› Point of View

Comprehensive Stress Testing: A Regulatory and Economic Perspective

Ever since the release of Basel II, which sets standards for how much capital banks need to hold to guard against financial and operational risks, stress testing has been frequently and hotly debated – and yet inadequately implemented. For instance, during bankwide simulations of stress situations, many banks still use nonupdated processes and methods, and as a result, risks are systematically underestimated.

Despite this, stress testing remains top of mind for many bank executives. And no wonder. It's affecting regulatory, internal risk and ICAAP assessment requirements. For instance, the European Union's CRD IV consultations, which are essentially the European implementations of Basel III, have addressed many of the shortcomings of both stress testing and back testing. These consultations have also resulted in finalization of the German Minimum Requirements for Risk Management (MaRisk), as well as CCAR (Comprehensive Capital Analysis and Review) and the Dodd Frank Act's stress testing requirements (DFAST) in the United States.

As a result, more bank executives are seeking to use comprehensive stress testing not only in the context of Basel III, but also as a **modern management tool for everything from financial planning to accounting**. Using stress tests, they can simulate different environmental conditions, or scenarios, to understand their effect on the financial position of their bank. Risk parameters are used to simulate negative economic developments so executives can understand their effects on portfolios.

The goal, of course, is to gain early insight into the resilience of banks given various adverse economic conditions. Imagine the benefits of being able to detect serious changes in the risk structure early, assess the stability of a bank during periods of crisis, and develop protective countermeasures to ensure sustainability during crises. When a bank's executive board and supervisory board understand risks like these more fully, they can make informed decisions and implement timely countermeasures that protect the solvency of their organization.

> Stress tests offer insights to direct management decisions.

But as explored in this paper, achieving this goal requires that banks standardize their processes and methods and centrally manage data and systems. And few are doing this effectively today.

Let's take a closer look at some of the best practices you can use to establish stress testing as a management tool within your organization.

sas
THE POWER TO KNOW.

Using Comprehensive Stress Testing as a Management Tool

In order for stress tests to be used continuously, regularly and effectively as a proactive management tool, you need to:

- Establish a process for documenting the assumptions, models and results of stress tests.
- Understand risks – and their associated, calculated weight-bearing capacity – within the context of the entire bank, not just individual departments.
- Make investments in risk management software.
- Champion stress testing at the highest levels of the organization to ensure adequate investment, governance and execution are made.
- Build stress testing capabilities into requirements across risk and infrastructure projects, such as liquidity risk projects.

These types of best practices need to be viewed as part of a complete risk management program that will enable robust processes to improve management's financial decision making process and identification of risk appetite – with the ultimate goal of industrializing stress testing processes.

The following sections provide an overview of the key elements of a successful approach to enterprisewide stress testing.

1. Work From Complete, Quality Data – the Key to Reliable Stress Testing

Data integration has long been a priority for financial service providers, but in reality, data often remains siloed within departments. As a result, most banks lack centralized data for planning and analysis. New regulatory requirements such as Basel II and III have not led to any fundamental changes in this respect. Yet in order to have reliable stress tests, banks need a way to easily connect operational systems and interactively link data across different analytical systems. This allows decision makers to aggregate data, calculate analyses once, and use the results in various applications.

At the same time, software used for management planning purposes (as opposed to operational purposes) must evolve from being recipients of data and into suppliers of data. For example, within a "data universe," they must provide information of overriding interest (for example, cash flow plans) to support processing in specialized topics as a central service.

The goal is to have a single point of truth – comprehensive, warehoused data that's available enterprisewide. This data environment can be used to drive improvements and answer specific questions using analytical software. The analysis can then be utilized to improve underlying data quality.

Data Quality: Vital to Data Warehousing

Data problems often only become visible at the very end of the process chain – in reports. So it's important to ensure data quality as early as possible – within operational systems where it's captured and created. Many banks do this manually and with great effort, despite the fact that technology-based tools can streamline the process. But what's most important is establishing data quality as a continuous process, rather than a one-off action. This approach is a source of significant potential savings and value, as it enables early identification of poor data quality during a stress test – an issue that can affect a bank's ability to accurately report the risks in its business model.

2. Integrate Stress Testing Into Departmental and Bankwide Controls

The supervisory board within a bank typically views enterprisewide stress testing as one of the executive board's central tools for managing a bank. In general, stress tests done within selected, individual departmental or division silos are considered of limited value. In order for results to be reliable for decision making, they want stress testing performed uniformly across divisions. As a best practice, banks should only use five to 10 enterprisewide stress scenarios to evaluate their risk exposures.

But departments can choose to run additional scenarios, as needed. For example, during inverse stress testing, a bank may perform a quasi-infinite number of stress simulations to collect information on risks that, at least in some circumstances, have not been included in the current assessment. They can then use probability forecasts to prove the relevance of these risks and provide responsible parties with important management tools and insights.

Banks can use a simulation platform to perform standardized simulations and integrate them into departmental and bankwide controls. To perform ad hoc simulations, employees also need a flexible, integrated simulation environment. In the past, this flexibility often came at the expense of integration due to the expense (in terms of time and resources) of acquiring access to the expanding and increasingly complex data set. But today, modern architectures can also offer these simulation functions in an integrated manner.

3. Establish Continuous Processes and Uniform Methods

Uniform methods and assumptions are requirements for having reliable stress test results. For example, banks need to define and make available the right data, format, methods and assumptions to all divisions so they can focus on delivering the content from a common point of reference. Equally important, there must be effective internal coordination within the bank (between the various disciplines of bank management).

Coordination must be supported by the right processes and methods powered by the right information technology. A static, one-off solution is not a viable option here; what's needed is a solution that promotes continuous information exchange and builds a cross-divisional general understanding in the spirit of the Internal Capital Adequacy Assessment Process (ICAAP).

4. Employ Automation and High-Performance Technologies for Timely Decision Making

Stress tests and simulations are only useful if the results are available in a timely manner for decision making. This can be difficult for banks with an integrated financial architecture, as the integration tends to increase complexity and hinder the performance of the overall system. Complicating matters is the fact that as regulatory requirements increase, so does the size of the warehoused data that must be analyzed to generate stress test results.

That's why banks need modern IT architectures that include high-performance solutions (such as grid, in-memory and in-database computing solutions) that can process big data lightning fast. Automation is also critical to enabling efficient decision making.

> Prior to automating manual processes, banks need to identify and delete unnecessary process steps. High-performance technologies can accelerate the processes and free up time to handle manual processes that can't be automated, as well as perform ad hoc analyses quickly.

5. Establish a Common, Enterprise-Level Metadata Structure to Document Stress Testing Data and Processes

Stress testing is now an indispensable factor in overall bank management that is not only relevant for regulatory law reasons. It also provides valuable insights into the most fundamental interest of the company: continued profitability. The challenge within the banking world will be figuring out how to employ this methodology sustainably and make findings available to decision makers who need it across the enterprise. Why? Because stress testing is no longer just a tool for risk modelers and compliance executives, but also a tool for top management to maximize bank profitability – and ultimately help ensure survival in times of crisis. Stress testing is a proven means of achieving decision-making certainty at all levels of an organization.

The first step toward making stress testing sustainable is to ensure that all departments that report data during stress testing store data using a common metadata structure. Ideally, this structure is enforced as part of an enterprisewide risk management framework. All of the applications within this framework need access to the information about each data item so they can process it and correctly present it to you (or the next application in your risk management workflow).

A consistent metadata structure makes it easy to verify and cleanse data, aggregate and consolidate it, and analyze and use it in simulations. It also allows you to create a seamless, enterprise-level process across a variety of systems – all the way to your stress testing environment – and have full traceability regarding where data came from.

Learn More

Stress testing is rapidly becoming an indispensable factor in overall bank management – not just a way to ensure regulatory compliance, as it provides valuable insights into the most fundamental interests of financial institutions. It's no longer just a tool for risk modelers, but also a tool for top management because it's a proven means of gaining an economic perspective and decision-making certainty.

The challenge for banks will be figuring out how to deploy stress testing in a way that is sustainable and delivers reliable results to the right decision makers in a timely manner. Banks that do this – and successfully introduce stress testing across their organization – gain clear competitive advantages.

SAS can help. Our solutions:

- Combine macroeconomic analysis with risk measurement.
- Propagate those measurements down to a finance view.
- Provide the tools for improved data quality and management required for successful stress testing.
- Enable the flexibility needed to accommodate changing regulatory requirements.

To learn more, contact your SAS representative, or visit us online at sas.com.

Glossary

Univariate methods (often also called sensitivity analyses) are characterized by their simplicity, since only one risk parameter (e.g., dollar/euro exchange rate) is stressed and the effects are analyzed. But this very simplicity is at the same time also the point of criticism. Thus, univariate methods cannot take account of the relationships between risk parameters, which may lead to distorted or even false conclusions.

Multivariate methods also take account of the relationships between risk factors, and use complex scenarios to attempt to predict the performance of a portfolio through the modulation of risk parameters. To create meaningful scenarios and map the relationships between the risk parameters, roughly deterministic and statistical methods are differentiated.

Deterministic methods use empirical values from experts to model risk parameters and form scenarios. Here it can freely be chosen in the modeling whether macroeconomic models (top down) or a portfolio-influencing proprietary internal model (top down or even bottom up) are used. All variations of scenarios are possible if they are meaningful and can be documented and plausibly explained with regard to the conditions and influencing factors.

To model the relationships between risk parameters, ***statistical methods*** use mathematical, statistical approaches (time series analyses, copula, etc.). Here, historical data is required to be able to estimate the correlations between risk parameters. Once the relationships between the factors have been determined, simulations can be run to obtain an estimate of the expected change in value of the portfolio.

Reverse/inverse stress testing focuses not only on the determination of a concrete risk value, but also examines the risk parameters in retrospect. This is based on a specified risk value and the calculation is done backward regarding how the risk parameters may develop, so as not to exceed this predetermined risk value. Theoretically, this results in an infinite number of combinations of risk parameters. These infinite constellations must then be evaluated in terms of their probability. If a scenario with a constellation of risk factors seems very likely, then it must be checked whether the available risk capital is actually sufficient.

Backtesting describes a verification process that checks the results of the stress tests based on real situations in retrospect. Here, the models are tested. Specific situations in the past are recalculated with the model and compared with the actual risks that occurred.

To contact your local SAS office, please visit: sas.com/offices

106958_S116856.0314

THE POWER TO KNOW®