

Category: **Loan Portfolio Management**
Topic: **Stress Testing**

Background

Within the context of loan portfolio management (LPM), stress testing represents a vital component in an institution’s risk management process. When done effectively, stress testing is a means for obtaining a better understanding of an institution’s risk profile; as such, it provides the board and management valuable information for use in key decisions. Stress testing can play a particularly important role in:

- Providing forward-looking risk assessments.
- Overcoming limitations of historical data for decision making.
- Assessing the adequacy of capital, earnings, and liquidity to absorb potential stress.
- Evaluating the need for changes in underwriting, credit concentrations, and loan pricing.
- Aiding in setting an institution’s risk appetite.
- Developing risk mitigation and contingency plans.

For stress testing to be effective all key stakeholders in the institution, including the board, management, and line staff that perform stress testing work, must support the stress testing process. Stress testing should be an integral part of the institution’s overall risk management process, with the results being used to make better and more informed risk management decisions. With that in mind, when evaluating stress testing, in addition to reviewing policies, procedures, models, and results, it is of utmost importance for examiners to assess how stress testing results are used in the risk management process.

For stress testing to facilitate better risk management decisions, the stress test must go beyond credit quality projections and show the effect of stress on a variety of credit quality and financial metrics such as capital levels, earnings, allowance provisions, etc. The degree and sophistication of an institution’s stress testing process should be commensurate with the complexity of the institution and the inherent risk in its portfolio.

General Examination Criteria

In addition to the Agency’s [LPM Publication](#) and this exam guide, the following additional criteria and resources exist:

- FCA [Informational Memorandums](#):
 - March 4, 2010 - FCA’s Stress Testing Expectations for All FCS Institutions
 - June 17, 2002 - Computer-Based Model Validation Expectations
- [Observations on Stress Testing Submissions - August 2010 e-mail](#) (sent to all CEOs)
- [Observations on Stress Testing Submissions - August 2010 Best Practices](#) (was an attachment in the above referenced email)

- [Stress Testing Frequently Asked Questions \(FAQs\)](#)
- [Stress Testing Study Memo for Banks - March 2010](#) (request letter for stress testing results sent to bank CEOs)
- [Stress Testing Study Memo for Associations - March 2010](#) (request letter for stress testing results sent to selected association CEOs)
- [Basel Stress Testing Paper](#) - “Principles for sound stress testing practices and supervision”

Examination Objective

Objectives for examining an institution’s stress testing practices are to:

- Determine if stress testing practices are appropriate for the complexity of the portfolio and risk-bearing ability of the institution.
- Determine if stress testing results are effectively used to identify and manage risk.

Examination Procedures and Guidance

1. *Direction and Involvement*

Exam Step: Determine the adequacy of stress testing policy and procedure direction and board and senior management involvement in the stress testing process.

Guidance: Direction on stress testing should start at the board level with expectations defined in board policy. Board policy direction should be supplemented with procedures established by management. Collectively, policies and procedures should address the frequency of stress testing, its role in the business planning process, and how the stress testing program is integrated into risk management activities. Policies and procedures should also specify a clear and central role for the board and senior management.

Board members should have the opportunity to provide high level front-end input into stress testing by identifying areas of the portfolio or economic factors that are of particular interest or potential concern, thereby warranting coverage in stress testing work. Also, the board should receive and review results via the reporting process. Senior management should be further involved by performing or overseeing stress testing work, formulating conclusions, and developing and implementing resulting responses/recommendations.

Evaluative questions, points to consider, and items to document include:

- Does the institution have board policy direction on stress testing that adequately communicates the board’s stress testing expectations (can be a separate policy or part of broader policy direction)?
- Has management established stress testing procedures to implement board policy direction?
- When viewed collectively, do policies and procedures address key items such as:
 - Frequency of stress testing
 - Role of stress testing in the business planning process
 - How stress testing is integrated into the institution’s risk management process

- The roles of senior management and the board in the stress testing process
- Is the level of board and senior management involvement in the stress testing process reasonable?

2. Model(s) Used

Exam Step: Evaluate the stress testing model(s) used by the institution and the underlying logic/technique employed by the model(s). Determine if the sophistication and capability of the model(s) are commensurate with the complexity of the institution's portfolio, and if model testing/validation has been completed.

Guidance: FCA is not dictating the stress testing model, the underlying model methodologies, or process to be employed. Each institution should have a stress testing process that provides the institution with information to make better risk management decisions in critical areas such as business planning, setting its risk appetite, modifying underwriting practices, and pricing loans to cover risk. The models and processes used to conduct stress testing could vary from sophisticated, data intensive, vendor-supplied models, to internally-developed spreadsheets. In some cases, the institution may rely on multiple models and analytical tools to conduct different facets of its stress testing work. The underlying methodologies used by the institution to make projections warrant examiner scrutiny and, at times, may justify expressing concerns if the models are judged too simplistic for the complexity of the institution's loan portfolio. However, institutions that use sophisticated models but do not effectively use the results in risk management processes are also a concern.

Stress testing models will differ in terms of the underlying methodologies that drive the models. For example, to project credit quality, some models may apply stressors to a customer portfolio with simulated borrower financial information. If this is constructed properly under an appropriate control framework, it can reasonably resemble the actual portfolio. Some models will consider and directly use actual customer financial information, and when stressors are applied the resulting effects to credit quality of individual customers and the portfolio as a whole are projected. Other models may not involve stressing simulated or actual customer financials. Instead, these models and processes rely more on identifying stressors and carefully making assumptions on how these stressors will affect the Probability of Default (PD) and Loss Given Default (LGD) ratings for certain customers, portfolio segments, and the portfolio as a whole.

FCA believes models utilizing actual borrower information are preferable, followed by models using simulated borrower financial information. Models relying on PD/LGD migrations are often less functional because they may lack the ability to analyze the impact of specific stressors on the borrower's financial condition. Borrower level financial statement stress testing can improve the depth and comprehensiveness of stress testing activities and result in less subjectivity being needed to project results. Nevertheless, PD/LGD migration models are recognized as a viable alternative to borrower level financial statement stress testing if supported by adequate documentation, analysis, and controls.

When PD/LGD migration models are used, the institution must have adequate documentation and supporting analysis in place to clearly and reliably illustrate the effect

of identified stressors on PD and LGD ratings. Institutions should support PD/LGD migrations in part with analysis that draws upon current borrower financial characteristics and historical portfolio performance during past periods of stress. In general, the documentation and supporting analysis expectations are higher when migration models are used for stress testing as these processes are inherently more subjective and require greater use of judgment. Institutions using PD/LGD migration stress testing should also be encouraged to consider borrower level financial statement stress testing, at least on the institution's largest loan exposures. Regardless of the type of model used, underlying documentation should lay out a set of economic and industry stressors that will drive the change in portfolio conditions and include adequate supporting analysis as to why resulting credit quality is a likely or potential outcome.

On certain segments of the portfolio, such as scorecard, housing, and smaller ag loans, it may not be feasible or cost effective to gather current financial information or construct simulated borrower financial statements. As a result, typical borrower-level stress testing work is not practical. An institution should have other processes in place to perform stress testing on these portfolio segments. The sophistication and comprehensiveness of stress testing in these portfolio segments should be commensurate with how significant these segments are to the institution.

Evaluative questions, points to consider, and items to document when evaluating an institution's model(s) include:

- Does the institution use a single model or series of models/applications to accomplish its stress testing work? Identify/describe the models and applications as appropriate and indicate which are internally-developed versus purchased from a vendor.
- If the institution is using multiple models/applications, does it integrate the output into an internally-consistent, consolidated set of stress testing results?
- Does the institution's stress testing model/process provide projections that show the effect of stress on borrower quality (i.e., PD ratings) and collateral-related considerations (i.e., LGD ratings)?
- Does the institution's model/process allow risk to be measured with adequate granularity (i.e., illustrate changes in PD and LGD ratings) versus simply showing migrations in UCS classifications?
- What is the underlying, fundamental logic/methodology employed by the institution's stress testing model(s)? As noted above, the most common models involve either stress testing with simulated customer financials, stress testing with actual customer financials, or stress testing using assumed PD/LGD migrations. Identify management's rationale for the type of model(s) used.
- If the institution is utilizing a model/methodology that is based primarily on PD/LGD migrations, are projected migrations sufficiently supported by underlying documentation and analysis? Does supporting analysis consider factors such as the underlying financial condition of borrowers and historical performance in past periods of stress? Does supporting documentation and analysis sufficiently explain and support why the projected PD/LGD migrations are an expected outcome to identified stressors?
- Does the model and stress testing process appropriately address portfolio segments where typical borrower-level stress testing is not feasible (i.e., housing loans, scorecard loans, small ag loans, etc.)?

- With the model(s) used, can the institution apply multiple shocks simultaneously and reflect the corresponding effects on PDs, LGDs, and the institution's financial condition and performance?
- Can the model(s) used be tailored to the institution's portfolio and major risk factors, and are the functionality and adaptability of the models high enough to allow stress testing practices to be responsive to changes in portfolio conditions and potential risk?
- Has the institution performed validation work on its stress testing model(s) consistent with guidance in FCA's Informational Memorandum "Computer-Based Model Validation Expectations" dated June 17, 2002? (In the event the institution has just developed/started using its stress testing model, determine if the institution has plans in place to validate its model when appropriate.)

If an institution is using a credible vendor supplied model for stress testing, FCA's assessment of an institution's model validation efforts should focus on:

- Determining if reasonable efforts have occurred to audit the accuracy of information entered into the model (i.e., is model input accurate and does model input agree with data in the general ledger, other data systems and supporting assumptions).

If an institution is using an internally-developed model, FCA's assessment of an institution's validation efforts should also address items such as:

- Determining if adequate change controls are in place to ensure significant revisions to the model are tracked/monitored by users/developers and approved by an independent party.
- Evaluating if assessments have been performed, independent of model construction and maintenance, to determine if results from the model are logical and consistent with assumptions.

(Examiners should also be cognizant that over time, all institutions should utilize opportunities to "back test" stress testing models. For example, if/when some of an institution's stress testing assumptions materialize; actual results should be compared against model output to evaluate the accuracy of the model and to identify ways to improve the model's reliability in forecasting results. Examiners, however, must recognize model validation work of this nature is long-term in nature, likely requiring many years to complete.)

3. Data Quality

Exam Step: Determine if the institution's data is of sufficient depth and integrity to promote a reliable stress testing program.

Guidance: Stress testing results are only as good as the underlying data used to conduct the analysis. Evaluative questions, points to consider, and items to document when evaluating an institution's stress testing-related data include:

- If the institution is using simulated customers/simulated customer data, have appropriate steps been taken to ensure (and test) that the simulated portfolio

resembles the actual portfolio?

- If the institution is using actual customer data, does enough of the portfolio have current and complete data to allow for meaningful stress testing? Also, are there any material problems or limitations associated with borrower financial information in the institution's database? Question management and review database information to determine what portion of the portfolio by volume has reasonably current (i.e., 3 years old or less) balance sheet and income information. Also, evaluate if financial information used for stress testing is consistent in terms of presentation (e.g., market value versus GAAP/cost basis balance sheet information, post closing or pre-closing financial statements, borrower-supplied versus institution-adjusted financial positions, accrual or cash income information, average earnings or the last year's only, etc.). Determine through management discussions and past internal credit review activities if overall data integrity is reasonable (i.e., when financial information is in the database is it sufficiently accurate). Also, does the portfolio of customers with current and complete data used for stress testing resemble the actual portfolio in terms of industry concentrations? Are data concerns adequately considered when interpreting stress testing results?
- Has the institution appropriately recognized data concerns in its decision on whether to use simulated or actual customer data? If an institution uses actual customer data but lacks current, complete, and consistent data on a significant portion of its portfolio, or other limitations exist with customer financial information in the institution's database, the institution may be better suited to use simulated data.
- Are there any concerns with the accuracy of the institution's assigned PD and LGD ratings, which in turn could affect the accuracy and usefulness of stress testing?
- In addition to simulated or actual customer data and assigned PD and LGD ratings, are there any other major input items that exist for the stress testing model (such as collateral values)? Assess the integrity of this other data/input that feeds the stress testing model.

4. Content, Assumptions, and Frequency

Exam Step: Determine whether stress testing assumptions are logical, well thought out, cover the institution's key risks, and are appropriately documented. Also, ensure that stress testing is being conducted with sufficient frequency and includes a severe yet plausible scenario.

Guidance: Institutions are expected to evaluate meaningful stress scenarios that address assumptions related to a range of factors based on the composition of the institution's portfolio. Also, the frequency of stress testing should be commensurate with risk levels and conditions but not less than annually. Evaluative questions, points to consider, and items to document include:

- Does stress testing address major industry concentrations?
- Is the degree of shock tailored as warranted to the specific industry, type of loan (commercial versus mortgage), and expected economic conditions?
- Are the stressors applied in a logical and consistent fashion? For example, if declining grain prices are assumed does the stress testing analysis also assume lower feed costs for livestock producers?
- Are stress testing scenarios well developed and well thought out? Does underlying documentation for each stress scenario adequately describe the underlying

economic and financial environment? Do stress testing assumptions and analysis address key risk factors affecting the institution and are assumptions relating to these risk factors logical and adequately documented? Key risk factors will vary by institution but may include:

- Commodity prices
 - Demand for farm products
 - Input costs
 - Production expectations
 - Farmland and other collateral values, particularly specialty collateral values
 - Interest rates and spreads (including effects of changing interest rates on capitalization rates and real estate values)
 - Funding costs
 - Patronage paid to shareholders and patronage received from the funding bank
 - Off-farm income
 - State of the general economy/overall macroeconomic factors (e.g., unemployment and inflation rates, contracting or expanding economy, etc.)
 - Counterparty concentrations
 - Unfunded commitment exposure and subsequent utilization
 - Government policies and programs relating to agriculture
 - Volume and growth trends (stress testing should not assume volume will remain static)
- Does the institution's stress testing work include at least one severe yet plausible scenario? In making this determination consider:
 - Whether multiple industries, including the institution's largest concentrations, were stressed.
 - If stress was applied for a prolonged period of time.
 - Whether collateral values and borrower financial positions were assumed to have deteriorated significantly.
 - How the stress scenario compares in magnitude to past time periods of actual stress.
 - If there was a sufficient degree of thoughtfulness and creativity employed in devising the scenario, or did the scenario simply reflect conditions that occurred in the past.

Note: It is important to recognize that a severe yet plausible scenario should not be viewed as an event that is likely to occur anytime in the near future. Institutions should perform "most likely" or "baseline" stress testing scenarios to analyze the effects of expected economic conditions moving forward. A severe yet plausible scenario should be analyzed to gain insight into an institution's risk-bearing ability in a situation of extreme and rapidly escalating stress, even if chances of the scenario occurring are remote.

Institutions should not let the time frames utilized by their stress testing models deter efforts to model severe yet plausible scenarios. Many stress testing models are designed to model conditions and performance over the next 3 years. The institution may adamantly believe the severe yet plausible scenario will not occur in the next 3 years. As a result, there may be reluctance to model this scenario. However, the scenario can and should still be modeled, whether tied to the next 3 years or some

other time frame. The primary objective for analyzing a severe yet plausible stress is to gain insight into an institution's risk-bearing ability in a situation of extreme and rapidly escalating stress. The time frames as to when the stress may occur or the probability of the stress occurring should not be the primary focus of that analysis.

- At least annually, does the institution complete a comprehensive stress testing analysis that shows the effect of stress scenarios over a **3-year** horizon on:
 - Credit quality, including risk ratings (PDs and LGDs), nonperforming, and nonaccrual loans
 - Provision for loan losses and allowance for loan losses
 - Capital and capital ratios
 - Earnings and earnings ratios
 - Liquidity measures (including effects on GFAs and bank CIPA scores)
- In addition to annual comprehensive stress testing, are ad hoc/targeted stress tests performed as warranted to address specific risk areas that may be of concern, such as large loan concentrations, specialized/distressed industries, loans originated under non-traditional credit delivery systems, etc.?
- Is the overall frequency of stress testing activities adjusted as warranted based on portfolio and economic conditions, and is the frequency of stress testing reasonable in relation to the size and complexity of the portfolio and underlying portfolio conditions?
- Is the overall depth and breadth of the institution's stress testing work commensurate with the size and complexity of the institution's portfolio and underlying portfolio conditions?

For banks, refer to Question 6 in [Stress Testing Frequently Asked Questions \(FAQs\)](#) and the [Observations on Stress Testing Submissions - August 2010 Best Practices](#) documents for additional guidance on content, assumptions, and frequency.

5. Integration With Financial Systems

Exam Step: Determine if the institution's stress testing process is adequately linked to and integrated with its financial systems to project the results of portfolio stress onto the institution's financial condition and performance.

Guidance: A critical element in all stress testing programs is linkage to and integration with the institution's financial systems. In order for stress testing to facilitate better risk management decisions, an institution's annual comprehensive stress testing must go beyond credit quality projections and show the effect of stress scenarios on financial condition and performance.

When the stress testing is ad hoc or targeted in nature, such as looking at a specific distressed industry or stressing borrowing bases, it is reasonable that these stress testing results may not flow through to an institution's financial statements. However, an institution's annual comprehensive stress testing activity should feature integration with financial systems.

Evaluative questions, points to consider, and items to document include:

- Does the institution’s stress testing process include the capability to take results from stress testing portfolio quality and project the effects on key financial metrics, such as:
 - Allowance for loan loss provisions and the allowance for loan losses
 - Capital and capital ratios
 - Earnings and earnings ratios
 - Liquidity and liquidity measures (including effects on funding costs)
- Is the institution’s stress testing model/process integrated with its economic capital model? As applicable, describe how the stress testing model/process and economic capital model are integrated and interrelated.
- Assess the overall reasonableness of the process and systems used to project the effects of portfolio stress onto the institution’s financial condition and performance. Points to consider include whether the process to project financial results is performed by some type of vendor or internally-developed model, or whether the process is more manual and judgment-based, relying heavily on numerous management assumptions.

6. Reporting Results

Exam Step: Review the report for the most recent comprehensive stress test conducted by the institution and conclude on the adequacy of the institution’s stress testing reporting practices.

Guidance: Stress testing programs are not complete without an effective reporting process. Given the inherent complexity of the stress testing process, reports should include narrative comments that “bring it all together” for senior management and the board. Reports should tell what was done, why it was done, what were the key assumptions and results, what it means for the institution, and include recommendations on how the institution should react. The frequency and level of detail in stress testing reports may differ for the board and management. However, at a minimum, a report on the annual comprehensive stress testing activity should be provided to and discussed with the board.

Evaluative questions, points to consider, and items to document when evaluating an institution’s stress testing reporting include:

- Was a narrative-based report on the comprehensive stress testing activity prepared for, reviewed by, and discussed with the board?
- Did the report address/include key items such as:
 - The scope of work performed
 - Why certain stressors were selected and applied
 - Key assumptions
 - The effects on the institution’s credit quality and its financial condition and performance
 - Whether the institution is unduly vulnerable to certain risk exposures
 - Recommended actions the institution should take
 - What contingency plans will be utilized if the stress scenario unfolds

- If not done as part of answering the preceding bullet points, summarize the institution's most recent comprehensive stress testing activity. What were the key assumptions/stressors that were applied, the resulting effect on credit quality and the institution's financial condition and performance, and recommendations formulated as a result of the stress testing activity? Review supporting information, schedules, tables, etc., used to prepare the report, as necessary, to fully evaluate and understand the stress testing results.

7. Using Results

Exam Step: Evaluate and conclude on the institution's efforts to incorporate stress testing results into business planning and risk management processes.

Guidance: After the stress tests are performed and the results are reported, the final step is to utilize the information. Examiners should assess how stress testing information and results were used by the institution in its planning efforts and risk management activities. Possible uses include adjusting/setting portfolio parameters, modifying underwriting practices and standards, revising capital goals, and changing loan pricing practices. At times, stress testing work may serve to validate that existing risk management practices are appropriate and should be continued. Furthermore, the results of the annual comprehensive stress testing activity and highlights from the comprehensive annual stress testing report should be incorporated into the institution's business plan (starting with 2011 business plans).

Evaluative questions, points to consider, and items to document when evaluating how the institution utilizes its stress testing results include:

- How has the institution integrated results from stress testing work into the business plan and planning process? Possible methods could involve including:
 - A business plan section on stress testing and identifying corresponding business plan strategies/contingency plans formulated as a result of stress testing work.
 - "Most likely" scenarios in the business plan that were formulated via stress testing work.
 - The severe yet plausible scenario in the business plan as a "worst case" forecast, along with contingency plans that will be implemented if the stress scenario unfolds.
- Does the most recent business plan differ from the prior business plan in terms of how stress testing is addressed/reflected?
- Do recommendations from the institution's stress testing reports represent specific, actionable items that will influence execution of the institution's risk management activities? Through discussions, gather feedback from management on how stress testing results are utilized in risk management activities.
- Is there evidence that stress testing results have been used to set, validate, or change items such as:
 - Portfolio parameters
 - Underwriting standards and practices
 - Use of FSA, USDA, Farmer Mac, and other guarantees

- Capital levels and capital goals
- Loan pricing practices
- Business plan goals and strategies
- Human resource needs