Randal K Quarles: Themistocles and the mathematicians – the role of stress testing

Speech by Mr Randal K Quarles, Vice Chairman for Supervision of the Board of Governors of the Federal Reserve System, at the Federal Reserve Bank of Atlanta, Atlanta, Georgia (via webcast), 25 February 2021.

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One of the principal themes of human history—and certainly of economic history—is that of a sudden technological breakthrough originally deployed for one purpose being gradually refined over time until new and better versions of it are eventually deployed for a much broader range of purposes. The breakthrough supplies the drama, but it's the steady incremental improvement over time that makes the greatest difference. The Phoenicians dramatically improved the speed and cargo load of their commercial voyages with the invention of the trireme—massive boats, powered with three tiers of oarsmen, rather than the standard one or two—dispatched from Tyre and Sidon in the service of exploration, commerce, and colonization. But the Greeks improved on the design, bit by bit, and over many years, until they became not commercial vessels ferrying cargo from Carthage to Cádiz, but warships that revolutionized naval combat and enabled Athens—led by the obstinate upstart Themistocles who built a fleet of 200 triremes, the largest navy Greece had ever seen—to challenge and defeat the Persian King. Or, somewhat closer to home, consider the development of radar in World War II. That initial innovation was instrumental in winning the war but continued refinement has led to technologies that can promptly warn us of tornados or even steer our cars.

In the world of bank supervision, our equivalent of the trireme has been the stress test. The initial innovation of stress testing gave us an urgently needed tool to measure how much additional capital banks with mounting losses needed to survive the financial crisis more than a decade ago. But because we continued with the refinement, we now have a tool that also helps us to set capital requirements credibly in the banking system, in good times as well as times of financial stress.

Today, I'd like to share with you my perspective about how stress testing has enhanced the credibility of our capital adequacy framework, highlight some features of the upcoming stress test, and offer some thoughts on the importance of continued innovation in supervision. In particular, I will discuss how stress testing serves as both a general tool to set bank capital requirements throughout the credit cycle and recently as a specialized tool to provide an analytical grounding for the decisions we have made on capital distributions during the COVID event. Then I will briefly review the recently released scenario for the 2021 test and discuss other changes for the upcoming stress testing cycle.

The 2020 Stress Tests

We now use stress testing in two important but different ways: to set capital requirements during normal times and to assess capital adequacy during exigent times. In March of last year, the Board of Governors finalized the stress capital buffer requirement, which uses the Fed's stress test results to set capital requirements for large banks, and by doing so, simplified our overall capital regime.

While this new framework has the same goal as the previous Comprehensive Capital Analysis and Review (CCAR) framework—using forward-looking analysis to help ensure that banks have sufficient capital to survive a severe recession while still being able to lend to businesses and household—it integrates our stress testing regime with our ongoing capital requirements so that large banks now have a single suite of dynamic and risk-sensitive capital requirements. While that framework is simpler, it is no less stringent than the CCAR framework—a framework that

contributed to a more than doubling of the common equity ratio at banks between 2009 and 2019. At the time we made the stress capital buffer final last March, we estimated that the stress capital buffer would have further increased capital requirements for the largest and most complex banks. By design, the new framework better captures systemic risk by requiring those banks to establish a buffer to absorb losses they'd take in a severe recession in addition to their G-SIB surcharges.

It is useful here to pause and put stress testing in the context of bank supervision in general. Both supervision and stress testing specifically have roles during normal times as well as times of stress, but those roles are somewhat different depending on the circumstances. Like all supervision, stress testing conducted during normal times of solid economic growth and financial stability is aimed at helping ensure banks remain in safe and sound condition. We use it to set the capital buffers, which give firms incentives to hold capital during normal times, so they are prepared to weather downturns. During periods of economic and financial turmoil, the goals shift to understanding banks' exposure to the turmoil and to ensuring that banks can support households and businesses by continuing to lend. The modern bank stress testing regime was born in the solvency crisis of 2009 but remains a flexible tool that can be used to understand the implications of a range of macroeconomic and financial conditions.

That includes conditions that few could have imagined, such as those that descended last spring. The temporary shutdown of large segments of the economy caused an unprecedentedly large and swift drop in economic activity. Equally unprecedented was the degree of uncertainty, both downside and upside, about how the economy would progress throughout the remainder of 2020.

We responded to that abrupt change in environment by adapting stress testing to conduct a sensitivity analysis, an application of the stress testing models used to inform the Board of Governors about risks to bank solvency during those rapidly changing conditions. The sensitivity analysis we conducted was possible because we routinely collect standardized data from banks on their exposures and have developed our own loss and income models at the Fed. Thus, we were able to conduct this analysis purely internally, without putting additional burdens on banks during an already-difficult time. That analysis used the same models as the regular stress test, but we made several changes with the goal of gaining a real-time understanding of the implications for bank capital of quite plausible downside scenarios. The sensitivity analysis included three additional scenarios that reflected the potential economic implications of the COVID event, as we understood them at the time. We also incorporated targeted adjustments to account for material changes to bank balance sheets resulting from the COVID event, such as large drawdowns on corporate credit lines.

At that time of great uncertainty, this sensitivity analysis helped sharpen our understanding of how banks might fare under the wide range of possible paths of the economy. We published that analysis to bolster public confidence in the financial system by providing a rigorous and timely assessment of the condition and prospects for the banking sector, based on data and well-established analytical methods. The additional analysis gave the public a view into the intellectual underpinnings of the policy actions the Board took, which included special limitations on—but not a complete elimination of—capital distributions and a requirement for all firms to re-assess their capital needs and submit another capital plan in late 2020 in light of the economic uncertainty. The December round of stress tests that followed informed an adjustment to and extension of the distribution limitations into the first quarter of 2021, and we are continuing to use insights from the stress tests as we consider when to lift the limitations.

Throughout the COVID event, the stress test has provided analysis necessary to tailor our actions to the risks we faced, and we have used the results from it to provide the public with transparency into the analysis that informs our decisions. The investment we've made in the Fed's own stress test models gave us an extra tool relative to regulators in other jurisdictions,

who generally rely on banks' own models for projections of losses and revenues in their supervisory stress tests. While those other jurisdictions cancelled or postponed their scheduled stress tests to avoid putting additional burdens on banks to run models during a period of financial stress, we expanded our internally-run analysis to meet the evolving conditions. We used the opportunity to inform ourselves about the impact of various plausible paths that the recovery might take and to provide the public with more frequent assessments of bank health. And as a result of the measures taken by the Board and the banks, U.S. bank capital levels actually increased last year, despite substantial increases in loan loss reserves—funds that banks set aside to cover expected losses. The aggregate common equity ratio across large banks increased from 12 percent at the end of 2019 to 12.8 percent at the end of 2020. During this same time, large banks built roughly $90 billion in loan loss reserves.

It may not have been possible to use stress testing in such a central way had we not done the work to establish its credibility over the past decade. That credibility is built on a foundation of cutting-edge models, which estimate how different bank assets would respond to economic stresses. Our careful execution of those models allows us to confidently disclose detailed results to the public. Those innovations prepared us to adapt quickly and respond to the unprecedented shock associated with the COVID event, which confirmed that stress testing is still effective in these unprecedented times.

The Fed's stress testing models are subject to continual development by experts in credit risk measurement, borrower behavior, and financial markets. Like a barometer, the models give us an early warning of stormy financial conditions ahead by distilling bank positions and scenarios into estimates of potential losses and revenues. These models are reviewed by a group of experts inside the Fed but outside the stress testing process that challenges their assumptions, further improving their credibility. The models span all material exposures held by banks, providing a comprehensive assessment of the risks different types of scenarios pose to overall bank capital.

Our disclosures of the results stemming from those models, along with transparency about the model assumptions, have given banks, markets, and the broader public a lens through which to understand risk in the system. We have built credibility over time through our consistent and increasingly detailed public disclosures. For nearly a decade, we have published the scenarios and results, and a few years ago we greatly expanded our disclosure of the modeling methodology in an additional annual publication.

Looking Ahead to the 2021 Stress Test

Continuing in that tradition, two weeks ago we initiated the 2021 stress test with the publication of this cycle's stress scenarios. As we've said many times, the scenarios are not projections or predictions. They are designed according to a longstanding framework that we published after incorporating feedback from the public. This year, the macroeconomic scenario envisions a severe global recession accompanied by a period of heightened stress in U.S. commercial real estate and corporate debt markets. As discussed in recent financial stability reports, the current environment presents unique challenges for those asset classes, and our focus on them in the scenarios is consistent with the salient risks they pose to banks. The scenario layers additional significant stress on top of the stress already absorbed by banks over the past year, with the unemployment rate rising back to nearly 11 percent and stock prices falling more than 50 percent.

In March, we will publish the details of the methodologies that underlie our models. This will mark the third year since we enhanced the disclosures to provide significantly more information about the stress testing models relative to earlier years. That information includes ranges of loss rates, estimated by using the models, for actual loans held by CCAR firms; portfolios of hypothetical loans with loss rates estimated by the models; and more detailed descriptions of the models,

such as equations and key variables that influence the results of the models. These disclosures enhance the ability of the public to understand and interpret the supervisory stress test results. And as I've noted before, I believe these enhanced disclosures have been a step in the right direction toward striking the right balance between rigor and transparency. They do not reveal everything about our models—lest we find ourselves in a "model monoculture" where supervisors and banks converge on the same sets of risks, ignoring other potential problems.

In June we'll publish the firm-level results from the test. Though 2021 is a year in which smaller firms are not subject to the supervisory stress test, the Board recently made final a rule that will allow them to opt in. Should they do so, their results will also be disclosed, and their stress capital buffers will be updated using the stress test results we publish in June. These actions, including greater transparency around our stress testing models and greater flexibility in our stress testing process for smaller firms, represent innovations that I believe help to improve the effectiveness and efficiency of supervision.

Future Innovation in Stress Testing

As we look to the future, the Fed must continue to innovate so that stress testing remains effective. In the near term, we must strive to understand the implications of the COVID event on how we measure financial risk. Borrowers are facing unemployment, cash flow disruptions, and continued economic uncertainty. The programs put in place to help those borrowers are critical for our recovery but will further complicate risk modeling as borrower stress may be obscured by temporary stimulus. For example, it is difficult to tell whether a borrower who has continued to make loan payments during the COVID event is able to do so because of stimulus payments or because they have continued to earn income. Borrowers benefitting from temporary forbearance may or may not be able to resume payments once the forbearance ends.

Over the longer term, we must continue to sharpen our thinking around the interrelationships between bank risk and broader changes, such as advancing technologies and growth in non-bank finance. Those forces are undoubtedly altering bank risk, and it will take creative and timely research to understand the implications. Our agenda also includes initiatives that could reduce the volatility in the stress test results without sacrificing either their probative value or their rigor. We will continue to explore those possibilities.

At the same time, we regularly get calls from the public to review various aspects of our models. For example, in recent years, representatives from an affordable housing group noted that the global market shock for real estate investments also affected certain lower-risk public welfare investments, thereby discouraging investment in affordable housing. We deliberatively studied the issue, concluded that the public welfare investments indeed posed a lower risk to bank capital than the other real estate investments, and adjusted downward the shock we apply to those investments in advance of the 2020 stress test.

More recently, we received feedback from banks via appeals of their stress capital buffers. I was encouraged by the fact that a number of the issues the banks raised were already on our research agenda. The banks, however, did raise issues relating to interest rate hedges, loss-sharing agreements, and loans that use fair value option accounting that the Board directed staff to investigate and address promptly. I am hopeful that the feedback we receive from the public as well as our own analysis will help us set the right priorities in our research and development work.

But innovation is not just about improving tools like stress testing. It is also about identifying new ways to apply those tools to a broader set of problems faced by the Board, in supervision, and perhaps beyond. The sensitivity analysis I described earlier demonstrates how we are able to adapt and apply a familiar tool in a new way to conduct critical analysis at a critical moment.

Drawing on that experience, I believe there is a need for more data and data-driven analysis

broadly in supervision, which is related to the larger goal of enhanced transparency. Important aspects of supervision are appropriately private, to protect a bank's confidential business information and to avert speculation about a bank's finances that could be destabilizing. And not every aspect of a supervisor's work can be quantified. But I believe that there is room for supervisors to be more transparent about their analytical processes in general, and more forthcoming about the data used as the basis for supervisory judgments. Stress testing can serve as an example of what may be possible as we explore those avenues. Themistocles saw the possibilities of an evolving technology in a changing world. That applies, too, to the ongoing work of reviewing, adjusting and improving supervision and stress testing to ensure that banks can continue supporting households and businesses in good times and in those that are more challenging.