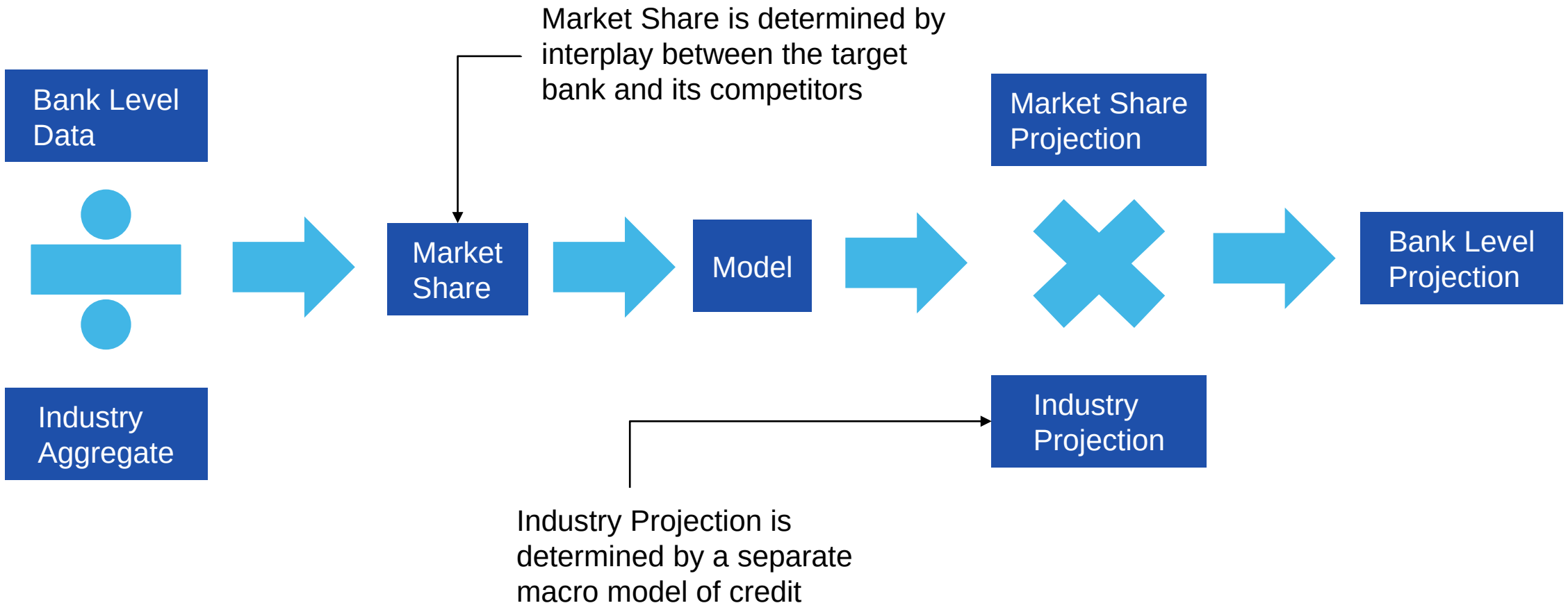


Typical Effort for Setting Up Stress Testing Framework

Planning a Tailored Approach for Bank's Requirements

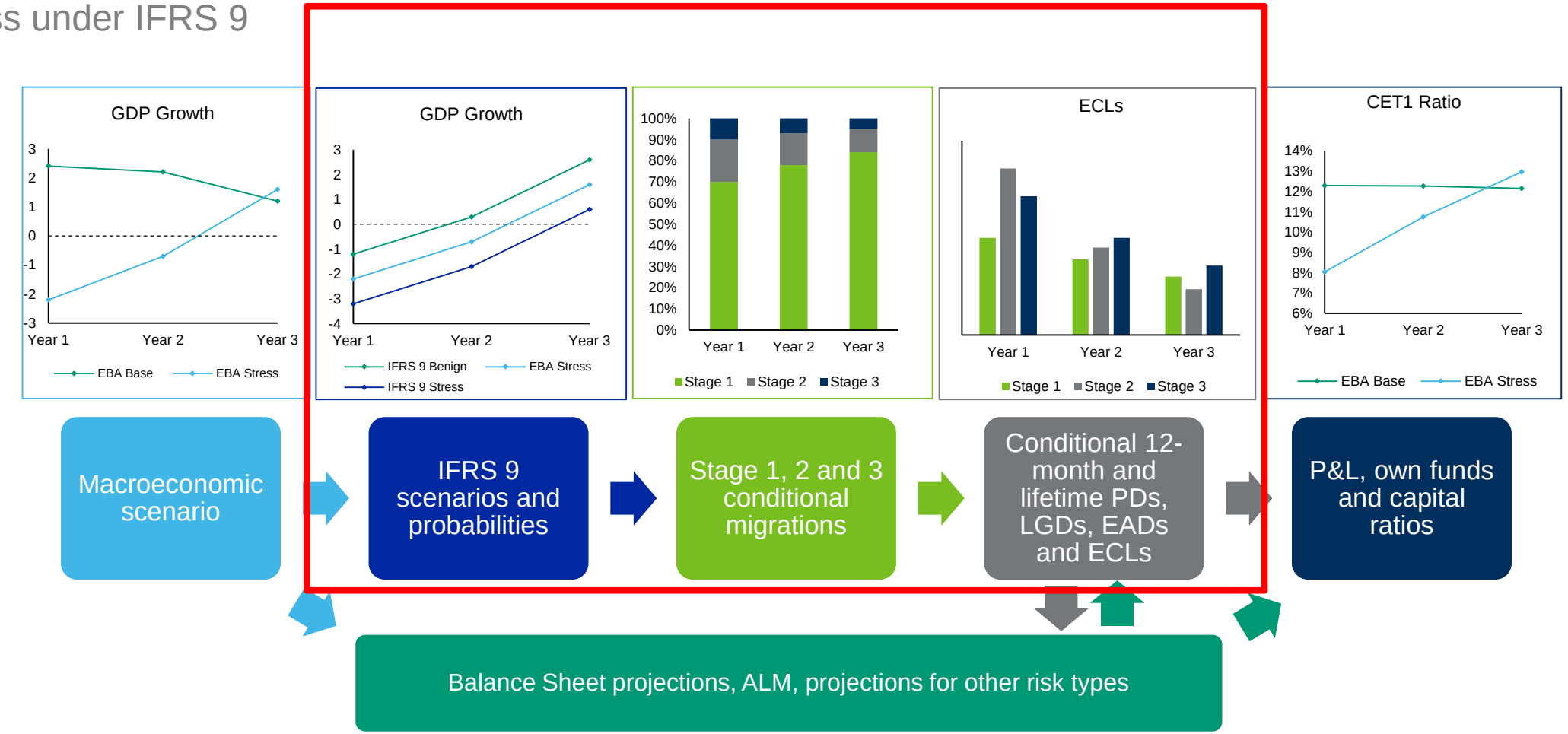


Example: Top Down Forecasting



Example: Bottom Up Stress Testing

Process under IFRS 9



Bottom Up Stress Testing Challenges

Forecasting Stage 2 Assets

- **Direct modelling of stage migrations**
  Only possible if the bank can backfill staging
- **Transition matrices**
  Forecasting transition matrices for wholesale exposures and days past-due for retail exposures
- **Lifetime PDs and qualitative criteria**
  Computationally demanding to forecast lifetime PDs and difficult to forecast qualitative judgement

Scenario Design

- **Perfect foresight**
  Best estimate complicates scenario generation and ECL calculations
- **Number of IFRS 9 scenarios**
  Single scenario reduces calculation time, multiple scenario capture better the non-linearities
- **Horizon of scenario**
  Assumptions post stress/planning scenario horizon

Complexity

- **Aggregation**
  Replicating the full IFRS 9 calculations at each point of the stress scenario very computationally intensive
- **Approximation**
  Simplified PD, LGD and EAD modelling or approximations might be needed
- **Simplification**
  Single scenario or perfect foresight bypassing the need for computationally demanding calculations

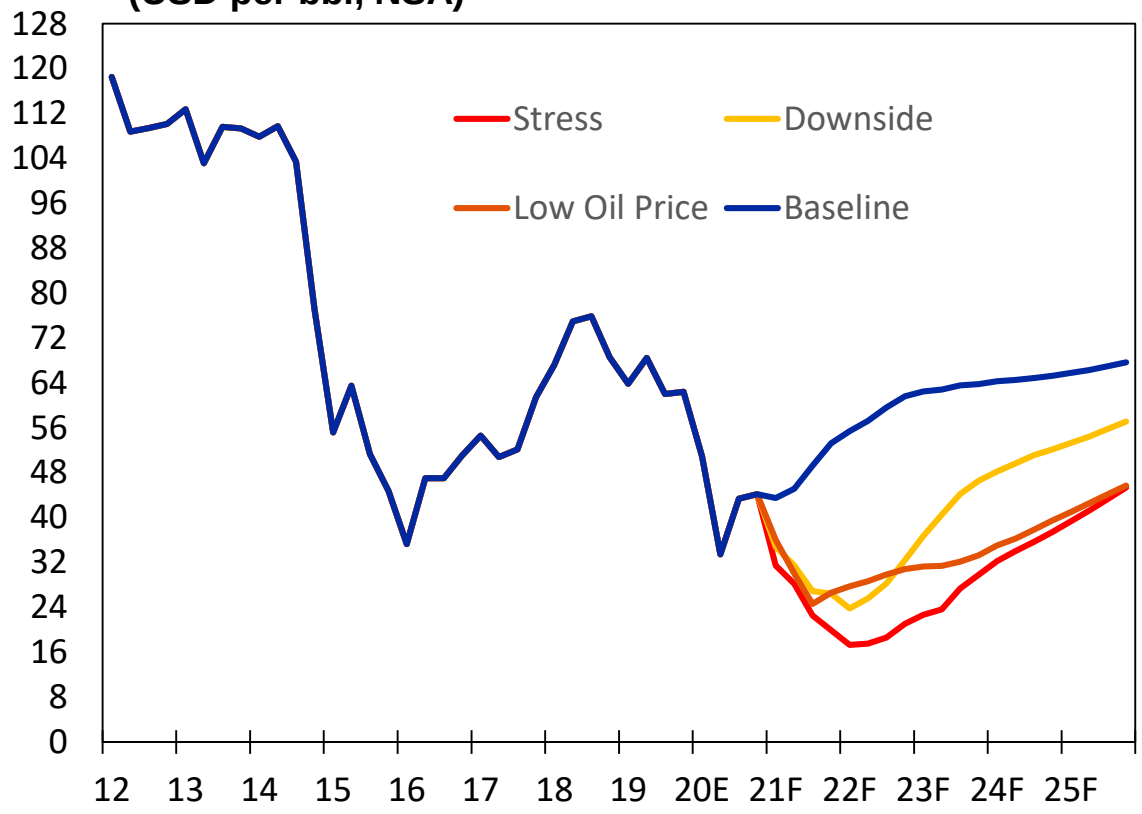
Treatment of IFRS 9

- **Static/new lending**
  Replacing loans during the forecast horizon would increase the stock of stage 1 assets
- **Capital Treatment**
  Transitional vs fully loaded: The former treatment can help smooth out the effects of IFRS 9, but the market might focus on the latter

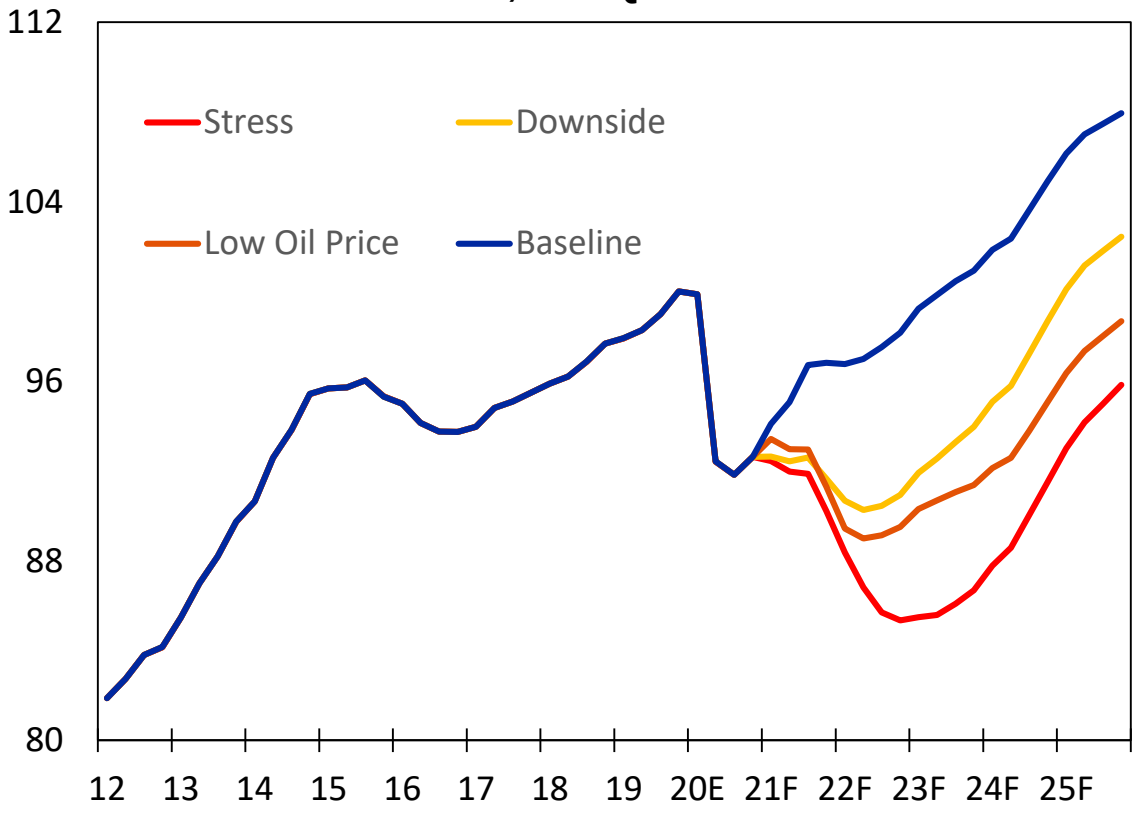
Economic Scenarios

Nigerian Banks to determine expected PD under stressed conditions

Brent crude oil 1-month forward [fob]
(USD per bbl, NSA)

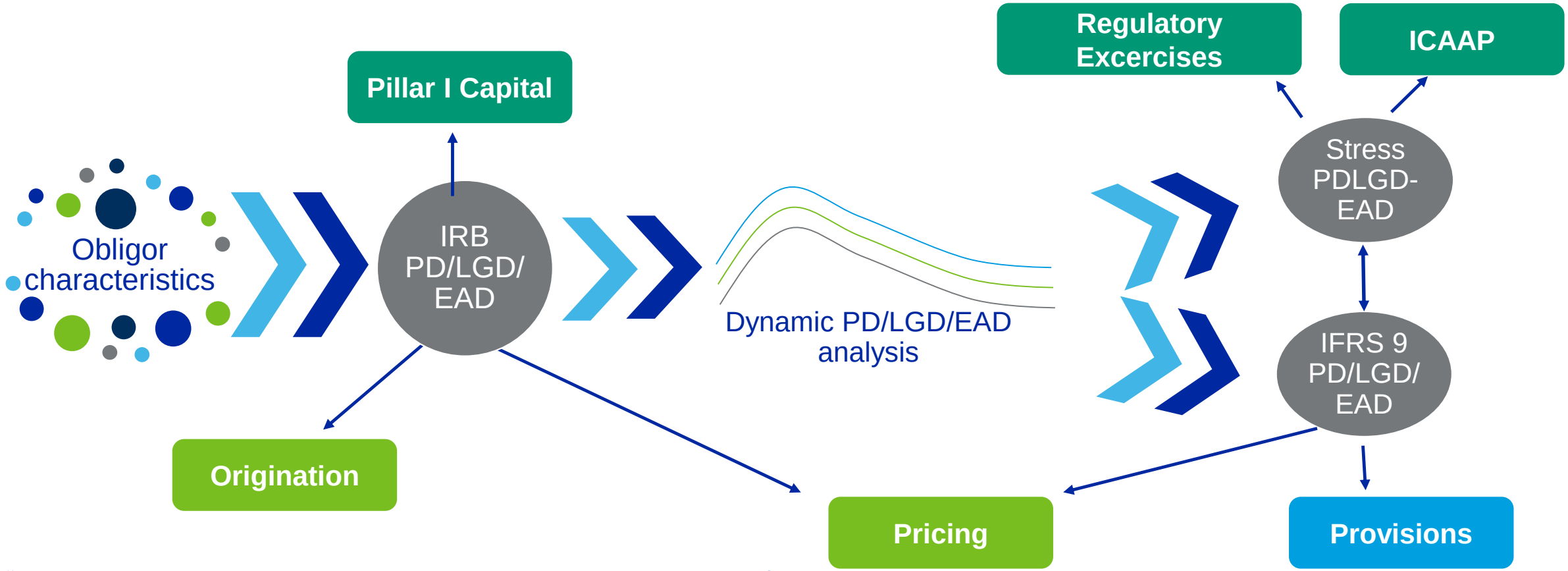


Real GDP, 2019Q4 = 100



Sources: SIX Financial Information; European Central Bank (ECB); The World Bank; United Nations Statistics Division (UNSD); Moody's Analytics Estimated and Forecasted

Leveraging Existing Models and Tools



"Banks should also, where applicable, consider making use of their other internally developed and validated risk quantification models in their stress testing exercise and should be able to provide a description of and justification for the methodology used to generate risk parameters including the relevant estimated parameters for all the credit portfolios."

Central Bank of Nigeria

3

Managing Liquidity Risk Under Regulatory Constraints?

Daily liquidity modelling

From cash flows to advanced analytics

Cash flows modelling

contractual, statistical, behavioral and regulatory cash flows

Balance Sheet Forecasting

Static, dynamic and regulatory stress tests and scenarios

Regulatory Compliance

Outsourcing the regulatory maintenance burden

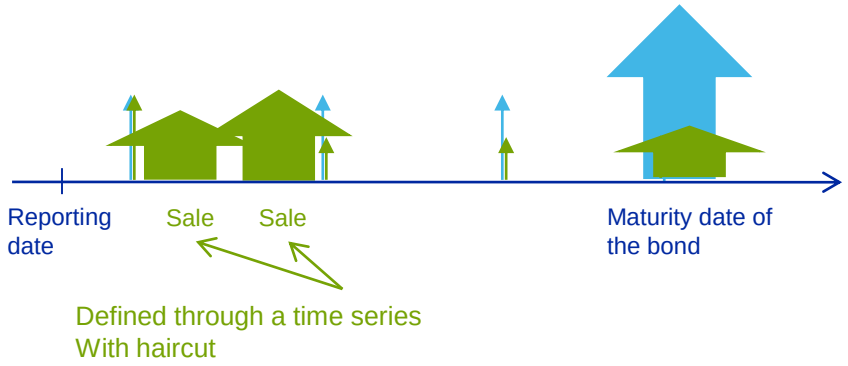
Analytics and Reporting

Granular Analytics & management reporting

Counterbalancing capacity: bonds sell-off

Example of behavior in a stress test scenario

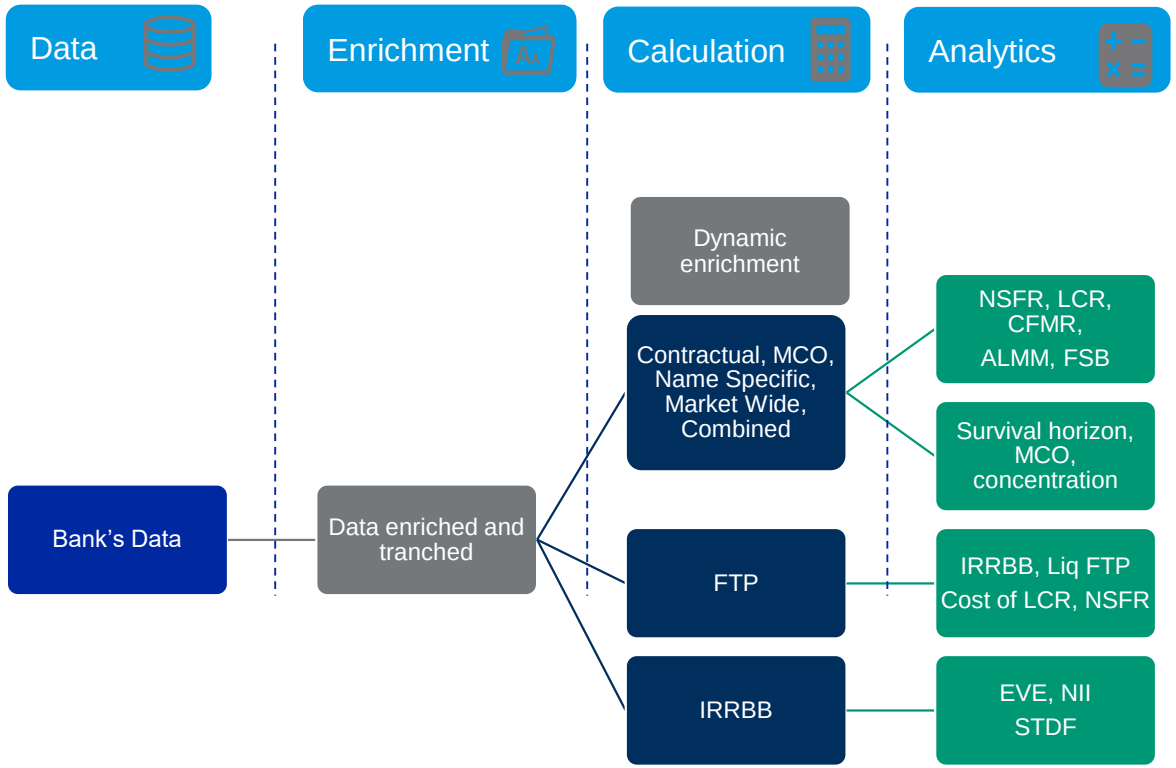
- Identify unencumbered positions including long, short positions and repos
- Simulating outright sale modeled with Time Series e.g. 20% of the position in one day, 50% in one week



$$CF(t) = AvailableSecurities \times TS \times price \times (1 - hc)$$

New generation of regulatory reports

- **Consistency**: single set of data to produce all analytics
- **Regulatory mapping**: phase that affect regulatory categories according to a supervisor and slice deposits balance
- **New business**: multiple scenarios (including stress testing) to produce the set of cash flows required by analytics
- **Reporting**: regroup regulatory and management analytics for ALM (IRRBB and Liquidity)



CFMR reports

- **Regulatory dimensions part of the reports,** a mix between operational ALM and regulatory compliance
- **What-if scenarios,** i.e. not only regulatory scenario
- **Behaviors** needs to be incorporated

	Monetisation Actions:	
7250	71	HQLA Securities monetised via outright sale
7260	71.1	Level 1 Tradable assets
7270	71.2	Level 2A Tradable Assets
7280	71.3	Level 2B Tradable Assets
7290	72	HQLA Securities monetised via new secured financing transactions
7300	72.1	Level 1 Tradable assets
7310	72.2	Level 2A Tradable Assets
7320	72.3	Level 2B Tradable Assets
7330	73	Cash flows from HQLA monetisation actions
7340	73.1	Level 1 Tradable assets
7350	73.2	Level 2A Tradable Assets
7360	73.3	Level 2B Tradable Assets

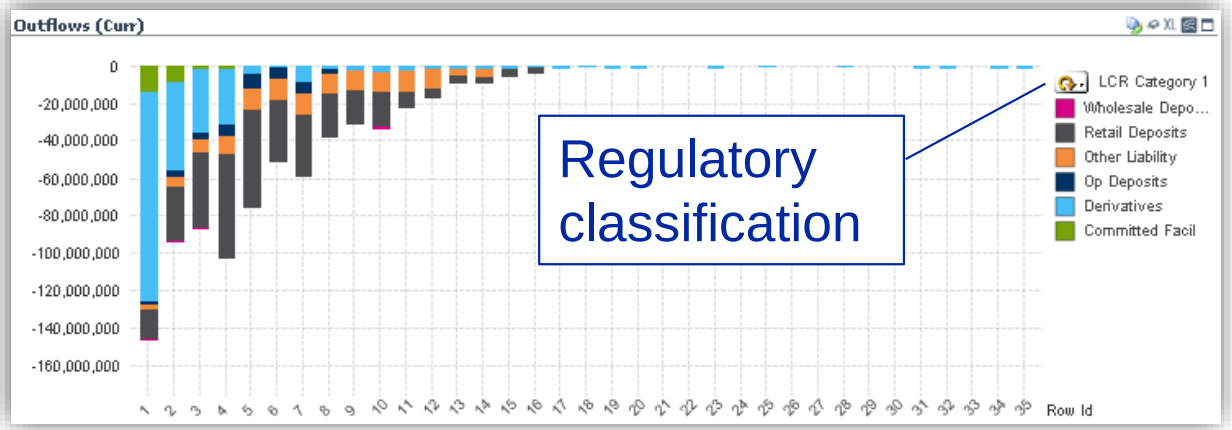
Code	ID	Item	LCR weight
			6000
	1	**OUTFLOWS**	
010	**1.1**	**Liabilities resulting from securities issued (if not treated as retail deposits)**	
020	1.1.1	unsecured bonds due	
030	1.1.2	regulated covered bonds	
040	1.1.3	securitisations due	
050	1.1.4	other	
060	**1.2**	**Liabilities resulting from secured lending and capital market driven transactions collateralised by:**	
070	1.2.1	Level 1 tradable assets	
7440	1.2.1.60	Of which: UK central or regional government, local authority or public sector entity assets	
080	1.2.1.1	Level 1 excluding covered bonds	
090	1.2.1.1.1	Level 1 central bank	
100	1.2.1.1.2	Level 1 (CQS 1)	
110	1.2.1.1.3	Level 1 (CQS2, CQS3)	
120	1.2.1.1.4	Level 1 (CQS4+)	
130	1.2.1.2	Level 1 covered bonds (CQS1)	
140	1.2.2	Level 2A tradable assets	
150	1.2.2.1	Level 2A corporate bonds (CQS1)	
160	1.2.2.2	Level 2A covered bonds (CQS1, CQS2)	
170	1.2.2.3	Level 2A public sector (CQS1, CQS2)	
180	1.2.3	Level 2B tradable assets	
190	1.2.3.1	Level 2B ABS (CQS1)	
200	1.2.3.2	Level 2B covered bonds (CQS1-6)	
210	1.2.3.3	Level 2B: corporate bonds (CQS1-3)	
220	1.2.3.4	Level 2B shares	
230	1.2.3.5	Level 2B public sector (CQS 3-5)	
240	1.2.4	other tradable assets	

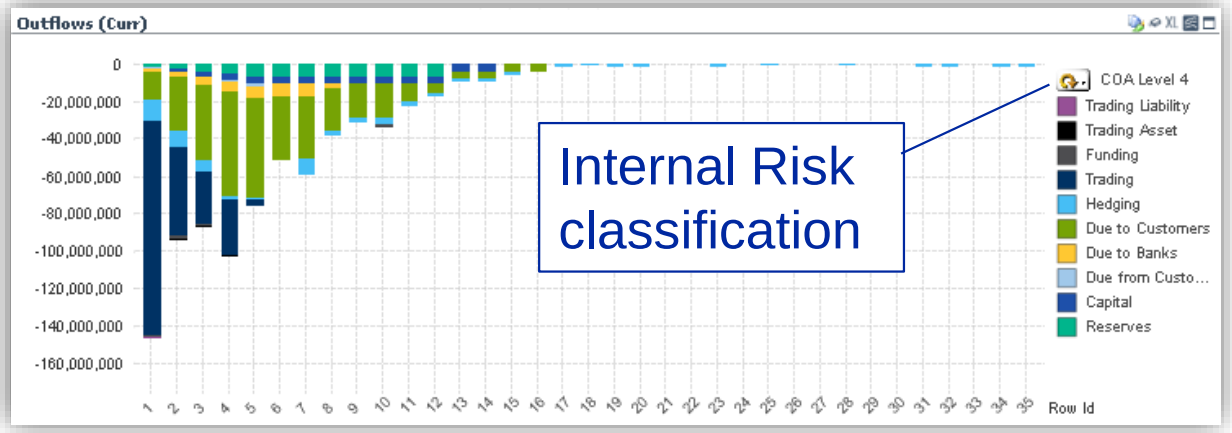
Liquidity Management

Example of reports

Components

- Same data to produce all analytics
  - BS Management: Liquidity and IRRBB
  - Regulatory: LCR and NSFR
- Instrument modeling for contractual cash flows
- Behavioral models for maturing and non-maturing contracts
- Regulatory classification enrichment
- What-if and Stress Testing scenarios
- Granular results
- Business reports

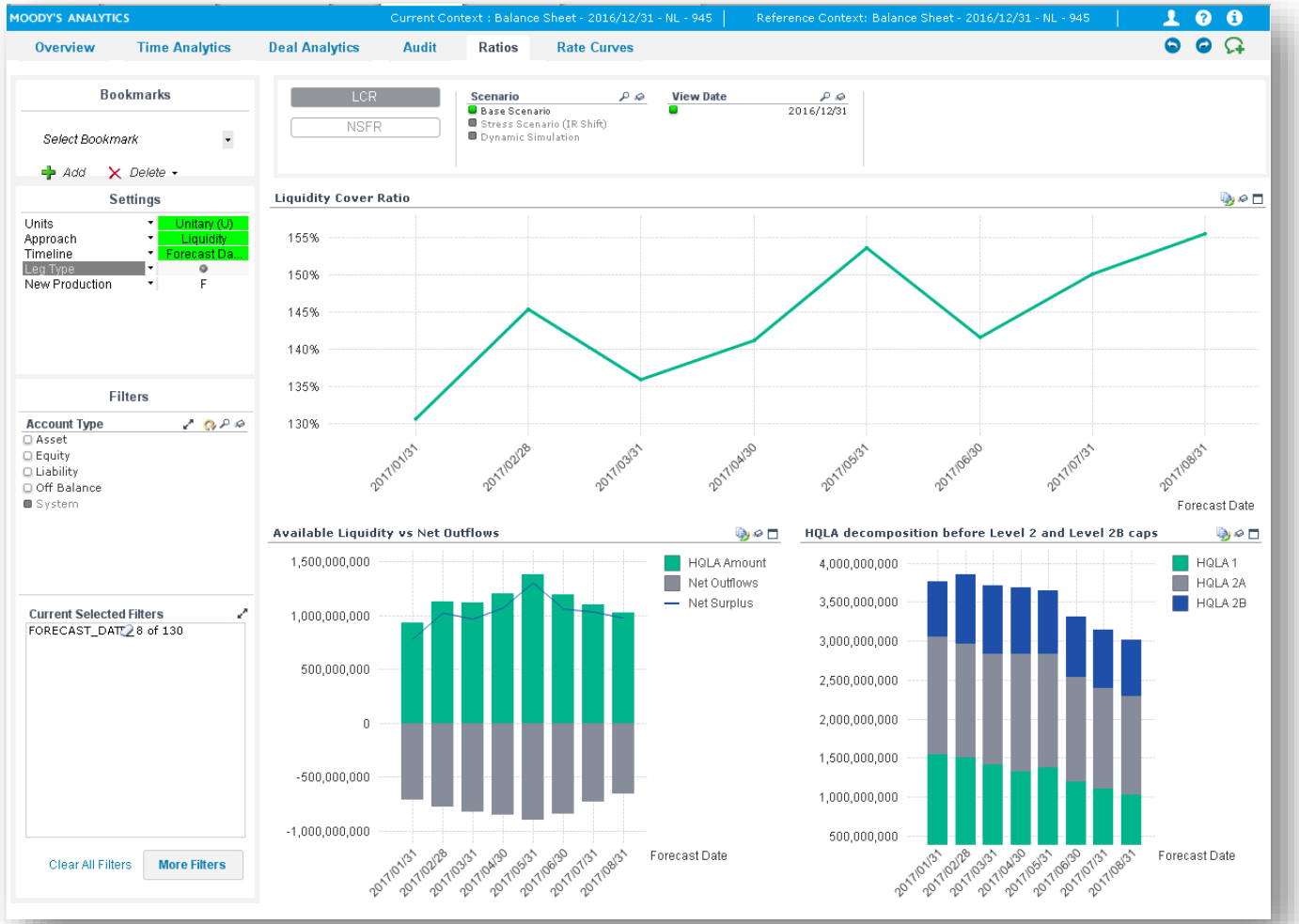




Optimizing your balance sheet

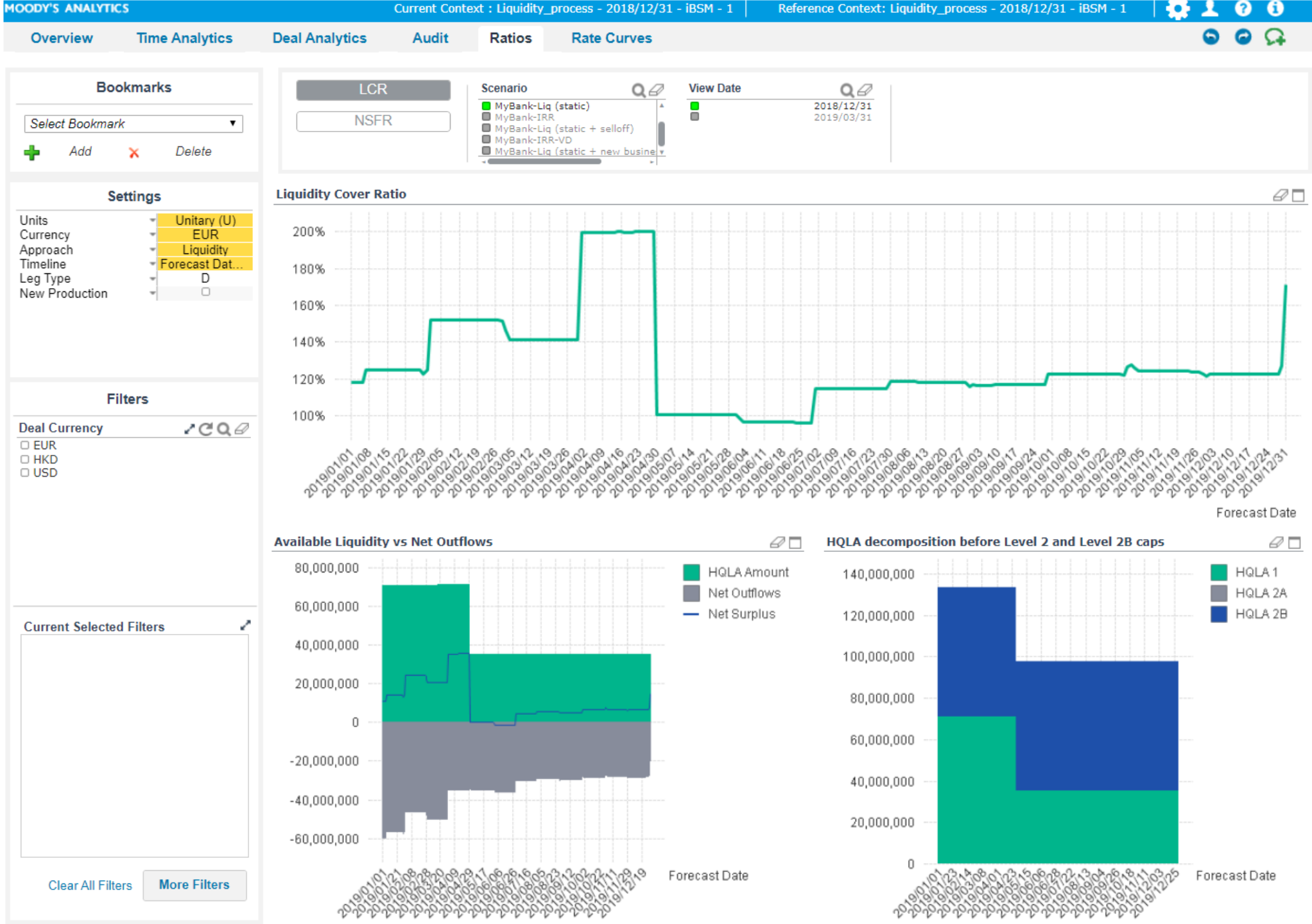
LCR forecast objectives

- **Analyze** the impact of all assumptions on the different regulatory analytics
- **Consistency:** use the same engine to compare “spot” results and “forecast” results
- **Mitigating actions:** what are the good hedging strategies
- **Performance:** launch multiple scenarios on a daily basis at a granular level



Liquidity Ratios

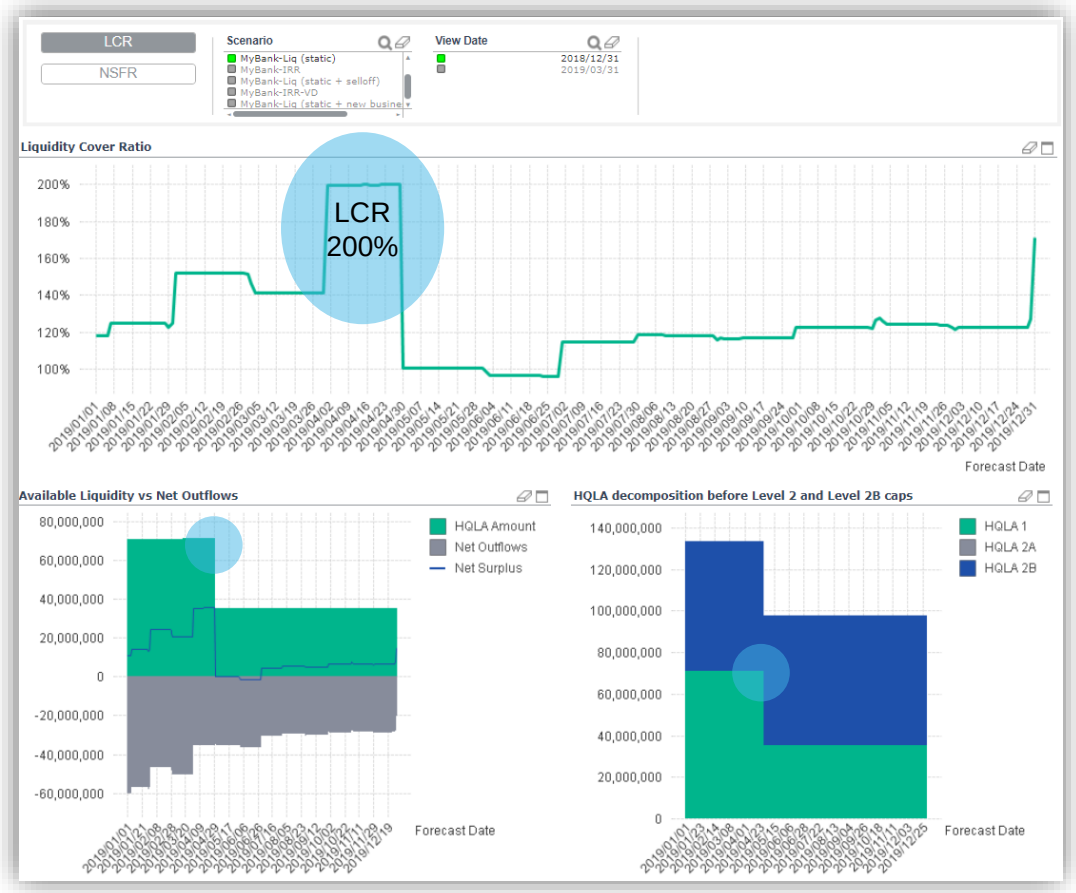
Analyze the LCR & NSFR and its evolution

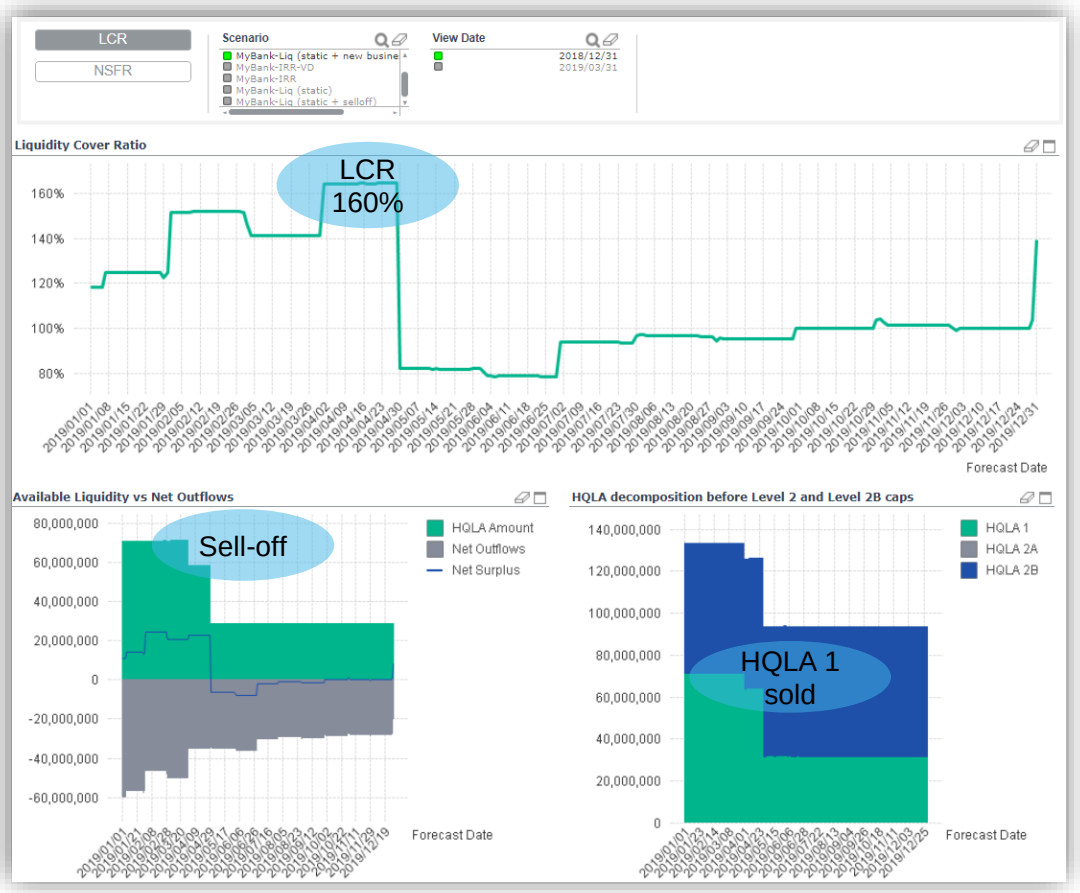


MOODY'S ANALYTICS

Sell-off impact on LCR forecast

LCR optimized by sell-off of Bonds to boost earnings





Benefits of an integrated platform

A great opportunity for better risk management

Regulatory Compliance

Banks need to be prepared for new regulatory requirements and must be able to forecast accurately the regulatory analytics.

Optimization

Regulatory constraints in business simulations is key to forecast and optimize your balance sheet

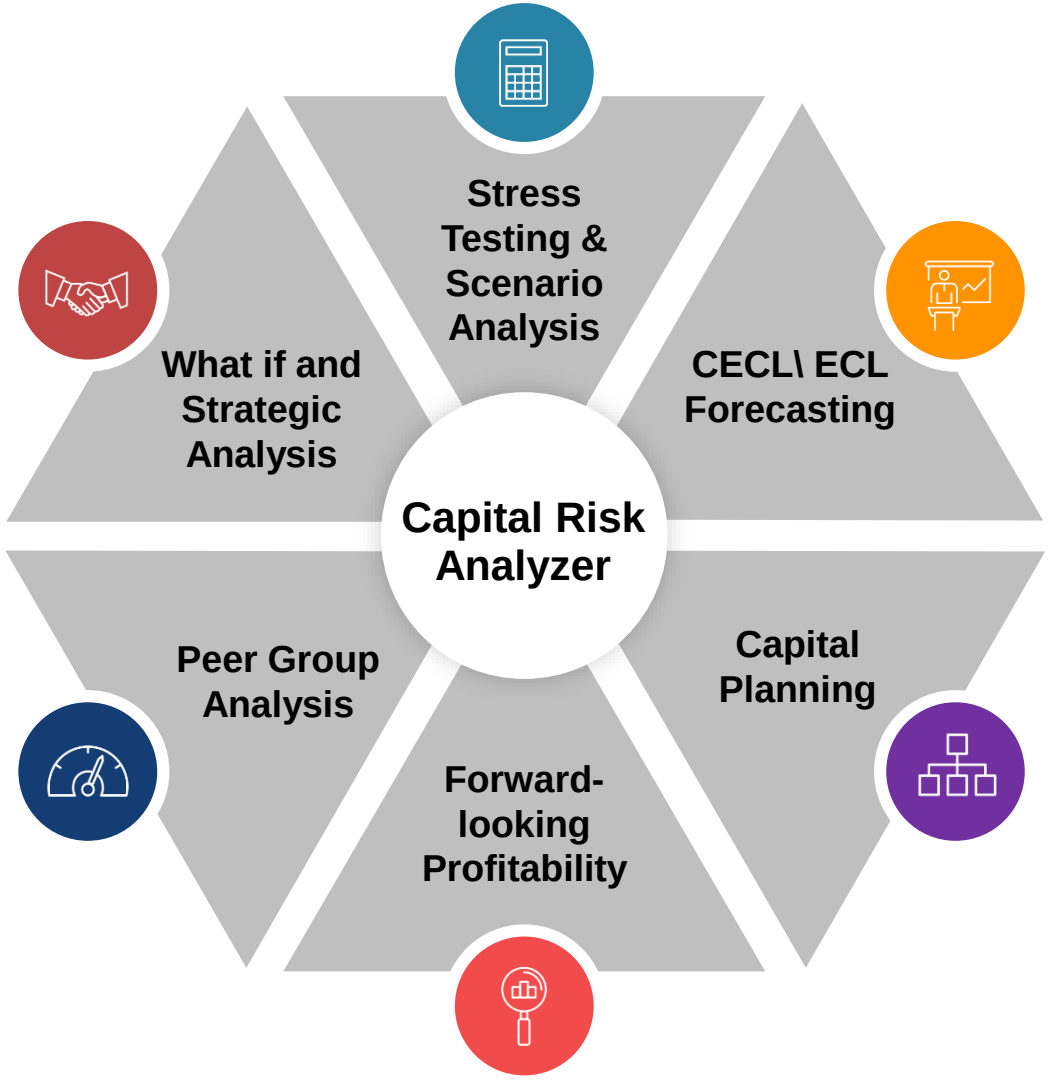
True Risk-adjusted pricing

Models need to be shared by the Bank and be consistent for all risks. The price of each transaction must reflect the variety of these risks.

4

Tools and Technologies for Compliance and Management

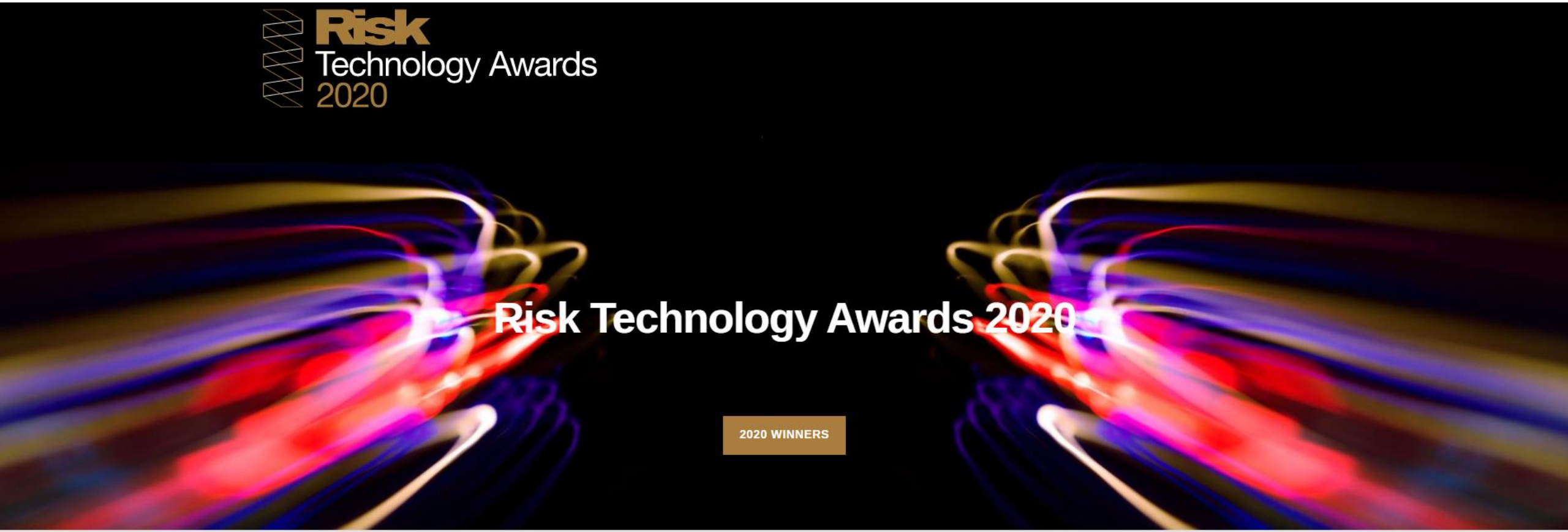
Strategic Capital Planning and Forecasting Tool



Awards

Credit stress-testing product of the year

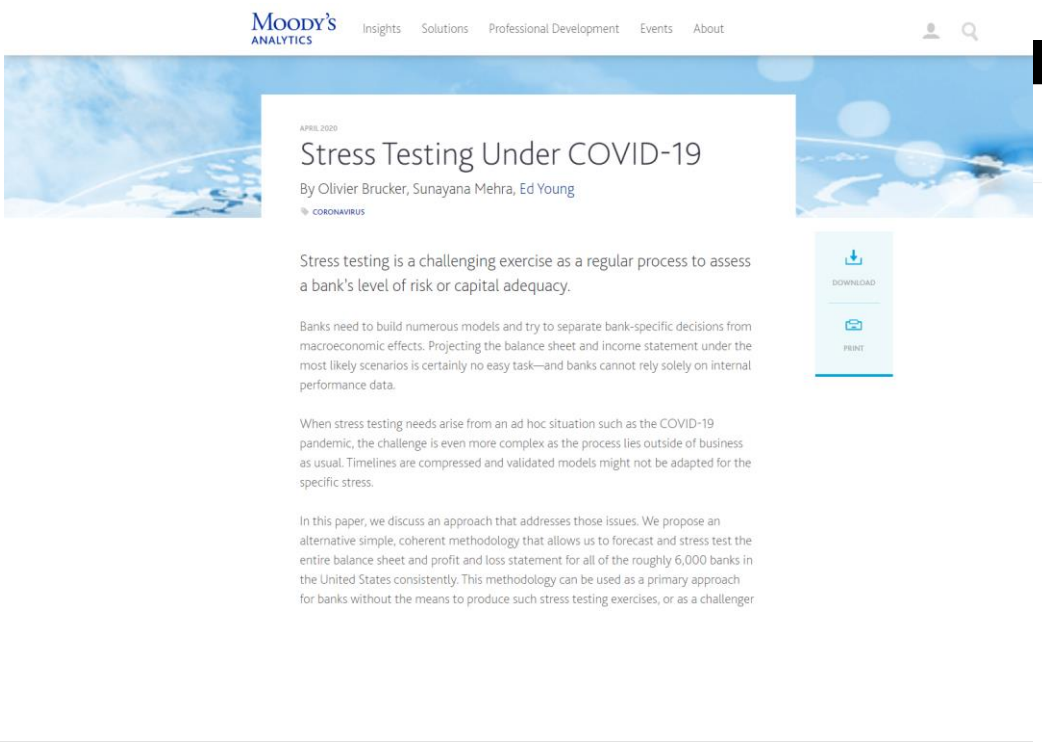
Enterprise-wide stress-testing product of the year

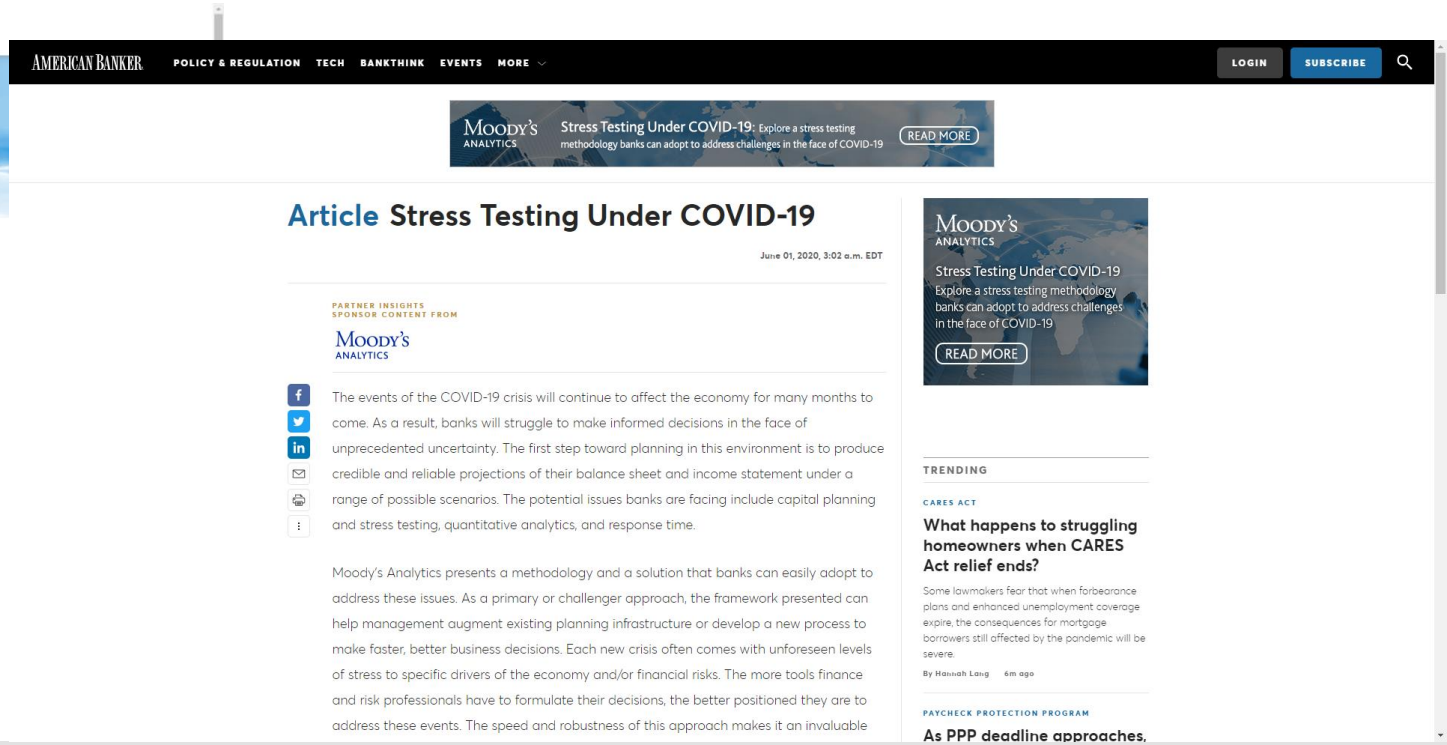


White Paper

Stress Testing Under COVID-19

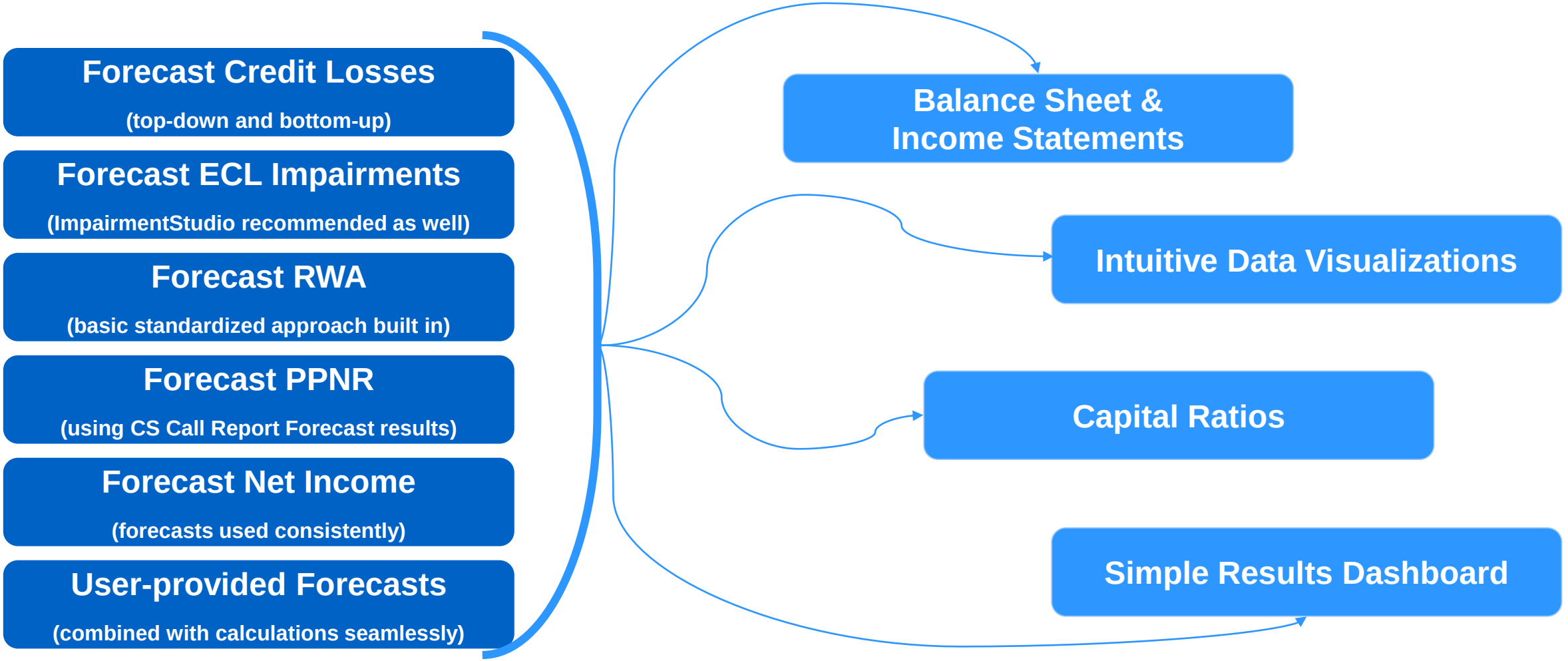
- Published on the MA website
- Published in the American Banker



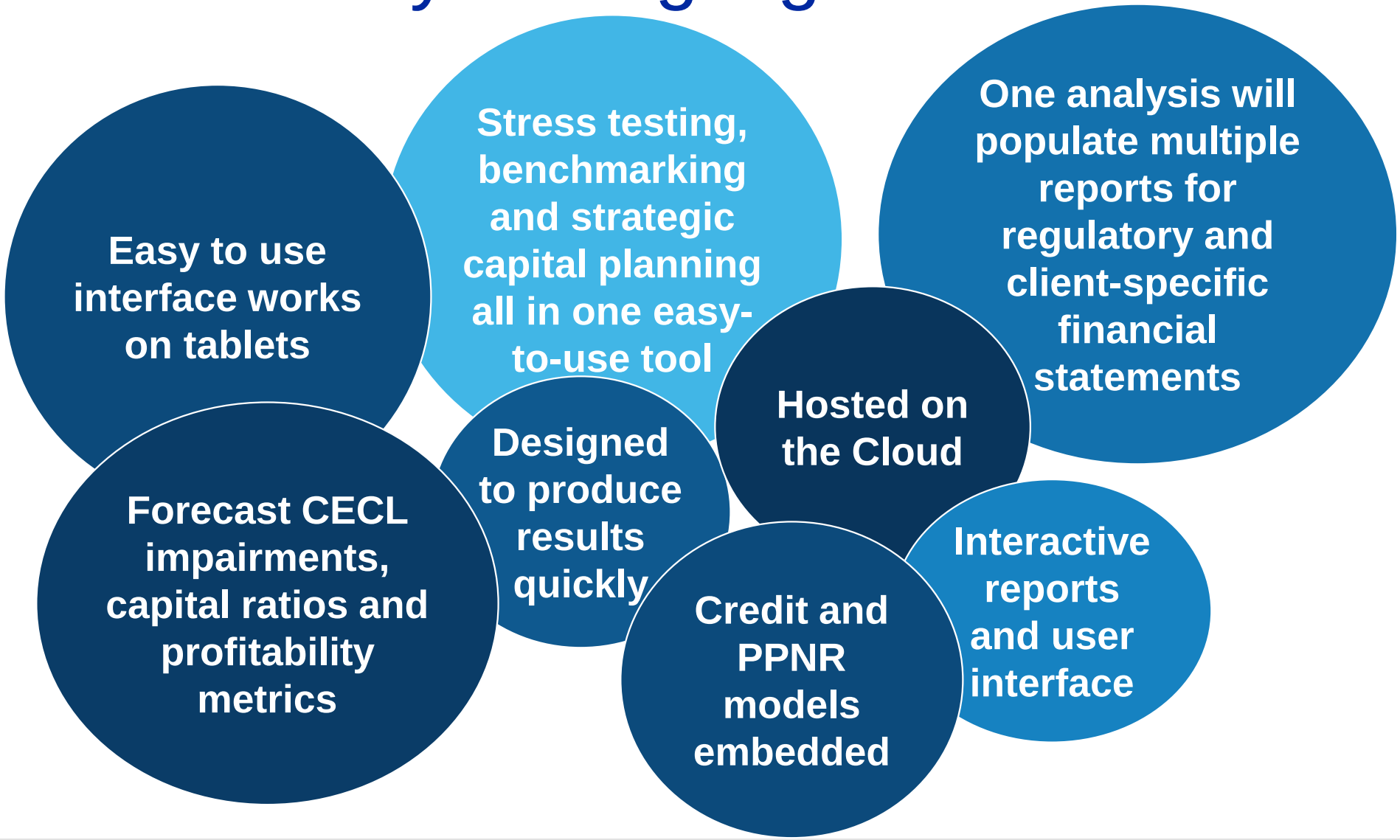


Our Solution: Capital Risk Analyzer (CRA)

Analytics are embedded to support critical management outputs



Capital Risk Analyzer Highlights



- Stress testing is a significant undertaking
- Requires data, analytics and technology infrastructure
- …and upskilling specialist resources

Moody's Analytics

riman
RISK MANAGEMENT ASSOCIATION OF NIGERIA

Better Faster Decisions

West Africa Autumn Webinar Series

Episode 2
Wednesday, 2December

09:00 GMT | 10:00 WAT

Implementing an Effective Model Validation Framework

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