

Stress Testing for Mid-Sized Banks

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ABSTRACT

In 2014, for the first time, mid-market banks (consisting of banks and bank holding companies with \$10–\$50 billion in consolidated assets) were required to submit Capital Stress Tests to the federal regulators under the Dodd-Frank Act Stress Testing (DFAST). This is a process large banks have been going through since 2011. However, mid-market banks are not positioned to commit as many resources to their annual stress tests as their largest peers. Limited human and technical resources, incomplete or non-existent detailed historical data, lack of enterprise-wide cross-functional analytics teams, and limited exposure to rigorous model validations are all challenges mid-market banks face. While there are fewer deliverables required from the DFAST banks, the scrutiny the regulators are placing on the analytical modes is just as high as their expectations for Comprehensive Capital Analysis and Review (CCAR) banks. This session discusses the differences in how DFAST and CCAR banks execute their stress tests, the challenges facing DFAST banks, and potential ways DFAST banks can leverage the analytics behind this exercise..

INTRODUCTION

Throughout the financial crisis of 2008 the regulators understood that, in order to stabilize the system and prevent a severe depression, banks would need to have enough capital to survive the losses of a crashing market. Additionally, in order for the markets to start working properly again, investors needed to be reassured that it was safe to put money back in them. The initial supervisory stress tests were developed as a means by which regulators could evaluate the capital position of a bank to determine if they would require an infusion of capital, while also providing much needed transparency to the investment community. This would give investors the confidence boost needed to avoid further runs on the banking system and to get the markets moving again. Since that time banks with consolidated assets of greater than \$50 billion (“large banks”) have been required to perform these exercises as described in the Dodd-Frank Wall Street Reform and Consumer Protection Act (“DFA”). In 2014 banks with consolidated assets of \$10 billion to \$50 billion (“mid-sized banks”) were required to perform their own stress tests under the DFA for the first time.

DODD-FRANK ACT STRESS TEST (“DFAST”)

The premise of the Dodd-Frank Act Stress Test is straightforward. It is a forecasting exercise required that requires banks and bank holding companies with over \$10 billion in consolidated assets to evaluate and report their capital position under baseline, adverse, and severely adverse scenarios on an annual basis. These scenarios are created by the regulators and then presented to the banks at the start of the annual stress testing exercise. They include a wide array of forecasted macro-economic conditions such as GDP drops, unemployment spikes, stock or housing market crashes, etc. The banks are then to use the variables in their forecasting models to assess their effects on the firm’s revenues, losses, balance sheet (including risk-weighted assets), liquidity, and capital position for each of the scenarios over a nine quarter horizon.

The guidance from the regulators during the first year of the DFAST for the mid-sized banks allowed for a wide range of interpretations. Recognizing that the banks in this segment have vastly different attributes, banks were given the latitude to conduct the tests in whatever way they felt was most suitable for their unique set of characteristics provided they fell within the established framework. The following excerpts from the most recent guidance available from the Office of the Comptroller of the Currency (“OCC”) highlight some of the regulators’ expectations with respect to the annual stress test (OCC, 2014):

THE FRAMEWORK FOR STRESS TESTING

1. A company's stress testing framework should include activities and exercises that are tailored to and sufficiently capture the company's exposures, activities, and risks;
2. An effective stress testing framework should employ multiple conceptually sound stress testing activities and approaches;
3. An effective stress testing framework should be forward-looking and flexible;
4. Stress test results should be clear, actionable, well supported, and inform decision-making; and
5. A company's stress testing framework should include strong governance and effective internal controls.

COMPREHENSIVE CAPITAL ANALYSIS & REVIEW ("CCAR")

While large banks must also conduct the DFAST annually, they have several additional regulatory requirements that the mid-sized banks do not. In addition to running their own stress tests, they must submit their data to the regulators who will then execute the supervisory test, the results of which are published annually. Large banks must also participate in the annual Comprehensive Capital Analysis and Review process. This test requires the banks must submit their proposed capital action plans (including changes to dividends, stock buybacks, etc.) to the regulators for review. The regulators then assesses whether the bank is able to maintain minimum regulatory capital ratios with the proposed capital plan under both adverse and severely adverse macroeconomic scenarios. Their assessment is issued as an object or a non-object opinion on the submitted plan. Plans cannot be made public until they are approved by the FRB and plans that are rejected must be redrawn and resubmitted.

THE DIFFERENCE BETWEEN MID-SIZE BANK DFAST AND LARGE BANK DFAST

Clearly DFAST and CCAR are two different tests. So the question is what are the differences between DFAST for large banks and DFAST for mid-sized banks? A quote from the March 2014 guidance provides some insight:

"For example, the expectations for data sources, data segmentation, sophistication of estimation practices approaches, reporting and public disclosures are elevated for larger and more complex organizations than for \$10-50 billion companies (Federal Reserve, 2014)."

The regulators clearly state that their expectations for mid-sized banks are not the same as their expectations for the large banks. In addition to differences in how the tests are administered (supervisory vs. company-run), there are several other notable differences:

- Mid-sized banks are not required to create their own scenarios in addition to the scenarios issues by the regulators.
- Data segmentation is much less granular for mid-sized banks and banks are permitted to use industry data as proxy data in some circumstances.
- Specific drivers are not required for the individual components of Pre-Provision Net Revenue ("PPNR") and a "top-of-the-house" approach can be taken.
- The time table for the 10-50 banks is less aggressive than the time table for the large BHCs.

Table 1: General Stress Testing Requirements, Table 2: Reporting Requirements, and Table 3: Supervisory Expectations summarize the differences in the tests that were presented in attachment 2 of the Federal Reserve Board Supervisory Letter, SR 14-3: *Supervisory Guidance on Dodd-Frank Act Company-Run Stress Testing for Banking Organizations with Total Consolidated Assets of More Than \$10 Billion but Less Than \$50 Billion*.

| Large banking organizations (≥\$50 billion in total consolidated assets) | Mid-size banking organizations (>\$10 billion and < \$50 billion in total consolidated assets) |
|--|--|
| General Stress Testing Requirements | |
| Large bank holding companies (BHCs) must participate in Federal Reserve's annual Comprehensive Capital Analysis and Review (CCAR) exercise | Mid-size BHCs do not participate in CCAR |
| Large BHCs are subject to annual supervisory stress tests <ul style="list-style-type: none"> • Federal Reserve publicly discloses summary results of supervisory stress tests | Mid-size BHCs are not subject to supervisory stress tests |
| Large BHCs must submit annual capital plans to Federal Reserve <ul style="list-style-type: none"> • Subject to Federal Reserve approval of results, capital plan and capital actions • Must maintain > 5% post-stress Tier 1 Common ratio • Must use both supervisory and BHC-specific stress test scenarios | Mid-size BHCs are not subject to Federal Reserve's capital plan rule <ul style="list-style-type: none"> • No required minimum post-stress capital ratios • No formal supervisory approval associated with stress testing • Only required to use supervisory scenarios in Dodd-Frank company-run stress tests |
| Dodd-Frank company-run stress test | |
| Semi-annual submissions by January 5 th and July 5 th of each year | Annual submission by March 31 st of each year |
| Report on form FR Y-14A | Report on form FR Y-16 |
| Semi-annual public disclosures of summary results (March and September) | Annual public disclosure of summary results beginning in June 2015 |
| Incorporation of U.S. Basel III into stress testing | |
| Must incorporate U.S. Basel III capital framework in capital projections | Not required to incorporate U.S. Basel III capital framework in capital projections until the 2015 stress testing cycle starting in October 2014 |
| Tier 1 Common ratio is calculated using existing capital rules | Not required to calculate Tier 1 Common ratio for 2014 stress testing cycle |

Table 1: General Stress Testing Requirements

| Large banking organizations (≥\$50 billion in total consolidated assets) | Mid-size banking organizations (>\$10 billion and < \$50 billion in total consolidated assets) |
|---|---|
| Dodd-Frank Stress Test Reporting Requirements | |
| Form FR Y-14A for large BHCs <ul style="list-style-type: none"> • Annual and semi-annual (mid-cycle) submission • Approximately 2,500 line items per scenario for annual and 1,900 for semi-annual (mid-cycle) submission | Form FR Y-16 for mid-size BHCs, state member banks (SMBs) and savings and loan holding companies (SLHCs) <ul style="list-style-type: none"> • Annual submission • Summary report with approximately 100 line items per scenario |
| FR Y-14Q for supervisory stress test <ul style="list-style-type: none"> • Quarterly submission • Loan-level data collected | Not applicable |
| FR Y-14M for supervisory stress test <ul style="list-style-type: none"> • Monthly submission • Loan-level data collected | Not applicable |

Table 2: Reporting Requirements

| Large banking organizations (≥\$50 billion in total consolidated assets) | Mid-size banking organizations (>\$10 billion and < \$50 billion in total consolidated assets) |
|--|--|
| Federal Reserve's Minimum Supervisory Expectations for Dodd-Frank Stress Tests | |
| Stress test scenarios | |
| Large BHCs must develop BHC-specific scenarios to stress key vulnerabilities and identify idiosyncratic risk drivers | Not required to develop own scenarios |
| Data sources and segmentation | |
| Proxy data acceptable, but generally expected to use internally generated data | May use industry data as a proxy under certain conditions |
| Data segmented at least as detailed as FR Y-14A (approximately 2,500 lines per scenario) | Data segmented by FR Y-16 (approximately 100 lines per scenario) and largely reflects Call Report and FR Y-9C report |
| Loss estimation | |
| Identify key loss drivers; indicate how the scenarios affect those drivers and losses | May choose to base their stress losses on industry historical loss experience |
| More granular loss estimation expectations using FR Y-14A segmentation | May be able to estimate credit losses on an aggregate level (top-down approach) using FR Y-16 segmentation |
| Operational losses | |
| Expected to include operational loss estimates | Include aggregate operational losses in Pre-Provision Net Revenue (PPNR) only if directly related to macroeconomic and financial scenarios provided by supervisors |
| PPNR | |
| Granular estimation approach | Less granular "top of the house" approach |
| Use internal revenue and expense data to estimate business lines' revenues and expenses | Project PPNR based on three main components (net interest income, noninterest income and noninterest expense) |
| Identify specific drivers of revenue and expenses and analyze how supervisory scenarios affect those drivers | Can project at an aggregate, company-wide level, and may be based on industry experience |
| Balance sheet and risk-weighted assets | |
| Projections for each major segment of the balance sheet for FR Y-14A | In some cases, may use a simple, constant method for projecting full balance sheet and risk weighted assets |
| Controls, oversight and documentation | |
| Must be an integral part of preparing and submitting capital plan and the resolution and recovery planning process | Must consider the role of stress testing results in the normal course of business (e.g., capital planning, assessment of capital adequacy and risk management) |

Table 3: Supervisory Expectations

ISSUES FACING MID-SIZED BANKS

FRAMEWORK FOR STRESS TESTING

Much of what is to be said about the benefits and perils of big data and data architecture has been addressed at great length in other papers; however, several issues stand out for the mid-sized banks. The regulators explicitly list the creation and use of high quality internal data as one of their expectations. Unfortunately, however, many smaller banks simply do not have enough historical data to support the modeling efforts required. Even when data does exist, it is often incomplete and unstructured. Adding to the difficulty, data is usually decentralized across multiple silos such as Finance, Treasury and Credit, each of which may have their own data repositories.

In virtually every case, lacking a centralized data warehouse to support stress testing, banks must rely on a tremendous amount of manual reconciliation before aggregating model outputs. Figure 1 presents an illustration of the potential reconciliation between the credit view and the accounting view of small set of loan segments. When considering all of the exposures of a bank across multiple business units, the reconciliation issues becomes readily apparent.

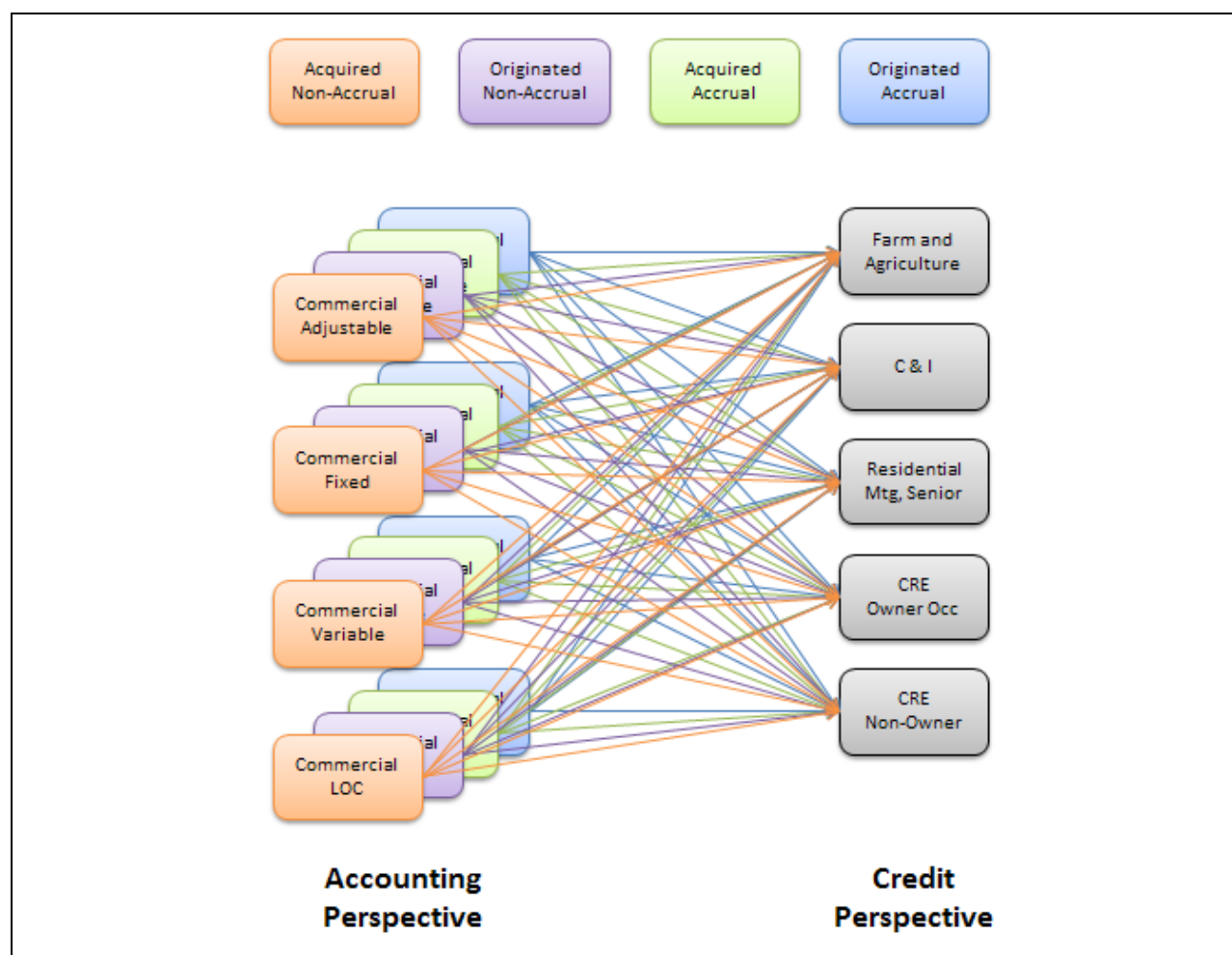


Figure 1: Data Reconciliation

Banks must exercise caution when considering their options for data architecture. While a data warehouse does create a single version of the truth that all business units can rely upon for their models, the process to implement a data warehouse is very expensive, complex, and time consuming. It requires resources from many business units to work together to identify common needs. This makes data warehousing projects vulnerable to a considerable amount of scope creep and taxes resources that are already hyper extended. In most cases, choosing to blend independent siloes of data with manual and systematic reconciliation can serve as the first step towards a more structured data management environment.

The regulators acknowledge that the issues with data availability cannot be resolved overnight; therefore banks are permitted to use proxy data where the internal data either does not exist or is of such poor quality that it will return unreliable results. However, they have also clearly indicated that they expect each bank to work quickly to resolve their data issues. With respect to data sources the Federal Reserve Board states in SR 14-3:

Companies are expected to have appropriate management information systems and data processes that enable them to collect, sort, aggregate, and update data and other information efficiently and reliably within business lines and across the company for use in DFA stress tests. In some cases, proxy data may be used. Companies should challenge conventional assumptions to ensure that a company's stress test is not constrained by its own past experience (Federal Reserve, 2014).

TECHNICAL RESOURCES

Knowing what data to collect and how to organize it is only the first step. For the first cycle banks outsourced much of the technical work they did not have the resources to do themselves. Over time, however, the regulators expect banks to become more self-sufficient. In order to fulfil this expectation, banks need to evaluate their technical resources to determine if they have the capacity to collect, prepare, store, process, and report on that data. Simple regression models in Microsoft Excel, a standard favorite, will need to be upgraded to withstand rigorous model validation. The volume of data that is required to obtain good model results is substantial; this volume of data will need more disc space. Moving and analyzing that data will require more CPU and memory. New software, with greater analytical capabilities may be required.

Technical resources include more than hardware and software, it also includes the programmers and analysts with the appropriate skill and expertise to build and use solutions. Most institutions recognize the need for good statistical modelers; however, there are other technical skill sets to consider. Data must be obtained and prepared for the model to ensure reliable results. The model output must be aggregated and compiled into financial results and a qualitative analysis performed. The systems that are utilized must be adapted from exiting systems or new system must be implemented. The stress testing architecture will need to be maintained. Database administrators, financial analysts, programmers and system administrators are typical roles that may need to be filled.

REGULATORY GUIDANCE

Unfortunately, throughout the first testing cycle there was very little specific guidance from the regulators for the mid-sized banks coming under the DFAST. The proposed guidance in June 2013 contained the framework for stress testing, consisting of the five key principles. Additional guidance was found in the general instructions issues with the scenarios; however, much of the clarity that banks needed was not provided until the issuance of SR 14-3 in March of 2014. With submissions due by March 31st, the majority of banks did not have time to react to the issuance. Since that time, regulators have conducted their reviews and have started to issue their recommendations. The final ruling in March 2014 contained several notable statements in response the comments received on the preliminary rule. The following statements shed more light on the regulators expectations (OCC, 2014):

1. Developing high-quality internal data is a crucial project for improving a company's stress testing estimation practices.
2. Agencies encourage companies to take ownership of stress tests rather than relying on vendors
3. Companies should have in place effective model risk management practices, including validation, for all models used in DFA stress tests.

BUILDING AN INTEGRATED SOLUTION

What tools do you need? How many people should you hire? Who will be managing the process? These questions, and many more, should be a part of an internal gap analysis to help management identify and prioritize the organization's needs with respect to data, modeling, technical resources, human resources and process. The most effective approach for many banks is to create a cross-functional steering committee to bring the business units together at the onset of the decision making process. Coordinating the effort in this way helps prevent independent business silos from unintentionally working at cross purposes and ensures that the bank utilizes its resources efficiently.

CHOOSING WHAT TO BUILD

Each bank will need to adapt their solution based upon their unique gap analysis; however, the figures below represent a high-level view potential configurations. The first scenario, shown in Figure 2 reflects a structure appropriate for a small institution with a limited budget and multiple heterogeneous systems. In this model the SAS® Office Analytics solution is used to move data between its source, models and target. Data managers can use Base SAS and SAS Macros to build ETL processes to extract data from the core systems and prepare it for modeling using SAS/STAT

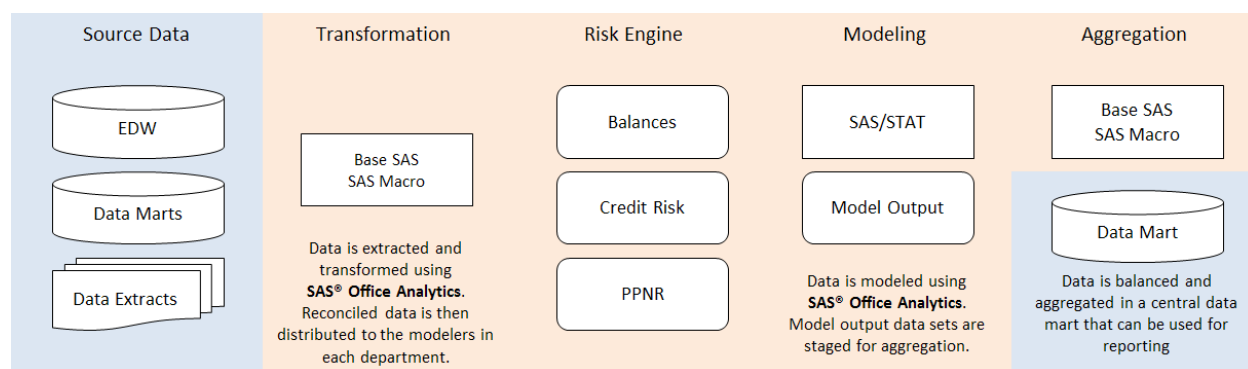


Figure 2: Entry Level Process Flow

The entry level solution is perfect for community banks and small mid-sized banks that are building up their initial enterprise analytical capabilities. It allows the data managers and modelers to harness the power of SAS through its user friendly interfaces while providing them, or their contractors, the ability to write more complex macro programs.

As the bank grows, however, in both size and analytical sophistication, it may become necessary to upgrade from the core tools provided in the SAS Office Analytics package to more powerful forecasting and risk management tools. Figure 3 shows how the powerful SAS Risk Dimensions and SAS Data Management tools are used to manage the stress testing cycle. SAS Risk will provide the modelers more advanced tools for creating and scoring their models while the SAS Data Management solution provides the firm a solid foundation for data governance. As DFAST matures and more scrutiny is placed upon data and model management, the ROI on these solutions will increase dramatically.

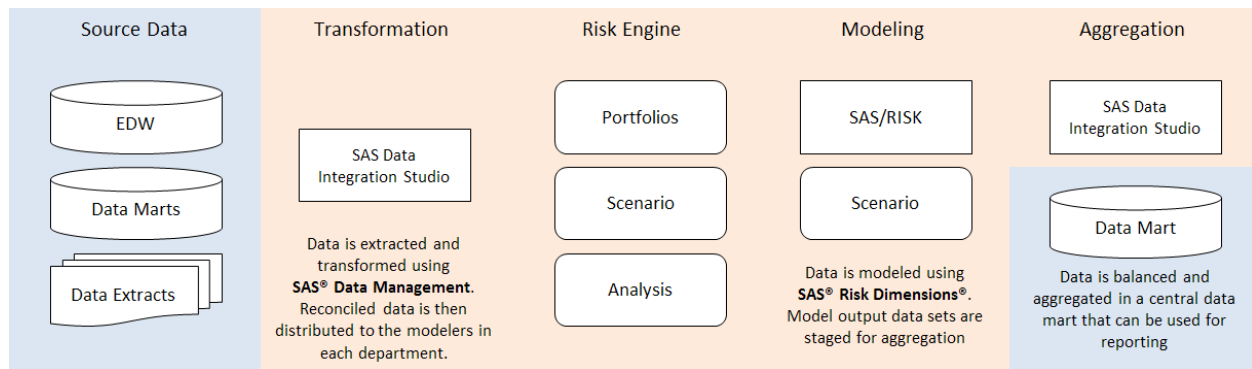


Figure 3: Intermediate Process Flow

Lastly, SAS has recently introduced a complete suite for stress testing that can address the needs of a fully developed stress testing ecosystem as pictured in Figure 4. For larger banks with a solid analytical infrastructure, adding the SAS High-Performance Risk is the next logical step. This powerful in-memory engine performs analysis in a fraction of the time, giving the modelers almost real-time feedback as they are developing. Results are quickly aggregated within the tool; therefore, the impact on capital can be seen within minutes, instead of hours or days. A complete overview of the solution can be found the free SAS white paper “*A Practical Approach to Firmwide Stress Testing*” which is available for download at: http://www.sas.com/resources/whitepaper/wp_25070.pdf.

In addition to high-performance analytical tools, the highly anticipated SAS Stress Testing Workbench is designed around the mid-sized back. The SAS Stress Testing Workbench provides a user all the key functionalities that are critical to a stress testing project such as (Chen, Pechacek, Leaver, & Clark, 2015):

- Customized workflows and scenario management tools
- Model implementation and integration
- Stress Testing reporting and submission tools
- Consolidation across multiple data sources
- Process flow auditing and governance

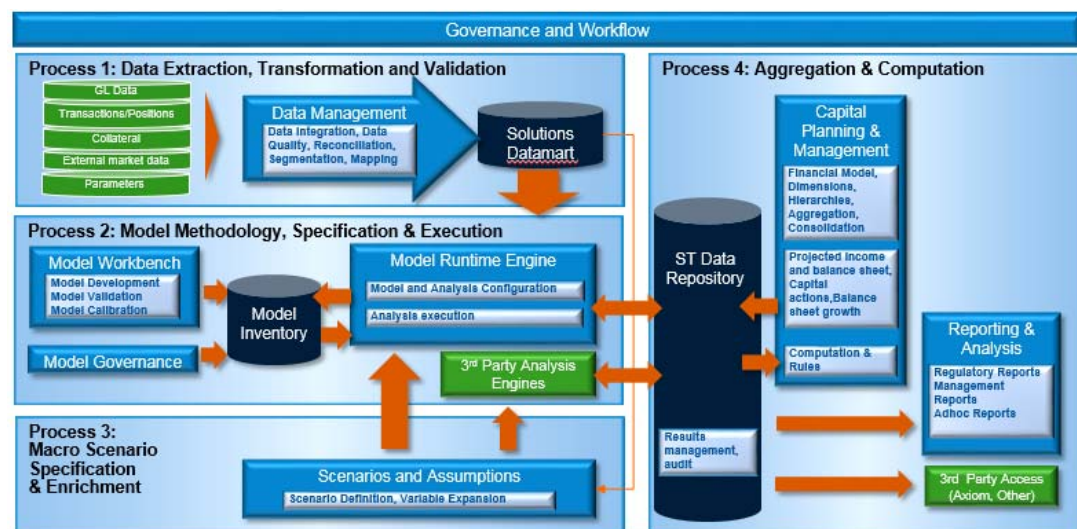


Figure 4: Illustration of a Stress Testing Ecosystem

A full review of the tool can be found in the white paper “*Regulatory Stress Testing—A Manageable Process with SAS®*”.

As banks identify gaps, they should bear in mind ways in which they can leverage additional investments. For example, due to the demand for high quality historical data to feed the forecasting models, a bank may determine they want to build a data warehouse. Because that is an expensive, time-consuming project, consider the other uses for a data warehouse and whether a warehouse project can be broken into phases to allow the bank to realize benefits as soon as possible. Technical resources, such as hardware and software, should be installed and configured in such a way as to maximize usage outside of stress testing. There is no magic solution for stress testing so finding creative ways to use your existing tools can help keep costs down. Table 4: DFAST Data and Tool UsageTable 4 below illustrates several ways in which individual business units can leverage the data and business intelligence generated in the stress testing process:

| Business Unit | Data and Tool Usage |
|------------------------|--|
| Capital Stress Testing | Model creation and validation Capital forecasting and scenario analysis |
| Credit | ALLL challenge modeling ALLL Ad-Hoc modeling DFAST ALLL modeling (scenario analysis) |
| Finance | Ad-hoc transaction analysis / exploration Ad-hoc customer analysis / exploration Enhanced profitability reporting Acquisition analysis / exploration DFAST PPNR modeling |
| Treasury | Portfolio analysis to support ALM modeling DFAST Balance Sheet modeling DFAST PPNR modeling support Acquisition analysis / exploration |
| IT | Master data management Data ETL across platforms Data validation and cleansing Data migration and synchronization |

Table 4: DFAST Data and Tool Usage

The data management and modeling skills developed internally can also be applied to other areas to improve the quality of internal reporting during the “off-season”. One of the five statements in the stress testing framework is that stress test results are to inform decision making. Using the assets that have been developed internally, banks can, and should, leverage the results of the annual stress test as a part of their strategic, operational, and capital planning.

CONCLUSION

The regulators have started to issue additional guidance, as noted above, for the mid-sized banks; however, there are still uncertainties about what their expectations will be for the next round. It can be assumed that the results of the first set of tests will impact their expectations. Some of the generally accepted assumptions about what they will expect include:

- Better governance and controls: Expect the regulators to continue to take a strong look at the governance process with a particular focus on both data management and the qualitative analysis prepared for the Board of Directors
- Stronger model validation: A number of banks and service providers indicated that the regulators had concerns about the models that were used for forecasting. Banks should strive to place more formal processes around the creation, management, and validation of their models. Expect the regulators to look the qualitative discussion to address how the model was challenged; a discussion the limitations, weaknesses, and uncertainties in the model; the sensitivity of the model to these issues; and what mitigating actions were taken.
- Greater emphasis on controls: Banks must be prepared to demonstrate that the models used by the business units (particularly Credit, Treasury, and Finance) are utilizing consistent assumptions, maintaining balance consistency with a complete reconciliation of variances, and that model output is correctly translated into financial results.
- Enhanced qualitative analysis: Banks will need to do a better job analyzing their results and presenting that analysis to the Board of Directors. There will be additional focus on the justification of the assumptions that were made in the forecast models, the forecasting of idiosyncratic elements and a discussion of the resulting drivers of change.

In order to fulfill these expectations, as well as to react quickly to new guidance as it is issued, banks must manage their resources effectively throughout the year to prevent bottle-necks and delays during the stress test. Rapid post-mortem analysis at the end of the stress testing cycle must be turned into actionable items for improvement prior to the start of the next cycle. Sourcing new technology, training on new or existing technologies, setting preliminary timelines and reviewing the allocation of personnel are activities that can start before the regulators issue their review and will distribute the activities that support the stress testing process more evenly throughout the year. By maintaining a proactive approach, mid-sized banks will be able to successfully navigate the new regulatory landscape.

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