

Moody's Analytics Global Macroeconomic Model and Scenario Studio

Mark Zandi, Mark Hopkins and Timothy Daly

June 28, 2018

Agenda

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2. Selected Scenario Analyses and Results
3. Forecast Governance and Scenario Studio
4. Scenario Studio Applications
5. Summary | Q&A

PRESENTERS



MARK ZANDI
CHIEF ECONOMIST
MOODY'S ANALYTICS



MARK HOPKINS
DIRECTOR, ECONOMIC
RESEARCH



TIMOTHY DALY
SENIOR DIRECTOR,
BUSINESS DEVELOPMENT

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Global Macroeconomic
Model Overview

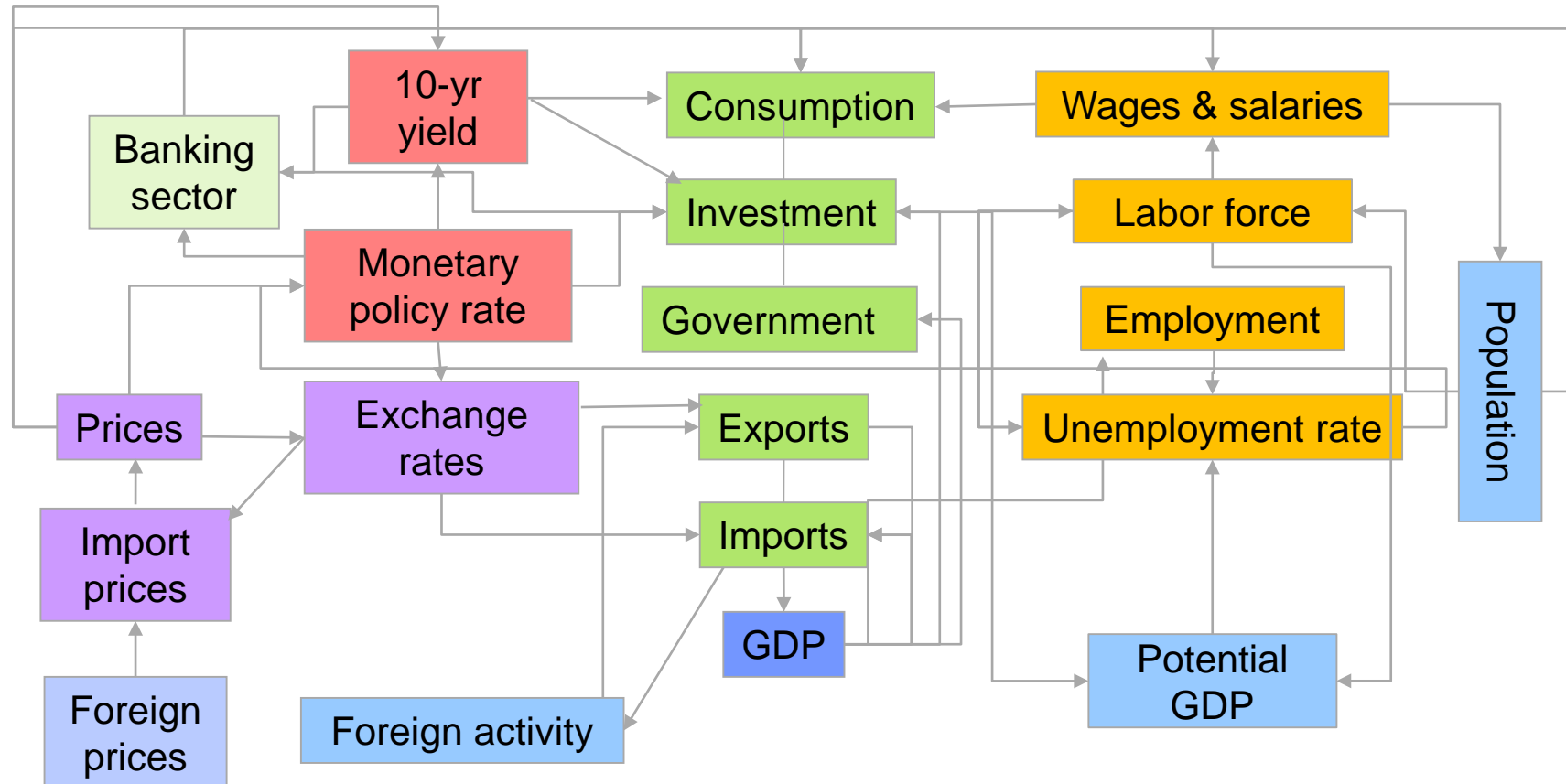
Global Macroeconomic Model

- » Produces a joint forecast of over 10,000 global economic and financial time series, accounting for roughly 95% of global activity.
- » Allows for shock propagation and contagion effects, and ensures greater scenario consistency.
 - Trade flows (exports reflect partner imports), Financial markets (stock prices and bond yields), Prices (exchange rates, terms of trade and global commodity prices), Investment (foreign direct investment and capital flows)
- » Allows users to determine the impact of domestic and foreign shocks.
 - Scenarios can be constructed through exogenous shocks or endogenous adjustments
- » Allows for multiple-use cases through scalable and flexible construction.
 - Real GDP may be a model output (for forecasting), or a model input (for regulatory stress test scenario generation)
- » Balances economic theory and empirical forecast performance.

Equations Balance Theory & Empirics

Variable	Specification suggested by economic theory draws on...
Unemployment rate	Okun's Law
Labor force	Participation rate & demographics
Private consumption expenditure	Keynesian consumption function / Euler equation
Public consumption expenditure	Baumol's disease w/ endogenous responses to fiscal space
Fixed investment	Accelerator model / Tobin's Q
Inventory investment	Adjustment process in deviations of final spending to firm output
Exports	Trading partner import demand and real effective exchange rate
Imports	Imports reflect domestic demand + re-exporting demand
Labor income (wages & salaries)	Wage bargaining over revenue product of labor
Central bank target rate	Policy assumption, based on an augmented Taylor Rule
10-yr gov bond yield	Fisher Rule w/ sovereign risk premium, global interest rate parity
Yield curve & market lending rates	Term-structure of interest rates
Exchange rate (floating)	Interest rate parity (short-run) & purchasing power parity (long-run)
Import price deflator	Exchange rate pass-through of foreign prices, global commodity prices
Consumer price index	Expectations augmented Phillips curve based on firm price setting function
House prices, stock prices	Asset pricing theory
Government total expenditure	Sum of government consumption + debt service + net transfers
Government total revenues	Revenues equal the effective tax rate multiplied by income
Industrial production	IP tracks the aggregate value added of goods-producing industries
Domestic credit (money supply)	Liquidity demand depends on transactions value (GDP) and interest rates
CA balance	(Identity) CA = net exports + net income + net transfers

Structural Model Methodology

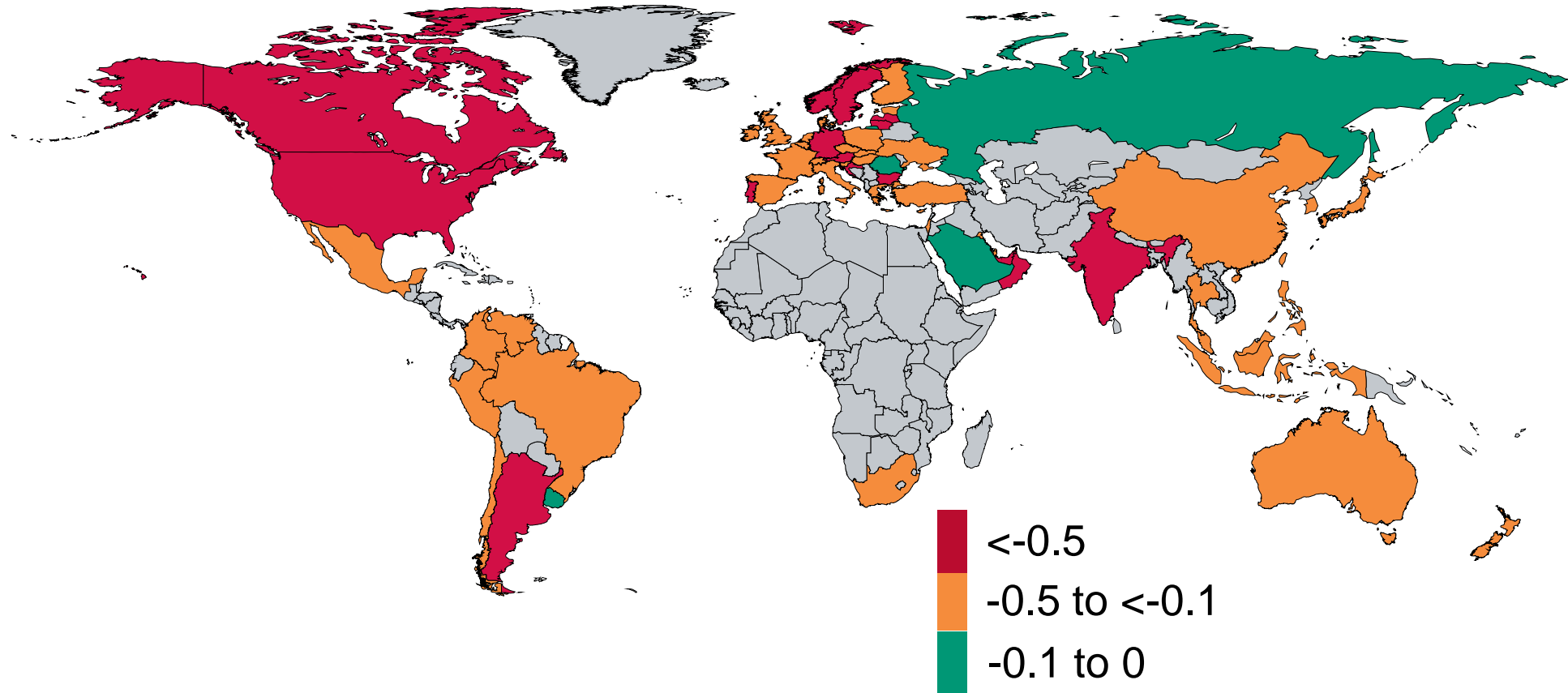


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Selected Scenario Analyses and Results

U.S. Stock Selloff Hurts Global Growth...

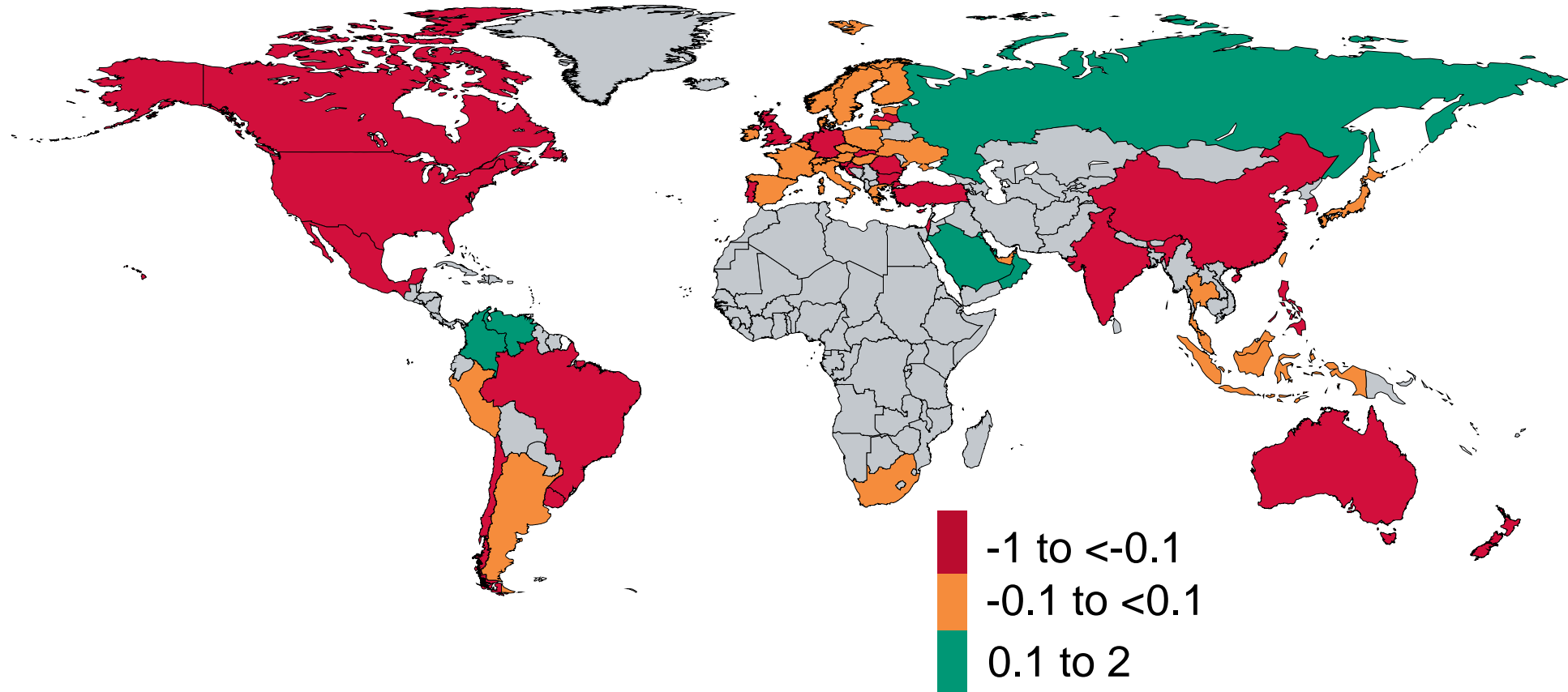
% difference in real GDP due to 20% decline in S&P 500



Source: Moody's Analytics

...While Higher Oil Prices Have Mixed Impacts

% difference in real GDP due to \$10/bbl increase in oil prices



Source: Moody's Analytics

Standard Scenarios

- BL** Baseline (most likely)
- CF** Consensus Forecast
- S0** Exceptionally Strong Growth
- S1** Stronger Near-Term Rebound
- S2** Slower Recovery
- S3** Moderate Recession
- S4** Protracted Slump
- S5** Below Trend, Long-Term Growth

- S6** Stagflation
- S7** Next-Cycle Recession
- S8** Low Oil Price

Regulatory-Driven

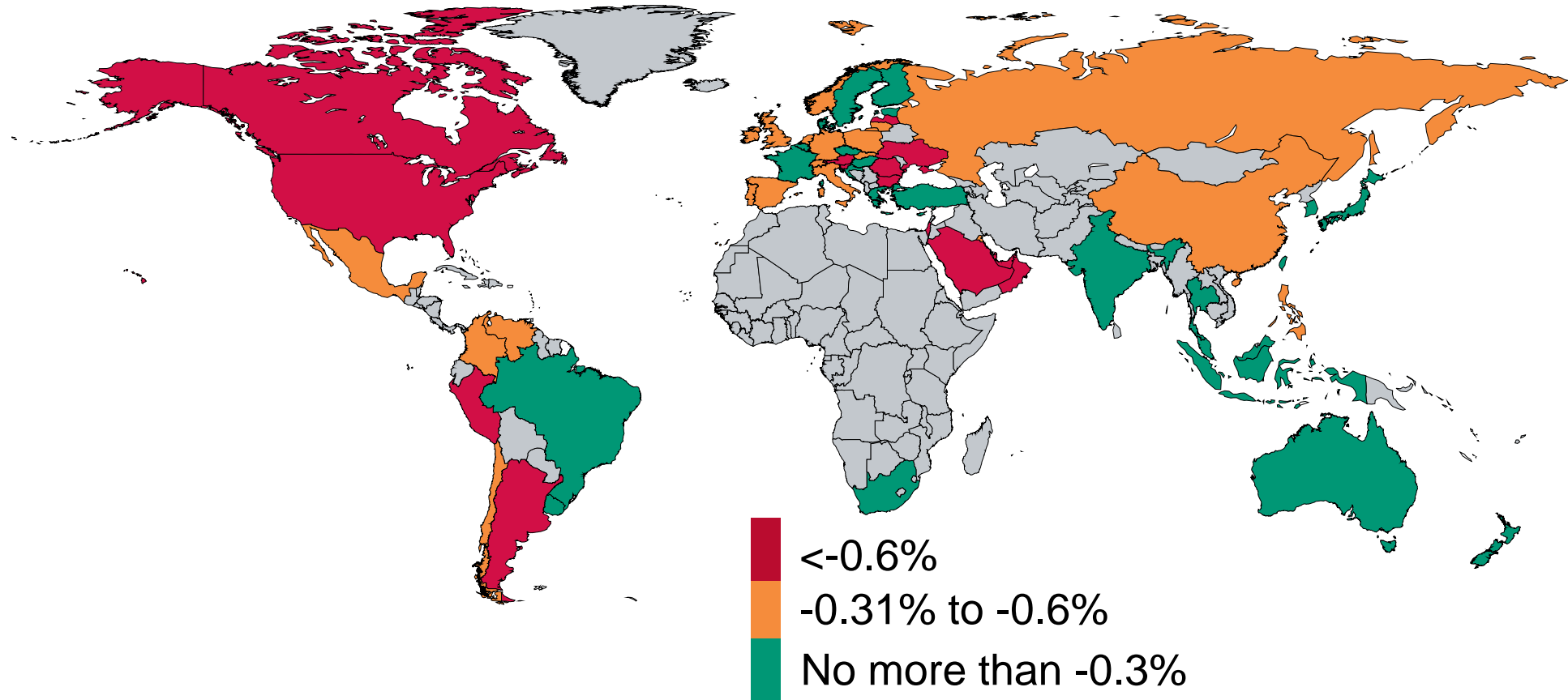
- FB** Fed Baseline
- FA** Fed Adverse
- FS** Fed Severely Adverse

Recent Scenarios Using Global Model

1. Trump Tariff Hikes
2. NAFTA Breakup
3. Venezuela Implosion
4. Chinese Debt Collapse
5. Italian Exit

U.S.-China Trade War

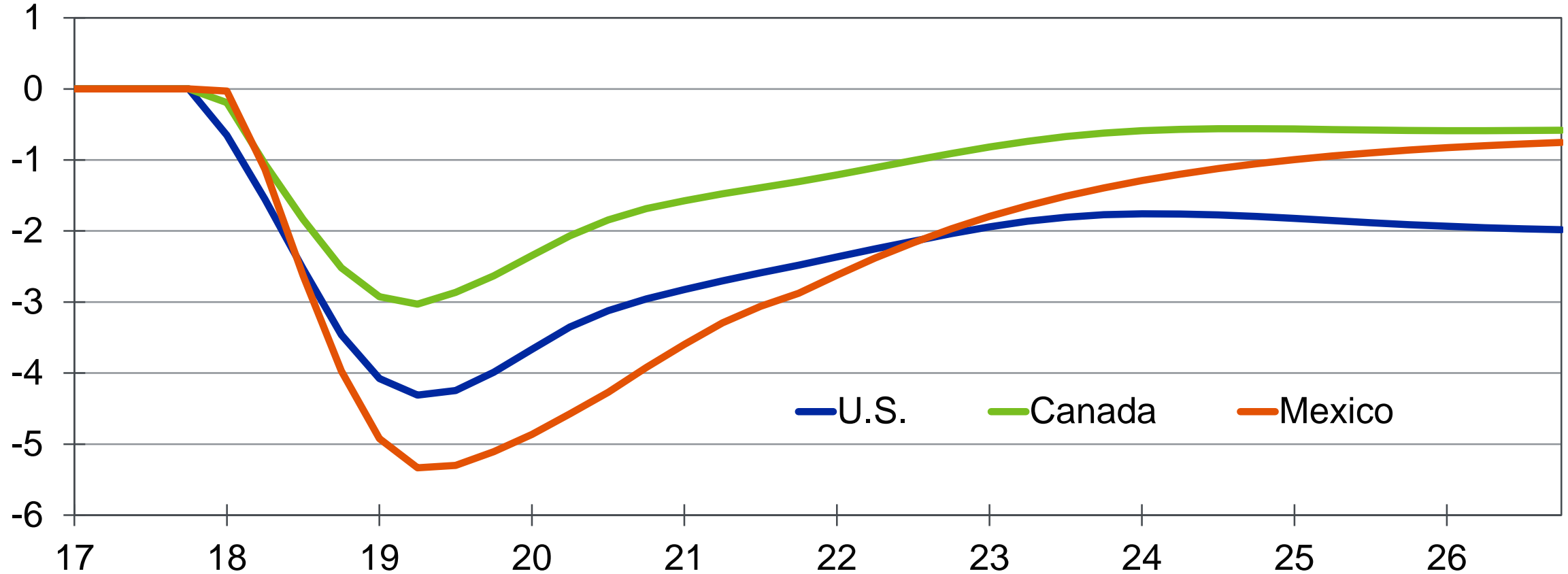
% difference in real GDP growth, 2018Q2-2020Q2, trade war vs. no tariff scenario



Source: Moody's Analytics

A NAFTA Collapse Results in Recession...

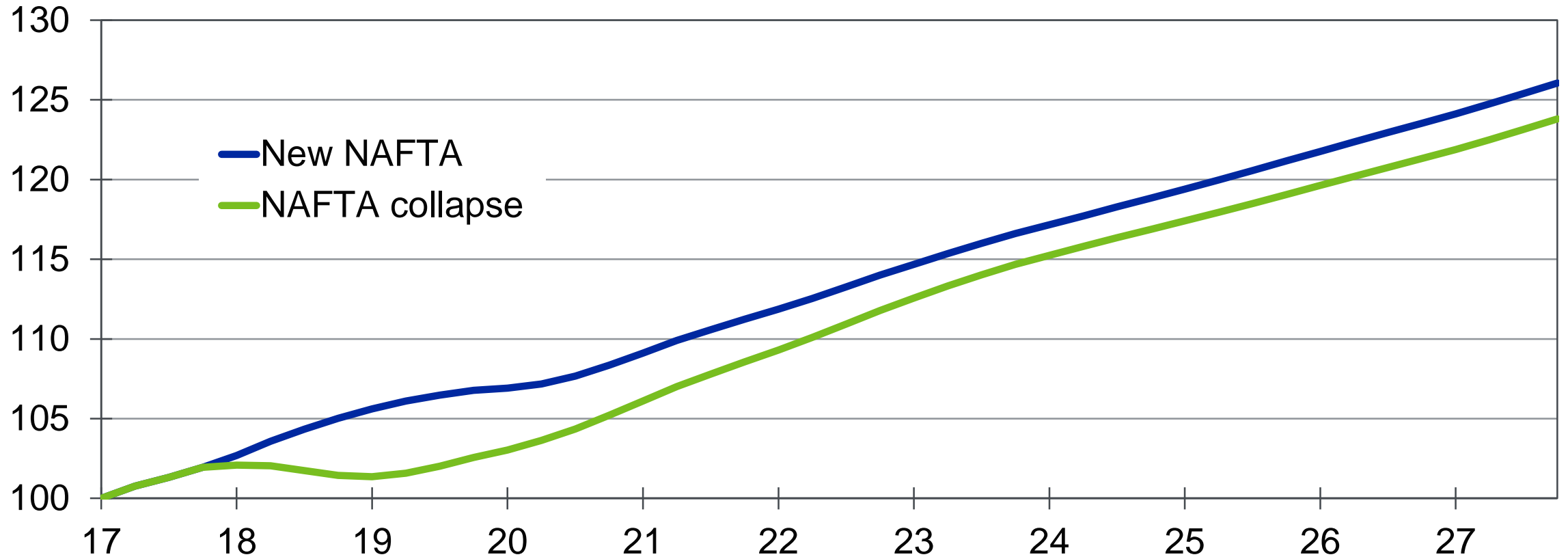
% difference in real GDP, NAFTA collapse vs. new NAFTA



Sources: BEA, Statistics Canada, INEGI, Moody's Analytics

...and a Sluggish Recovery

North America combined real GDP, 2017Q4=100

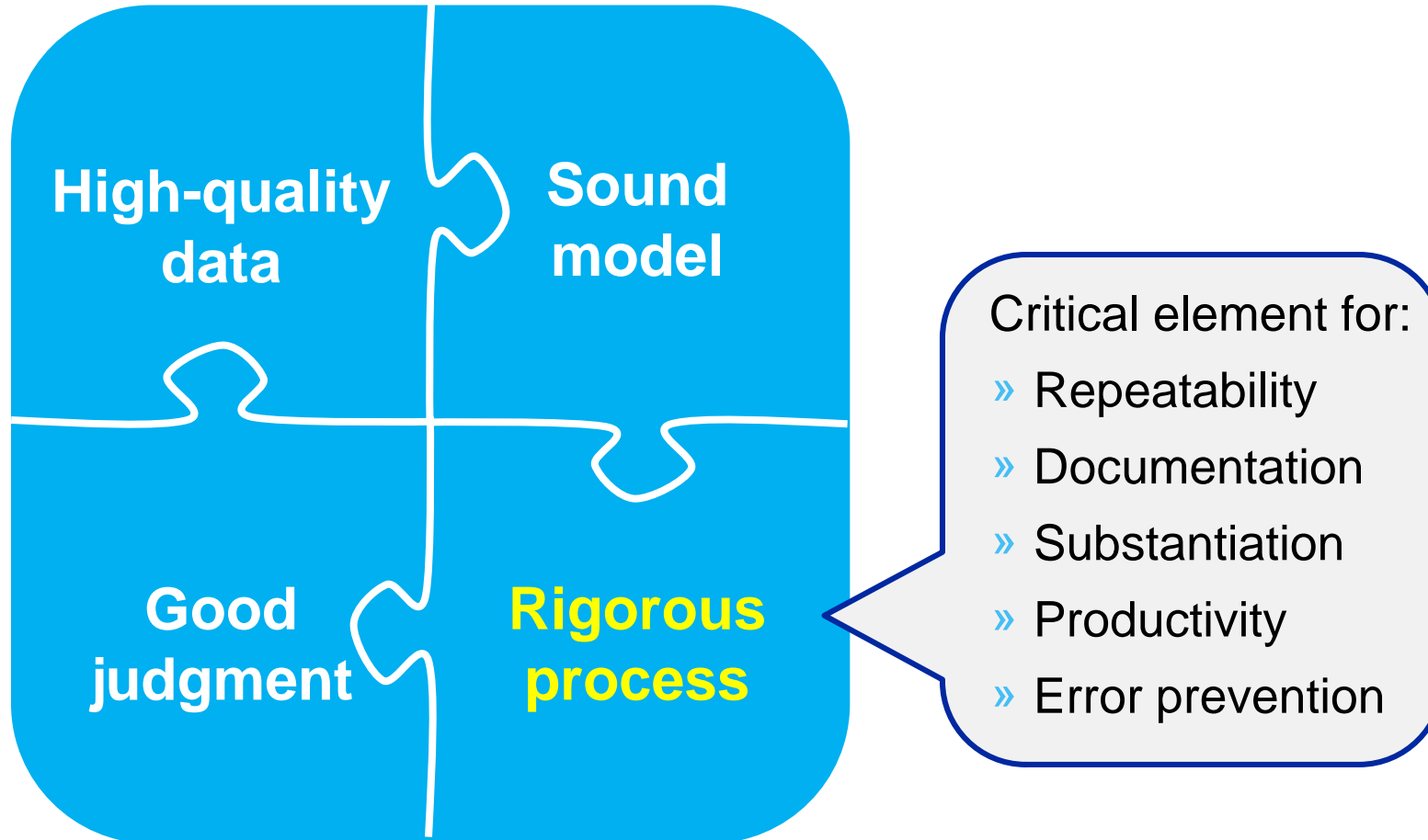


Sources: BEA, Statistics Canada, INEGI, Moody's Analytics

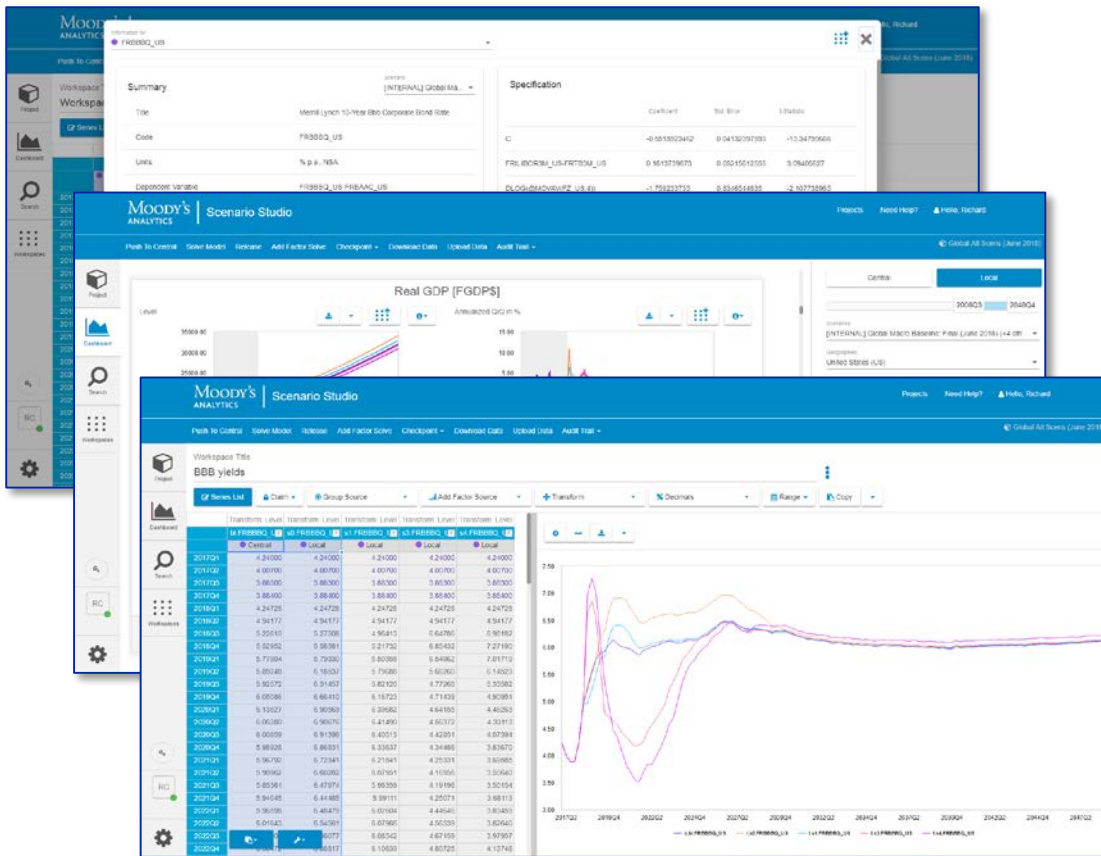
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Forecast governance and Scenario Studio

Elements of Forecast Integrity



Scenario Studio

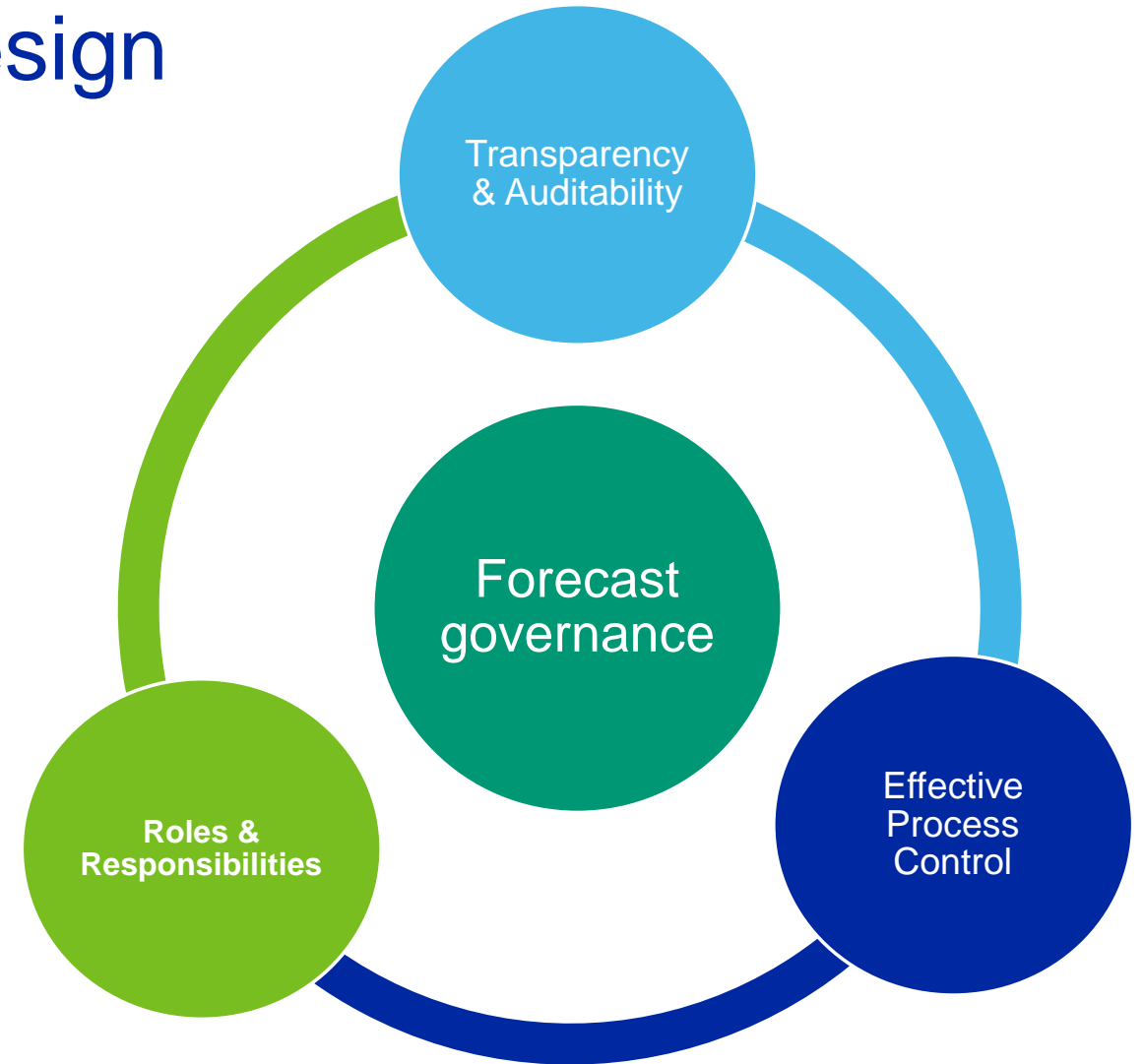


- » Web-based scenario building application
- » Hosts Moody's Analytics global model
- » Facilitates real-time forecasting for individual and teams
- » Supports rigorous forecast processes

Forecast Governance by Design

How?

- » Annotated audit trail
- » Rapid visualization
- » Model & equation exploring tools
- » Data mastering
- » Configurable user access levels
- » Process checkpoints

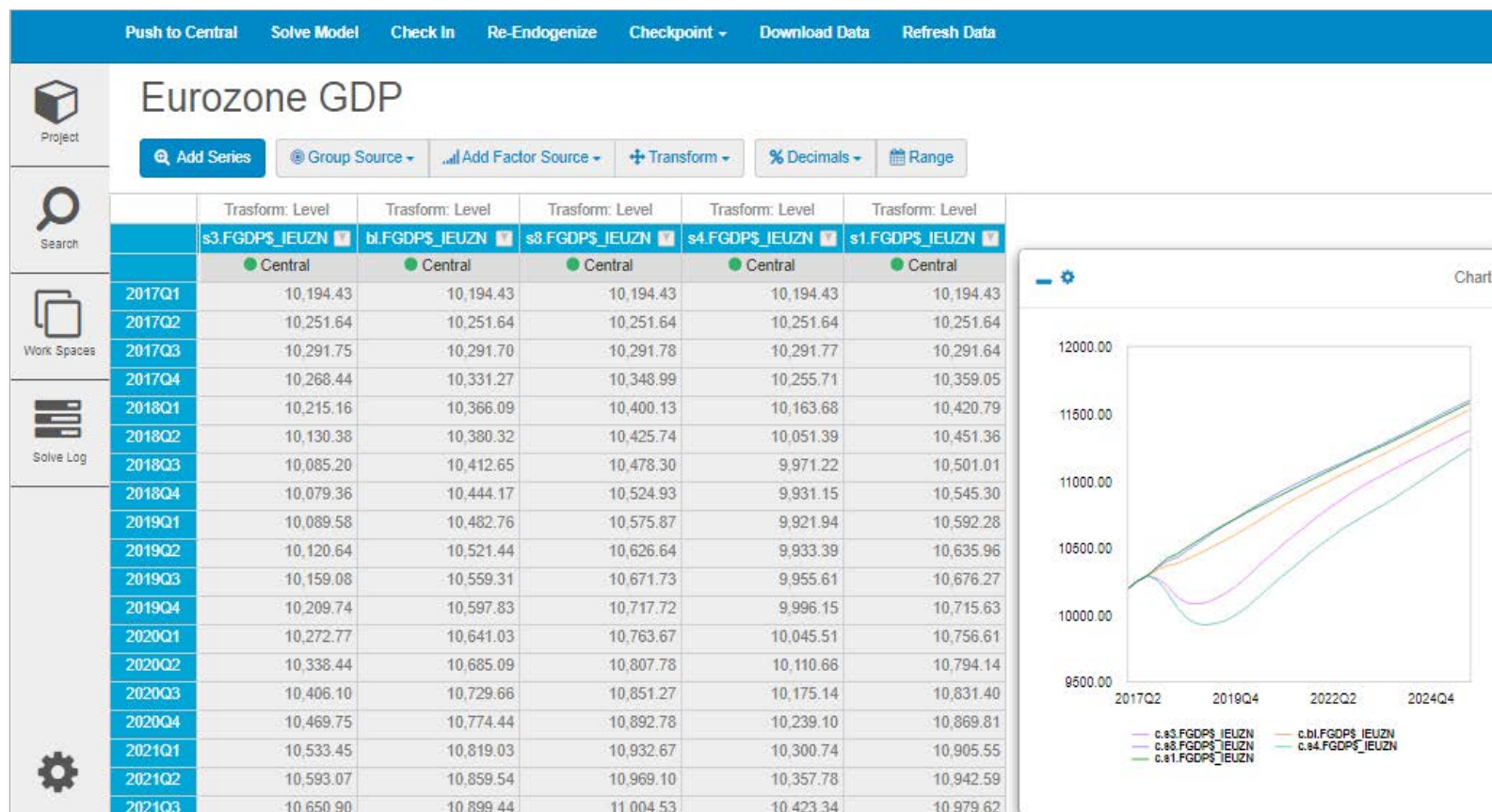


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Scenario Studio
Applications

Scenario Studio Applications

moodysanalytics.com/scenariostudio



- » **CECL** – Reasonable & supportable forecasts within a transparent, validated global model framework
- » **IFRS 9** – Probability-weighted scenarios including two upside, a baseline and two downside scenarios.
- » **Stress-Testing** – Use Moody's expanded regulatory scenarios or create bespoke scenarios for regulatory or enterprise purposes
- » **BAU** – Capital planning and budgeting, event-driven scenarios, internal stress-testing to prepare for next recession

For More Information...

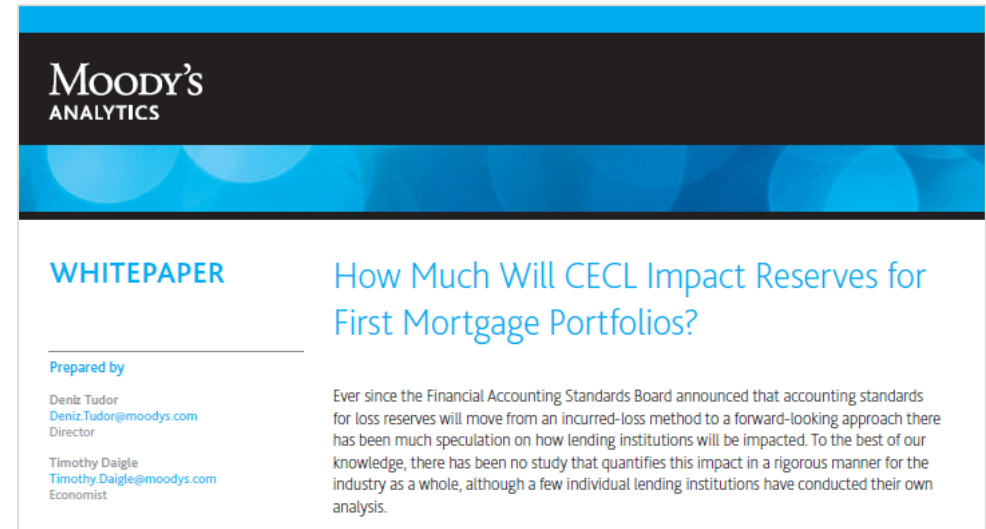
moodysanalytics.com/cecl or email help@economy.com



**MOODY'S
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CECL's Forward-Looking Requirement: The Impact Could Be Substantial

Cristian deRitis PhD, Sr Director, Economics
Timothy Daly, Director, Sales Manager



**MOODY'S
ANALYTICS**

WHITEPAPER

How Much Will CECL Impact Reserves for First Mortgage Portfolios?

Prepared by

Deniz Tudor
Deniz.Tudor@moodys.com
Director

Timothy Daigle
Timothy.Daigle@moodys.com
Economist

Ever since the Financial Accounting Standards Board announced that accounting standards for loss reserves will move from an incurred-loss method to a forward-looking approach there has been much speculation on how lending institutions will be impacted. To the best of our knowledge, there has been no study that quantifies this impact in a rigorous manner for the industry as a whole, although a few individual lending institutions have conducted their own analysis.



**MOODY'S
ANALYTICS**

WHITEPAPER

Economic Scenarios: What's Reasonable and Supportable?

Prepared by

Cristian deRitis
Cristian.deRitis@moodys.com
Senior Director

[Contact Us](#)

Introduction

The world is awash in forecasts. Politicians, pundits, analysts and even economists are constantly filling the airwaves with their views on economic issues and how the future is bound to unfold. Forecasts often come with an agenda or other motivation in order to nudge policymakers in a particular direction. But even more neutral analysts can differ in their

Q&A

Additional questions?

Send an email to help@economy.com or contact:

Timothy Daly
Senior Director
timothy.daly@moodys.com
212-553-6879

Roberta Cristino
Senior Director
roberta.cristino@moodys.com
+44 (442) 077-721550

Visit moodysanalytics.com/outlook or moodysanalytics.com/scenariostudio.

United States
121 North Walnut Street
Suite 500
West Chester PA 19380
+1.610.235.5299

United Kingdom
One Canada Square
Canary Wharf
London E14 5FA
+44.20.7772.5454

Australia
Level 10
1 O'Connell Street
Sydney, NSW, 2000
Australia, +61.2.9270.8111

Prague
Washingtonova 17
110 00 Prague 1
Czech Republic
+420.22.422.2929

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