WHITE PAPER

TATA CONSULTANCY SERVICES

Overcoming CCAR Challenges for Forward-looking Capital Planning

Abstract

The US Federal Reserve instituted the Comprehensive Capital Analysis and Review (CCAR) regulatory framework in 2009 to assess if large banks have adequate capital to cope with severe economic stress scenarios. CCAR and other stress tests require banks to demonstrate capital adequacy to withstand economic stress or financial downturns. Though conceptualized and executed 10 years ago, many banks still face multiple challenges in CCAR compliance interfering with their ability to adopt quick, robust, and resilient stress testing processes. Delayed and erroneous submissions can adversely affect reputation and lead to regulatory criticism. As a result, banks focus more on the CCAR execution process rather than on analyzing and applying its results. This white paper highlights the challenges in CCAR execution and suggests appropriate solutions to improve capital planning.

CCAR: The Regulation at a Glance

The 2008 financial crisis exposed several gaps in the regulatory framework of financial institutions, and the CCAR was a part of the regulatory tsunami that followed. CCAR assesses the largest US banks to determine if they are adequately capitalized to operate during periods of economic and financial stress. It also evaluates the quality of capital-planning and assessment processes to ascertain their capability to cover a bank's unique risks.

The CCAR process involves the simultaneous execution of over 50 models, including over 25 credit loss models and more than 10 pre-provision net revenue (PPNR) models, for more than three scenarios across 10 plus lines of business (LoB) in each stress test cycle (see Figure 1). The models are executed through sophisticated centralized modelling platforms, individual desktops, and spreadsheets. This heterogeneous execution causes multiple data quality and governance issues.

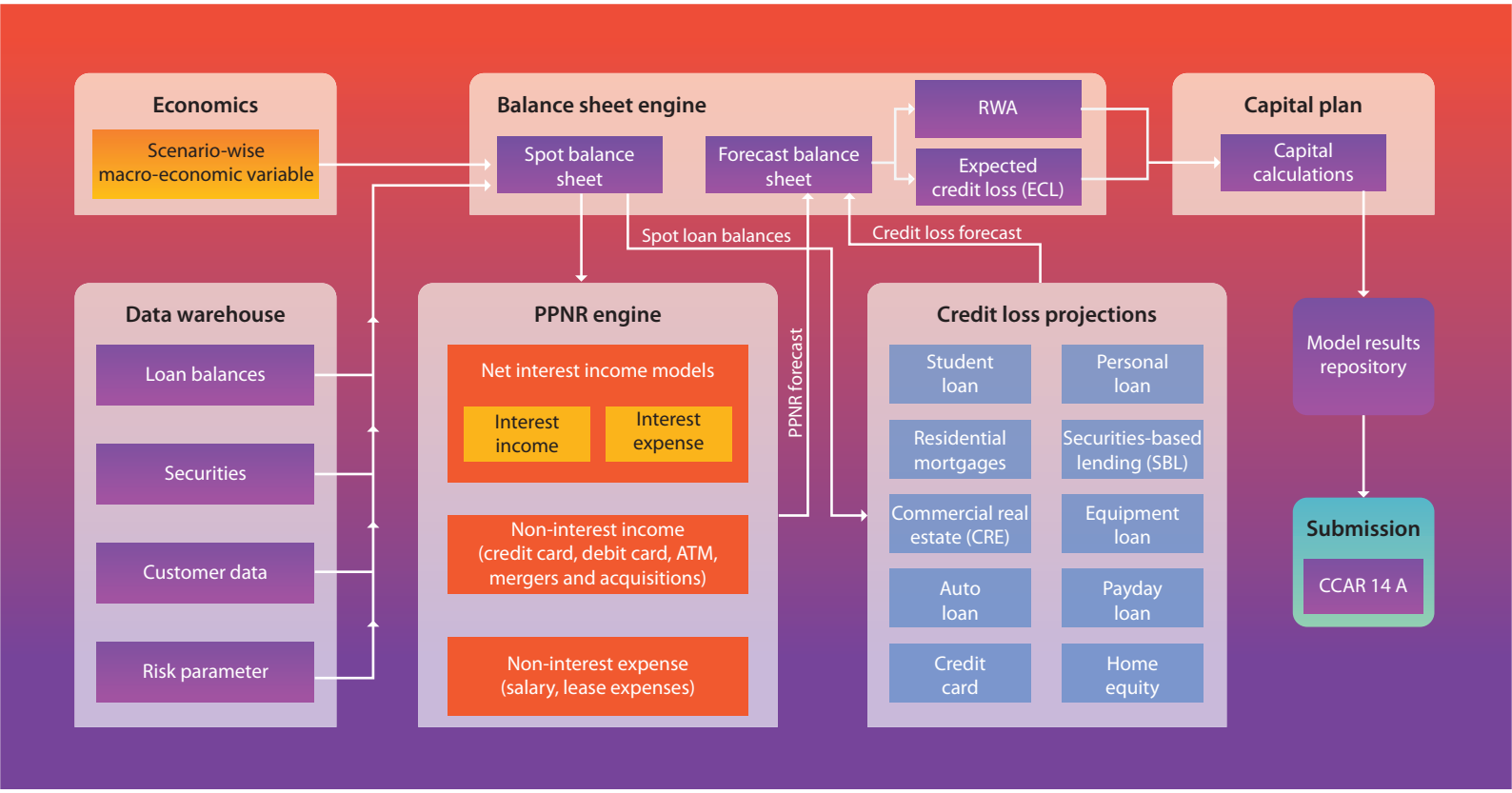

Figure 1: Stress Testing Ecosystem

While CCAR compliance is mandatory, banks face a slew of challenges in execution.

Data lineage, quality, and governance

Multiple models and inconsistent data sources pose challenges in establishing end-to-end data lineage. Non-availability of source system data within the data warehouse compels modelers to source data directly from front-end systems. Modelers often struggle to locate the right attribute and often alter the data while preparing model inputs or use wrong input data. Consequently, there are issues with data lineage and data quality resulting in inaccurate model forecasts.

Process orchestration

The three-month long CCAR process involves over 50 resources and the execution of more than 80 models. Most of the models are interdependent – for instance, the macro-economic variables forecast serves as the input for many of the credit loss and PPNR models. Similarly, the output of the credit loss and PPNR models is the input for the balance sheet engine and risk-weighted asset (RWA) models. CCAR execution requires co-ordination between multiple groups to ensure data handoff and process orchestration. Additionally, the execution cycle is long, which often defeats the purpose of stress testing, in turn leading to inaccurate balance sheet forecasts.

Manual overlay process

Model outputs must undergo model output overlay process or LoB specific review, which could alter the forecasted numbers driven by business priorities. Overlay process is performed offline on spreadsheets and the adjusted model output numbers are shared with downstream models. As the process is manual, the rationale for the adjustment is often lost frequently resulting in supervisory criticism in the form of matters requiring attention (MRA) during regulatory review.

Attacking the Challenges Head On

The objective of CCAR is to ensure that large US banks follow forward-looking, risk-tailored, capital planning processes. Improving model risk management and validations coupled with robust model platforms will help banks predict the true capital position and facilitate better decisions during stressed scenarios in turn leading to resilient capital planning processes. A robust CCAR execution framework will enable quick rectification of errors identified and free business teams to focus on analyzing models and results rather than execution. Executing CCAR while taking into account evolving risks, such as those emanating

from global macro-economic shocks like the ongoing pandemic, is an uphill task, which is not helped by the numerous challenges that banks have to contend with. However, we believe that banks can take certain steps to streamline execution.

Centralized model execution platform

Complex credit loss models require accurate model input, availability of model parameters during run time, and an efficient, scalable, and reliable calculation engine to execute stress tests. In addition, the modeling platform must integrate with the banks' data warehouse so that all data needs can be met from a single source (data warehouse).

Deploying a central model execution platform (see Figure 2) will enable accurate lineage and higher data quality. Assembling all the components – model input, parameters, and output – on a single platform will facilitate easy and smooth analysis of the results as well as quick review and decision-making. To reduce errors and enable early issue identification, a model validation framework can be incorporated into the platform with pre-built validation rules for inputs and parameters. Adopting a central platform for model execution will also help develop modelling frameworks in compliance with the US Federal Reserve's SR 11-7 guidelines.

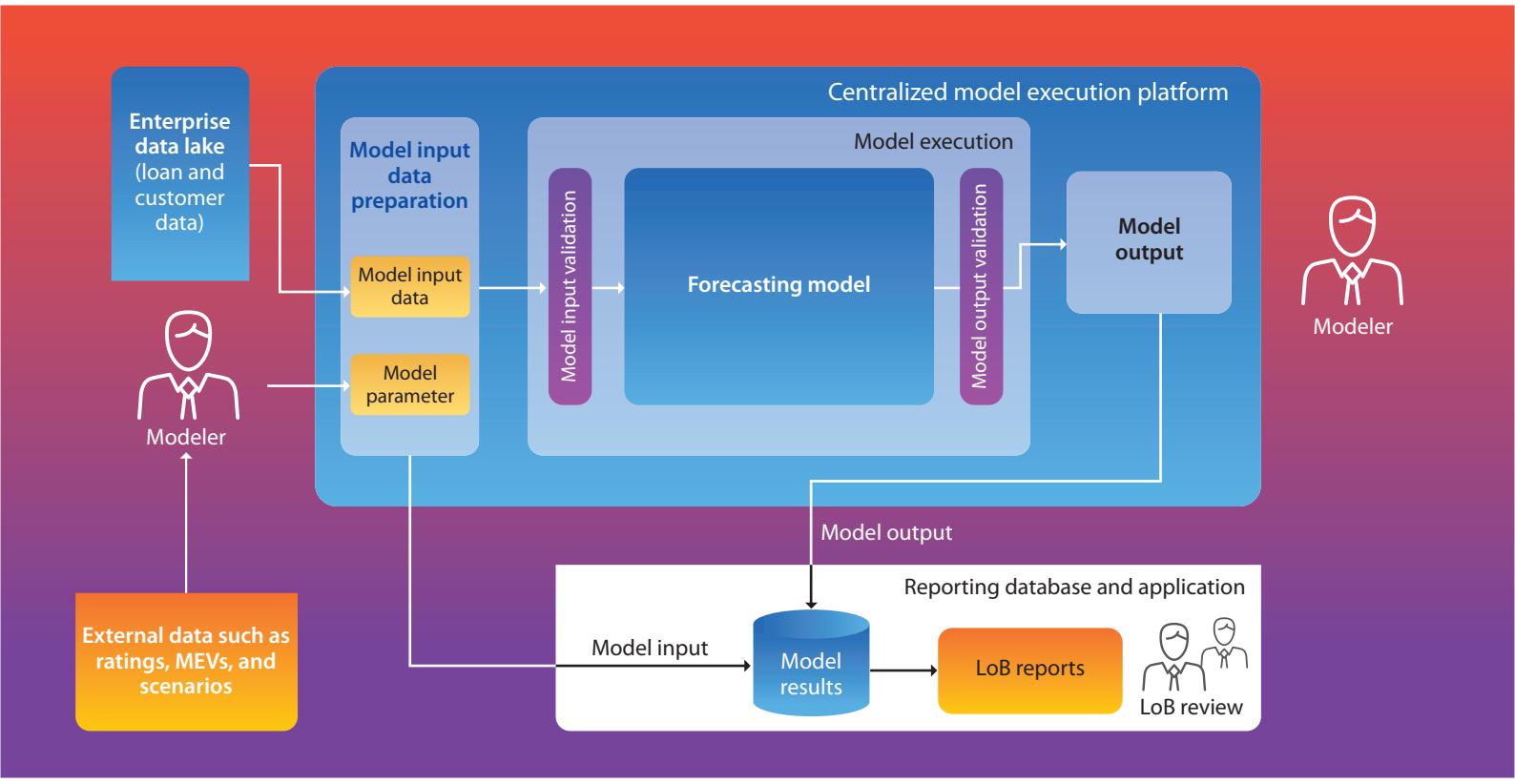

Figure 2: Centralized Model Execution Platform (to-be state)

Authorized data sources

Data should come from a single source – the enterprise data warehouse – to ensure that standards are maintained. Banks must ensure that the source system data is available in the data warehouse to prevent lineage and quality issues. The enterprise data warehouse must house all the data required to support CCAR compliance and stress test processes. Building a single, unified data lake and/or datamart for risk and finance will help (see Figure 2).

Automation of overlay process

Model output needs to undergo LoB review and approval processes. During this process, often model overlays are used in place of model outputs to address weaknesses in models. Moreover, the LoB review and overlay process is performed manually on spreadsheets. In the absence of an audit trail, it becomes difficult to track who or why the model output numbers were changed. In fact, this has come under the regulatory lens and financial institutions have been instructed to automate the overlay process to ensure transparency and better control.

Process orchestration

The end-to-end CCAR stress testing cycle entails more than 100 resources working for three months posing challenges in program execution and governance. To cut execution time, reduce manual intervention, and enable on-demand re-start of the process from an identified step, banks must adopt business process orchestration tools. As soon as macroeconomic forecast and input data is available, the model can be run, and the output stored in a database. All the stakeholders can be automatically notified to review and analyze the model output, and if necessary, overlay can be performed. Once the model output numbers are finalized, downstream models can be triggered to continue execution. In our view, this methodology can significantly reduce manual execution efforts freeing banks' resources to focus on analyzing and applying the model results rather than execution.

Intelligent technologies in scenario creation

The use of artificial intelligence (AI) and machine learning (ML) technologies is being explored for scenario creation and back testing. Since stress tests are forward–looking, it is essential to forecast macro-economic variables for baseline, adverse, and severe-adverse scenarios. However, given how heavily stressed these scenarios are, it is difficult to make accurate predictions, and this is where embracing ML techniques can help. Some banks have already adopted AI and ML techniques in conjunction with big data technologies for scenario management resulting in higher efficiency and development of robust scenarios.

Moving to an open modeling environment

Research on new variables, equations, and techniques as well as continuous back testing are essential for improving forecasting models and ensuring better forecasts. This continuously evolving process often results in last minute changes leading to compliance as well as data quality and governance issues. Going forward, complex interplay will further increase necessitating a relook at traditional models. To address this, we believe that banks must break the 'black box' and embrace a transparent, open modeling environment with access to authorized data, an analytical platform for model development, and visualization tools for analyzing model results.

Collaboration between business and IT teams

The real purpose of CCAR and other stress tests is to ensure robust capital planning processes to deal with severely stressed scenarios such as the 2008 financial crisis and the ongoing pandemic. To realize these benefits, banks' business and IT teams need to work together. While business teams need to develop predictive models, the IT teams need to accurately execute and operationalize stress tests allowing business teams to focus on model output and forecasts.

The Way Forward

Regulators expect financial institutions to establish robust stress testing processes to ensure efficient capital management. However, over the last few years, regulators have highlighted weaknesses in banks' internal controls resulting in qualitative objections and conditional non-objections. To meet the Federal Reserve's stringent stress testing demands and ensure efficient risk management in the wake of unexpected paradigm shocks such as the COVID -19 crisis, banks will need to revamp their CCAR and stress testing processes and infrastructure sooner rather than later.

About The Authors

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