Beverly Hirtle: Structural and cyclical macroprudential objectives in supervisory stress testing

Remarks by Ms Beverly Hirtle, Executive Vice President and Director of Research of the Federal Reserve Bank of New York, at the conference "The Effects of Post-Crisis Banking Reforms", Federal Reserve Bank of New York, New York City, 22 June 2018.

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Good morning. It is my pleasure to make the opening remarks at this conference on post-crisis regulatory reform in the banking industry. It's exciting to see such a distinguished group of researchers and supervisors in the room, all focused on developing a deeper understanding of the effects of the many significant regulatory changes that were put in place in response to the global financial crisis. I hope that the day is filled with productive discussion and debate. And, before I continue, I want to note that my comments today reflect my own views and not necessarily the views of the Federal Reserve Bank of New York or the Federal Reserve System.

We are approaching the ten-year anniversary of the worst financial crisis in generations. Many regulatory and supervisory reforms have been made since, including changes to regulatory capital requirements, the introduction of new liquidity requirements, the redesign of the supervisory program for systemically important banks by the Federal Reserve's Large Institution Supervision Coordinating Committee (LISCC), the introduction of the Comprehensive Capital Analysis and Review (or CCAR) program, requirements about recovery and resolution planning, and myriad other regulations under the Wall Street Reform and Consumer Protection Act (Dodd-Frank Act).

In my remarks today, I want to focus on one particular post-crisis change, the introduction of supervisory stress testing, as embodied in CCAR and the stress tests required by the Dodd-Frank Act (DFAST). In my personal view, supervisory stress testing and the CCAR are the most significant and impactful of the many regulatory and supervisory changes implemented following the global financial crisis. The CCAR and stress testing introduced a forward-looking perspective to capital adequacy and capital planning, something that static book-value-based regulatory capital measures lacked. We felt this acutely during the financial crisis, when market values of bank equity plunged while book values evolved only very slowly, based on accounting measures of losses. Aside from the stress-test-based quantitative requirements, the CCAR also requires large complex banks to do systematic capital planning, including developing criteria for when dividends and share repurchases will be made, increased or curtailed. This is an important innovation, as banks were slow to reduce dividends during the financial crisis, even as losses mounted and share prices fell.[1]

I want to examine supervisory stress testing through the lens of a paper I wrote in 2009 with former colleague Til Schuermann and current colleague Kevin Stiroh, now head of the New York Fed's Supervision Group.[2] That paper looked at the very first set of stress tests conducted by the Federal Reserve and other federal banking supervisors. The Supervisory Capital Assessment Program, or SCAP, was a watershed moment in the financial crisis. The program covered the 19 largest domestic bank holding companies—firms with assets of at least $100 billion—accounting for two-thirds of the assets and one-half of the loans in the U.S. banking system at that time. Collectively, these firms spanned nearly every business area in the U.S. banking industry—including commercial and consumer lending, real estate lending, trading, derivatives, custody services and investment banking.

The key point in our paper was that the SCAP was a program that used microprudential supervisory tools to achieve macroprudential objectives. I am sure that everyone here is familiar with these two terms, but let me provide a quick overview. *Microprudential* objectives focus on the health, performance, safety and soundness of individual firms. This was the perspective that

dominated supervision prior to the financial crisis. In contrast, *macroprudential* objectives focus on the stability and performance of the entire banking and financial system, emphasizing links among firms, how their activities can interact and the impact of the financial sector on the broader economy. This perspective has become more prominent since the global financial crisis.

Macroprudential objectives can themselves be divided into two distinct groups. The first is what might be called *structural objectives*, which focus on the impact large, systemically important institutions have on the rest of the system when they fail or become distressed. Structural macroprudential objectives motivate regulatory tools such as additional capital requirements for systemically important banks ("SIFI surcharges"), which aim to reduce the probability that a large institution fails, and resolution and recovery planning, which seeks to limit the damage in the event of failure.

The second set of macroprudential objectives are *cyclical objectives*, focusing on the build-up of risks during credit and asset price booms and the consequent pull-back in financial intermediation during periods of stress. Cyclical macroprudential goals motivate regulatory and supervisory tools that "lean against the wind" in good times and "lean into the wind" during stress, such as the countercyclical capital buffer, the design of stress test scenarios, and time-varying loan-to-value restrictions, which are imposed in some countries.

The macroprudential objectives of the SCAP reflected both structural and cyclical concerns. The primary goal was to ensure that large banks had sufficient capital to withstand an even-worse-than-expected economic downturn and still be able to lend—a structural perspective. Each of the 19 banks was required to raise additional capital if the stress tests indicated a shortfall relative to the supervisory target. However, the SCAP's objectives also embodied cyclical concerns, namely, to provide confidence that banks could continue current lending ("leaning into the wind") and thus reduce the likelihood of a worse-than-expected economic outcome.

In the paper, we identified six elements that we argued made the SCAP a successful macroprudential exercise: comprehensiveness; consistency; multiple, independent estimates; diverse perspectives; transparency of process and results; and clear and predictable goals and actions. Today I will use these elements to talk about the current supervisory stress testing regime and assess whether it continues to address macroprudential objectives. I should note that my focus today is on the broad structure of supervisory stress testing and not on any specific set of stress test results. As you know, the 2018 DFAST results were released yesterday and the corresponding CCAR results will be released next week. I am not going to discuss these results or draw any inferences from them.

Comprehensiveness

Let me start the discussion with the first of the elements: comprehensiveness. As noted, the set of banks participating in the SCAP accounted for a large portion of the assets and loans in the U.S. banking industry and spanned nearly all significant banking industry activities. In 2009, we argued that this comprehensiveness was essential in achieving the SCAP's macroprudential goals as the collective stress test results provided a view into a large share of the industry. More important, through the subsequent capital raises, the SCAP helped ensure that this large segment was sufficiently well capitalized to provide a buffer to the broader economy against possible future bad outcomes.

After the SCAP, the Dodd-Frank Act expanded the set of banking companies subject to supervisory stress testing to include all bank holding companies with assets exceeding $50 billion—about another 15 to 20 firms, including the U.S. operations of many large, foreign-owned banks. In 2018, a total of 35 firms participated in the CCAR and DFAST stress tests. However, with the recent passage of the Economic Growth, Regulatory Relief and Consumer Protection Act, many of these will no longer be subject to DFAST supervisory stress testing or could

participate only on a periodic basis. The very largest and most systemically important firms, including all domestic bank holding companies with assets exceeding $250 billion, will continue to be required to participate in DFAST supervisory stress testing on an annual basis.

These recent changes are consistent with an emphasis on structural macroprudential concerns, in that they focus the DFAST stress tests on the set of firms that are individually the most systemically important. The intention seems to be to balance the burden of the supervisory stress testing regime against the negative impact that distress at one of these firms could cause to other banks and the rest of the financial system—part of the broader tailoring of the regulatory framework to the size and risk profile of different types of institutions.[3] At the same time, however, reducing the set of firms subject to annual DFAST supervisory stress testing seems less consistent with cyclical macroprudential concerns, as it could narrow the window that stress test results provide on the build-up of risks and the loss-absorbing capacity of the banking system. Whether the set of banks that continue to be subject to annual DFAST supervisory stress testing represents a large enough share of the overall banking industry and sufficiently spans the range of banking activities to provide a comprehensive perspective is something that merits monitoring and analysis.

Consistency

The second element we identified as contributing to the SCAP's macroprudential effectiveness was consistency. In the SCAP, as in the current supervisory stress testing regime, all banks were subject to the same hypothetical stress scenario—that is, the same set of assumptions about the path of economic activity, interest rates, asset prices and volatility over the future stress test horizon. In SCAP, the scenarios were defined in a very parsimonious way, using just three variables (GDP growth, unemployment and housing prices). In contrast, the current supervisory stress test scenarios involve more than two dozen variables describing U.S. and foreign economic activity, interest rates and asset prices.

Then, as now, the common scenario provided a consistent framework for assessing the vulnerability not just of the individual banking companies, but of the banking system as a whole. This consistency is especially important to address cyclical macroprudential objectives, as it provides a unified assessment of the performance of the overall industry. And of course the stress scenarios are themselves an important cyclical macroprudential element, as they are designed to impose more stress—in particular, a larger increase in the unemployment rate—during periods of strong expansion.

But a single scenario will not be equally stressful for all firms. Depending on each firm's business focus, geographic reach and customer base, any single scenario will result in variable degrees of stress, potentially undercutting structural macroprudential objectives. In the current stress testing regime, the bank-generated stress tests required as part of the CCAR go a long way to addressing concerns that stress tests based on a single supervisory scenario will not be tailored enough to expose capital vulnerabilities at all firms. In these exercises, banks are supposed to identify scenarios that are uniquely stressful to them. Evaluating these scenarios to ensure that they capture firm-specific risks is a key part of the CCAR qualitative review. This seems a very constructive way to think about consistency across firms, with the emphasis on each firm having robust risk identification and thorough consideration of the kinds of stress environments that would uniquely test its business model.

Multiple, Independent Estimates and Diverse Perspectives

Our 2009 paper described the benefits of the SCAP's use of multiple, independent estimates of losses, revenue and expenses, as well as bringing diverse perspectives to bear on the design and implementation of the exercise. At that time, the technology of firm-wide stress testing was in its infancy, and the SCAP results were based on a combination of bank-generated estimates,

(somewhat primitive) supervisory models, and high-level "top down" estimates of possible stressed loan losses. Given the early state of the art, the SCAP team brought together supervisors, economists, attorneys, accountants, financial analysts, regulatory capital experts and others from the Fed and the other supervisory agencies involved in the program. This kind of multi-disciplinary approach is now embedded in many aspects of supervision, including the LISCC, which includes economists, attorneys and financial market experts, as well as supervisors.

The blending of bank-generated and supervisory estimates may be the aspect of the supervisory stress testing regime that has evolved most significantly since the SCAP. Supervisory stress test results are now based on models developed by supervisors that rely on detailed firm-specific data filed through regulatory reports, so the results now represent a fully distinct and independent supervisory view.[4] And, as described above, banks are required to generate their own stress test estimates. Public disclosure of both sets of results based on the common supervisory scenarios has provided diverse perspectives on banks' capital vulnerabilities.

Diverse perspectives, especially those from outside the banking industry and supervisory community, continue to be critical in supporting stress testing's macroprudential objectives. Academic economists can play an especially important role in helping to foster innovation and creativity by advancing thinking on stress test scenario design and on modeling techniques that better capture the impact of the external environment on bank financial condition. A particularly ripe area for fresh thought, in my view, concerns modeling revenues and non-credit expenses—so-called pre-provision net revenue, or PPNR—an area that is notoriously difficult to assess. More broadly, developing practical ways to model realistic interactions among banks and other financial institutions and between the financial and real sectors of the economy would be important advances.

Transparency of Process and Results

The next element we identified as contributing to the SCAP's success as a macroprudential exercise was transparency, both of the process and, especially, of the results. The SCAP was groundbreaking because it disclosed firm-specific supervisory estimates in detail, including loss amounts and rates on different types of loans, projections of net revenues, and the amount of capital each firm would have to raise to meet publicly disclosed supervisory targets ratios. These disclosures formed the template for subsequent DFAST and CCAR stress test results. Current stress test disclosures deliver not just insight into individual banks' ability to withstand stressful economic outcomes, but also provide a broader perspective about the exposure of different segments of bank lending, securities and other activities to adverse economic and financial market developments. These segment-level results, aggregated across banks, are important because they have the potential to serve as public warning signals about over-heating or a build-up of risk that can supplement other cyclical macroprudential analysis.

While the transparency of the supervisory stress test results was a groundbreaking element of the SCAP in 2009, subsequent discussion has focused largely on the transparency of the *process* of generating the results, in particular, information about supervisory stress test models. The Fed discloses descriptive information about the models, including the general statistical approach and key variables, but does not release the code or detailed equation estimates. Industry groups and individual banks have called for the Fed to release more detail about its models, including the specific formulas and equations.[5]

On one level, full disclosure of the Fed's supervisory stress test models might seem like good public policy. Such disclosures would provide insight into how the stress test calculations are made, making the results predictable to the banks subject to the tests. Greater predictability of the stress test results could enhance banks' ability to do capital planning, because any constraints arising from the supervisory stress test results would be known *ex ante*. Detailed

disclosures could also enhance the credibility of the stress test regime by allowing external parties to critique the Fed's models, a form of "peer review" that could lead to improved modeling techniques or identify areas of emerging risk that the Fed's models do not adequately capture.

But these benefits could come at significant cost to the broader goals of the supervisory stress testing regime. My co-author, Til Schuermann, has argued that increased reliance on supervisory models, especially in the context of the CCAR program, provides powerful incentives for banks to abandon innovation in stress test modeling and instead devote their energy to mimicking the Fed's models. In the extreme, these incentives could result in "model monoculture," in which all actors use very closely related models.[6] This risk becomes especially acute the more is known about the details of the supervisory models.

A lack of modeling diversity would be especially concerning from a macroprudential perspective, since it would mean that the entire industry would be capturing the same risks in the same way —a form of collective blindness to new industry practices and products and emerging risk developments. As important, banks have incentives to optimize around the stress test and other risk models, engaging in strategies that maximize returns while minimizing measured risk exposures. Widespread use of very similar models could mean widespread loading on the same kind of risks and adopting the same hedging or mitigation techniques—increasing systemic risk.

A final concern that I want to mention is based less in economic theory and more on the practical realities of implementing and updating regulations. The more stress test models are "hard coded" in regulation, the more difficult it is to change them as modeling practices improve or as new risks emerge. The models and parameters can quickly become stale and inferences from the models inaccurate. For those interested in a real-life case study of such an outcome, I recommend a paper by Scott Frame, Kristopher Gerardi and Paul Willen about the stress test models used by OFHEO, the agency that oversaw Fannie Mae and Freddie Mac before the financial crisis.[7] The paper documents the large understatement of the agencies' credit risk exposures stemming from "hard coded" models that failed to capture innovation in mortgage underwriting.

In fact, the Fed has proposed additional disclosures about its stress test models, including indicative loan loss rates and loss results based on standardized portfolios.[8] These enhanced disclosures aim to provide greater insight into the Fed's modeling approaches and thus to facilitate "peer review," while maintaining the rigor of the stress testing regime. This is another area where academic economists can help enrich the debate. There is already a literature on the impact of the disclosure of supervisory stress test results;[9] that literature could usefully be extended to consider the impact of underlying model disclosure, especially in the context of macroprudential goals.

Clear and Predictable Goals and Actions

The final element we identified supporting the macroprudential goals of the SCAP was that the exercise had clear and predictable objectives and actions. Our paper argued that the financial crisis environment gave the SCAP a very clear goal of providing confidence that the banking system could continue to lend even under more dire economic conditions as a way of mitigating the chance that those dire economic conditions actually materialized. In that sense, the SCAP was very much a "lean into the wind" macroprudential exercise.

In the current environment, I'd argue that the goals of the supervisory stress testing regime are more diffuse. There are clearly microprudential "safety and soundness" objectives related to sound capital planning, risk identification and capital adequacy at each of the firms participating in the exercise. These are critically important objectives. The focus on the largest, most systemically important banks also seems consistent with the structural macroprudential channel

—by reducing the risk that these most systemic firms become distressed, we reduce the risk of the externalities that such distress places on other financial institutions and, most important, on consumers and businesses.

What is less clear to me is what role cyclical macroprudential concerns play in the evolving stress testing regime. Clearly, the design of the stress test scenarios, which embed a number of counter-cyclical features, is an important channel for "lean against the wind" or "lean into the wind" efforts. However, narrowing the set of firms subject to DFAST supervisory stress testing potentially pushes away from the broader cyclical perspective. Less of the banking industry will be covered by the stress tests and assessments of the strength of the industry will be based on a smaller part of the whole.

In pointing out these implications, I am not making any judgments about whether the focus on microprudential and structural macroprudential goals is optimal from a public policy perspective. In my view—and I really cannot say this strongly enough—ensuring that the largest and most systemically important banks do robust capital and liquidity planning, have strong internal controls, do good risk identification and have very healthy amounts of capital (especially common equity) and liquidity resources is fundamental to fostering a stable banking system that can perform its critical financial intermediation role in both calm and stressed economic environments. What I hoped to do today is simply to point out that one of the key objectives of the original SCAP stress program—leaning into the wind during a severe economic downturn—might be getting less emphasis as the time since the financial crisis grows, the economic expansion continues, and the supervisory stress testing regime evolves.

Thanks for your attention this morning. I hope that you enjoy the rest of the conference.

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1 See, for example, Viral Acharya, Irvind Gujral, Nirupama Kulkarni and Hyun Song Shin. 2012. "Dividends and Bank Capital in the Financial Crisis of 2007–2009." *CEPR Discussion Paper* No. 8801. February 2012; Beverly Hirtle. "Bank Holding Company Dividends and Repurchases during the Financial Crisis." Federal Reserve Bank of New York *Staff Report* No. 666. March 2014; and David S. Scharfstein and Jeremy C. Stein. 2008. "This Bailout Doesn't Pay Dividends." *New York Times*. October 21, A29.

2 Beverly Hirtle, Til Schuermann and Kevin Stiroh. Macroprudential Supervision of Financial Institutions: Lessons from the SCAP, Federal Reserve Bank of New York *Staff Report* no. 409. November 2009.

3 Randal K. Quarles. Early Observations on Improving the Effectiveness of Post-crisis Regulation, Speech at the American Bar Association Banking Law Committee Annual Meeting. January 19, 2018.

4 An important exception to this is that losses on trading book positions and counterparty exposures as a result of the global market shock continue to be based on sensitivities generated by bank models.

5 The ClearingHouse. The ClearingHouse Offers Recommendations to Improve Stress Testing Transparency, January 22, 2018.

6 Til Schuermann. "The Fed's Stress Tests Add Risk to the Financial System." *Wall Street Journal*. March 19, 2013.

7 W. Scott Frame, Kristopher Gerardi and Paul S. Willen. The Failure of Supervisory Stress Testing: Fannie Mae, Freddie Mac and OFHEO, Federal Reserve Bank of Atlanta *Working Paper* 2015–3. March 2015.

8 Board of Governors of the Federal Reserve System. Federal Reserve Board requests comment on package of proposals that would increase the transparency of its stress testing program, December 7, 2017.

9 See, for instance, Itay Goldstein and Haresh Sapra. "Should Banks' Stress Test Results be Disclosed? An Analysis of Costs and Benefits." *Foundations and Trends in Finance*. Vol. 8. March 2014.