

# 1<sup>st</sup> Largest Global Bank

The largest bank in the world by market capitalization and one of the best managed in the industry provides retail banking, credit cards, mortgages and loans to individuals and companies worldwide. The company operates in 35+ countries and has 70+ million customers globally.

## Challenge

The bank relies heavily on quantitative models for a broad range of operational activities including underwriting credits; managing client assets; determining capital reserve adequacy; and many other activities. With strict regulatory requirements and the increasing use of quantitative models, the Clarendon Partners (CP) team worked with the bank to actively manage model risk and ensure that the models are used in line with regulatory requirements.

The challenges the CP validation team encountered were as follows:

- Complexity of model production environment and statistical packages.
- Large number of high impact models with different quantitative frameworks.
- Multiple data sources and an extremely large dataset.
- Unclear or lack of development evidence and documentation.

## Solution & Delivery

To complete the validation of the large number of models under the tight time line, the CP model validation team performed the following activities:

- Model software performance evaluation on different production platforms - to validate the efficiency of the model development and implementation environment (Linux, Windows) as well as quantitative decision-making tools, the CP team had the following key deliverables:
  - Built the model validation platform on Linux and Windows using an Aster database.
  - Independently tested accuracy and efficiency of SAS, R, Revolution R, and Python.
  - Evaluated performance and scalability of the platform and statistical products with large datasets.
  - Developed test plans and use cases.
  - Executed validation test plans, test cases, deciphered results and created the final test report.

- Validation and documentation deliverables were produced across multiple credit risk models:
  - Model validation and draft of validation report of WBR Consumer Mortgage Credit Loss Model Validation - Wealth, Brokerage, and Retirement (WBR)'s Consumer Mortgage Loss Forecast Model is constructed on a set of statistical models. The model will be used for WBR consumer mortgage portfolio loss forecast process including the Business Loss Forecasting (BLF), Allowance for Credit Losses (ACL). Its forecasted losses of the first 12 months are the part of the economic base case (business as usual) scenario for CCAR stress test.
  - Model validation and draft of validation report of
    - Consumer Deposits Non-Interest-Bearing (NIB) Mix model- provides projections of the percentage of total bank consumer deposits that are NIB versus Interest-Bearing (IB).
    - Business Deposits NIB Mix model Validation - the Business Deposits NIB Mix Model provides projections of the percentage of business deposits that are Non-Interest-Bearing (NIB) versus Interest-Bearing (IB). Both models are being used in CCAR and stress testing scenarios.
  - Model outcome and implementation validation of Mortgage Servicing Rights Customer Level Prepayment Model - CLPM-MSR is a competing risk model used to project monthly prepayments and defaults for valuation and risk management of WFHL's Mortgage Servicing Rights (MSR) asset. The monthly projections are embedded into other downstream systems through a programmatic interface called the Blade Runner Interface (BRI). These downstream systems are used for MSR financial reporting, risk measurement and management, and Comprehensive Capital Analysis and Review (CCAR) and Dodd-Frank Act Stress Testing (DFAST).
  - Asset-Liability Management (ALM) Yield Curve Forecasting Conceptual Review - The purpose of this model is to construct the yield curves for Bank Company's Asset Liability Committee (ALCO) Policy scenarios as well as stress testing scenarios. The ALCO Policy scenarios are comprised of the Management Most Likely (MML), Management Low, Alternative Low, Alternative High and Management High scenarios as stated in the ALCO Policy. These scenarios are developed every quarter for at least a two year rolling period going forward.
  - Drafted testing plan for WBR Home equity Line and Home equity loan loss forecast model validation.
- Validation test plan, test cases and test report – included the following:
  - Senior Prime Current Model Testing
  - WFHMSA star model post processing validation
  - WFHMSA star model validation and testing

**Impact & Value**

- Delivered optimized validation infrastructure for model development and implementation.
- Provided model validation documentation and conceptual review of critical CCAR and DFAST models of WFHL.
- Developed test plan and documented validation test results to calibrate risk drivers.