FEDERAL RESERVE BANK *of* KANSAS CITY

May 31, 2012

SR Letter 12-7 Supervisory Guidance on Large Bank Stress Testing

Attention: **Chief Executive Officer of Each Tenth District State Member Bank, Bank Holding Company and Savings and Loan Holding Company with More Than $10 Billion In Total Consolidated Assets**

Subject: Final Supervisory Guidance on Stress Testing for Banking Organizations with More Than $10 Billion in Total Consolidated Assets

In Brief: The Board of Governors of the Federal Reserve System, FDIC and OCC (collectively, the "agencies") are issuing this guidance, which outlines high-level principles for stress testing practices that are applicable to all Federal Reserve-supervised, FDIC-supervised, and OCC-supervised banking organizations with more than $10 billion in total consolidated assets.

Highlights: The guidance highlights the importance of stress testing at banking organizations as an ongoing risk management practice that supports a banking organization's forward-looking assessment of its risks and better equips it to address a range of adverse outcomes. The recent financial crisis underscored the need for banking organizations to incorporate stress testing into their risk management practices, demonstrating that banking organizations unprepared for particularly adverse events and circumstances can suffer acute threats to their financial condition and viability.

This guidance builds upon previously issued supervisory guidance that discusses the uses and merits of stress testing in specific areas of risk management. The guidance outlines general principles for a satisfactory stress testing framework, and describes various stress testing approaches and how stress testing should be used at various levels within an organization. The guidance also discusses the importance of stress testing in capital and liquidity planning, and the importance of strong internal governance and controls as part of an effective stress-testing framework.

The guidance does not implement the stress testing requirements in the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) or in the Federal Reserve Board's capital plan rule that apply to certain companies. Those requirements have been, or are being, implemented through separate proposals by the respective agencies. However, the agencies expect that banking organizations with total consolidated assets of more than $10 billion would follow the principles set forth in the guidance, as well as other relevant supervisory guidance, when conducting stress testing in accordance with the Dodd-Frank Act, the capital plan rule, and other statutory or regulatory requirements.

Effective Date: This guidance will become effective on July 23, 2012.

Attachment: SR Letter 12-7: Supervisory Guidance on Stress Testing for Banking Organizations with More Than $10 Billion in Total Consolidated Assets

Further Information: Questions regarding the guidance may be directed to Nancy Fitzgerald at (816) 881-6847 or (800) 333-1010, extension 16847.

Internet: A copy of the SR Letter is available on the Federal Reserve Board of Governors' Web site at: http://www.federalreserve.gov/bankinforeg/srletters/sr1207.htm

BOARD OF GOVERNORS

OF THE

FEDERAL RESERVE SYSTEM

WASHINGTON, D.C. 20551

DIVISION OF BANKING
SUPERVISION AND REGULATION

SR 12-7

May 14, 2012

TO THE OFFICER IN CHARGE OF SUPERVISION AND APPROPRIATE SUPERVISORY AND EXAMINATION STAFF AT EACH FEDERAL RESERVE BANK AND TO BANKING ORGANIZATIONS SUPERVISED BY THE FEDERAL RESERVE

SUBJECT: Supervisory Guidance on Stress Testing for Banking Organizations with More Than $10 Billion in Total Consolidated Assets

Applicability to Community Banking Organizations: This guidance does not apply to community banking organizations, defined as institutions supervised by the Federal Reserve with total consolidated assets of $10 billion or less.

The Federal Reserve, together with the Office of the Comptroller of the Currency (OCC) and the Federal Deposit Insurance Corporation (FDIC) (collectively, the "agencies"), has issued the attached *Guidance on Stress Testing for Banking Organizations with Total Consolidated Assets of More Than $10 Billion.* The guidance is intended to emphasize the importance of stress testing as an ongoing risk management practice that supports banking organizations' forward-looking assessment of risks and better equips them to address a range of adverse outcomes.

This joint guidance is applicable to all institutions supervised by the agencies with more than $10 billion in total consolidated assets. Specifically, with respect to the Federal Reserve, these banking organizations include state member banks, bank holding companies, savings and loan holding companies, and all other institutions with more than $10 billion in total consolidated assets for which the Federal Reserve is the primary federal supervisor.[1]

Summary of the Guidance

For purposes of the guidance, "stress testing" refers to exercises used to conduct a forward-looking assessment of the potential impact of various adverse events and circumstances on a banking organization. An effective stress testing framework provides a comprehensive,

[1] Given the unique structure of U.S. branches and agencies of foreign banking organizations, the agencies recognize that certain aspects of this guidance may not apply to those U.S. branches and agencies (such as the portions related to capital stress testing) or may apply differently (such as the portions related to governance and controls). Supervisors can work with these entities on a case-by-case basis to identify the portions of the guidance that are most relevant for them.

integrated, and forward-looking set of activities for a banking organization to employ in order to assist in the identification and measurement of its material risks and vulnerabilities. Material risks and vulnerabilities may manifest themselves during stressful economic or financial environments, or arise from firm-specific adverse events. A banking organization should develop and implement its stress testing framework in a manner commensurate with its size, complexity, business activities, and overall risk profile.

As described in the guidance, a banking organization should apply the following five principles when designing and implementing a stress testing framework:

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

The guidance also describes several approaches and applications that banking organizations should consider using, such as scenario analysis, sensitivity analysis, enterprise-wide stress testing, and reverse stress testing. Organizations should also recognize that stress testing approaches will evolve over time and they should update their practices as needed.

Given the importance of capital and liquidity to a banking organization's viability, the guidance also emphasizes the use of stress testing in these two areas in particular, including an evaluation of the interaction between capital and liquidity, and the potential for both to become impaired at the same time. Stress testing for capital and liquidity adequacy should be conducted in coordination with a banking organization's overall strategy and annual planning cycles. Results should be refreshed in the event of major strategic decisions, or other decisions that can materially impact capital or liquidity.

Federal Reserve Banks are asked to distribute this letter to banking organizations supervised by the Federal Reserve, as well as to their own supervisory and examination staff. Questions regarding this letter should be directed to: Constance M. Horsley, Manager, Capital and Regulatory Policy (202) 452-5239; David Palmer, Senior Supervisory Analyst, Risk Section, (202) 452-2904; or Sean Healey, Financial Analyst, Capital and Regulatory Policy, (202) 912-4611, Division of Banking Supervision and Regulation. In addition, questions may be sent via the Board's public website.[2]

Michael S. Gibson
Director

[2] See http://www.federalreserve.gov/apps/contactus/feedback.aspx.

Attachment:

- *Guidance on Stress Testing for Banking Organizations with Total Consolidated Assets of More Than $10 Billion*

Cross-references to:

- SR letter 11-11, "Supervision of Savings and Loan Holding Companies (SLHCs)"
- SR letter 11-7, "Guidance on Model Risk Management"
- SR letter 10-6, "Interagency Policy Statement on Funding and Liquidity Risk Management"
- SR letter 10-1, "Interagency Advisory on Interest Rate Risk"
- SR letter 09-4, "Applying Supervisory Guidance and Regulations on the Payment of Dividends, Stock Redemptions, and Stock Repurchases at Bank Holding Companies"
- SR letter 07-1, "Interagency Guidance on Concentrations in Commercial Real Estate"
- SR letter 01-4, "Subprime Lending"
- SR letter 99-18, "Assessing Capital Adequacy in Relation to Risk at Large Banking Organizations and Others with Complex Risk Profiles"

Board of Governors of the Federal Reserve System
Federal Deposit Insurance Corporation
Office of the Comptroller of the Currency

Guidance on Stress Testing for Banking Organizations with Total Consolidated Assets of More Than $10 Billion

May 14, 2012

I. Introduction

All banking organizations should have the capacity to understand fully their risks and the potential impact of stressful events and circumstances on their financial condition. The U.S. federal banking agencies have previously highlighted the use of stress testing as a means to better understand the range of a banking organization's potential risk exposures.[1] The 2007-2009 financial crisis underscored the need for banking organizations to incorporate stress testing into their risk management practices, demonstrating that banking organizations unprepared for stressful events and circumstances can suffer acute threats to their financial condition and

[1] *See, e.g.*, Supervision and Regulation Letter SR 10-6, OCC Bulletin 2010-13 or FDIC Financial Institution Letter (FIL) 13-2010, *Interagency Policy Statement on Funding and Liquidity Risk Management* (March 17, 2010), available at http://www.federalreserve.gov/boarddocs/srletters/2010/sr1006.htm (hereinafter *Funding and Liquidity Risk Management Policy Statement*); Supervision and Regulation Letter SR 10-1, OCC Bulletin 2010-1 or FDIC FIL-2-2010, *Interagency Advisory on Interest Rate Risk* (January 11, 2010), available at http://www.federalreserve.gov/boarddocs/srletters/2010/sr1001.htm (hereinafter *Interest Rate Risk Advisory*); Supervision and Regulation Letter SR 09-4, *Applying Supervisory Guidance and Regulations on the Payment of Dividends, Stock Redemptions, and Stock Repurchases at Bank Holding Companies* (revised March 27, 2009), available at http://www.federalreserve.gov/boarddocs/srletters/2009/SR0904.htm (hereinafter SR 09-04); Supervision and Regulation Letter SR 07-1, OCC Bulletin 2006-46 or FDIC FIL-104-2006, *Interagency Guidance on Concentrations in Commercial Real Estate* (January 4, 2007), available at http://www.federalreserve.gov/boarddocs/srletters/2007/SR0701.htm; Supervision and Regulation Letter SR 01-4, OCC Bulletin 2001-6 or FDIC FIL-9-2001, *Subprime Lending* (January 31, 2001), available at http://www.federalreserve.gov/boarddocs/srletters/2001/SR0104.htm; Supervision and Regulation Letter SR 99-18, *Assessing Capital Adequacy in Relation to Risk at Large Banking Organizations and Others with Complex Risk Profiles* (July 1, 1999), available at http://www.federalreserve.gov/boarddocs/srletters/1999/SR9918.htm (hereinafter SR 99-18); *Supervisory Guidance: Supervisory Review Process of Capital Adequacy (Pillar 2) Related to the Implementation of the Basel II Advanced Capital Framework, 73 FR 44620 (July 31, 2008) (hereinafter Supervisory Review Process of Capital Adequacy); The Supervisory Capital Assessment Program: Overview of Results* (May 7, 2009), available at http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20090507a1.pdf; *Comprehensive Capital Analysis and Review: Objectives and Overview* (March 18, 2011), available at http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20110318a1.pdf; and 12 CFR 225.8.

viability.[2] The Federal Reserve, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation (collectively, the "agencies") are issuing this guidance to emphasize the importance of stress testing as an ongoing risk management practice that supports banking organizations' forward-looking assessment of risks and better equips them to address a range of adverse outcomes.

This joint guidance is applicable to all institutions supervised by the agencies with more than $10 billion in total consolidated assets. Specifically, with respect to the OCC, these banking organizations include national banking associations, federal savings associations, and federal branches and agencies; with respect to the Board, these banking organizations include state member banks, bank holding companies, savings and loan holding companies, and all other institutions for which the Federal Reserve is the primary federal supervisor; with respect to the FDIC, these banking organizations include state nonmember banks, state savings associations and insured branches of foreign banks.[3]

The guidance does not apply to any supervised institution below the designated asset threshold. Certain other existing supervisory guidance that applies to all supervised institutions discusses the use of stress testing as a tool in certain aspects of risk management, such as for commercial real estate concentrations, liquidity risk management, and interest-rate risk management. However, no institution at or below $10 billion in total consolidated assets is subject to this final guidance.

Building upon previously issued supervisory guidance that discusses the uses and merits of stress testing in specific areas of risk management, this guidance provides broad principles a banking organization should follow in conducting its stress testing activities, such as ensuring that those activities fit into the organization's overall risk management program. The guidance outlines broad principles for a satisfactory stress testing framework and describes the manner in which stress testing should be employed as an integral component of risk management that is applicable at various levels of aggregation within a banking organization, as well as for contributing to capital and liquidity planning.[4] While the guidance is not intended to provide detailed instructions for conducting stress testing for any particular risk or business area, the document describes several types of stress testing activities and how they may be most appropriately used by banking organizations.

---

[2] The Dodd-Frank Wall Street Reform and Consumer Protection Act (Pub. L. 111-203, 124 Stat. 1376) requires financial organizations with more than $10 billion in total consolidated assets to conduct a stress test at least annually. *See generally* 12 U.S.C. 5365(i)(2).

[3] Given the unique structure of U.S. branches and agencies of foreign banking organizations, the agencies recognize that certain aspects of this guidance may not apply to those U.S. branches and agencies (such as the portions related to capital stress testing) or may apply differently (such as the portions related to governance and controls). Supervisors can work with these entities on a case-by-case basis to identify the portions of the guidance that are most relevant for them.

[4] While capital and liquidity stress tests may be among the most prominent, other types of stress testing exercises that use different metrics should be conducted.

II. Overview of Stress Testing Framework

For purposes of this guidance, stress testing refers to exercises used to conduct a forward-looking assessment of the potential impact of various adverse events and circumstances on a banking organization. Stress testing occurs at various levels of aggregation, including on an enterprise-wide basis. As outlined in section IV, there are several approaches and applications for stress testing and a banking organization should consider the use of each in its stress testing framework.

An effective stress testing framework provides a comprehensive, integrated, and forward-looking set of activities for a banking organization to employ along with other practices in order to assist in the identification and measurement of its material risks and vulnerabilities, including those that may manifest themselves during stressful economic or financial environments, or arise from firm-specific adverse events. Such a framework should supplement other quantitative risk management practices, such as those that rely primarily on statistical estimates of risk or loss estimates based on historical data, as well as qualitative practices. In this manner, stress testing can assist in highlighting unidentified or under-assessed risk concentrations and interrelationships and their potential impact on the banking organization during times of stress.[5]

A banking organization should develop and implement its stress testing framework in a manner commensurate with its size, complexity, business activities, and overall risk profile. Its stress testing framework should include clearly defined objectives, well-designed scenarios tailored to the banking organization's business and risks, well-documented assumptions, sound methodologies to assess potential impact on the banking organization's financial condition, informative management reports, ongoing and effective review of stress testing processes, and recommended actions based on stress test results. Stress testing should incorporate the use of high-quality data and appropriate assumptions about the performance of the institution under stress to ensure that the outputs are credible and can be used to support decision-making. Importantly, a banking organization should have a sound governance and control infrastructure with objective, critical review to ensure the stress testing framework is functioning as intended.

A stress testing framework should allow a banking organization to conduct consistent, repeatable exercises that focus on its material exposures, activities, risks, and strategies, and also conduct ad hoc scenarios as needed. The framework should consider the impact of both firm-specific and systemic stress events and circumstances that are based on historical experience as well as on hypothetical occurrences that could have an adverse impact on a banking organization's operations and financial condition. Banking organizations subject to this guidance should develop policies on reviewing and assessing the effectiveness of their stress testing frameworks, and use those policies at least annually to assess the effectiveness of their frameworks. Such assessments should help to ensure that stress testing coverage is comprehensive, tests are relevant and current, methodologies are sound, and results are properly considered.

---

[5] For purposes of this guidance, the term "concentrations" refers to groups of exposures and/or activities that have the potential to produce losses large enough to bring about a material change in a banking organization's risk profile or financial condition.

III. General Stress Testing Principles

A banking organization should develop and implement an effective stress testing framework as part of its broader risk management and governance processes. The framework should include several activities and exercises, and not just rely on any single test or type of test, since every stress test has limitations and relies on certain assumptions.

The uses of a banking organization's stress testing framework should include, but are not limited to, augmenting risk identification and measurement; estimating business line revenues and losses and informing business line strategies; identifying vulnerabilities, assessing the potential impact from those vulnerabilities, and identifying appropriate actions; assessing capital adequacy and enhancing capital planning; assessing liquidity adequacy and informing contingency funding plans; contributing to strategic planning; enabling senior management to better integrate strategy, risk management, and capital and liquidity planning decisions; and assisting with recovery and resolution planning. This section describes general principles that a banking organization should apply in implementing such a framework.

Principle 1: A banking organization's stress testing framework should include activities and exercises that are tailored to and sufficiently capture the banking organization's exposures, activities, and risks.

An effective stress testing framework covers a banking organization's full set of material exposures, activities, and risks, whether on or off the balance sheet, based on effective enterprise-wide risk identification and assessment. Risks addressed in a firm's stress testing framework may include (but are not limited to) credit, market, operational, interest-rate, liquidity, country, and strategic risk. The framework should also address non-contractual sources of risks, such as those related to a banking organization's reputation. Appropriate coverage is important as stress testing results could give a false sense of comfort if certain portfolios, exposures, liabilities, or business line activities are not included. Stress testing exercises should be part of a banking organization's regular risk identification and measurement activities. For example, in assessing credit risk a banking organization should evaluate the potential impact of adverse outcomes, such as an economic downturn or declining asset values, on the condition of its borrowers and counterparties, and on the value of any supporting collateral. As another example, in assessing interest-rate risk, banking organizations should analyze the effects of significant interest rate shocks or other yield-curve movements.

An effective stress testing framework should be applied at various levels in the banking organization, such as business line, portfolio, and risk type, as well as on an enterprise-wide basis. In many cases, stress testing may be more effective at business line and portfolio levels, as a higher level of aggregation may cloud or underestimate the potential impact of adverse outcomes on a banking organization's financial condition. In some cases, stress testing can also be applied to individual exposures or instruments. Each stress test should be tailored to the relevant level of aggregation, capturing critical risk drivers, internal and external influences, and other key considerations at the relevant level.

Stress testing should capture the interplay among different exposures, activities, and risks and their combined effects. While stress testing several types of risks or business lines simultaneously may prove operationally challenging, a banking organization should aim to identify common risk drivers across risk types and business lines that can adversely affect its financial condition. Accordingly, stress tests should provide a banking organization with the ability to identify potential concentrations – including those that may not be readily observable during benign periods and whose sensitivity to a common set of factors is apparent only during times of stress – and to assess the impact of identified concentrations of exposures, activities, and risks within and across portfolios and business lines and on the organization as a whole.

Stress testing should be tailored to the banking organization's idiosyncrasies and specific business mix and include all major business lines and significant individual counterparties. For example, a banking organization that is geographically concentrated may determine that a certain segment of its business may be more adversely affected by shocks to economic activity at the state or local level than by a severe national recession. On the other hand, if the banking organization has significant global operations, it should consider scenarios that have an international component and stress conditions that could affect the different aspects of its operations in different ways, as well as conditions that could adversely affect all of its operations at the same time.

A banking organization should use its stress testing framework to determine whether exposures, activities, and risks under normal and stressed conditions are aligned with the banking organization's risk appetite.[6] A banking organization can use stress testing to help inform decisions about its strategic direction and/or risk appetite by better understanding the risks from its exposures or of engaging in certain business practices. For example, if a banking organization pursues a business strategy for a new or modified product, and the banking organization does not have long-standing experience with that product or lacks extensive data, the banking organization can use stress testing to identify the product's potential downsides and unanticipated risks. Scenarios used in a banking organization's stress tests should be relevant to the direction and strategy set by its board of directors, as well as sufficiently severe to be credible to internal and external stakeholders.

Principle 2: An effective stress testing framework employs multiple conceptually sound stress testing activities and approaches.

All measures of risk, including stress tests, have an element of uncertainty due to assumptions, limitations, and other factors associated with using past performance measures and forward-looking estimates. Banking organizations should, therefore, use multiple stress testing activities and approaches (consistent with section IV), and ensure that each is conceptually

---

[6] For purposes of this guidance, risk appetite is defined as the level and type of risk an organization is able and willing to assume in its exposures and business activities, given its business objectives and obligations to stakeholders. *See* Senior Supervisors Group, *Observations on Developments in Risk Appetite Frameworks and IT Infrastructure* (December 23, 2010), available at http://www.newyorkfed.org/newsevents/news/banking/2010/an101223.pdf.

sound. Stress tests usually vary in design and complexity, including the number of factors employed and the degree of stress applied. A banking organization should ensure that the complexity of any given test does not undermine its integrity, usefulness, or clarity. In some cases, relatively simple tests can be very useful and informative.

Additionally, effective stress testing relies on high-quality input data and information to produce credible outcomes. A banking organization should ensure that it has readily available data and other information for the types of stress tests it uses, including key variables that drive performance. In addition, a banking organization should have appropriate management information systems (MIS) and data processes that enable it to collect, sort, aggregate, and update data and other information efficiently and reliably within business lines and across the banking organization for use in stress testing. If certain data and information are not current or not available, or if proxies are used, a banking organization should analyze the stress test outputs with an understanding of those data limitations.

A banking organization should also document the assumptions used in its stress tests and note the degree of uncertainty that may be incorporated into the tools used for stress testing. In some cases, it may be appropriate to present and analyze test results not just in terms of point estimates, but also including the potential margin of error or statistical uncertainty around the estimates. Furthermore, almost all stress tests, including well-developed quantitative tests supported by high-quality data, employ a certain amount of expert or business judgment, and the role and impact of such judgment should be clearly documented. In some cases, when credible data are lacking and more quantitative tests are operationally challenging or in the early stages of development, a banking organization may choose to employ more qualitatively based tests, provided that the tests are properly documented and their assumptions are transparent. Regardless of the type of stress tests used, a banking organization should understand and clearly document all assumptions, uncertainties, and limitations, and provide that information to users of the stress testing results.

Principle 3: An effective stress testing framework is forward-looking and flexible.

A stress testing framework should be sufficiently dynamic and flexible to incorporate changes in a banking organization's on- and off-balance-sheet activities, portfolio composition, asset quality, operating environment, business strategy, and other risks that may arise over time from firm-specific events, macroeconomic and financial market developments, or some combination of these events. A banking organization should also ensure that its MIS are capable of incorporating relatively rapid changes in exposures, activities, and risks.

While stress testing should utilize available historical information, a banking organization should look beyond assumptions based only on historical data and challenge conventional assumptions. A banking organization should ensure that it is not constrained by past experience and that it considers multiple scenarios, even scenarios that have not occurred in the recent past or during the banking organization's history. For example, a banking organization should not assume that if it has suffered no or minimal losses in a certain business line or product that such a pattern will continue. Structural changes in customer, product, and financial markets can present unprecedented situations for a banking organization. A banking organization with any

type of significant concentration can be particularly vulnerable to rapid changes in economic and financial conditions and should try to identify and better understand the impact of those vulnerabilities in advance. For example, the risks related to residential mortgages were underestimated for a number of years leading up to the 2007-2009 financial crisis by a large number of banking organizations, and those risks eventually affected the banking organizations in a variety of ways. Effective stress testing can help a banking organization identify any such concentrations and help understand the potential impact of several key aspects of the business being exposed to common drivers.

Stress testing should be conducted over various relevant time horizons to adequately capture both conditions that may materialize in the near term and adverse situations that take longer to develop. For example, when a banking organization stress tests a portfolio for market and credit risks simultaneously, it should consider that certain credit risk losses may take longer to materialize than market risk losses, and also that the severity and speed of mark-to-market losses may create significant vulnerabilities for the firm, even if a more fundamental analysis of how realized losses may play out over time seems to show less threatening results. A banking organization should carefully consider the incremental and cumulative effects of stress conditions, particularly with respect to potential interactions among exposures, activities, and risks and possible second-order or "knock-on" effects.

In addition to conducting formal, routine stress tests, a banking organization should have the flexibility to conduct new or ad hoc stress tests in a timely manner to address rapidly emerging risks. These less routine tests usually can be conducted in a short amount of time and may be simpler and less extensive than a banking organization's more formal, regular tests. However, for its ad hoc tests a banking organization should still have the capacity to bring together approximated information on risks, exposures, and activities and assess their impact.

More broadly, a banking organization should continue updating and maintaining its stress testing framework in light of new risks, better understanding of the banking organization's exposures and activities, new stress testing techniques, and any changes in its operating structure and environment. A banking organization's stress testing development should be iterative, with ongoing adjustments and refinements to better calibrate the tests to provide current and relevant information. Banking organizations should document the ongoing development of their stress testing practices.

Principle 4: Stress test results should be clear, actionable, well supported, and inform decision-making.

Stress testing should incorporate measures that adequately and effectively convey results of the impact of adverse outcomes. Such measures may include, for example, changes to asset values, accounting and economic profit and loss, revenue streams, liquidity levels, cash flows, regulatory capital, risk-weighted assets, the loan loss allowance, internal capital estimates, levels of problem assets, breaches in covenants or key trigger levels, or other relevant measures. Stress test measures should be tailored to the type of test and the particular level at which the test is applied (for example, at the business line or risk level). Some stress tests may require using a range of measures to evaluate the full impact of certain events, such as a severe systemic event. In addition, all stress test results should be accompanied by descriptive and qualitative

information (such as key assumptions and limitations) to allow users to interpret the exercises in context. The analysis and the process should be well documented so that stress testing processes can be replicated if need be.

A banking organization should regularly communicate stress test results to appropriate levels within the banking organization to foster dialogue around stress testing, keep the board of directors, management, and staff apprised, and to inform stress testing approaches, results, and decisions in other areas of the banking organization. A banking organization should maintain an internal summary of test results to document at a high level the range of its stress testing activities and outcomes, as well as proposed follow-up actions. Regular review of stress test results can be an important part of a banking organization's ability over time to track the impact of ongoing business activities, changes in exposures, varying economic conditions, and market movements on its financial condition. In addition, management should review stress testing activities on a regular basis to determine, among other things, the validity of the assumptions, the severity of tests, the robustness of the estimates, the performance of any underlying models, and the stability and reasonableness of the results.

Stress test results should inform analysis and decision-making related to business strategies, limits, risk profile, and other aspects of risk management, consistent with the banking organization's established risk appetite. A banking organization should review the results of its various stress tests with the strengths and limitations of each test in mind (consistent with Principle 2), determine which results should be given greater or lesser weight, analyze the combined impact of its tests, and then evaluate potential courses of action based on that analysis. A banking organization may decide to maintain its current course based on test results; indeed, the results of highly severe stress tests need not always indicate that immediate action has to be taken. Wherever possible, benchmarking or other comparative analysis should be used to evaluate the stress testing results relative to other tools and measures – both internal and external to the banking organization – to provide proper context and a check on results.

Principle 5: An organization's stress testing framework should include strong governance and effective internal controls.

Similar to other aspects of its risk management, a banking organization's stress testing framework will be effective only if it is subject to strong governance and effective internal controls to ensure the framework is functioning as intended. Strong governance and effective internal controls help ensure that the framework contains core elements, from clearly defined stress testing objectives to recommended actions. Importantly, strong governance provides critical review of elements of the stress testing framework, especially regarding key assumptions, uncertainties, and limitations. A banking organization should ensure that the stress testing framework is not isolated within a banking organization's risk management function, but is firmly integrated into business lines, capital and asset-liability committees, and other decision-making bodies. Along those lines, the board of directors and senior management should play key roles in ensuring strong governance and controls. The extent and sophistication of a banking organization's governance over its stress testing framework should align with the extent and sophistication of that framework. Additional details regarding governance and controls of an organization's stress testing framework are outlined in section VI.

IV. Stress Testing Approaches and Applications

This section discusses some general types of stress testing approaches and applications. For any type of stress test, banking organizations should indicate the specific purpose and the focus of the test. Defining the scope of a given stress test is also important, whether it applies at the portfolio, business line, risk type, or enterprise-wide level, or even just for an individual exposure or counterparty. Based on the purpose and scope of the test, different stress testing techniques are most useful. Thus, a banking organization should employ several approaches and applications; these might include scenario analysis, sensitivity analysis, enterprise-wide stress testing, and reverse stress testing. Consistent with Principle 1, banking organizations should apply these commensurate with their size, complexity, and business profile, and may not need to incorporate all of the details described below. Consistent with Principle 3, banking organizations should also recognize that stress testing approaches will evolve over time and they should update their practices as needed.

Scenario Analysis

Scenario analysis refers to a type of stress testing in which a banking organization applies historical or hypothetical scenarios to assess the impact of various events and circumstances, including extreme ones. Scenarios usually involve some kind of coherent, logical narrative or "story" as to why certain events and circumstances can occur and in which combination and order, such as a severe recession, failure of a major counterparty, loss of major clients, natural or man-made disaster, localized economic downturn, disruptions in funding or capital markets, or a sudden change in interest rates brought about by unfavorable inflation developments. Scenario analysis can be applied at various levels of the banking organization, such as within individual business lines to help identify factors that could harm those business lines most.

Stress scenarios should reflect a banking organization's unique vulnerabilities to factors that affect its exposures, activities, and risks. For example, if a banking organization is concentrated in a particular line of business, such as commercial real estate or residential mortgage lending, it would be appropriate to explore the impact of a downturn in those particular market segments. Similarly, a banking organization with lending concentrations to oil and gas companies should include scenarios related to the energy sector. Other relevant factors to be considered in scenario analysis relate to operational, reputational and legal risks to a banking organization, such as significant events of fraud or litigation, or a situation when a banking organization feels compelled to provide support to an affiliate or provide other types of non-contractual support to avoid reputational damage. Scenarios should be internally consistent and portray realistic outcomes based on underlying relationships among variables, and should include only those mitigating developments that are consistent with the scenario. Additionally, a banking organization should consider the best manner to try to capture combinations of stressful events and circumstances, including second-order and "knock-on" effects. Ultimately, a banking organization should select and design multiple scenarios that are relevant to its profile and make intuitive sense, use enough scenarios to explore the range of potential outcomes, and ensure that the scenarios continue to be timely and relevant.

A banking organization may apply scenario analysis within the context of its existing risk measurement tools (e.g., the impact of a severe decline in market prices on a banking organization's value-at-risk (VaR) measure) or use it as an alternative, supplemental measure. For instance, a banking organization may use scenario analysis to measure the impact of a severe financial market disturbance and compare those results to what is produced by its VaR or other measures. This type of scenario analysis should account for known shortcomings of other risk measurement practices. For example, market risk VaR models generally assume liquid markets with known prices. Scenario analysis could shed light on the effects of a breakdown in liquidity and of valuation difficulties.

One of the key challenges with scenario analysis is to translate a scenario into balance sheet impact, changes in risk measures, potential losses, or other measures of adverse financial impact, which would vary depending on the test design and the type of scenario used. For some aspects of scenario analysis, banking organizations may use econometric or similar types of analysis to estimate a relationship between some underlying factors or drivers and risk estimates or loss projections based on a given data set, and then extrapolate to see the impact of more severe inputs. Care should be taken not to make assumptions that relationships from benign or mildly adverse times will hold during more severe times or that estimating such relationships is relatively straightforward. For example, linear relationships between risk drivers and losses may become nonlinear during times of stress. In addition, organizations should recognize that there can be multiple permutations of outcomes from just a few key risk drivers.

Sensitivity Analysis

Sensitivity analysis refers to a banking organization's assessment of its exposures, activities, and risks when certain variables, parameters, and inputs are "stressed" or "shocked." A key goal of sensitivity analysis is to test the impact of assumptions on outcomes. Generally, sensitivity analysis differs from scenario analysis in that it involves changing variables, parameters, or inputs without an explicit underlying reason or narrative, in order to explore what occurs under a range of inputs and at extreme or highly adverse levels. In this type of analysis a banking organization may realize, for example, that a given relationship is much more difficult to estimate at extreme levels.

A banking organization may apply sensitivity analysis at various levels of aggregation to estimate the impact from a change in one or more key variables. The results may help a banking organization better understand the range of outcomes from some of its models, such as developing a distribution of output based on a variety of extreme inputs. For example, a banking organization may choose to calculate a range of changes to a structured security's overall value using a range of different assumptions about the performance and linkage of underlying cash flows. Sensitivity analysis should be conducted periodically due to potential changes in a banking organization's exposures, activities, operating environment, or the relationship of variables to one another.

Sensitivity analysis can also help to assess a combined impact on a banking organization of several variables, parameters, factors, or drivers. For example, a banking organization could better understand the impact on its credit losses from a combined increase in default rates and a decrease in collateral values. A banking organization could also explore the impact of highly

adverse capitalization rates, declines in net operating income, and reductions in collateral when evaluating its risks from commercial real estate exposures. Sensitivity analysis can be especially useful because it is not necessarily accompanied by a particular narrative or scenario; that is, sensitivity analysis can provide banking organizations more flexibility to explore the impact of potential stresses that they may not be able to capture in designed scenarios. Furthermore, banking organizations may decide to conduct sensitivity analysis of their scenarios, i.e., choosing different levels or paths of variables to understand the sensitivities of choices made during scenario design. For instance, banking organizations may decide to apply a few different interest-rate paths for a given scenario.

Enterprise-Wide Stress Testing

Enterprise-wide stress testing is an application of stress testing that involves assessing the impact of certain specified scenarios on the banking organization as a whole, particularly with regard to capital and liquidity. As is the case with scenario analysis more generally, enterprise-wide stress testing involves robust scenario design and effective translation of scenarios into measures of impact. Enterprise-wide stress tests can help a banking organization in its efforts to assess the impact of its full set of risks under adverse events and circumstances, but should be supplemented with other stress tests and other risk measurement tools given inherent limitations in capturing all risks and all adverse outcomes in one test.

Scenario design for enterprise-wide stress testing involves developing scenarios that affect the banking organization as a whole that stem from macroeconomic, market-wide, and/or firm-specific events. These scenarios should incorporate the potential simultaneous occurrence of both firm-specific and macroeconomic and market-wide events, considering system-wide interactions and feedback effects. For example, price shocks may lead to significant portfolio losses, rising funding gaps, a ratings downgrade, and diminished access to funding. In general, it is a good practice to consult with a large set of individuals within the banking organization – in various business lines, research and risk areas – to gain a wide perspective on how enterprise-wide scenarios should be designed and to ensure that the scenarios capture the relevant aspects of the banking organization's business and risks. Banking organizations should also conduct scenarios of varying severity to gauge the relative impact. At least some scenarios should be of sufficient severity to challenge the viability of the banking organization, and should include instantaneous market shocks and stressful periods of extended duration (e.g., not just a one or two-quarter shock after which conditions return to normal).

Selection of scenario variables is important for enterprise-wide tests, because these variables generally serve as the link between the overall narrative of the scenario and tangible impact on the banking organization as a whole. For instance, in aiming to capture the combined impact of a severe recession and a financial market downturn, a banking organization may choose a set of variables such as changes in gross domestic product (GDP), unemployment rate, interest rates, stock market levels, or home price levels. However, particularly when assessing the impact on the whole banking organization, using a large number of variables can make a test more cumbersome and complicated – so a banking organization may also benefit from simpler scenarios or from those with fewer variables. Banking organizations should balance the comprehensiveness of contributing variables and tractability of the exercise.

As with scenario analysis generally, translating scenarios into tangible effects on the banking organization as a whole presents certain challenges. A banking organization should identify appropriate and meaningful mechanisms for translating scenarios into relevant internal risk parameters that provide a firm-wide view of risks and understanding of how these risks are translated into loss estimates. Not all business areas are equally affected by a given scenario, and problems in one business area can have effects on other units. However, for an enterprise-wide test, assumptions across business lines and risk areas should remain constant for the chosen scenario, since the objective is to see how the banking organization as a whole will be affected by a common scenario.

Reverse Stress Testing

Reverse stress testing is a tool that allows a banking organization to assume a known adverse outcome, such as suffering a credit loss that breaches regulatory capital ratios or suffering severe liquidity constraints that render it unable to meet its obligations, and then deduce the types of events that could lead to such an outcome. This type of stress testing may help a banking organization to consider scenarios beyond its normal business expectations and see the impact of severe systemic effects on the banking organization. It also allows a banking organization to challenge common assumptions about its performance and expected mitigation strategies.

Reverse stress testing helps to explore so-called "break the bank" situations, allowing a banking organization to set aside the issue of estimating the likelihood of severe events and to focus more on what kinds of events could threaten the viability of the banking organization. This type of stress testing also helps a banking organization evaluate the combined effect of several types of extreme events and circumstances that might threaten the survival of the banking organization, even if in isolation each of the effects might be manageable. For instance, reverse stress testing may help a banking organization recognize that a certain level of unemployment would have a severe impact on credit losses, that a market disturbance could create additional losses and result in rising funding costs, and that a firm-specific case of fraud would cause even further losses and reputational impact that could threaten a banking organization's viability. In some cases, reverse stress tests could reveal to a banking organization that "breaking the bank" is not as remote an outcome as originally thought.

Given the numerous potential threats to a banking organization's viability, the organization should ensure that it focuses first on those scenarios that have the largest firm-wide impact, such as insolvency or illiquidity, but also on those that seem most imminent given the current environment. Focusing on the most prominent vulnerabilities helps a banking organization prioritize its choice of scenarios for reverse stress testing. However, a banking organization should also consider a wider range of possible scenarios that could jeopardize the viability of the banking organization, exploring what could represent potential blind spots. Reverse stress testing can highlight previously unacknowledged sources of risk that could be mitigated through enhanced risk management.

V. Stress Testing for Assessing the Adequacy of Capital and Liquidity

There are many uses of stress testing within banking organizations. Prominent among these are stress tests designed to assess the adequacy of capital and liquidity. Given the importance of capital and liquidity to a banking organization's viability, stress testing should be applied in these two areas in particular, including an evaluation of the interaction between capital and liquidity and the potential for both to become impaired at the same time. Depletions and shortages of capital or liquidity can cause a banking organization to no longer perform effectively as a financial intermediary, be viewed by its counterparties as no longer viable, become insolvent, or diminish its capacity to meet legal and financial obligations. A banking organization's capital and liquidity stress testing should consider how losses, earnings, cash flows, capital, and liquidity would be affected in an environment in which multiple risks manifest themselves at the same time, for example, an increase in credit losses during an adverse interest-rate environment. Additionally, banking organizations should recognize that at the end of the time horizon considered by a given stress test, they may still have substantial residual risks or problem exposures that may continue to pressure capital and liquidity resources.

Stress testing for capital and liquidity adequacy should be conducted in coordination with a banking organization's overall strategy and annual planning cycles. Results should be refreshed in the event of major strategic decisions, or other decisions that can materially impact capital or liquidity. Banking organizations should conduct stress testing for capital and liquidity adequacy periodically.

Capital Stress Testing

Capital stress testing results can serve as a useful tool to support a banking organization's capital planning and corporate governance.[7] They may help a banking organization better understand its vulnerabilities and evaluate the impact of adverse outcomes on its capital position and ensure that the banking organization holds adequate capital given its business model, including the complexity of its activities and its risk profile. Capital stress testing complements a banking organization's regulatory capital analysis[8] by providing a forward-looking assessment of capital adequacy, usually with a forecast horizon of at least two years (with the recognition that the effects of certain stress conditions could extend beyond two years for some stress tests), and highlighting the potential adverse effects on capital levels and ratios from risks not fully captured in regulatory capital requirements. It should also be used to help a banking organization assess the quality and composition of capital and its ability to absorb losses. Stress testing can aid

---

[7] In this manner, stress testing can form an integral part of an organization's internal capital adequacy process, consistent with supervisory standards outlined in *SR 09-4*, *SR 99-18,* and *Supervisory Review Process of Capital Adequacy, supra* note 12.

[8] While savings and loan holding companies currently are not subject to consolidated regulatory leverage or risk-based capital requirements, a savings and loan holding company should have sufficient capital and an effective capital planning process, consistent with its overall risk profile and considering the size, scope, and complexity of its operations, to ensure the safe and sound operation of the company. See Supervision and Regulation Letter SR 11-11, Supervision of Savings and Loan Holding Companies (July 21, 2011), available at http://www.federalreserve.gov/bankinforeg/srletters/sr1111.pdf.

capital contingency planning by helping management identify exposures or risks in advance that would need to be reduced and actions that could be taken to bolster capital levels or otherwise maintain capital adequacy, as well as actions that in times of stress might not be possible – such as raising capital.

Capital stress testing should include exercises that analyze the potential for changes in earnings, losses, reserves, and other potential effects on capital under a variety of stressful circumstances. Such testing should also capture any potential change in risk-weighted assets, the ability of capital to absorb losses, and any resulting impact on the banking organization's capital ratios. It should include all relevant risk types and other factors that have a potential to affect capital adequacy, whether directly or indirectly, including firm-specific ones. A banking organization should also explore the potential for possible balance sheet expansion to put pressure on capital ratios and consider risk mitigation and capital preservation options, other than simply shrinking the balance sheet. Capital stress testing should assess the potential impact of a banking organization's material subsidiaries suffering capital problems on their own – such as being unable to meet local country capital requirements – even if the consolidated banking organization is not encountering problems.[9] Where material relative to the banking organization's capital, counterparty exposures should also be included in capital stress testing.

Enterprise-wide stress testing, as described in section IV, should be an integral part of a banking organization's capital stress testing.[10] Such enterprise-wide testing should include pro-forma estimates of not only potential losses and resources available to absorb losses, but also potential planned capital actions (such as dividends or share repurchases) that would affect the banking organization's capital position, including regulatory and other capital ratios. There should also be consideration of the impact on the banking organization's allowance for loan and lease losses and other relevant financial metrics. Even with very effective enterprise-wide tests, banking organizations should use capital stress testing in conjunction with other internal approaches (in addition to regulatory measures) for assessing capital adequacy, such as those that rely primarily on statistical estimates of risk or loss estimates based on historical data.

Liquidity stress testing

A banking organization should also conduct stress testing for liquidity adequacy.[11] Through such stress testing a banking organization can work to identify vulnerabilities related to liquidity adequacy in light of both firm-specific and market-wide stress events and circumstances. Effective stress testing helps a banking organization identify and quantify the depth, source, and degree of potential liquidity and funding strain and to analyze possible impacts on its cash flows, liquidity position, profitability, and other aspects of its financial condition over various time horizons. For example, stress testing can be used to explore

---

[9] For regulated subsidiaries, stress testing activities should be fully consistent with the regulations and guidance of the relevant primary federal supervisor.

[10] The agencies expect that the stress test requirements in the Dodd-Frank Act for companies with more than $10 billion in assets would be an integral part of this type of stress testing.

[11] *See, Funding and Liquidity Risk Management Policy Statement* and *Interest Rate Risk Advisory*, *supra* note 12.

potential funding shortfalls, shortages in liquid assets, the inability to issue debt, exposure to possible deposit outflows, volatility in short-term brokered deposits, sensitivity of funding to a ratings downgrade, and the impact of reduced collateral values on borrowing capacity at the Federal Home Loan Banks, the Federal Reserve discount window, or other secured wholesale funding sources.

Liquidity stress testing should explore the potential impact of adverse developments that may affect market and asset liquidity, including the freezing up of credit and funding markets, and the corresponding impact on the banking organization. Such tests can also help identify the conditions under which balance sheets might expand, thus creating additional funding needs (e.g., through accelerated drawdowns on unfunded commitments). These tests also help determine whether the banking organization has a sufficient liquidity buffer to meet various types of future liquidity demands under stressful conditions. In this regard, liquidity stress testing should be an integral part of the development and maintenance of a banking organization's contingency funding planning. Liquidity stress testing should include enterprise-wide tests as discussed in section IV, but should also be applied, as appropriate, at lower levels of the banking organization, and in particular should account for regulatory or supervisory restrictions on inter-affiliate funding and asset transfers. As with capital stress testing, banking organizations may need to conduct liquidity stress tests at both the consolidated and subsidiary level. In undertaking enterprise-wide liquidity tests banking organizations should make realistic assumptions as to the implications of liquidity stresses in one part of the banking organization on other parts.

An effective stress testing framework should explore the potential for capital and liquidity problems to arise at the same time or exacerbate one another. For example, a banking organization in a stressed liquidity position is often required to take actions that have a negative direct or indirect capital impact (e.g., selling assets at a loss or incurring funding costs at above market rates to meet funding needs). A banking organization's liquidity stress analysis should explore situations in which the banking organization may be operating with a capital position that exceeds regulatory minimums, but is nonetheless viewed within the financial markets or by its counterparties as being of questionable viability. Assessing the potential interaction of capital and liquidity can be challenging and may not be possible within a single stress test, so organizations should explore several avenues to assess that interaction. As with other applications of stress testing, for its capital and liquidity stress tests, it is beneficial for a banking organization to articulate clearly its objectives for a post-stress outcome, for instance to remain a viable financial market participant that is able to meet its existing and prospective obligations and commitments. In such cases, banking organizations would have to consider which measures of financial condition would need to be met on a post-stress basis to secure the confidence of counterparties and market participants.

VI. Governance and Controls

As noted under Principle 5, a banking organization's stress testing framework will be effective only if it is subject to strong governance and controls to ensure the framework is functioning as intended. The extent and sophistication of a banking organization's governance

over its stress testing framework should align with the extent and sophistication of that framework.

Governance over a banking organization's stress testing framework rests with the banking organization's board of directors and senior management. As part of their overall responsibilities, a banking organization's board and senior management should establish a comprehensive, integrated and effective stress testing framework that fits into the broader risk management of the banking organization. While the board is ultimately responsible for ensuring that the banking organization has an effective stress testing framework, senior management generally has responsibility for implementing that framework. Senior management duties should include establishing adequate policies and procedures and ensuring compliance with those policies and procedures, assigning competent staff, overseeing stress test development and implementation, evaluating stress test results, reviewing any findings related to the functioning of stress test processes, and taking prompt remedial action where necessary. Senior management, directly and through relevant committees, also should be responsible for regularly reporting to the board on stress testing developments (including the process to design tests and develop scenarios) and on stress testing results (including from individual tests, where material), as well as on compliance with stress testing policy. Board members should actively evaluate and discuss this information, ensuring that the stress testing framework is in line with the banking organization's risk appetite, overall strategy and business plans, and contingency plans, directing changes where appropriate.

A banking organization should have written policies, approved and annually reviewed by the board, that direct and govern the implementation of the stress testing framework in a comprehensive manner. Policies, along with procedures to implement them, should:

- Describe the overall purpose of stress testing activities;
- Articulate consistent and sufficiently rigorous stress testing practices across the entire banking organization;
- Indicate stress testing roles and responsibilities, including controls over external resources used for any part of stress testing (such as vendors and data providers);
- Describe the frequency and priority with which stress testing activities should be conducted;
- Indicate how stress test results are used, by whom, and outline instances in which remedial actions should be taken; and
- Be reviewed and updated as necessary to ensure that stress testing practices remain appropriate and keep up to date with changes in market conditions, banking organization products and strategies, banking organization exposures and activities, the banking organization's established risk appetite, and industry stress testing practices.

A stress testing framework should incorporate validation or other type of independent review to ensure the integrity of stress testing processes and results, consistent with existing supervisory expectations.[12] If a banking organization engages a third party vendor to support

[12] For validation of models and other quantitative tools used for stress testing, *see* OCC Bulletin 2011-12, *Supervisory Guidance on Model Risk Management* (April 4, 2011), available at http://www.occ.gov/news-

some or all of its stress testing activities, there should be appropriate controls in place to ensure that those externally developed systems and processes are sound, applied correctly, and appropriate for the banking organization's risks, activities, and exposures. Additionally, senior management should be mindful of any potential inconsistencies, contradictions, or gaps among its stress tests and assess what actions should be taken as a result. Internal audit should also provide independent evaluation of the ongoing performance, integrity, and reliability of the stress testing framework. A banking organization should ensure that its stress tests are documented appropriately, including a description of the types of stress tests and methodologies used, key assumptions, results, and suggested actions. Senior management, in consultation with the board, should review stress testing activities and results with an appropriately critical eye and ensure that there is objective review of all stress testing processes.

The results of stress testing analyses should facilitate decision-making by the board and senior management. Stress testing results should be used to inform the board about alignment of the banking organization's risk profile with the board's chosen risk appetite, as well as inform operating and strategic decisions. Stress testing results should be considered directly by the board and senior management for decisions relating to capital and liquidity adequacy, including capital contingency plans and contingency funding plans. Senior management, in consultation with the board, should ensure that the stress testing framework includes a sufficient range of stress testing activities applied at the appropriate levels of the banking organization (i.e., not just one enterprise-wide stress test). Sound governance also includes using stress testing to consider the effectiveness of a banking organization's risk mitigation techniques for various risk types over their respective time horizons, such as to explore what could occur if expected mitigation techniques break down during stressful periods.

VII. Conclusion

A banking organization should use the principles laid out in this guidance to develop, implement, and maintain an effective stress testing framework. Such a framework should be adequately tailored to the banking organization's size, complexity, risks, exposures, and activities. A key purpose of stress testing is to explore various types of possible outcomes, including rare and extreme events and circumstances, assess their impact on the banking organization, and then evaluate the boundaries up to which the banking organization plans to be able to withstand such outcomes. Stress testing may be particularly valuable during benign periods when other measures may not indicate emerging risks.

While stress testing can provide valuable information regarding potential future outcomes, similar to any other risk management tool it has limitations and cannot provide absolute certainty regarding the implications of assumed events and impacts. Furthermore, management should ensure that stress testing activities are not constrained to reflect past experiences, but instead consider a broad range of possibilities. No single stress test can accurately estimate the impact of all stressful events and circumstances; therefore, a banking organization should understand

---

issuances/bulletins/2011/bulletin-2011-12a.pdf; or Supervision and Regulation Letter SR 11-7, *Guidance on Model Risk Management* (April 4, 2011), available at http://www.federalreserve.gov/bankinforeg/srletters/sr1107.pdf.

and account for stress testing limitations and uncertainties, and use stress tests in combination with other risk management tools to make informed risk management and business decisions.