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The Pew Financial Reform Project

Standards for Financial Stress Tests

Executive Summary

Capital and liquidity standards for banks and other financial institutions proved to be inadequate during the financial meltdown of 2008. The severity of the crisis, coupled with deficient data quality, models, risk-management practices and regulatory oversight, rendered those standards meaningless. To prevent this from happening again, the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 was passed and, among other mandates, it requires stress tests for individual institutions and the financial system as a whole.

A stress test determines whether an institution—or the broader financial system—would have sufficient capital and liquidity to survive a steadily deteriorating economy or a sudden economic shock. If either capital or liquidity drops below acceptable minimums during the test, it is a signal that the business models or risk-management practices should be changed.

Comprehensive stress tests pose significant challenges even for best practice institutions. It is difficult to aggregate the impact of scenarios across portfolios and business lines. For the financial system as a whole, not only do the direct effects on institutions have to be aggregated, but the indirect effects caused by contagion among institutions should be taken into account too.

This paper proposes a set of standards for stress testing at the institution and system-wide level:

- Capital and liquidity sufficient to protect the financial system. Stress-test programs should help ensure that systemically important financial institutions have sufficient capital and liquidity to minimize the risks to the system during times of severe strain.
- Validated testing with demanding scenarios. Stress tests should be conducted using demanding scenarios that reflect serious macroeconomic and financial system stresses. The frameworks and results should be validated by independent modeling.
- A transparent process that is well-governed, managed and resourced. Stress tests should be well-governed, well-managed, adequately resourced and transparent. Senior managers should ensure the quality of the tests and be held accountable for the results.
- Test results should have real consequences. Institutions should address weaknesses quickly by raising capital and liquidity or adjusting risk-management or business strategies. Also, regulators should act quickly to change any policy or practice that is contributing to systemic risk.

Stress tests are an expense for systemically significant banks and nonbanks. But large financial institutions impose a huge cost on the entire system when they fail during a crisis. By using rigorous stress tests and acting on the results, these institutions can protect themselves, and the financial system, from serious harm.

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The Pew Financial Reform Project, formed in response to the 2008 financial crisis, brings a nonpartisan, fact-based approach to reforming and modernizing the financial sector.



The Pew Charitable Trusts' economic policy work aims to encourage an informed debate and promote practices that strengthen the U.S. economy. Pew is a nonprofit organization that applies a rigorous, analytical approach to improve public policy, inform the public and stimulate civic life.

Introduction

During the 2008 financial crisis, capital and liquidity standards for banks and other financial institutions proved to be inadequate. Using those standards, many institutions looked strong one moment and failed the next. Shortfalls in data quality, models, risk-management practices and regulatory oversight combined with an extraordinary set of circumstances to render these standards obsolete.

In the wake of the crisis, a search began for more reliable ways to set standards, and stress tests emerged as one particularly promising option. Over the years, they proved to be an effective risk-management tool for positions and portfolios within institutions. Now, regulators and legislators in the United States and abroad have decided to mandate their use for entire institutions and the financial system as a whole.

A stress test begins with forecasts of capital and liquidity under a set of scenarios in which economic and financial conditions deteriorate over time or there is a sudden shock to the economy and markets. It evaluates the capacity of existing capital to absorb loss and available liquidity to meet funding needs. If forecasted capital and liquidity remain above a minimum standard over the forecasts' horizon, a well-designed and executed stress test provides some comfort that capital and liquidity are sufficient. If they drop below acceptable minimums, the test points to a need to change some combination of the business model, risk-management practice and the level and quality of capital and funding.

Stress tests become more challenging when they are more comprehensive. Even for best-practice financial institutions, it is difficult to aggregate scenarios across portfolios and business lines accurately. For the financial system as a whole, information and analysis have to be aggregated across institutions. Moreover, a systemic test should take into account not only the direct effects of a shock but also the potential indirect effects caused by contagion and feedback loops among institutions. For example, if one distressed institution has to sell assets to raise its capital ratio, it might drive down asset prices to a point where other institutions become distressed and have to sell, further depressing prices. Such self-reinforcing chains of cause-and-effect were at the heart of the recent crisis. Analyzing them thoroughly, however, is particularly difficult.

This paper proposes a set of standards for stress testing at the institutional and system-wide level. It is based upon lessons learned from recent stress-testing exercises, discussions with individual experts and the insights drawn from a workshop with senior official, academic and industry participation held at Pew's Washington offices in January. The standards are intended to:

- Provide a nonpartisan point of reference. As part of the implementation of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act), the federal financial regulatory agencies will go through a policy-making process for stress testing covering a range of financial institutions, including, but not limited to, the systemically important financial institutions (SIFIs) that are eventually designated for heightened supervision. Many public advocacy and industry groups will produce proposals for stress testing during this process. The standards outlined here are a yardstick for assessing them.

- Be a medium-term target. It will take some time for firms and regulators to meet these standards. A phase-in period will be needed because many difficult data and analytical issues must be resolved before institutional and systemic stress tests can be satisfactory.

At the highest level, there are four standards for stress testing:

1. Capital and liquidity sufficient to protect the financial system. Stress-test programs should help ensure that SIFIs have the capital and liquidity to minimize risks to the system during times of severe strain.
2. Validated testing on demanding scenarios. Stress tests should be conducted on demanding scenarios reflecting serious macroeconomic and financial system stresses. The frameworks and results should be validated by independent modeling to challenge key assumptions and sensitivities.
3. A transparent process that is well governed, managed and resourced. Every covered institution, its regulators and key third parties should establish a process for designing and executing stress tests that is well governed, managed and resourced, and are as transparent as possible. Senior management should take ownership of their results and ensure tests' quality. Boards of directors should see that they do.
4. Test results should have real consequences. Institutions should address weaknesses quickly by raising capital and liquidity, curtailing activity or making other adjustments in risk management or business strategy. Also, regulators should act quickly to change any policy or practice that tests show is contributing to systemic risk.

Although a strong program should generate large public benefits, effective testing will have immediate costs for individual SIFIs. However, there must be a robust plan to contain the potentially large costs that SIFIs can impose in a crisis on the entire financial system and on our economy as a whole. In technical terms, SIFIs create negative externalities through their overly large contribution to systemic risk, and stress testing is an important way for the regulatory regime to internalize those effects.

The main text is divided into four sections:

- *Legislative Background*, which describes the main stress-testing provisions of the Dodd-Frank Act;
- *Context*, which provides further historical and institutional background and highlights important considerations when designing a stress-testing program;
- *Standards*, with four subsections, each laying out a proposed standard in some detail; and
- *Conclusion*.

Legislative Background

The Dodd-Frank Act requires federal financial regulatory agencies to organize periodic stress tests to see how individual institutions and the financial system as a whole stand up in difficult conditions. They should be conducted regularly in normal times as well as during periods of stress.

The Federal Reserve System (Fed) is expected to take the lead and define at least three scenarios—baseline, adverse and severely adverse—for each round of tests.¹ These assessments must be conducted by institutions under the supervision of their primary regulator.² One must occur every year, covering all nonbank SIFIs and all banks with more than \$10 billion in assets. A second round must be held for those SIFIs subject to heightened supervision by the Fed. The Fed may extend stress testing to any other financial institution. All of these exercises must analyze whether institutions have enough capital in excess of minimum requirements to survive in a crisis. The act does not require a test for adequate liquidity.

The Dodd-Frank Act gives little guidance to the Fed and other federal financial regulatory agencies about conducting these stress tests; indeed, it even leaves them to define one.³ The Fed is instructed to develop and apply the necessary analytic techniques; the primary regulators are expected to set out requirements for reporting the results and to oversee institutions' tests;⁴ and the newly created Office of Financial Research (OFR) has to evaluate and report on their implications for systemic stability.⁵ Otherwise, regulatory discretion is broad.

The act does not specify a timeline for implementing regular stress tests. Still, the approach and scope of the programs should be settled within about a year from the bill signing, and the first round should be implemented within 18 months.⁶

To meet the act's general objective, which is to strengthen the financial system, the standards recommended in this paper go beyond the act's specific requirements for stress testing in three ways by:

- covering liquidity as well as capital;

¹ The Dodd-Frank Act, Title I, § 165 (i)(1)(B)(i). <http://www.gpo.gov/fdsys/pkg/PLAW-111publ203/pdf/PLAW-111publ203.pdf>.

² The Dodd-Frank Act, Title I, § 165 (i)(2)(A).

³ The Dodd-Frank Act, Title I, § 165 (i)(2)(C)(i).

⁴ The Dodd-Frank Act, Title I, § 165 (i)(2)(C).

⁵ The Dodd-Frank Act, Title I, § 154 (c)(1)(D).

⁶ According to officials in private conversations, the federal financial regulators have a July 2011 deadline for the design of the new stress test program. Given that there is the Supervisory Capital Assessment Program exercise on which to build, and that stress testing has been a well-established technique for testing portfolios within institutions for at least a decade, this timeline seems reasonable, even though there are several other policies and programs of the Dodd-Frank Act have a similarly demanding deadline.

- proposing an active role in the tests' design for the Financial Stability Oversight Council (FSOC) and the OFR so that programs can meet standards that OFR might use for evaluation; and
- explicitly proposing that the tests have consequences for institutions and regulatory policy.

Regarding financial stability, the overall goal of the Dodd-Frank Act is to reduce the frequency and severity of any future crisis. Effective stress-test programs can help significantly.

Context

Implementing the Dodd-Frank Act requirements for stress testing can build upon experience. Stress testing is a long-established tool of risk management within institutions. During the crisis, both U.S. and European authorities experimented with coordinated institutional stress tests for SIFIs, and U.S. authorities are currently running a follow-up exercise:

- In the United States, the Federal Reserve Bank of New York (FRBNY) organized the Supervisory Capital Assessment Program (SCAP) early in 2009. The objective was to ensure that 19 of the largest bank holding companies could remain strongly capitalized, even in a deteriorating economic environment.⁷ Two scenarios were used: one baseline and one more adverse.⁸ The FRBNY set an important precedent by publicly reporting the general methodology, assumptions and the findings for individual institutions, including their capital needs and loss estimates.^{9,10} The exercise had consequences: Several firms involved were required to raise capital. Had they not been able to do so, the U.S. Treasury was prepared to inject public resources to strengthen their balance sheets. It was a successful exercise in that it calmed the markets by demonstrating that the covered institutions' problems were manageable and that the federal government was proactively engaged.
- In Europe, the Committee of European Banking Supervisors (CEBS) coordinated a stress-test exercise in the first half of 2010.^{11,12} The objective was similar, but consistent implementation was more of a challenge, as 91 institutions in 20 different jurisdictions tried to apply the same scenarios. The CEBS published aggregate results, and those for individual banks were published by the banks themselves or their national supervisors. Although the CEBS noted the apparent

⁷ Bernanke, Ben. "Transcript: Ben Bernanke Stress Tests Speech, Jekyll Island, Georgia." May 11, 2009. <http://www.federalreserve.gov/newsevents/speech/bernanke20100506a.pdf>.

⁸ Board of Governors of the Federal Reserve System. "The Supervisory Capital Assessment Program: Overview of Results." May 7, 2009. <http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20090507a1.pdf>.

⁹ Tarullo, Daniel. "Lessons from the Crisis Stress Tests." Speech at the Federal Reserve Board International Research Forum on Monetary Policy. Washington, D.C., March 26, 2010. <http://www.federalreserve.gov/newsevents/speech/tarullo20100326a.htm>.

¹⁰ Peristiani, Stavros, Donald P. Morgan and Vanessa Savino. "The Information Value of the Stress Test and Bank Opacity." *FRB of New York Staff Report No. 460*. July 1, 2010. <http://ssrn.com/abstract=1650670>.

¹¹ Board of Governors of the Federal Reserve System. "The Supervisory Capital Assessment Program: Design and Implementation." April 24, 2009. <http://www.federalreserve.gov/bankinfo/bcreg20090424a1.pdf>.

¹² Committee of European Banking Supervisors. Press Release on the Results of the 2010 EU-Wide Stress Testing Exercise. July 23, 2010. <http://stress-test.c-eb.org/documents/CEBSPressReleasev2.pdf>.

resilience shown in the test results, it emphasized that continued government support for some institutions made them look better than they really were.¹³

- The objective of the current U.S. follow-up exercise is to assess the plans of the 19 largest bank holding companies for raising capital and liquidity relative to the standards for 2018 set by the Basel Committee, the international committee of the bank supervisors and regulators that meets under the auspices of the Bank for International Settlements in Basel, Switzerland. The Fed is testing to see that these plans work in adverse economic and financial conditions. If the results are strong enough, specific banks might be allowed to distribute dividends.

There is a tentative commitment to establish institutional and systemic stress testing at the international level. Although the Basel Committee has not set international standards for these assessments since the crisis, in 2009 it did reiterate its earlier view that stress testing is an important tool for institutional risk management.¹⁴

Even with time, stress testing can achieve only so much. Many other tools are needed to manage risks well. Assumptions and models have their limits and will not always capture the uncertain and the unusual. Naïve testing failed in the run-up to the crisis because it was insufficiently comprehensive and because it was not always used thoughtfully.¹⁵

Standards

#1: Capital and liquidity sufficient to protect the system

Stress-test programs should help ensure that SIFIs have sufficient capital and liquidity to minimize the risks to the system during times of severe stress.

These plans should meet five overall objectives:

- 1.1 Support communication. Institutional tests should facilitate communication about risks within institutions and with their boards, their regulators and the markets. Systemic tests should improve understanding of vulnerabilities among regulators, industry participants and other stakeholders, including Congress.

¹³ Committee of European Banking Supervisors. "Aggregate outcome of the 2010 EU wide stress test exercise coordinated by CEBS in cooperation with the ECB." July 23, 2010. <http://stress-test.c-ebs.org/documents/Summaryreport.pdf>.

¹⁴ Basel Committee on Banking Supervision, Bank for International Settlements. "Principles for sound stress testing practices and supervision." May 2009. <http://www.bis.org/publ/bcbs155.pdf>.

¹⁵ Haldane, Andrew. "Why Banks Failed The Stress Test." Bank of England. February 13, 2009. <http://www.bankofengland.co.uk/publications/speeches/2009/speech374.pdf>.

- 1.2 Inform risk management & governance. Institutional tests should inform capital, liquidity and risk-management standards and practices, including the definition of risk appetite approved by the firm’s board. Institutional and systemic tests together should inform micro-prudential regulatory practices and systemic risk management.
- 1.3 Inform rapid resolution plans. Institutional tests should inform the choice of contingencies addressed in SIFI “rapid resolution plans.”
- 1.4 Help ensure institutional strength. Institutional tests should be used to prompt changes in business models, portfolio size, risk-management practices and capital and liquidity levels to ensure the strength and resiliency to withstand adverse economic and financial market conditions.
- 1.5 Help ensure system stability and resilience. Systemic tests should be used to identify changes in public policies and practices that the system needs to survive serious stresses, even when individual institutions fail. The goal is to be sure that SIFIs will have sufficient buffers of capital and liquidity to limit contagion during times of stress, and that enough capital remains in the system to support sustained intermediation.¹⁶

#2: Validated testing on demanding scenarios

Stress tests should be conducted on demanding scenarios reflecting serious macroeconomic and financial system stresses.

Tests should be validated by independent modeling:

- 2.1 Scenario development process. As the Dodd-Frank Act proposes, the Fed should lead the development of a set of assumptions for baseline, adverse and severely adverse scenarios. These should incorporate suppositions from the Council of Economic Advisers (CEA) on interest rates and any other macroeconomic variables that are sensitive for the Fed to forecast. The OFR and the FSOC should review these and the analytical approach before each round of tests.¹⁷
- 2.2 Range of assumptions. Assumptions should be specified for:
 - 2.2.1 Gross Domestic Product, unemployment, exchange rates, interest rates and inflation;

¹⁶ Greenlaw, David, Anil Kashyap, Kermit Schoenholtz and Hyun Song Shin. “Stressed Out: Macroprudential Principles for Stress Testing.” Conference draft. U. S. Monetary Policy Forum. February 25, 2011. <http://research.chicagobooth.edu/igm/usmpf/download2.aspx>.

¹⁷ The FSOC, the OFR and the CEA need to be involved because several other regulators will oversee individual tests for non-SIFIs; the act requires the OFR to review all stress test results for their implications for systemic stability; and the Fed cannot easily forecast interest rates and other financial variables without compromising monetary policy, which the CEA can do.

- 2.2.2 Equity, commodity and house-price indices;
- 2.2.3 Key financial market variables, such as interest rate differences (reflecting, among other things, possible illiquidity in major markets); and
- 2.2.4 Correlations within and among major asset classes.

Following SCAP practice, indicative loss rates for different major loan types should also be provided for supervisor and institution guidance.

- 2.3 Macroeconomic and financial developments. Adverse scenarios should include undesirable macroeconomic developments and then superimposed financial market shocks.¹⁸ In general, these occurrences should build up more slowly than additional financial market shocks. Changes from the baseline scenario should be sustained for the full time horizon of the analysis, which should be long enough to reflect the possible difficulties of a slow recovery.¹⁹
- 2.4 Methods of analysis. Scenarios should not be limited to formal modeling. Whenever practical, an institution's stress tests should consider such things as a potential deposit run, the impact of credit-rating downgrades on its borrowing costs, the possible impairment of its collateral and potential operational difficulties resulting from the failure of markets or counterparties on which it heavily depended.²⁰
- 2.5 Severity of assumptions. The difference between baseline assumptions and those for adverse scenarios should at least reflect the difference between normal circumstances and the worst experience of past crises and shocks.^{21,22,23} Assumptions for testing institutional and system

¹⁸ The SCAP not only provided two sets of assumptions for the macroeconomic and the financial shock scenarios; it also applied these separately. The macroeconomic scenario was applied to each bank's book of loans, and the financial shock was applied to its trading activities. In doing so, the SCAP was following the current internally inconsistent Basel practice of marking trading book assets to market but using accrual accounting for the bank book.

¹⁹ The SCAP exercise used a time horizon of two years. Subsequently, some observers have questioned if this was long enough, given the slow recovery and the long tail of effects from foreclosure problems after the 2008 crisis. For a full discussion of the SCAP forecast horizon, see the Board of Governors of the Federal Reserve, "The Supervisory Capital Assessment Program: Design and Implementation." April 24, 2009. <http://www.federalreserve.gov/bankinforeg/bcreg20090424a1.pdf>.

²⁰ Principle 9 in "Principles for sound stress testing practices and supervision" deals with reverse stress tests.

²¹ The Basel Committee on Banking Supervision addresses the shortcomings of historical scenarios in "Stress Testing at Major Financial Institutions: Survey Results and Practice – Report by a working group established by the Committee on the Global Financial System." January 2005. <http://www.bis.org/publ/cgfs24.pdf?noframes=1>.

²² Basel Committee on Banking Supervision, Bank for International Settlements. "Principles for sound stress-testing practices and supervision." The text in this paper refers to "normal times." In abnormal times, when markets are weakening and systemic risks are emerging, the adjustments to the baseline scenario that are used to create the adverse and severely adverse scenarios should be smaller because, presumably, the baseline will itself be adverse. Also, to do otherwise would be to impose pro-cyclical requirements on institutions.

²³ Kay, John, "Banking Needs More Robust Stress Tests than These." *Financial Times*. July 27, 2010. www.ft.com/cms/s/0/18156e7c-99ae-11df-a852-00144feab49a.html. Kay recently wrote about stress tests in finance and engineering. He pointed out that stress tests for bridges, for example, do not test for strong gusts of wind or the additional pedestrian or two, but for their ability to survive storms and loads far in excess of what is actually expected. He argues that the same idea should apply to stress tests for financial institutions. If they have the liquidity and capital to survive unlikely but possible severely adverse scenarios, then they can operate with a

strength in a crisis should be much more severe than those used to assess positions and portfolios inside institutions as a part of day-to-day risk management.

2.6 Additional scenarios. Regulators and SIFI management should use the second round of stress testing each year to analyze each institution's resilience in the face of potentially serious risks that economy or market-wide assumptions cannot capture. For example, they should consider assessing the effects of:

- 2.6.1 illiquidity in the two markets most important to its financing and risk management;
- 2.6.2 the failure of its two largest counterparties; and
- 2.6.3 the simultaneous materialization of its two largest risks.²⁴

Each SIFI also should run a reverse stress test whereby it identifies combinations of assumptions that might generate enough illiquidity or losses in different portfolios to cause it to fail.

2.7 Comprehensive and reasonably detailed institutional models. Each SIFI should use its own institution-wide model. This should be comprehensive enough to include, for example, pipeline and warehousing risks and exposures that are created by guarantees and off-balance-sheet vehicles. It also should cover obligations that, while not legally binding, might have to be met for reputational reasons.²⁵ For over-the-counter (OTC) derivative positions and securitizations, it should take account of triggering thresholds and issue subordination. It should incorporate or reflect subsidiary and business line models. For each SIFI, its model should estimate net revenue, capital and liquidity. Following SCAP, it should estimate losses for major classes of asset and activity such as:

- 2.7.1 First lien mortgages;
- 2.7.2 Second lien mortgages;
- 2.7.3 Commercial and industrial loans;
- 2.7.4 Commercial real estate loans;
- 2.7.5 Credit card loans;
- 2.7.6 Securities available for sale and held to maturity; and
- 2.7.7 Trading and counterparty risk activities.

Models need to be sufficiently granular to capture material details in dissimilar asset classes.

2.8 Implications for capital and liquidity. Stress-test model outputs should include measures of any additional capital and liquidity buffers that might be needed to meet minimum regulatory standards in adverse and severely adverse scenarios.

desirable safety margin or a buffer in more normal circumstances.

²⁴ Supervisors and senior management will have to exercise judgment to identify the two largest risks facing an institution. These might include sovereign risk, exposure to commodity price fluctuations, demographic shifts or natural disasters, depending on the institution.

²⁵ See page 14, "Principles for sound stress testing practices and supervision."

- 2.9 Aggregation within institutions. Models for lines of business and subsidiaries should aggregate into the ones for the group or holding companies.
- 2.10 Independent regulatory validation. Regulators should build and maintain their own independent model for each institution. For covered non-SIFIs, this should be developed collaboratively by the primary regulator and the Fed, reflecting particular knowledge of the institution as well as of financial markets and the economy.
- 2.11 Systemic stress testing. Working with the Fed, the OFR should test systemic stability through ancillary analyses of positive feedback loops and contagion effects. This should include consideration of the behavior of the non-SIFI financial sector under different scenarios.

Individual institutions should undertake a core analysis using the same assumptions and comparable models and data so that their results can be aggregated meaningfully.

In addition to the testing performed by covered institutions, federal financial regulatory agencies should look at the possible effects of contagion and feedback loops on institutions and markets, and at systemic stresses that might result from widespread collateral impairment or credit downgrades. The Fed and primary regulators for non-SIFIs should take into account the requirements of this ancillary analysis when they approve models before each round of testing.

#3: A transparent process that is well governed, managed and resourced

Every covered institution, its regulators and key third parties should establish a process that is well governed, managed and resourced, and is as transparent as possible.

- 3.1 Role of the board of directors. At the institutional level, the board of directors of the group or holding company should be aware of the stress test exercises, review the results and be informed about remedial actions and supervisory issues.
- 3.2 Role of senior management. Senior management of institutions running the tests should understand the analytical approach and the significance of the results. The CEO, CFO and CRO should ensure that tests are useful for capital, liquidity and risk management, and are useful in communicating risk and strategy internally and externally. They should be engaged in planning, managing and interpreting the tests.

Responsibilities for model development and validation should be split between the CFO and CRO in such a way as to ensure validation is independent for the institutional model and its business level, portfolio and legal subsidiary components.

- 3.3 Process. Implementation should be managed within a framework spelled out in written policies and procedures. Institutional tests should be carried out in two phases, separated by a period of supervisory review. That oversight should be exercised throughout both phases of each test.

- 3.3.1 At the start of the first phase, institutions' models should be reviewed, tested and approved by the Fed and, for non-SIFIs, their primary regulator.
 - 3.3.2 Supervisory review of institutional tests should follow SCAP practice and involve multi-disciplinary teams with expertise in products, markets, risk, finance, accounting and legal issues, as well as teams with particular institutional knowledge. The review should involve benchmarking results across institutions as well as against regulator models, leading to an understanding of reasons for differences and a preliminary analysis of systemic issues. Necessary changes in data and analysis should be introduced in the second phase.
 - 3.3.3 The CEO, CFO and the CRO should discuss a final report on the results and implications with regulators. This information should include an account of the interpretation of assumptions, the modeling approach and methodology, the resources used and the policies applied, as well as the detailed results and implications of each scenario.
- 3.4 Sufficient resources. Institutions should allocate sufficient resources under the leadership of the CEO, CFO and CRO. SIFI teams should be multi-disciplinary and include risk managers, financial analysts and economists, as well as line managers and lawyers.
- 3.5 Meeting international regulatory needs. The Fed and the OFR should share international coordination for macro-prudential stress tests. International coordination at the institutional level should be organized through the colleges of supervisors. To the extent possible, national requirements for assumptions, approaches, results and publication should be coordinated internationally so that institutions can meet these requirements with a minimum number of individual exercises. Internationally active institutions should implement their models in a way that meets the needs of country regulators abroad as well as in the United States.
- 3.6 Institutional review. Institutions should regularly review their stress-testing programs, evaluate them for effectiveness and relevancy and improve them as needed.
- 3.7 Documentation of stress tests. Details of institutional and systemic stress tests should be documented. For example, specific institutional models behind forecasting losses—the default rates, severity, etc.—require individual assumptions that should be available for external audit and regulatory scrutiny.
- 3.8 Institutional disclosure. As a part of market disclosure, stress-test summaries should be published to help markets understand the condition of financial institutions and, thereby, reduce uncertainty about their prospects. These should include key assumptions and individual institutional results, including broad risk sensitivities and the implications for capital and liquidity buffers. Analysts should be provided with enough information to check test results and the modeling approach, and the management and governance of the process should be described. Any remedial actions should also be outlined.

The CEO, CFO and CRO should sign a summary of the results as part of each published report and attest that the results represent their best understanding of the likely effect of the scenarios analyzed on their institution's financial situation.

3.9 Regulatory disclosure. Within one quarter after each round of testing, a report on the main assumptions, the general approach and the main institutional results should be prepared by the Fed and published by the FSOC.²⁶ In its annual report to Congress, the OFR should describe the scope, approach and results of the ancillary analyses that supplement the institutional tests during the year. This report should describe the implications for the current stability of the system and the systemic issues that might arise during periods of economic and financial stress, and detail any prudential regulatory responses.

3.10 FSOC's role. FSOC should oversee the U.S. stress-testing program because one objective of the program is to test systemic stability and, more generally, because of the need to coordinate testing across federal financial regulatory agencies. An external group of respected industry, vendor, consultant and academic experts should be appointed to advise the FSOC on assumptions for stress test rounds and more generally on program design and evolution over time. This group should include lawyers, accountants, financial analysts and management experts as well as economists.

3.11 Ongoing supervisory responsibility. Supervisors should include an assessment of the stress-testing program of each institution as in their regular examination of risk-management practices.²⁷

#4: Test results should have real consequences

Institutions should address weaknesses quickly by raising capital and liquidity, curtailing activity or making any other needed risk-management or business strategy adjustments. Also, regulators should act quickly to change any policy or practice that tests show is contributing to systemic risk.²⁸

²⁶ For some reason, the market shock assumptions in the SCAP were not published. In the future, they should be.

²⁷ The Basel Committee recommends that supervisors make regular and comprehensive assessments of banks' stress testing programs. Basel Committee on Banking Supervision, Bank for International Settlements. "Principles for Sound Stress-Testing Practices and Supervision" May 2009, pg. 21. <http://www.bis.org/publ/bcbs155.pdf>.

²⁸ It is important that stress-test results should not be viewed as a pass-or-fail situation. A well-capitalized institution might be required to take remedial action to deepen its liquidity and capital buffers as protection against severe economic and financial contingencies. For additional comments, see Sasseen, Jane and Theo Francis. "A Stress Test Every Bank Can Pass?" *Bloomberg Businessweek*. February 25, 2009. http://www.businessweek.com/magazine/content/09_10/b4122000698277.htm.

- 4.1 Consequences. When stress tests reveal that there is insufficient capital or liquidity to meet minimum requirements during an adverse or severely adverse scenario, the institution should take corrective action. It should submit a plan to its primary regulator for approval specifying how it would build capital or liquidity buffers or change its business strategy to close any gap between forecast capital and liquidity and minimum requirements in the adverse and severely adverse scenario. If the Fed has created a fund to support a specific market, such plans might draw on that fund. Otherwise, this plan should depend solely on private resources and not on any government intervention. The institution should then execute the plan. Not doing so should result in the same regulatory sanctions as a failure to meet basic capital and liquidity adequacy standards.

Conclusion

Some SIFIs will fail. Effective stress testing should make failures less frequent and, when they do occur, less likely to have systemic consequences. Stress testing programs cannot do this alone, but they are an important tool for informing decision makers about risk and return and building sufficient buffers of capital and liquidity. The goal is to make institutions stronger and more resilient, and thereby less likely either to start a systemic collapse or to act as a pathway for contagious failure.

The standards proposed here are not radical. They extend a well-established practice—stress-testing portfolios—to encompass entire institutions and the financial system as a whole. They encapsulate an emerging consensus on the what, why and how of the future of stress testing. To the extent that these standards exceed the explicit specific mandate of the Dodd-Frank Act—by covering liquidity as well as capital, for example—they are addressing the clear general mandate of the act to strengthen the financial system in ways that are within the powers for the regulatory agencies and the capabilities of covered institutions.

Together with higher basic capital and liquidity standards, heightened supervision, effective rapid resolution planning and orderly liquidation authority, the extension of stress testing is among the most important provisions of the Dodd-Frank Act and similar rule-making initiatives abroad. Stress testing should materially reduce the risk of future crises and thereby improve the economic prospects for all.

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