Moody's
ANALYTICS

ARTICLE
May 2023

Author
Carmen Gracia Caceres
Director
Advisory Services

Contact Us
Americas
+1.212.553.1658
clientservices@moodys.com

Capital Stress Testing: More Than Just a Regulatory Exercise

Institutions of all sizes have raced to the finish line and wrapped up their annual capital plan and stress testing this April. What made this year's exercise unique is that it coincided with the onset of the banking crisis. If you were one those organizations that considered capital stress testing to be merely a regulatory exercise that relied on hypothetical scenarios and carried little value, you surely paid special consideration to the integration of interest rate, liquidity, and capital risks in this year's stress testing. In today's economic conditions of high inflation, high interest rates, deposit volatility, and recession risk, it is important that your institution continues to translate these economic conditions into balance, income, and capital projections. This will assist you in designing strategic and tactical actions to help manage income and capital risks. Therefore, capital stress testing should be an important component of your ongoing risk management function. That is, if only the process were efficient and repeatable.

CAPITAL STRESS TESTING SCENARIOS:

Supervisory:
- Baseline
- Severely Adverse

Internal:
- Baseline
- Stress Scenario 1
- Stress Scenario 2, etc.

Key Outputs:
- Quantitative:balance sheet, income, loss and capital projections
- Qualitative: capital policies, stress testing framework and methodologies
- Final Users: ALCO/board, regulators, public

WHAT IS CAPITAL STRESS TESTING?

Capital stress testing is a framework developed to assess whether there is sufficient capital for institutions to sustain normal operations even under adverse conditions. The framework involves scenario analysis and produces forward-looking assessments of the impact of adverse macroeconomic and idiosyncratic events on the institution as a whole.

- *Scenario analysis comprises supervisory and internal scenarios.* Supervisory scenarios are published by regulators and allow for comparability of results across institutions. Internal scenarios are defined by institutions to capture their unique risk profiles.
- *Forward-looking Assessments.* These include balance sheet, income, loss and capital projections. The capital stress testing process also produces qualitative outputs such as capital policies, stress testing framework and methodologies. Quantitative and qualitative information is summarized in capital plan documents. For larger institutions, the capital plan contains mandatory elements and can reach thousands of pages. Institutions provide capital stress testing results to their ALCO/Board, regulators, and the general public, depending on requirements.

U.S. regulators have issued tailoring capital (and liquidity) rules that place larger institutions in different categories based on asset size and other factors that reflect their risk and complexity. The various rules establish the requirements that apply with respect to capital stress testing, including:

- Type of stress testing (supervisory-run vs. company-run) and frequency (annual vs. every other year)
- Capital plan submission
- Reporting
- Risk-based capital calculation approaches.

ASSET SIZE TO KEEP IN MIND:

- **$10B**: Capital planning and stress testing requirement for credit unions starts
- **$10B**: Supervisory guidance on stress testing for banking organizations starts
- **$100B**: Capital plan and stress testing requirement for banking organizations starts

Smaller institutions that do not have the same enhanced requirements are still expected to conduct some level of stress testing as part of managing their capital.

WHY INSTITUTIONS NEED TO PAY ATTENTION TO CAPITAL STRESS TESTING

For many institutions capital stress testing is a check-the-box exercise. However, a well conducted exercise will add value to your organization and provide critical information that helps you identify risks, assess vulnerabilities, design mitigation strategies, and define realistic capital contingency plans.

- *Identify risks.* Supervisory scenarios have a function in capital stress testing, but it is equally important that your institution develop internal stress scenarios that capture your unique risks. How do you define the scenarios that are more relevant for your institution?
    1. Risk identification. Start by leveraging risk-control inventories and creating surveys to business units.
    2. Risk selection. Select the risks and macroeconomic variables that represent stressful conditions for each area of business: a credit event? A recessionary environment that impacts the commercial or residential real estate markets? Market volatility or high interest rates that negatively impact asset valuations? This is a deep dive into each area of the business that may uncover offsetting risks and exposures.
    3. Scenario selection. Construct scenarios around the selected risks from your risk identification process, or select scenarios that more closely represent those risks from a service provider. Most institutions go down this path, given the complexity of developing scenario narratives and projecting multiple dimensions of economic variables. Finally, layer in idiosyncratic loss events and risks to business plans to complete your scenario design.

MITIGATION STRATEGIES TO IMPROVE CAPITAL POSITION:

- Reduce balance sheet size, manage deposit growth through pricing strategies and deposit arrangements that move cash off balance sheet
- Adjust asset mix (product, sector, asset classes)
- Reduce expenses
- Execute asset sales after evaluating unrealized gains/losses
- Issue preferred or common
- Receive capital infusions from parent
- Reduce or eliminate share repurchases

- *Assess vulnerabilities.* Well-executed stress testing will expose the institution's vulnerability to factors that are the direct result of the stress and from second-order or knock-on effects. It is not uncommon that loss events that pose stress to capital also evolve into liquidity or credit stress events. This should not be a surprise, given the strong relationship between capital, liquidity and credit risks. For example, large losses may prevent an affiliate from paying dividends to a parent company that relies on subsidiary dividends as a key source of funding, and a deteriorating credit environment may prevent the parent from accessing the capital markets.

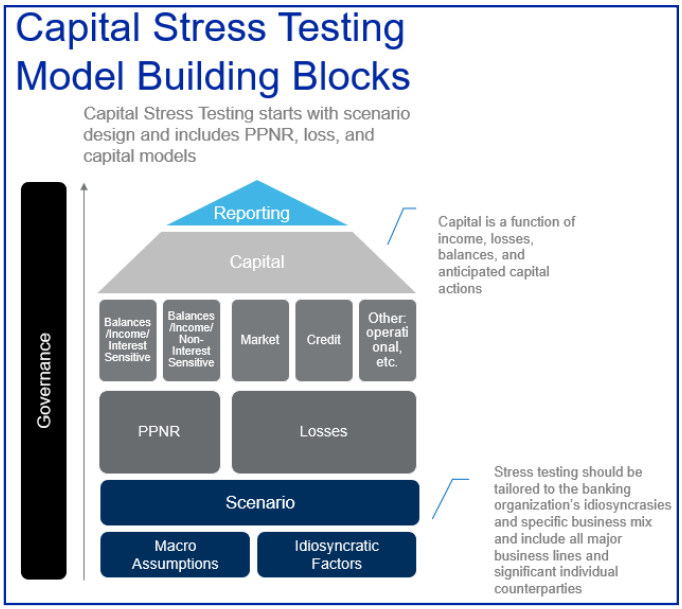
- *Define mitigation strategies*. Well-executed stress testing informs decision-making. As you review your post-stress capital results and consider the range of actions you would take to strengthen your capital position, pull your capital contingency plan. Does the plan identify capital triggers? Is the list of actions comprehensive? Are the plans feasible? Is it aligned with capital risk appetite statements approved by your Board? If the answer to any of the questions is "no", then it is time to revisit your capital contingency plan.

- *Assess capital adequacy.* Capital stress testing will help your institution establish internal capital thresholds consistent with your risk appetite. It is also the tool leveraged by regulators in their supervisory stress tests to set capital levels for larger institutions. Capital requirements effectively impact the level of capital distributions in the form of shareholder dividends or share repurchases.

HOW CAPITAL STRESS TESTING IS PERFORMED TODAY AND CHALLENGES AHEAD

Capital stress testing is a complex and highly collaborative process that involves steps, models and business units.
Typical steps include:

1. Planning/project management.
2. Scenario design (macro variables and risk events).
3. Modeling.
4. Review and approvals.
5. Reporting, and if required, regulatory submission.



The actual modeling and generating results typically take a third of the time allotted to capital stress testing, with one third each spent on planning/project management/governance activities, and on reporting/reviews/ approvals.

- Capital stress testing models can be grouped into PPNR and loss models, which along with non-model processes, produce outputs that are consumed by the next model or process. These models and processes are usually disconnected, and data needs to be passed between systems and reconciled. Capital projections are the result of balance and income aggregation processes and are often built in Excel.
- Business units involved include product lines and corporate functions such as FP&A, Risk, Treasury, ALM, and Regulatory Reporting. Various levels of management committees review and provide effective challenge of assumptions and results.

TODAY'S CHALLENGES: DISCONNECTED MODELS

Most institutions deploy their heavy artillery to perform capital stress testing once a year, while they rely on overly simplistic, excel-based approaches for managing capital the rest of the year. For these institutions, capital stress testing is hardly a repeatable process given the amount of time and effort required from their teams. What makes the process so complicated? The main reason is disconnected models.

Disconnected models presents many challenges, including inconsistencies and process inefficiencies, leading to elevated operational risk:

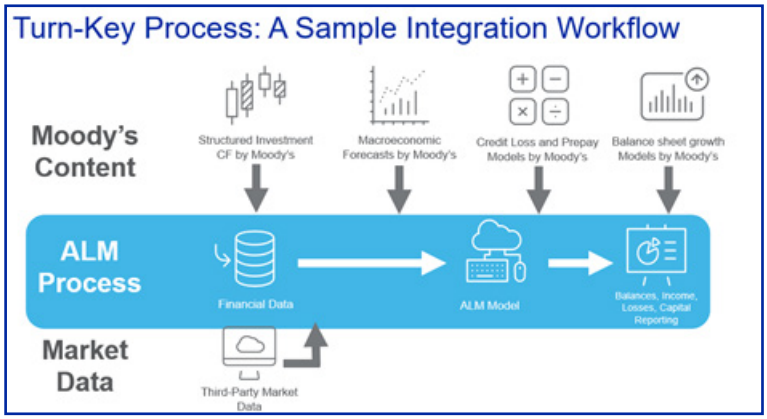
- *Inconsistent assumptions and results.* When credit, ALM, and capital models are disconnected, there is a risk that model outputs be inconsistent with each other and with scenario assumptions, requiring additional efforts to reconcile data and results. For example, credit losses may be modeled outside ALM and fed as static loss forecasts that affect the income statement but not the cash-flows, leading to overstated balances and interest income.

- *Inefficient processes.* When models are disconnected, workflows are overly complicated and time is spent in operational tasks, instead of evaluating risks and designing strategies. Making any adjustments require re-performing the process in the various solutions. Reporting can also be challenging when you are pulling capital, balances and income from different systems to find that they do not tie at the end.
- *Model and operational risk.* Model governance activities consume an important amount of time in capital stress testing. Institutions need to demonstrate to regulators and model risk teams that they maintain effective controls, integrity of the data, and sound modeling approaches. Disconnected models may result in control breakdowns and model inconsistencies that may impair the results.
- *High employee turnover.* Not frequently mentioned, institutions have traditionally experienced high levels of attrition in their capital stress testing teams. The timeframe to produce stress testing results is compressed between when scenarios are available and when results need to be submitted. Inefficient processes take more time and add on to the planning, ALCO and other responsibilities in the teams' day-to-day jobs, leading to staff attrition.

AN INTEGRATED ALM MODEL APPROACH TO CST

Moody's Analytics offers an integrated, yet flexible capital stress testing solution that relies on the ALM solution a single interface, where the various components are designed to work together to produce dynamic projections of balance sheet, income, and capital that are scenario dependent.

This integrated approach leverages multiple solutions from the Moody's Analytics' ecosystem, including economic scenarios, structured product cash-flows, prepayments, credit losses, and balance sheet growth assumptions. Select the macroeconomic scenario, and the corresponding prepayment, credit and growth model in ALM and watch your results update immediately, without the need to run parallel processes and transfer data between systems.



Do you want to use your own assumptions? No problem. The framework is completely flexible and allows you to import your own scenarios and assumptions if you would like to incorporate firm-specific risks and strategies.

This model integration approach reduces risk and creates a turnkey solution that makes capital stress testing a repeatable process.

MOODY'S ANALYTICS ECONOMIC SCENARIOS

Moody's Analytics' economic scenarios have become a standard in capital stress testing. Moody's Analytics' U.S. Macro Models produce forecasts for a large number of variables under a baseline and a variety of alternative economic scenarios, including expanded projections for the supervisory scenarios provided by U.S. regulators

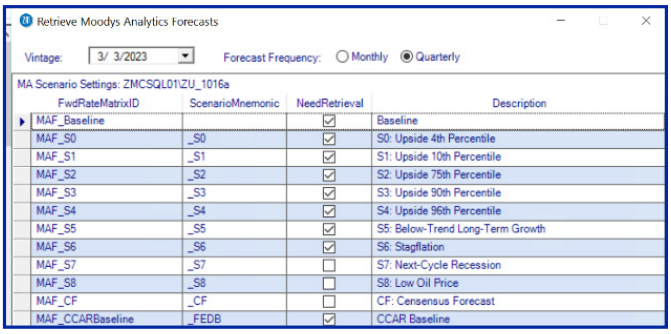
BL	S4	CCAR Base
CF	S5	CCAR Sev. Adverse
S1	S6	
S2	S7	
S3	S8	

MOODY'S ANALYTICS CREDIT AND BALANCE SHEET MODELS

Moody's Analytics offers a variety of models that integrate with ALM, including structured product cash flows, prepayment models, bottom-up credit models of the Portfolio Analyzer suite, top-down credit losses and balance sheet projections rom the Call Report Forecast (CRF) model. CRF relies on statistical models of call report data to model your unique growth on a scenario-conditioned basis using Moody's Analytics' scenarios

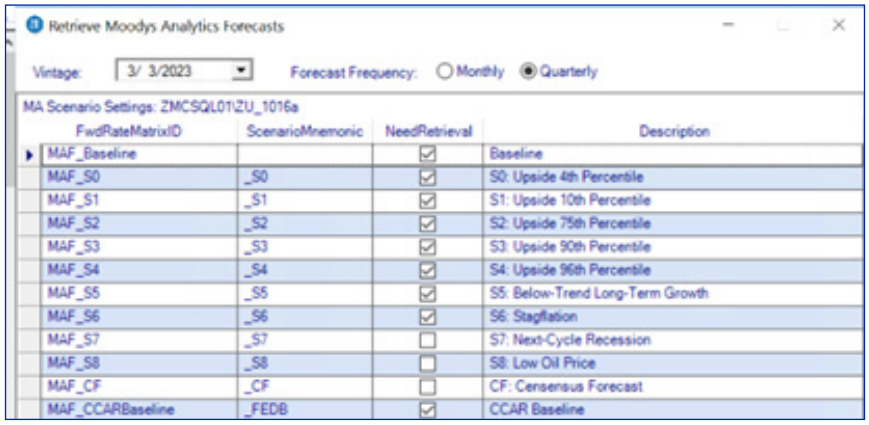
Moody's Analytics' integrated approach supports different use cases:

- Use as champion model. Choose Moody's Analytics' off-the-shelf economic, growth and credit loss models, for on-demand capital stress testing.
- Use as champion model with overlays. Use Moody's Analytics' models as the starting point, and layer in firm-specific or idio- syncratic assumptions to account for your unique risks.
- Use as challenger model. Confirm or challenge your own assumptions.

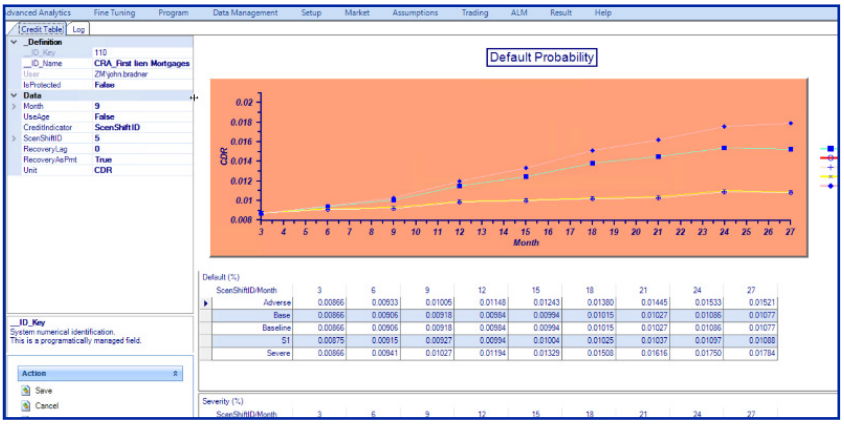


There are just a few simple steps to execute this integrated approach in Moody's Analytics ALM:

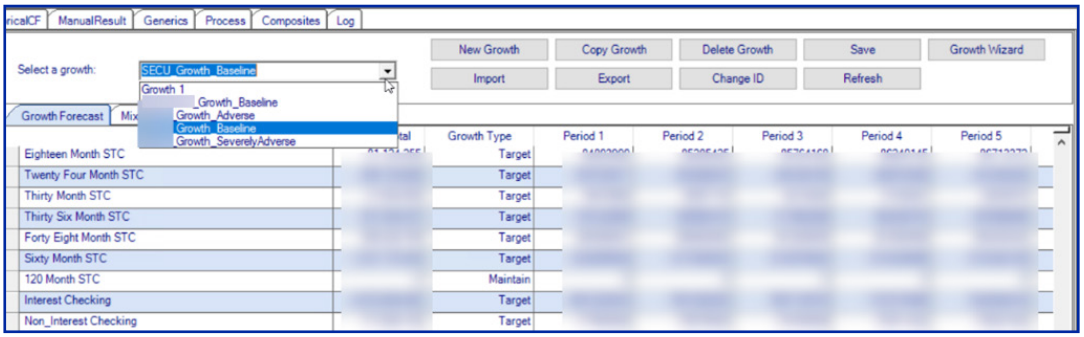
1. *Configure solution.* One-time configuration to assign credit models to portfolios, call report categories to accounts if the Moody's Analytics Call Report Forecast model is used, and report codes and risk weights for capital reporting. Moody's Analytics onboarding team will help you with this initial configuration step.
2. *Retrieve Moody's Analytics economic scenarios.* This step allows you to import the economic scenario projections directly into the Moody's Analytics ALM system to create a "forward rate matrix." No need to store, transfer, and reconcile rate forecasts.



3. *Import credit loss assumptions.* Choose between Moody's Analytics bottom-up or top down credit models by instrument type, or import your own credit loss assumptions, as needed. Regardless of the method you select, your cash-flows projections are credit-affected and the projected losses flow into income, balance sheet, and capital.



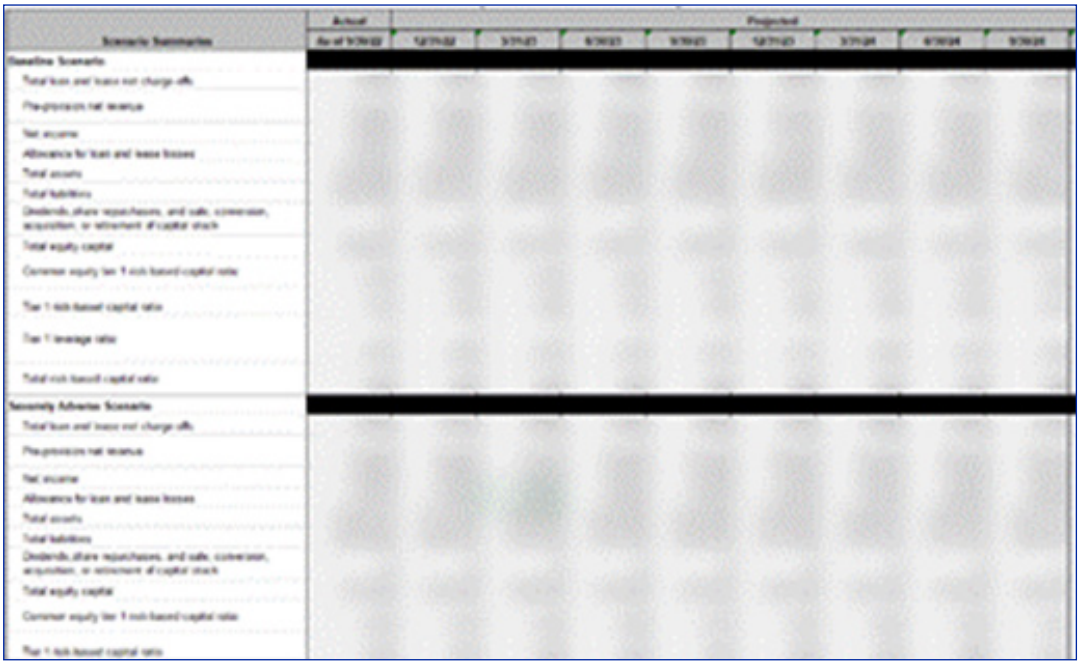
4. *Import balance sheet growth rate assumptions.* Moody's Analytics' balance sheet growth rates are from the Call Report Forecast model and are applied to your base case to generate balance sheet projections for the Moody's Analytics' economic scenarios. If desired, you can import the assumptions developed by your risk and planning groups instead.



5. *Define and run scenario*. Simply select the forward rate matrix corresponding to the economic scenarios you would like to run in your scenario settings.

Settings	Base	Baseline	S1
Shift ID	Base	Baseline	S1
_Level(bps)	0	0	0
_Slope(bps)	0	0	0
_ShockDaysStart	0	0	0
_ShockDaysEnd	0	0	0
_HorizDays	0	0	0
Fwd Rate(type)	FwdMatrix	FwdMatrix	FwdMatrix
Fwd Rate(matrix)	MAF_Baseline	MAF_CCARBaseline	MAF_S1
FX Rate(type)	MAF_CCARSevereAdverse		Static
FX Rate(matrix)	MAF_CF		
OasShift(bps)	MAF_S0		0.00
OasMult	MAF_S1		1.00
PrepayShift(cpr)	MAF_S2		0.00
PrepayMult	MAF_S3		1.00
DecayShift(cpr)	MAF_S4		0.00
DecayMult	MAF_S5		1.00
RateResponseShift			0.00

6. *Review and report.* Run standard reports of balance sheet, income, losses, and capital by scenario.



BENEFITS OF INTEGRATION

Regardless of your particular use case, Moody's Analytics' integrated framework presents multiple benefits, including model consistency, process efficiencies, and reduced model and operational risk, so you can focus on assessing risks and developing mitigation strategies:

- *Consistent assumptions and results.* The single framework across ALM, credit loss and capital leverages the same source of data and ensures consistency in cash flows, revenue, balances and capital. Reporting becomes greatly simplified because you are pulling your results from the same framework.
- *Operational efficiencies.* Moody's Analytics' integrated capital stress testing framework is flexible and smart because you can leverage Moody's Analytics' comprehensive set of scenarios and assumptions or can select your own, all inside ALM. Run periodically on when economic conditions warrant it. Only one interface to learn, fewer dependencies from other model owners and a simplified workflow. Time to ditch data transfer and reconciliation processes from disconnected models.
- *Enhanced model governance.* With an integrated model and fewer data handoffs you can more easily maintain model documentation, demonstrate data lineage and effective controls. Easy to audit, reconcile, validate, and interpret.
- *Engaged teams.* Integration means you have a staff that can dedicate more time to assess risks, evaluate and recommend strategies rather than operating the model and reconciling data.

CONCLUSION

As you debrief on this year's annual capital plan and stress testing, consider that a more efficient process is possible. An integrated capital stress testing framework that is easier on your organization and that can be executed on demand, and not just annually for regulatory purposes. Think integrated ALM, credit and capital stress testing with the power of Moody's Analytics' macroeconomic scenarios: run faster, run smarter, make better decisions.