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Stress Testing after Five Years

Remarks by

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Born of necessity during the depths of the financial crisis as part of an effort to restore confidence in the U.S. financial system, supervisory stress testing has in the intervening five years become a cornerstone of a new approach to regulation and supervision of the nation's largest financial institutions. First, of course, it is a means for assuring that large, complex financial institutions have sufficient capital to allow them to remain viable intermediaries even under highly stressful conditions. More broadly, supervisory stress testing and the associated review of capital planning processes have provided a platform for building out a regulatory framework that is more dynamic, more macroprudential, and more data-driven than pre-crisis practice.

Each year we have refined elements of both the substance and process of the stress tests. These changes have been informed not only by our own experience, but also by critiques and suggestions offered by others. This annual symposium hosted by the Federal Reserve Bank of Boston has become an important channel for eliciting reactions and advice from outside experts and the banks subject to the annual Comprehensive Capital Analysis and Review (CCAR). Although the major elements of our approach have now been successfully established, I anticipate that we will continue to make enhancements. If supervisory stress testing is to give regulators, banks, and the public a dynamic view of the capital positions of large financial firms, it must itself respond to changes in the economy, the financial system, and risk-management capabilities.

This morning I will give a retrospective on the first five years of supervisory stress testing, highlighting some of the accomplishments and identifying some areas in which we may consider changes in the future. Then I would like to turn to a topic that has gained increasing

attention in the past couple of years--the qualitative assessment of firms' capital planning processes that we conduct in parallel with our quantitative assessment of firms' capital positions.

From SCAP to CCAR

The potential value of comprehensive stress testing had been much discussed among academics, analysts, and regulators in the years preceding the financial crisis, but only during the crisis was this supervisory tool first used at the same time across the largest firms. The Supervisory Capital Assessment Program (SCAP) demonstrated in practice, not just in theory, the value of simultaneous, forward-looking projections of potential losses and revenues based on each bank's portfolio and circumstances. The forward-looking feature overcame the limitations of static capital ratios. The simultaneity, along with stress test features such as the use of common macroeconomic scenarios, introduced a critical macroprudential dimension that offered insights into the condition of the entire financial system, including whether banks were sufficiently resilient to continue to lend to households and businesses under such adverse conditions.

The Federal Reserve's basic approach to stress testing has not changed materially since the SCAP. We continue to take a multidisciplinary approach, drawing on a wide range of staff expertise. We create hypothetical macroeconomic scenarios that incorporate an assumed sharp deterioration in economic and financial conditions. Supervisors estimate each bank's expected losses and revenues and use these estimates to project post-stress capital levels and ratios under the hypothetical scenarios. The estimated capital ratios are then compared with regulatory benchmarks. We use common scenarios for all firms; for the firms with the largest trading activities, we add a market-shock scenario that incorporates market turbulence of severity similar to that of the latter half of 2008.

While the basic approach has remained consistent, much else has changed. In the first place, of course, the requirement for stress testing has become statutory, as Congress drew on the lessons of SCAP in crafting prudential standards for large financial firms in the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act).[1] Second, the annual supervisory stress test has been incorporated into CCAR, a broader program that requires large banking organizations to submit a capital plan annually. The CCAR process gives supervisors an opportunity to evaluate plans for capital distributions against the backdrop of the firm's overall capital position under both baseline and hypothesized stressed conditions. It also provides a regular, structured, and comparative way to assess the capacity of these firms to manage their capital positions and, by implication, more generally to manage their risks. I will return to this feature of CCAR a bit later.

Third, there have been substantial enhancements to the supervisory stress test. Perhaps the most important change has been the development of independent supervisory models. Because the original SCAP was developed on the fly and under considerable time pressure, supervisors necessarily had to rely on firms' own estimates of losses and revenues as a starting point for analysis, although they evaluated the firms' estimates and made significant adjustments. In each stress test that has followed, and building upon the considerable progress in data collection, we have made completely independent estimates of a progressively greater proportion of potential net income or losses. These improvements in data and models have increased our ability to distinguish risks within portfolios.

We have also refined the formulation of the hypothetical scenarios that form the basis of the stress tests. The severely adverse scenario is designed to reflect, at a minimum, the economic

[1] Dodd-Frank Act §165(i), 12 U.S.C. §5365(i).

and financial conditions typical of a severe post-World War II U.S. recession.[2] In devising recession scenarios, we draw on many of the same macroeconomic modeling tools used in making monetary policy. Because not all significant risks facing banks are tied to the business cycle, our scenarios now incorporate other adverse developments such as an exceptionally large decline in house prices, sharp drops in the value of stocks and other financial assets, or a worsening of global economic conditions more severe than might normally be expected to accompany a deep recession in the United States. We have implemented the Dodd-Frank requirement for an "adverse," as well as a "severely adverse," scenario not by simply hypothesizing a milder recession, but by testing for somewhat different risks. The past two years we have used the adverse scenario to test the impact of a sudden, significant increase in interest rates.

More discrete changes of note include the assumption of default by each firm's largest counterparty and the incorporation of salient risks beyond those in the overall scenarios.[3] The former obviously serves a microprudential purpose, but it also could promote systemic stability objectives if it were to identify a single exceptionally large exposure for the entire financial system. The incorporation of salient risks helps to use stress tests to "lean against the wind," not just build a buffer for future losses. For example, the 2011 and 2012 scenarios incorporated possible severe stress in Europe. Inclusion of this factor may have led to greater awareness and better risk management of U.S. firms' European exposures.

[2] See Board of Governors of the Federal Reserve System (2013), "Policy Statement on the Scenario Design Framework for Stress Testing," final rule (Docket No. OP–1452), *Federal Register*, vol. 78 (November 29), p. 71443, www.gpo.gov/fdsys/pkg/FR-2013-11-29/pdf/2013-27009.pdf.

[3] See Board of Governors of the Federal Reserve System (2013), *Comprehensive Capital Analysis and Review 2014 Summary Instructions and Guidance* (Washington: Board of Governors, November 1), p. 8, www.federalreserve.gov/newsevents/press/bcreg/bcreg20131101a2.pdf.

Finally, I might mention a change made this year that actually reverted to a feature of the SCAP. We did not allow banks to assume their balance sheets would shrink in the stress scenarios as a way of meeting the minimum capital charge, something that many banks had done in the stress tests of the past few years.[4] Foreclosing this assumption serves the macroprudential goal of helping to ensure that the major financial firms remain sufficiently capitalized to support lending in a severe downturn.

As I have already suggested, we are likely to continue to hone the supervisory stress test. In particular, I expect that we will devote more attention to developing the macroprudential elements of the stress tests. For example, we might sharpen our focus on the risks to the financial system of significant common exposures among firms. We have already adjusted the market shock applied to the trading books of the six largest firms to ensure that firms are not incentivized to hold significant amounts of certain assets simply because they performed well in the second half of 2008.[5] But there is more that could be done. One idea would be to test whether individual firms that are revealed by the tests to be vulnerable to serious stress might engage in asset fire sales that could produce knock-on damage to other firms. Another would be to incorporate more assumptions pertaining to the increased cost of, or reduced access to, funding in stressed environments, when lots of credit lines may be drawn simultaneously.

In short, we do not regard the supervisory stress test and CCAR as finished products. In fact, we should *never* regard them as finished products, since to do so would be to overlook

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[4] Prior to CCAR 2014, the Board sent CCAR participants a letter detailing the Federal Reserve's procedure for independently projecting the firms' balance sheets and risk-weighted assets in the supervisory stress test and the implications of the independent projections. See Board of Governors of the Federal Reserve System (2013), "Federal Reserve Independent Balance Sheet and RWA Projections," December 16, www.federalreserve.gov/bankinforeg/independent-projections-letter-20131216.pdf.

[5] See Board of Governors of the Federal Reserve System, *2014 Supervisory Scenarios for Annual Stress Tests Required under the Dodd-Frank Act Stress Testing Rules and the Capital Plan Rule* (Washington: Board of Governors, November 1), p. 5, www.federalreserve.gov/bankinforeg/bcreg20131101a1.pdf.

changes in the real economy, financial innovations, and shifts in asset correlations across firms. But I think it fair to say that supervisory stress testing and the CCAR have already made important contributions to financial stability and, in the process, have led the way in transforming supervision of the nation's largest financial firms.

First, they have played a key role in strengthening dramatically the capital position of the industry. The firms participating in CCAR have more than doubled their tier 1 common capital since 2009, an increase of $500 billion of additional, high-quality capital in the U.S. financial system. It is noteworthy that supervisors in other countries have themselves been moving toward greater use of stress tests as a centerpiece of efforts to build strong capital positions for their banks. Most members of the Basel Committee on Banking Supervision now use some form of stress testing.[6] The European Union and the United Kingdom are currently conducting supervisory stress tests whose results will be publicly released.

Second, they have been the leading edge of a movement toward greater supervisory transparency. The Federal Reserve's decision in spring 2009 to disclose the results of the SCAP on a firm-specific basis proved to be an important step in re-establishing market and public confidence in the U.S. financial system. In the Dodd-Frank Act, Congress endorsed the practice of disclosing both supervisory and firm stress test results in normal times, as well as in crisis periods. During the past five years we have progressively increased disclosures of firm-specific information, the methodologies we use, and the details of the stress test scenarios. From the outset, we have published the broad framework and methodology used in the supervisory stress

[6] See Bank for International Settlements (2012), *Peer Review of Supervisory Authorities' Implementation of Stress Testing Principles* (Basel: BIS, April), p. 8, www.bis.org/publ/bcbs218.pdf.

test, including information about the types of models we use.[7] We solicited comments on our design framework for scenarios in 2012, and incorporated into the final document some of the ideas we received--such as providing more information about the economic and financial conditions represented by paths of the variables in the scenarios.[8] And this past spring, we published the additional set of stress test results that described how the firms would perform under the adverse scenario, in addition to the results of the severely adverse scenario, which we had previously released.[9]

Because bank portfolios are often quite opaque and thus difficult for outsiders to value, this information should allow investors, counterparties, analysts, and markets more generally to make more informed judgments on the condition of U.S. banking institutions. Coupled with other regulatory measures, this transparency should in turn increase market discipline. This level of transparency also subjects *us* to greater outside scrutiny and analysis, a process that increases our accountability as regulators and helps us improve our assumptions and methodology over time. These choices for greater transparency in the supervisory stress tests and CCAR have prompted healthy discussion on the merits of disclosure in other supervisory areas.

As I think everyone in this audience knows, we have not disclosed the supervisory models themselves. We do not want firms simply to copy our modeling in their own assessment of risks and capital needs. And we certainly do not want them to construct their portfolios in an effort to game the model--a kind of analogue to teaching to a test. But even though we do not publicly release the models, we have put systems in place to ensure oversight and accountability.

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[7] See Board of Governors of the Federal Reserve System (2014), *Dodd-Frank Act Stress Test 2014: Supervisory Stress Test Methodology and Results* (Washington: Board of Governors, March), www.federalreserve.gov/newsevents/press/bcreg/bcreg20140320a1.pdf.
[8] See Board of Governors, "Policy Statement on the Scenario Design Framework for Stress Testing," p. 71437.
[9] See Board of Governors, *Dodd-Frank Act Stress Test 2014,* p. 39.

The models are evaluated by a special model validation group made up of experts within the Federal Reserve who do not work on the stress tests. We have also created a Model Validation Council made up of outside experts to provide independent views and advice.[10]

The third important effect of the supervisory stress tests and CCAR has been to pave the way for other horizontal, simultaneous supervisory exercises. We created the Large Institution Supervision Coordinating Committee (LISCC) in 2010 to implement an approach to supervision of systemically important firms that was better coordinated, more data-driven, and more focused on the largest institutions as a group.[11] While CCAR includes a number of firms that are not in the LISCC portfolio, the stress tests and CCAR have been the proving ground for LISCC, and as the committee has evolved to administer these programs more efficiently, these exercises have shown the way to other horizontal supervisory exercises or assessments. Some, like the newer Comprehensive Liquidity Analysis and Review, which focuses on assessing liquidity sufficiency and banks' internal liquidity risk-management practices, are intended to be recurring. Others are ad hoc efforts responsive to more episodic or transitory concerns.

Fourth, and in some sense an extension of the prior point, CCAR in particular has defined an approach toward developing and maintaining better risk management within the banking organizations subject to these exercises. Let me turn now address this topic in somewhat greater detail.

Ensuring Strong Risk Management

Here again, the origins of our current program lie in our experience with the SCAP in 2009, during which we learned a great deal beyond just post-stress loss and capital numbers. The horizontal, cross-firm nature of the exercise also allowed us to evaluate and compare the

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[10] For more information about the Model Validation Council, see www.federalreserve.gov/aboutthefed/mvc.htm.
[11] For information on LISCC, see www.federalreserve.gov/bankinforeg/large-institution-supervision.htm.

effectiveness of the firms' processes for determining and addressing their own capital needs. We discovered that, at the time, many of the firms had critical deficiencies in the fundamental risk-measurement and risk-management practices necessary to assess their capital needs. Many firms did not have a systematic program for assessing their capital needs and even lacked the basic data on firm-wide risks and exposures needed to begin such a program. Not surprisingly, there appeared to be a correlation between firms found to be insufficiently capitalized to withstand further financial and economic stress and firms lacking effective processes for assessing their risks and vulnerabilities.

In response to these deficiencies, the Federal Reserve initiated the annual CCAR process for assessing the capital adequacy and internal capital planning processes of large, complex bank holding companies (BHCs). CCAR is premised on the belief that thorough, rigorous risk management must underpin all the activities of all such firms. Risks that are identified and understood can be evaluated and, where appropriate, assumed with proper safeguards and capital planning. Risks that are overlooked, misunderstood, or taken outside of a well-considered and comprehensive risk-management framework plant the seeds for serious trouble for individual firms and potentially for the financial system. Through CCAR, we have sought to ensure not only that all large BHCs have strong capital positions as determined through our supervisory stress test, but also that they have strong capital planning practices that are appropriately focused on the capital needed to withstand possible losses from the specific risks in each firm's business model. These processes, grounded in strong quantitative and qualitative risk management, also give supervisors a clearer window into each firm's activities and thus increase the effectiveness of regular supervision.

Since the first CCAR there has been notable improvement in the firms' capital planning processes. Many firms have made meaningful investments in their risk-measurement processes, including significant enhancements to their internal data and management information systems. Many firms have adopted a formal framework to inform their capital planning through an analysis of their vulnerabilities and capital adequacy under a range of potential adverse scenarios. They have also taken steps to enhance the integrity of their risk measures, analysis, and the decision-making around their capital levels and distributions.

Despite these advances, there is continuing need for improvement in the firms' capital planning processes. Some firms still lack reliable information about their businesses and exposures. Firms also are sometimes unable to measure or understand how stressful conditions can change the performance of their material business lines. In particular, the capacity to assess the impact of tail risks remains in need of further development at many firms. These deficiencies are, in some instances, compounded by weak oversight by senior management and boards of directors, and lack of effective checks and accountability in the process.

The Qualitative Assessment in CCAR

The importance we attach to these risk-management and capital planning processes is reflected in the component of CCAR known as the qualitative assessment. This assessment covers a range of topics, including the extent to which the design of a firm's internal scenario captures the specific risks from the firm's activities, the firm's methods for projecting losses under stress scenarios, and how the firm identifies appropriate capital levels and plans for distributions. As detailed in our CCAR regulation, where these processes are found to be inadequate, or to raise safety and soundness concerns, they may form the basis for an objection

by the Board of Governors to the capital distribution plans of a firm.[12] If a firm's internal processes are unreliable, supervisors will necessarily be concerned that a firm may not properly have assessed risks clearly and, where needed, assured adequate capital for the many risks that cannot be fully captured by standardized stress tests.

As the process and expectations for the quantitative test have become better understood, attention has shifted a bit to the qualitative assessment. To place that part of the CCAR in context, let me make several additional points.

First, as I have already noted, many firms had a long way to go to meet high standards of capital planning backed by strong risk management when we began CCAR. Given that initial gap, we have allowed time for firms to work toward full achievement of those standards. Thus, what may be perceived as a raising of the bar every year is better understood as our effort to provide a demanding, but still realistic, glide path for firms to reach that goal. We do, however, expect firms to continue to make steady progress each year.

Second, the horizontal nature of the qualitative assessment does not mean that every year one or more firms must receive an objection on qualitative grounds. The comparative approach helps ensure that firms are evaluated consistently and fairly. And it does allow us to see where specific firms may be outliers from good practices followed in the rest of the industry. But this is not a PGA tournament--there is no foreordained cut that some participants will miss.

Third, while there are minimum standards for all CCAR firms, the standards are more stringent for firms of greater systemic importance.[13] It is not enough for the largest and most

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[12] See 12 CFR 225.8(e)(2)(ii).

[13] It is also worth emphasizing that both elements of CCAR--the qualitative and the quantitative assessments--only apply to BHCs with $50 billion or more in total consolidated assets. The Dodd-Frank Act requires companies with between $10 and 50 billion in assets to conduct an annual company-run stress test. The Federal Reserve does not conduct a CCAR-like exercise to evaluate these company-run stress tests, although we do review the firms'

complex banking organizations to meet only the minimum standards in CCAR. We expect the more systemically important firms to establish and maintain the most sophisticated risk-management and capital planning practices. Their risk management and capital adequacy should be sufficiently strong to help ensure their resiliency to a range of unexpected stress events, since their distress could pose a threat to the financial system and to the broader economy.

Fourth, precisely because of its importance to our supervisory program, the qualitative assessment will continue to be progressively more integrated into year-round supervision of the CCAR firms. While some important features of capital planning are observable only during the formal CCAR process, most of the risk-management and capital planning standards incorporated in CCAR are operative and observable by supervisors throughout the year. These should be an important focus of ongoing supervisory oversight and of discussions between firms and supervisors. Only in unusual circumstances should supervisors learn for the first time during CCAR of significant problems in the quality of the capital planning processes, and only in unusual circumstances should firms be surprised at the outcome of the qualitative assessment.

We have already taken steps to further this integration of CCAR and regular supervision. At the end of each CCAR process our supervisors send to each firm a letter detailing their conclusions concerning the qualitative assessment. To the extent weaknesses or areas for improvement are identified, those letters provide a basis for regular stocktaking by both firms and supervisors. More generally, last year we released a paper on our expectations for all aspects

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company-run stress tests and capital planning processes in the normal course of supervision. This review is tailored to the smaller size, reduced complexity, and limited systemic risk of these firms. See footnote 5, p. 14160, of Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and Office of the Comptroller of the Currency (2014), "Supervisory Guidance on Implementing Dodd-Frank Act Company-Run Stress Tests for Banking Organizations with Total Consolidated Assets of More Than $10 Billion but Less Than $50 Billion," final supervisory guidance (Docket No. OCC–2013–0013), *Federal Register*, vol. 79 (March 13), www.gpo.gov/fdsys/pkg/FR-2014-03-13/pdf/2014-05518.pdf. For other, smaller banking organizations--those with $10 billion or less in total consolidated assets--there is no supervisory expectation or regulatory requirement that these firms will conduct capital stress testing.

of capital planning, providing greater detail than what is included in the annual CCAR instructions.[14]

I anticipate that we will take additional steps to integrate ongoing supervisory assessments of risk-management and other internal control processes with the annual CCAR exercise, and to assure that communications in both directions are heard. One such step has just recently begun: The committee chaired by senior Board staff that is responsible for the oversight of CCAR, supported by the relevant horizontal assessment teams, will directly engage with firms during the course of the year to evaluate progress in remediating weaknesses or other issues identified in the post-CCAR letters. Increasingly, our regular supervisory work on topics such as risk-identification and internal audit will focus on processes that are critical to risk management and capital planning at the firms, areas of focus for CCAR. The aim of these and additional measures is to make CCAR more the culmination of year-round supervision of risk-management and capital planning processes than a discrete exercise that takes place at the same time as the supervisory stress tests.

Finally, I would note that, to provide investors, counterparties, analysts, and the public with better information on the meaning of an objection on qualitative grounds to a capital distribution plan, we now release our decisions on each capital plan and, for firms whose capital plans were objected to, provide a summary of the specific reasons for those objections.[15]

Conclusion

Although strong capital regulation is critical to ensuring the safety and soundness of our largest financial institutions, it is not a panacea, as indeed no single regulatory device can ever

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[14] See Board of Governors of the Federal Reserve System (2013), *Capital Planning at Large Bank Holding Companies: Supervisory Expectations and Range of Current Practice* (Washington: Board of Governors, August), www.federalreserve.gov/bankinforeg/bcreg20130819a1.pdf.
[15] See Board of Governors, *Comprehensive Capital Analysis and Review 2014*, p. 7.

be. Similarly, supervisory stress testing and CCAR, while central to ensuring strong capital positions for large firms, are not the only important elements of our supervisory program. Having said that, however, I hope you will take at least these three points away from my remarks today.

First, supervisory stress testing has fundamentally changed the way we think about capital adequacy. The need to specify scenarios, loss estimates, and revenue assumptions--and to apply these specifications on a dynamic basis--has immeasurably advanced the regulation of capital adequacy and, thus, the safety and soundness of our financial system. The opportunities it provides to incorporate macroprudential elements make it, in my judgment, the single most important advance in prudential regulation since the crisis.

Second, supervisory stress testing and CCAR have provided the first significant form of supervision conducted in a horizontal, coordinated fashion, affording a single view of an entire portfolio of institutions, as well as more data-rich insight into each institution individually. As such, these programs have opened the way for similar supervisory activities and continue to teach us how to organize our supervisory efforts in order most effectively to safeguard firm soundness and financial stability.

Finally, supervisory stress testing and CCAR are the exemplary cases of how supervision that aspires to keep up with the dynamism of financial firms and financial markets must itself be composed of adaptive tools. If regulators are to make the necessary adaptations, they must be open to the comments, critiques, and suggestions of those outside the regulatory community. For this reason, transparency around the aims, assumptions, and methodologies of stress testing and our review of capital plans must be preserved and extended.

With that point, I end where I began--by emphasizing the importance of forums such as this one, and thanking you for your participation.