Simulation-based Insights on Stress Testing in the Banking Industry

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Large financial institutions in Europe and the United States have been following rigorous, regulator-mandated stress testing programs since 2009. Even institutions not subject to required prescriptive examinations are more likely than ever to perform some form of stress testing. However, recent economic calamities have demonstrated that the depth and rigor of existing stress testing processes are often insufficient. These shortcomings, combined with new liquidity requirements and rules from the Federal Reserve Board (FRB), should inspire many banks to upgrade their stress testing capabilities. In December 2011, for example, the FRB finalized its provision that bank holding companies with consolidated assets of $50 billion or more submit annual capital plans. Rigorous stress testing is an integral part of these requirements. The new rules will increase from 19 to 35 the number of financial services companies required to file stress test results.

To help banks of all sizes understand the possible impacts of FRB-mandated stress testing, Accenture's Risk Management practice and SAS Financial Services group developed a six-step stress testing methodology. A detailed look at the methodology, along with an analysis of its effect on a hypothetical regional bank, are included among the following five sections:
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A Brief History of Stress Testing in Banking

The first comprehensive, FRB-mandated, stress testing initiative was the Supervisory Capital Assessment Program (SCAP), launched at the height of the banking crisis in April 2009. The SCAP had two primary objectives: 1) identify large institutions vulnerable to a continued decline in macroeconomic conditions and 2) detect systemic risks to the financial system and markets.

The 19 banks required to run the SCAP test included all US bank holding companies with assets exceeding $100 billion. This group (which, at the time, managed 66 percent of the US banking system’s assets and 50 percent of its loans) was asked to project credit losses and revenues over the period 2009-2010 under two scenarios:

1. Baseline scenario: reflecting the consensus forecast among economists as of February 2009.

Figure 1 illustrates the stress testing scenarios.

Despite findings that affirmed the basic stability and soundness of the largest financial institutions, the SCAP tests revealed serious flaws in the industry’s stress testing capabilities and processes. This is not surprising since many institutions had little experience with enterprise-wide testing and because most management teams were preoccupied with the financial crisis.

The SCAP program did meet its two objectives: identifying vulnerable institutions and detecting systemic risks. The initiative also provided valuable insights for regional banks that were building stress testing programs. Moreover, the publication of SCAP results helped financial markets stabilize by providing evidence that capital positions of the largest institutions were being adequately monitored, and that the probability of a structural, systemic shock was declining. The SCAP also gave the FRB considerable insight into the particular vulnerabilities of America’s largest financial institutions. Renewed investor confidence resulted, providing the 19 bank holding companies with a more than $300 billion increase in common equity from the fourth quarter of 2008 through the end of 2010. (This includes equity raised through the Troubled Asset Relief Program).

The increase in investor confidence coincided with improvements in the strength of the 19 institutions’ balance sheets, with their weighted average Tier 1 common ratio rising from 5.4 percent in the fourth quarter of 2008 to 9.4 percent in the fourth quarter of 2010.3
Comprehensive Capital Adequacy Review

In February 2011, the affected banks were subject to a second test: the Comprehensive Capital Adequacy Review (CCAR). For this initiative, the FRB had the top banks run stress tests around a new set of economic scenarios (Figure 2). These tests represented a significant departure from SCAP in terms of depth and breadth of objectives, the robustness of the scenarios and the seriousness of their implications. Briefly, the 19 banks were asked to develop capital plans in response to continued deterioration of the economy. CCAR results would help determine if an institution should be given permission to release capital in the form of higher shareholder dividends. The institutions were asked to provide detailed plans across five areas:

2. Capital distribution policy.
3. Plans to repay any government investment.
4. Ability to absorb losses under several scenarios.
5. Plans for addressing the expected impact of Basel III and Dodd-Frank.

The tests projected bank revenue, losses and pro forma capital positions over a nine-quarter period, from the fourth quarter of 2010 through the fourth quarter of 2012. Three scenarios were simulated:

2. Stress scenario: an evaluation of each bank’s specific vulnerabilities. Scenarios are generated by the bank with input from the FRB.
3. Supervisory stress scenario: a prescriptive stress scenario generated by the FRB to evaluate the impact of continued, steep declines in employment, economic growth and housing.

The key outputs of this stress scenario analysis were nine-quarter projections of each bank’s regulatory capital ratios—the Tier 1 capital ratio, the total capital ratio and leverage ratio, as well as a Tier 1 common ratio similar to that used in the SCAP. The regulators wanted banks that were planning to resume paying dividends to demonstrate that their adjusted Tier 1 common ratio exceeded a supervisory reference level of 5 percent on a pro forma, post-stress basis in each quarter over the planning horizon. It is important to note that the 5 percent threshold is higher than the 4 percent Tier 1 common ratio required for SCAP.

European Banking Authority Testing

The European Banking Authority’s (EBA) test of 90 European banks was similar to SCAP and CCAR in rigor and scope. EBA’s objective was to test resilience to an adverse but plausible scenario. The benchmark was that banks must have at least 5 percent of risk-weighted assets as Core Tier 1 capital. The simulation covered 2010 through 2012, with results published in July 2011.

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Banks made loss provisions of around €200 billion during the two-year EBA test period. Preliminary results showed that, as a result of the adverse scenario, 20 out of the 90 subjects would fall below the 5 percent threshold. However, the EBA allowed the banks’ capital-raisings efforts during the first four months of 2011 to count toward the required capital. Adjusting for the new capital, only eight banks failed to meet the standard.

Bank for International Settlements

Recommendations for Stress Testing

The Bank for International Settlements (BIS) published recommendations regarding stress testing in 2009. Abstracted below, these recommendations illustrate stress testing’s increasing sophistication. Moreover, BIS was adamant that 1) stress testing cannot become a model-driven on-off exercise, 2) the tests produce actionable results, 3) subsequent responses are embedded into banks’ risk management processes and 4) senior management and boards are active participants.

1. A bank should operate a stress testing program that promotes risk identification and control; provides a complementary perspective to other risk management tools; improves capital and liquidity management; and enhances internal and external communication.
2. Stress testing programs should consider views from across the organization.
3. A bank should have written policies and procedures governing the stress testing program.
4. The bank’s infrastructure should be flexible enough to accommodate different and possibly changing stress tests at an appropriate level of granularity.
5. A bank should regularly maintain and update its stress testing framework.
6. Stress tests should cover a range of risks and business areas, including at the firm-wide level.

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<th>2011</th>
<th>2012</th>
<th>2013</th>
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<td>Real GDP (%)*</td>
<td>-1.5</td>
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<td>Unemployment Rate (%)</td>
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<td>National House Price Index (%)*</td>
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<tr>
<td>Equity Price Index (%)*</td>
<td>-27.8</td>
<td>36.9</td>
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* Percent change over the four quarters ending in the fourth quarter of the year indicated.
7. Stress testing programs should cover a range of scenarios, including forward-looking scenarios, and take into account system-wide interactions and feedback effects.

8. Stress tests should feature a range of severities, including events capable of generating the most damage whether through size of loss or damage to reputation. A stress testing program should also determine what scenarios could challenge the viability of the bank (reverse stress tests) and thereby uncover hidden risks and interactions among risks.

9. As part of an overall stress testing program, a bank should aim to take account of simultaneous pressures on funding and asset markets, and the impact of a reduction in market liquidity on exposure valuation.

10. The effectiveness of risk-mitigation techniques should be systematically challenged.

11. The stress testing program should explicitly cover complex and bespoke products such as securitized exposures. Stress tests for securitized assets should consider the underlying assets, their exposure to systematic market factors, relevant contractual arrangements and embedded triggers, and the impact of leverage, particularly as it relates to the subordination level in the issue structure.

12. The stress testing program should cover pipeline and warehousing risks. A bank should include such exposures in its stress tests regardless of how likely it is that they will be securitized.

13. A bank should enhance its stress testing methodologies to fully understand the effect of reputational risk. The bank should incorporate risks arising from off-balance-sheet vehicles and other related entities in its stress testing program.

14. A bank should enhance its stress testing approaches for highly leveraged counterparties when considering its vulnerability to specific asset categories or market movements, and when assessing potential wrong-way risk related to risk-mitigation techniques.

**Federal Reserve Board Final Capital Plan Requirements**

In December 2011, the FRB issued new rules for capital planning. These mandates build upon the BIS recommendations and reflect the growing reliance upon, and increasing sophistication of, stress testing as a primary risk management tool. As part of the Capital Plan Review exercise, bank holding companies (BHC) are now required to project their revenue, losses and pro forma capital positions under four scenarios: BHC baseline, supervisory baseline, BHC stress and supervisory stress. These scenarios should be able to reflect deep fractures in both asset classes and liquidity, as well as on- and off-balance-sheet impacts. Mirroring lessons learned from recent financial crises, the scenarios also could help gauge impacts to a bank’s reputation and the bank’s ongoing ability to access financial markets.

The two FRB-mandated scenarios involve 25 variables, including five measures of economic activity, four aggregate measures of asset prices, four measures of interest rates and three international variables in four countries or country blocks.

The development/enhancement of the SCAP, CCAR, EBA and BIS initiatives underscores the fact that stress testing has evolved from a largely discretionary tool to an increasingly core (and largely mandatory) capability. Despite some execution and consistency issues, stress testing also has become an effective forward-looking analytical tool for regulators and banking institutions. The 19 bank holding companies subject to SCAP and CCAR now are refining their stress testing programs to correct many deficiencies associated with older, highly siloed modeling approaches. Regulators, in turn, have a new supervisory tool that gives them timely and relevant insights into both individual and systemic banking vulnerabilities. Now, it is time for banks that have recently become subject to the FRB’s new capital requirements—primarily those that did not participate in earlier tests—to develop their own stress testing programs. The remainder of this article looks at a generalized approach that banks with less stress testing experience could use to address the regulatory agencies’ expanded requirements.
A Suggested Approach to Stress Testing

Based on our observations of banks’ crisis responses, and our examinations of the SCAP, CCAR, EBA and BIS programs, Accenture and SAS have formulated a six-step approach to stress testing:

1. Develop generic scenarios.
2. Identify relevant macroeconomic factors.
3. Segment the portfolio.
4. Localize macro-factors into the segmented portfolio.
5. Run scenarios.
6. Aggregate results and analyze.

1. Develop Generic Scenarios

History provides a rich source of information for developing possible scenarios. A brief list of possibilities includes the 1987 market crash (Black Monday), the Northeast US real-estate collapse in the early 1990s, the implosion of the Russian ruble, the bursting of the .com tech bubble, the European sovereign debt crisis, inflationary or deflationary events, and the sub-prime debacle and related destruction of the mortgage securitization market.

However, it also is true that “experience is a hard teacher who gives the test first and the lesson afterwards” and that historical crises are only a starting point for scenario development. In fact, companies may wish to build scenarios that are not based on past events but that still have the (hypothetical) potential to push the bank toward insolvency. Working with subject matter experts throughout the bank, a stress testing team must develop scenarios that (once they are fully developed in subsequent steps) represent a robust indicator of the bank’s specific vulnerabilities. Thus the desired outcome of this step is to create a set of generic scenarios (e.g., collapse of a particular market segment, sovereign debt crisis, inflationary or deflationary event) that management agrees could pose a grave threat to the institution.

2. Identify Relevant Macroeconomic Factors

The next step involves translating the generic scenarios into quantitative macroeconomic factors that can be used as initial inputs to the downstream, segment-specific models. To accomplish this, a number of mature methodologies exist, such as multifactor regression models (based on underlying econometric variables) or simulation-based approaches (where econometric variables populate the market states).

Quantitative macroeconomic factors used by the FRB for its stress testing requirements include impacts on housing, real GDP, interest rates, exchange rates, unemployment and asset prices. Regulators have stressed that generated scenarios should create disruptions that are severe but plausible. Part of the macroeconomic factor identification exercise should be an analysis of the historical plausibility of a generated scenario. The severe scenarios prescribed in both the SCAP and CCAR tests were considered to have a 10 percent chance of occurring, and this can be considered the de-facto standard for a “plausible but unlikely” case.

3. Segment the Portfolio

There are two, often competing, requirements involved in portfolio segmentation. One is that there is enough granularity to incorporate the most relevant characteristics of each asset class. For example, while residential mortgages and commercial term loans are both “loan products,” it would be inappropriate to use the same methodology (or even the same input sensitivities) for both.

The second requirement is to clearly articulate how the results will be used and reported. In the SCAP, results were expected to follow the format of the Call Report so the minimum level of granularity was established at that level. However, it might have been better to further segment the portfolio by geography or some other narrower category. Of course, there also is the potential for too much granularity. For example, when portfolios are exceptionally fluid (such as highly active equity or credit-trading portfolios), focusing too heavily on specific positions within the portfolio could produce a false sense of accuracy. In instances such as these, it would be better to consider higher levels of aggregation—perhaps at the sector- or industry-specific levels.
4. Localize Macro-factors into the Segmented Portfolio

The stress test process described in this paper requires two levels of translation. One level (described in Step 2) is turning scenario descriptors into a coherent set of macroeconomic factors. The second level is to translate the econometric variables generated in Step 2 into a series of factor inputs. These inputs are used in the forecast models that will help simulate the institution’s cash flows and balance sheet. For example, the unemployment rate by itself is unlikely to be a direct input into a given obligor default model. Thus, we need a bridge between that macroeconomic variable and the microeconomically specific model that will drive the forecast. Building on the previously defined level of granularity (and often incorporating some level of expert judgment), factor-translation models can vary significantly in complexity.

5. Run Scenarios

The advantage of the methodology described in this section is that it allows an institution to leverage many existing default, loss, and revenue models. However, the typical horizon for stress testing initiatives tends to be longer than most modeling activities. In forecast models that already have long horizons (e.g., allowance and capital models), extending the stress testing horizon beyond a year is not unmanageable. However, models such as value-at-risk (VaR) become problematic when extended so far beyond their typical horizons. Using the “square-root-of-time” heuristic gives us some sense of the massive expansion in the confidence interval associated with extending a ten-day or two-week VaR to a more than 500-day or two-year VaR. In effect, the value of VaR as a credible source for projecting potential losses becomes sketchy over longer horizons. There are no set rules for how these estimates should be derived. With SCAP, banks employed many different approaches, which led to a variety of impacts during the first-round results. During CCAR testing (and presumably learning from experience), the Federal Reserve Board watched closely for overly optimistic risk-factor assumptions. In our suggested methodology, we make adjustments using a combination of regression analysis, historical relationships, and judgment to deduce how different asset classes might behave.

For banks conducting rigorous stress testing for the first time, or when exploring a new scenario, the Run Scenarios step can be particularly time consuming and challenging. However, with proper management involvement, this stage can also be one of the most rewarding because it gives management an opportunity for serious discussions about the quality and durability of different bank portfolios.

6. Aggregate Results and Analyze

An aggregated view at the enterprise level (showing the expected capital position of the institution following the stress scenario) is the overall exercise’s primary goal. But because any stress test results are likely to undergo significant levels of scrutiny, an institution must be able to drill down into the constituent segments to 1) identify the institution’s particular sensitivities and 2) perform coherence analyses on the results. The coherence analysis is done to learn the extent to which model sensitivities diverge from anecdotal or colloquial expectations (even though results of the test seem to be rational at an aggregate level). For example, a stress test scenario described as a housing double-dip might increase the loss content of the residential mortgage portfolio by 25 percent over some baseline expectation, but only have a marginal impact on a home-equity portfolio. This result could spur further analysis or even a recalibration of the localization model driving either portfolio. However, the aforementioned divergence might be appropriate, given a portfolio’s specifics. For example, differing sensitivities to a housing double dip might be okay if 1) there are only prime home-equity lines in a first-lien position (with low loan-to-value) and 2) the mortgage portfolio comprises high-LTV (Loan-to-Value), low FICO (Fair Isaac Corporation) score legacy loans from a prior acquisition. However, the ability to first identify the divergent sensitivities and then understand the drivers depends on appropriately segmenting and analyzing the respective portfolio data and models.

We can also consider a situation wherein an institution is undergoing a purely internal or externally driven stress test. For instance, the SCAP and the CCAR required results in the call report format. This format is particularly useful when trying to compare results across organizations. However, banks and other institutions are not managed along Call Report categories; their asset classes often span lines of business and can have materially different risk and return profiles. Owner-occupied commercial real estate (where the property simply exists as collateral and isn’t generating income to drive the repayment stream) can behave very similarly to a typical commercial loan. Alternatively, if the property has a significant amount of leased space, it may behave more like a typical income-producing commercial real estate exposure. In either situation, the loan balance is going to be rolled up to the owner-occupied commercial real estate bucket on the Call Report. Which group in the institution actually manages the borrower relationship—and, more importantly, is responsible for the profit and loss (P&L) on that relationship—is a different matter. Regardless of the level of granularity at which the tests are run, it must be possible to roll the results up through any required axis: internal line-of-business hierarchies, geographic hierarchies or externally mandated templates and schedules.

Lastly, we should point out that, like any stress testing methodology, this is an unavoidably iterative process. For example, the coherence analysis discussed earlier has the potential to yield material inconsistencies between asset classes; and when that happens, the process must be run again, with model adjustments incorporated.
Results of a Simulated Stress Test Performed on a Hypothetical Bank

This paper has discussed a generalized methodology for constructing a stress testing process that incorporates the entire risk landscape of an institution. In this section, we offer sample output from the models the methodology used to simulate the behavior of various portfolios. Because the analysis’ overall volume is so extensive, we cannot provide an exhaustive review of all factors, inputs, outputs and sensitivities. Presented instead is an analysis of segments that may warrant further investigation.

The scenario generated by Accenture and SAS used economic conditions as of January 2011 and incorporated economic deterioration metrics similar to what was experienced from January 2007 forward. The synthetic scenario is analogous to a double-dip recession. In absolute terms, the downturn is not as significant as 2007 to 2009. This is because a linear translation of that scenario would have yielded economic conditions that are highly unlikely, such as US unemployment in excess of 17 percent and further deterioration of home prices by approximately 25 percent. Adjustments thus were made to both the duration and the depth of the downturn. Figure 3 illustrates the scenario used as the initial input.

Credit Portfolio

Beginning with the institution’s credit portfolio, we note a marked decrease in loan assets. This is not unexpected, since it is consistent with previous economic recessions. As the economic scenario deteriorates, decreases are seen in demand for credit and the bank’s willingness to supply credit. Initially, however, there is an increase in loans outstanding. This is a result of funding the institution’s previously unfunded commitments. Lines of credit, letters of credit and the mortgage pipeline all have different funding behavior patterns. Lines of credit (frequently used by companies to meet payroll commitments or fund inventory) rise, as do loan balances. Letters of credit also see an increase in funding as the underlying business environment becomes more uncertain. Funding offered by the letters of credit (often used for backstop or guarantee purposes) becomes more frequent. Lastly, the institution takes a few months to realize that the credit environment is deteriorating. As a result, there is a lag of several quarters before the institution begins to reign in loan exposure.

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* Percent change over the four quarters ending in the fourth quarter of the year indicated.
In the stress scenario cited here, the institution’s total loan portfolio declines by approximately $2 billion or 3.6 percent (Figure 4). And even though GDP and unemployment begin to recover in 2013, loan demand continues to fall. This is consistent with experiences garnered during the most recent recession. As we will demonstrate later, declining loan demand puts pressure on margins and net revenue.

Our approach segments the credit portfolio into subsets: C&I, Commercial Real Estate, Mortgage, Credit Card and Other Retail. Additional granularity might even be appropriate for institutions of this size. A deeper drilldown might focus on areas such as specific asset classes of commercial real estate (investor-owned versus owner-occupied), C&I (middle market versus small business lending), mortgage (prime versus non-prime), card (retail versus commercial) or geographic considerations.

Credit Card Portfolio
As unemployment increases, individuals come to rely more on their credit cards. This produces an increase in utilization for the portfolio. However, outstandings peak roughly a year into the scenario, as the institution works to reduce the availability of existing lines. At this point, consumer deleveraging and write-downs on the portfolio begin reducing balances to levels lower than in the original portfolio (Figure 5).

Mortgage Portfolio
The mortgage portfolio also sees an initial increase in outstandings, followed by a decrease over time (Figure 6). The initial increase is due in part to a large mortgage pipeline that funds over the first quarter and continues to grow the balance sheet for another quarter. After that, mortgage originations decrease significantly. Lower overall mortgage outstandings then follow for a period of three years—the result of prepayments driven by low interest rates and write-downs on mortgages that have become significantly delinquent.
Non-performing Loans

Despite the decline in loan balances, non-performing loans (NPLs) in the portfolio increase from $679 million in Q4/2010 to $1.15 billion in Q4/2013, even though the economic environment improves in 2013 (Figure 7). No segment of the portfolio has been immune to the deterioration in credit quality, although month-over-month increases in non-performing loans slow down at the end of the forecast period. However, it is important to be aware of “hockey stick” projections—immediate improvements in problem loan ratios. Credit portfolios can take a significant amount of time to return to pre-stress, asset-quality levels, given that credit workouts, restructurings and other modifications must be resolved over multiple quarters.

Net Charge-offs

Though lagging the increase in non-performing loans, a commensurate rise occurs in net charge-offs (NCOs). Charge-offs as a percent of both average loans and NPLs also rise. The lag is most evident toward the end of the forecast period, as non-performing loan levels begin to stabilize but charge-offs continue to increase. The effect is compounded because, as the simulation scenario progresses, the bank starts to see an increase in recoveries, which winds up netting out gross charge-offs. Specifically, net charge-offs climb throughout the period, almost quadrupling from $100 million in the fourth quarter of 2010 to just under $400 million three years later (Figure 8).

Deposits

With diminishing loan demand, the institution no longer needs as large a pool of deposits. It therefore reduces its reliance on brokered deposits (Figure 9). Reducing reliance on brokered deposits is generally considered prudent since brokered deposits as a funding source are notoriously transient at maturity. However, as the deposit supply also becomes constrained, the deposit base of the institution as a whole decreases. So in order to sustain its balance sheet, the institution ultimately becomes a net borrower on the interbank market. This is a less-than-ideal scenario for a financial institution because reliance on the interbank market for liquidity is inherently risky.

Figure 7. Non-performing loans, total (in $millions).

Figure 8. Net charge-offs, total (in $millions).

Figure 9. Brokered deposits, total (in $millions).
Profitability

Understandably and expectedly, the profitability of the institution falls (Figure 10). Fee-based and trading revenues do little to help support revenue losses from the credit portfolio's decreasing quality because the institution is heavily dependent on interest income as its primary revenue driver. In addition to the loss in interest income from non-performing loans, the provision associated with bad debt increases, pulling more revenue from earnings each subsequent quarter as the allowance for loan and lease losses decreases. Arguably, the institution could mitigate this by incorporating a through-the-cycle provision and reserve process. However, we have attempted to show a "typical" institution; and in our experience, the reserve processes in these institutions are primarily point-in-time in nature. Thus the reserve will have to be re-provisioned during times of distress. Particularly worrisome are decreasing capital levels, which make it difficult to support more revenue-earning assets.

Capital

In our scenario, Tier 1 capital falls almost 150 basis points—from 8.5 percent to 7 percent (Figure 11). This is a significant drop given the shrinking balance sheet. Tier 1 capital remains comfortably above the 6 percent threshold set by the FRB in the CCAR test. However, the decrease in capital, combined with the reduced balance sheet, will make it difficult to return to a level of profitability that can comfortably support capital-rebuilding, unless there is some sort of external capital injection.

Management Implications

Based on the behavior of institutions subject to the CCAR, it is unlikely that our hypothetical bank would be allowed to raise its dividends. Continued deterioration in the portfolio at the end of the scenario time horizon would be a particular concern. It also is likely that a contingency plan would be needed to ensure that the institution can fund its balance sheet and not rely excessively on a fickle interbank lending market. Given the systemic liquidity decreases seen during the stress scenario, it is highly optimistic to believe that the interbank market would continue to operate seamlessly. In that eventuality the institution would depend on the Federal Reserve as a lender of last resort.
Stress Test Challenges and Key Success Factors in Stress Testing

During this hypothetical stress test Accenture and SAS encountered a number of challenges—barriers similar to what many of our clients have encountered in their stress testing efforts:

• Developing plausible, yet impactful, scenarios. We took an obvious, if simplistic, approach and based our tests on the Federal Reserve Board’s CCAR program. However, in an FRB-mandated stress test, an institution would also be required to conduct a test targeting its specific vulnerabilities. The development of such scenarios should include thoughtful input from management across the bank, as well as from board members and external subject matter experts. Understanding idiosyncratic risks is one of the key benefits of stress testing, and distinguishing between systemic and specific risks is critical.

• Combining a bottom-up and top-down approach. A bottom-up approach allows for greater model specificity. A top-down approach provides greater consistency. The bottom-up approach also can make it difficult to incorporate macro-factor elements, while the top-down approach can effect less detail in the results. Many banks have tried both approaches. In our view, one of the best practice is a combination of both, and this is what we did with our hypothetical stress test.

• Weaving qualitative expert opinions into scenario development. Savvy banks will marshal a senior team to actively participate in the stress-testing process. As noted before, the ability to determine which scenarios are most applicable rests largely with senior management—the people best positioned to understand the sensitivities of an institution’s asset classes. Moreover, the coherence of the entire test can be put at risk if key stakeholders do not provide input early in the process.

• Process, data and system integration. Bottom-up or top-down, it is essential to develop seamless links to multiple systems, along with a single version of the truth. Given the number of different models, and the siloed nature of risk modeling, there is a large amount of data quality and systems integration work that must be included in the stress testing process. This problem was minimized with our hypothetical bank because portfolios were constructed with a common data hierarchy. However, that challenge will be prevalent and significant in any real stress testing situation.

• Translating macro-factor variables into micro-factor inputs. It is challenging to translate the econometric variables generated for the stress test into a series of factor inputs that can be used in the forecast models. However, this activity is very important to the stress test process. It also is an area that will receive particularly close regulatory review.

• Balancing quantitative and qualitative inputs. The stress test cannot be a simple quantitative and statistical exercise. Econometric analysis of the impact of macroeconomic variables on risk factors (along with effects on an institution’s portfolios) is useful but limited. The crux of the test is making reasoned assumptions regarding the response, as well as the second- and third-order responses of the institution’s management, customers, investors and, ultimately, regulators. At its core, the assumptions call for answering difficult questions, such as “how will all of our constituents react to these volatile events?” and “how will we respond?”

• Positioning stress testing as a key risk management tool. Lastly, it should be noted that the most insightful banks position stress testing not as an isolated compliance process but as an important risk management tool that can have a substantial impact on how they pursue their strategic initiatives. Multiple executives and employees with varying backgrounds should participate in this intense, ongoing and interactive process, during which model results are challenged, assumptions modified, models rerun and the cycle repeated until meaningful and realistic results have been achieved. The results themselves should be used regularly by management when making decisions.

Our stress-testing experiences and discussions with clients underscore the above point: Success depends less on the sophistication of underlying risk models and more on the involvement of senior management throughout the process. Our hypothetical bank has a relatively straightforward balance sheet and income statement. It does not have a major trading portfolio or products with complex optionality. Nevertheless, we had to make a number of qualitative adjustments and assumptions. In a formalized stress test with an actual financial institution, these assumptions would need explicit documentation and validation, and such input is highly likely to influence final results. This adds further credence to the criticality of senior management involvement.

• Balancing quantitative and qualitative inputs. The stress test cannot be a simple quantitative and statistical exercise. Econometric analysis of the impact of macroeconomic variables on risk factors (along with effects on an institution’s portfolios) is useful but limited. The crux of the test is making reasoned assumptions regarding the response, as well as the second- and third-order responses of the institution’s management, customers, investors and, ultimately, regulators. At its core, the assumptions call for answering difficult questions, such as “how will all of our constituents react to these volatile events?” and “how will we respond?”

• Positioning stress testing as a key risk management tool. Lastly, it should be noted that the most insightful banks position stress testing not as an isolated compliance process but as an important risk management tool that can have a substantial impact on how they pursue their strategic initiatives. Multiple executives and employees with varying backgrounds should participate in this intense, ongoing and interactive process, during which model results are challenged, assumptions modified, models rerun and the cycle repeated until meaningful and realistic results have been achieved. The results themselves should be used regularly by management when making decisions.
Conclusion: The Case for Stress Testing

Institutions that are new to the Federal Reserve Board’s stress testing requirements may find the process cumbersome and confusing. Part of the reason is that, despite FRB guidance, there is no single set of detailed guidelines that all institutions can follow. However, even organizations with little stress testing experience can build on the approach introduced in this paper to begin creating a detailed and company-specific program. Invariably, that development process will involve questionable assumptions, multiple iterations and conflicting results. But on the positive side, it also will provide a host of surprising and useful insights. Chances are good that the value of the results will more than justify the challenges and setbacks.

All in all, it is remarkable that, in less than five years, stress testing has become a vital risk management and regulatory tool—a fundamental way to assess future vulnerabilities (systemic and idiosyncratic) with levels of granularity, transparency and realism that weren’t previously possible. Today’s stress testing capabilities clearly support the adage that “crises (and necessity) are the mothers of invention.”
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