

METAVANTE WHITE PAPER

Beyond Compliance:

The Case for a Robust Approach to Credit Stress Testing

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Table of Contents

Table of Contents	1
Executive Take-Aways	2
The Benefit of Hindsight	2
A Lukewarm Embrace	3
The new breed of credit risk.....	3
Technological challenges.....	4
Shortcomings of traditional credit risk evaluators	4
Failure to leverage effective tools.....	5
Examining the Robust Credit Stress Test.....	5
A strategic focus	5
Stress testing types.....	6
The criticality of data	7
Other tips to ensure the success of a stress test initiative.....	7
Metavante Risk Management Consulting	9

Executive Take-Aways

- Credit stress testing, to date underutilized by the financial services industry, is receiving renewed focus in the wake of the current credit crunch.
- In the past, these factors have teamed to work against banks attempting to leverage credit stress testing:
 - The bank’s false sense of security deriving from a market that appeared endlessly favorable
 - The bank’s inability to recognize and understand the rising complexity of credit risk
 - The bank’s failure to leverage rapidly evolving credit risk-related technology
- Stress testing should be considered a strategic initiative, not a technological or compliance-centric one. Its greatest impacts will be on the way the bank adjusts its business practices to manage risk more effectively.
- Four types of stress testing that tell the “story” of the bank’s risk exposure with a focus on the future, include:
 - Scenario writing
 - Sensitivity analysis
 - Statistical inference
 - Worst-case-scenario analysis
- As data is a critical component of an effective stress, the bigger the set of valid, clean data covering a significant period of time within a stable organization, the better the bank’s analysis. To this end, proxy data is less than ideal.
- Other tips for successful stress testing include:
 - Engage senior management
 - Fully utilize stress testing as a communications conduit
 - Rigorously pursue the initial design
 - Be consistent in the approach to data collection
 - If necessary, implement the model gradually
 - Test on a regular basis
 - Document the stress test, including key indicators and what outcomes are considered alarming
- Regulating entities cannot drive the stress testing initiative, or worse yet, design it. The stress test is for the good of the bank, and should be developed to address its specific exposures by those who know the business, namely bank management and staff.

The Benefit of Hindsight

On May 13, 2008, Federal Reserve Board Chairman Ben Bernanke, while offering no concrete solution to the credit crunch dragging down the economy, openly admitted that banks should identify and measure risks better. In the process he openly endorsed stress testing.

“Stress testing forces practitioners to step back from daily concerns to think through the implications of scenarios that may seem relatively unlikely, but could pose serious risks to the firm if they materialized,” the Fed Chairman said.¹

¹ Steven Sloan, “Fed Chief on Risk Practices, Originate-to-Distribute Model,” *American Banker Online*, May 16, 2008, p. 1.

A cynic might remark that proffering solutions with the benefit of hindsight is easy, but it is never too late to improve. Circumstances, no matter how dire, can worsen. And stress testing – or to be more precise in the context of this paper, *credit* stress testing – is an established methodology. It has a proven ability to identify the possible changes in economic conditions that could have unfavorable effects on credit exposures, like the downturns in the general economy and its specific segments, market risk events, and liquidity conditions.²

At its core, credit stress testing guards against unexpected loss. Banks, by the very nature of their business, expect some loss, usually covered by the loan loss reserve account. Unexpected loss, by contrast, has no such hedge, and requires dipping into shareholder capital, disturbing the underpinnings of the bank's financial foundation. This makes it critical for bank management to identify unexpected loss as far out in the future as possible.

If correctly designed and implemented, credit stress testing is an invaluable tool for banks grappling with today's "unpredictable" financial services market. That being the case, why haven't banks leveraged it more productively?

A Lukewarm Embrace

Several reasons are responsible for the financial services industry's lukewarm embrace of credit stress testing. For starters, a false sense of security brought on by conditions that appeared endlessly favorable pervaded the financial services industry for years, leading to inertia on the bank's part. When one perceives nothing is broken, one tends not to see the need to pursue more stringent risk measures, even in the light of potentially troubling market developments. As a general rule, banks did what was required by regulators, little more, and regulators' requirements for stress testing were not as stringent as they have become over the last six months.

While this self-satisfied attitude didn't help matters, other conditions made it challenging for even the most vigilant banks to identify the need for robust stress testing, namely rapid change both in the nature of credit risk and the technology available to address those changes.

The new breed of credit risk

Assessing credit risk was once simpler. A set of constant, measurable variables were involved in evaluating the risk associated with the performance of a bank's asset: loans. For the most part these variables were in plain view, making them easy to identify, and any ripple effect they had upon each other was minimal and fairly easy to contain. A bank had the luxury of evaluating one or two risk variables at a time.

While the classic indicators of credit risk still exist (see sidebar), their "personality" has changed in the current credit market, making them more difficult to manage. The effort and acuity required to review lending activities, analyze portfolios, monitor allowance for loan losses, and decide variance in loan concentrations – to name some of the most common – has grown in breadth and depth of dimension. The opportunity to misclassify a loan as a good loan, one that will default, or vice-versa, has never been greater.

"CLASSIC" INDICATORS/MEASUREMENTS OF CREDIT RISK

- Ratio of non-performing assets to total loans and leases
- Ratio of net charge-offs of loans to total loans and leases
- Ratio of annual provision for loan losses to total loans and leases or to equity capital
- Ratio of allowance for loan losses to total loans and/or to equity capital
- Ratio of non-performing assets to equity capital
- Ratio of total loans to loan deposits

² Central Bank of Egypt in cooperation with the Egyptian Banking Institute, "Stress Testing Best Practices and Risk Management Implication for Existing Banks," Seminar Transcript, November 21, 2007, p. 4.

The factors associated with credit risk interrelate with each other more than at any time in memory and spread far and wide into non-traditional markets. The global stage is vast and financial cause and effect moves through it with lightning speed. A ripple through the financial markets can set off a non-linear domino effect that builds steady momentum and sends shocks through the financial system. These shocks can become immense.

Difficulty also stems from structural changes in the financial system worldwide, including the easing of credit conditions (particularly the use of credit ratings which became associated with constant probability of default with little concern for reality), changes in the regulatory environment, and technological developments. They have combined to catalyze securitization and consolidation³ (most notably manifested in the much maligned originate-to-distribute model) and off-balance sheet financing. This obscures credit risk variables, making their isolation, assessment, and measurement challenging.

These factors add up to a credit risk environment that not only has a propensity for unpredictability, but is unprecedented in scope. Banks, often slow to realize the magnitude of these changes (and not particularly vigilant about them in the first place), failed to recognize that their risk evaluation tools would not anticipate the range and severity of impacts posed by market events.

Technological challenges

SHORTCOMINGS OF TRADITIONAL CREDIT RISK EVALUATORS

This isn't to say that banks were without "safeguards" for credit risk management. They relied then, as they do today, on statistical models to measure and manage credit risk. Models of this type provide a coherent framework for identifying, analyzing, and communicating this risk, and in that way provide the bank a certain level of comfort that controls are in place. The problem is statistical tools of this type tend to simplify reality by their nature and are not designed to capture unlikely yet possible events that could cause significant losses.⁴ They project the *possible*, isolating factors and deterring what risk exposures are realistic.

As has been stated previously, isolation of risk factors is only of limited use, and the paradigm for what is considered "realistic" has shifted. "Likely loss" simply doesn't mean what it used to – one needs to think "big" in terms of possible outcomes, and traditional statistical tools aren't built to do that.

The Value at Risk (VaR) model, one of the most popular tools to evaluate credit risk, is a case in point. It is designed to reflect price behavior in everyday markets, but doesn't take into account exceptional circumstances or the possible changes in economic conditions that could have unfavorable effects on credit exposures. This model gives no indication regarding extreme losses, assumes constant market situations over time, and presupposes that changes in risk factors are normally distributed, which can lead to questionable predictions. For example, it projects the stock market crash of 1987 as an event that can only happen once in x billion years (10 to 20 standard deviations),⁵ making it hard for a banker to take seriously.

This is not to dismiss these types of statistical models out of hand – after all, stress testing is simply another flavor (albeit more robust) of statistical analysis – but in today's market, they are best used in tandem with credit stress testing, a methodology that can correctly account for events of large magnitude.

³ Speech by Malcolm D. Knight, General Manager of the Bank for International Settlements at the Euro 50 Group Roundtable on "The Future of the Originate and Distribute Model," London, April 21, 2008.

⁴ Jose A. Lopez, "Stress Tests: Useful Compliments to Financial Risk Models," Federal Reserve Bank of San Francisco Economic Letter, June 24, 2005, p.1.

⁵ Patrick Haas, "Stress Test Requirements," *Bank Forum No. 36* (www.financetrainer.com), October, 2004, p.1.

FAILURE TO LEVERAGE EFFECTIVE TOOLS

A second issue banks have grappled with is the changing face of available technology and how to best utilize it in the context of stress testing. The components in question, if assembled correctly, are robust enough for stress testing, but for one reason or another are not being deployed to the bank's advantage. This is a strategic issue, as much as a technological one.

Over the past decade, analytical tools, led by Microsoft Excel®, have become powerful enough to handle stress testing analytics and are very cost-effective. It has become feasible for robust statistical analysis to be brought in under the roof of the financial service organization – right on the banker's desktop.

“This was a significant breakthrough, in that larger banks traditionally had an advantage over small to mid-size banks since they had more resources and computing horsepower to process risk-related data,” explains Joe Hill, founder, Chairman and President of CEIS Review, Inc., a firm that provides consulting services to financial institutions. “Placing more computing muscle at the fingertips of banking staff appeared to level the playing field somewhat.”

In theory, this is also an advantage because greater computer power in the hands of the user gives those who understand credit risk and its impacts command over the tools needed to design a credit stress testing model, thus narrowing the classic disconnect between the I.T. department and those who are provided with aggregated data. Cheaper computing also eliminated reliance on large third-party vendors providing statistical analysis products that – despite their computing power – never adequately addressed the specifics of a bank's market adequately and at a reasonable cost.

For all the potential of this new breed of risk analytics, banks remain challenged to implement them effectively; they fail to integrate an overriding strategy into the analytics that can be communicated and adhered to throughout the organization. There are three reasons this is true:

- Most bankers don't know the key variables and leading indicators that have to be incorporated into their bank's stress testing system.
- Even though the available technology has become more cost-effective, numerous data points are needed, and the required manpower for data collection and consolidation is expensive and time consuming. “Analysis wasn't a problem anymore,” adds Hill, “but securing the data remained problematic. Data mining is still problematic, takes a lot of time, and can be expensive. You might find, for example, that some of the origination information is still in paper files.”
- A disconnect between the I.T. department and the rest of the organization remains, though it has changed in nature. The issue has its roots in the I.T. department's conditioning to be skittish about allowing data it considers sensitive – personal customer information, for example – to be manipulated by those outside the department.

Yet, this is exactly what needs to be done. Even in cases where a bank is savvy enough to place someone knowledgeable and math-oriented in charge of designing a credit stress test, a certain amount of discovery will be required – trial and error is the nature of the beast. There will be a careful sifting through data; a look at whatever minutiae are required. Certain fields will be locked out, others edited down. This makes the I.T. department nervous, especially when its employees are being asked to do some of this “invasive” work themselves.

Examining the Robust Credit Stress Test

A strategic focus

Problems like those mentioned above serve to illustrate one of the most important tenets of stress testing and one this paper wishes to emphasize. Successful credit stress testing isn't just about the technology; like any initiative the bank

undertakes it needs an underlying coherent strategy. A set of stress tests, in conjunction with regular risk forecasts, should give management insight into the range of potential risk exposures.

This requires a focus that goes beyond mere compliance. This is not to say that bankers should become non-compliant, but compliance should be only one of the focuses of stress testing, which should be embraced as a significant part of strategy and management.

“The methodology the bank selects should align with its goals,” states Hill. “When significant risks are identified, the bank will be obligated to cover its weaknesses, whether that means increasing capital reserves, changing the marketing plan, or killing part of a portfolio, to name a few options. In cases where the potential for exceeding bank limits is uncovered, the bank should have a strong contingency plan in place and take a look at its risk monitoring procedures. These are strategic management decisions, not technological or compliancy-driven ones.”

Stress testing types

In order to recognize that stress testing serves more than one purpose, it helps to break it down into various types:

- **Scenario Writing** – A narrative of a generally qualitative nature consisting of players and risks – an integrated future view. The result is a scenario map that consists of one or more agreed-upon events that may occur in the future, even if the probability is small. Stress scenarios compute the extent of exposure under extreme assumptions or evaluate the aftermath of unexpected but plausible high-impact events. Assumptions for both independent and dependent variables reflect inter-relationships between variables.
- **Sensitivity Analysis** – Isolates the ex-post effect on a chosen variable and also addresses one or more predefined moves in a particular risk factor.
- **Statistical Inference** – Involves tests under extreme conditions (for example, five, 10, or 15 standard deviations) which go well beyond sensitivities. This ranges from the analysis and spikes in time series to estimating outliers, stress conditions, and unexpected events.
- **Worst-Case-Scenario Analysis** – Very low probability but very high impact. Has no use for normal distribution; associated concerned only with extreme events toward the end of a long leg of extreme events. The goal is to identify weak links and institute capital damage control procedures before a catastrophe hits.

These types of analyses contribute directly to the strategic nature of stress testing. Embracing the “types” concept and building it into the fabric of the bank becomes more appealing because it gets the organization focused on the future.

To strengthen this focus, scenario analysis should become both the starting point and the foundation of stress testing. By starting with scenario analysis, the outcomes become more robust and correlated. For example, a 200-basis point rise in interest rates in an asset-sensitive institution begins a discussion on the effect on marginal credits or on local employers that may struggle or go out of business. In contrast to more traditional statistical risk analyses, you are telling a story – parallel stories, in fact – that unfold over time. Part of what sets stress testing apart from other risk measures is this emphasis and dependency on historical components. This is part of what makes the initial compilation of data so labor intensive – the more historical data that can be compiled, the greater the clarity of the scenarios and resulting outcomes.

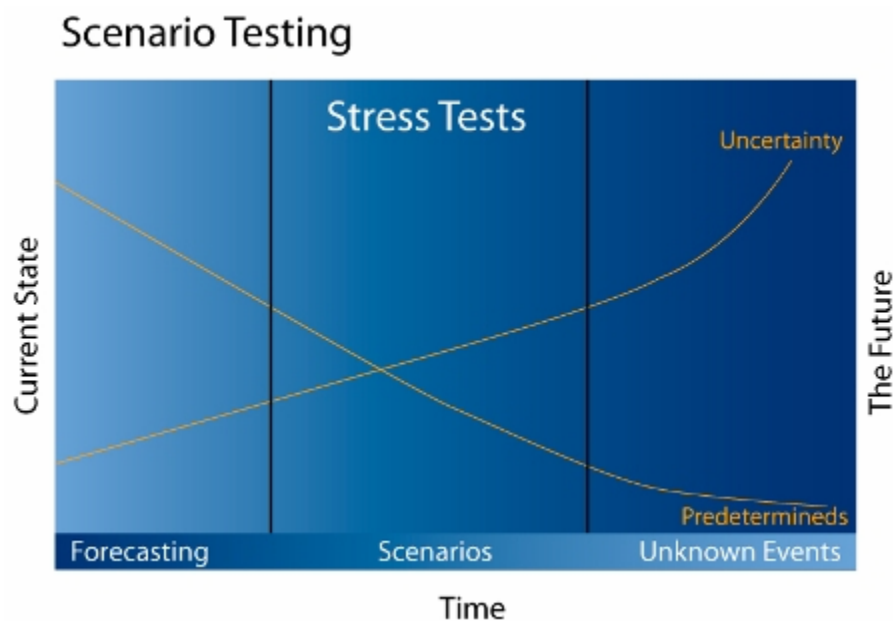
This being the case, bankers must be wary of proxy data that is purported to reflect the financial institution’s portfolio. Proxy data is market or loss data acquired from a third party. It “stands in” for the bank’s data when the bank does not have an adequate or sufficient history to reflect its performance through various economic cycles. It may have to be used if a history has not yet been established, but it should be replaced as soon as possible.

The criticality of data

Stress testing requires accuracy but not precision. Since it is a predictive activity, it is nearly impossible to be precise. The data source and methodology need to be well defined and defensible because when the wrong path is taken, the ability to review that path, make corrections, and explain why that path was taken to shareholders, regulators, and employees is of paramount importance.

What does it take to conduct quality stress tests for a financial institution in order to achieve results that satisfy the regulators, the board of directors, and management? The answer is a big set of good, clean data covering a significant period of time within a stable organization. With respect to the data requirement, Ron Kundinger of M&I Bank (a \$60 billion U.S. bank) estimates that approximately 2,000 data points are required to build a robust credit data warehouse. These data points do not include the historical data, which should probably reflect seven to 10 years of information (compiled monthly), nor do they include economic data. As far as stability, the same products and services should be offered over the seven to 10-year period (preferably without mergers, acquisitions, or new products). This, of course, is somewhat of an exaggeration, but it does indicate why methodology is so important.

The following graphic provides an overview of the fit of stress testing as the bank progresses from the current state of known events to future unknowns.



Other tips to ensure the success of a stress test initiative

- Senior management has to be engaged.** Since stress testing is a strategic initiative at its core, senior management must get on board early. The problems in the credit market were caused, in part, by senior managers who were too slow to react. Management passivity, even if it results from the fear of misinterpreting data, cannot be allowed. We have seen that issues pertaining to a stress test initiative are not necessarily technological shortfalls, but managerial ones. Senior management must be actively engaged from the beginning, openly endorse the initiative, offer input from their perspective, and provide the oversight necessary to keep the initiative on track. Keep in mind that current banking regulations call for the board of directors to review the design and results of stress tests.
- Utilize the stress test's effectiveness fully as a communication conduit.** If a formal plan is not in place to communicate stress test results back to senior management, one should be implemented immediately. Stress tests have an inherent

advantage as a communication conduit in that they explicitly link potential losses to a specific and concrete set of events,⁶ an excellent starting point for meaningful strategic discussion.

- **The initial design process must be rigorous.** You can never be too meticulous as you do not want to keep changing the design once you start (see next bullet). Are all key exposures included? Have assumptions been well thought out and do they have a realistic basis? Are assumption changes controlled? Are stress scenarios well developed, dynamic, and appropriate? Do the stress scenarios go far enough? These are the kinds of questions that should be asked at this time.

REGULATORY IMPACT ON STRESS TEST DESIGN

In recent months, regulating entities have become more vociferous in their call for a robust approach to stress testing. In itself this is a positive development, but banks should remain cautious: it is easy to fall into the trap of embarking upon a stress test initiative that is driven primarily by regulation. A bank should embrace stress testing because it is good for the bank, not because it helps ensure compliance. And a bank should certainly not rely on regulatory agencies to shape their credit risk management programs.

It is sobering that some large banks have been doing exactly that. They invested billions in their risk management program, yet, it was these very same financial institutions that dried up the overnight lending market and wouldn't lend to others. It is admirable, perhaps, that they were focusing on credit risk management while others were ignoring it or underestimating its importance, but the result is only marginally more positive, if that.

Financial institutions absolutely cannot become over focused on regulatory agencies to define their bank's risk management program, and bankers cannot abdicate this responsibility to the regulators. Regulators can and will accept this responsibility.

Some consultants are equally culpable because they interpret the regulations for clients and use regulations and regulatory opinions as foundations for the risk management programs they help implement. As a result, instead of being mitigated, risk may be amplified, because the bank is not making enough of an effort to design the model that is best for them and their business strategy.

No one knows the bank like the bank itself. If stress testing helps avoid risk and ensures increased profitability, an effort has to be made by the organization. Take regulatory requirements into account, but they should not be exclusive guidelines.

- **When designing data collection, go for consistency.** Data collection and compilation can be expensive, and there is no way to completely avoid it. However, it is easy to compile unnecessary expenses if the design keeps changing. Be sure that the data points and key indicators, once established, remain constant throughout the initiative. Rearranging them will drive unnecessary costs and extend your development timeline. Data quality is a key; perhaps *the* key. "Once a reliable stress testing mold is established, more data can be added to it with confidence, without having to reinvent the wheel," says Hill.
- **When implementing the model, do so gradually.** Taking on a stress testing model is complicated enough, especially considering the variety of markets affecting your bank's credit portfolio. To make life simpler, roll the initiative out gradually. "For example, you can start with a more straightforward part of your bank's portfolio, such as commercial real estate, and devise scenario testing that takes into consideration the impact on vacancy rates, rents, interest rates, income properties, and other related entities," advises Hill. "There is no need to rush; roll it out over a year or two and then, if necessary, make minor adjustments.
- **Test on a regular basis.** Market conditions can change more rapidly and dramatically than ever, making it prudent to reassess your stress test methodology on a regular basis. Do so at least once a year, if not more often. Make sure this testing is coordinated among those who will be using it.
- **Document the stress test.** Your stress test methodology and its results will impact all areas of the bank, and those affected need a clear idea of how to interpret the outcomes. This makes it important to document the test. This document should include what is regarded as an alarming stress test result and what measures should be taken when one is uncovered.⁷

⁶ Lopez, *Ibid.*

⁷ Haas, *ibid.*

Metavante Risk Management Consulting

Metavante consultants leverage a **SMART** (Subject, Methodology, Actions, Results, Testing) approach to assist banks with their risk management issues. The **SMART** methodology applies to any risk scenario and creates consistency in client process, procedures, and policies.

Our experienced team, working in concert with superior risk management and communication tools, is focused on real savings, increased revenues, and mitigating risk. We have worked with banks of various sizes and complexities and have delivered financial risk management solutions to all of them – not only assisting them in selecting the right technology and data analytics methodology, but helping them formulate a strategy that can help leverage the insight they have gained from correct identification of risk exposures.