

Capital Buffers and the Future of Bank Stress Tests

By Jill Cetina, Bert Loudis, and Charles Taylor¹

The Basel III banking accord introduced the concept of capital buffers — extra capital cushions on top of regulatory capital minimums — to absorb unexpected shocks. These buffer requirements are now phasing in for U.S. banks. Federal Reserve officials are considering including these buffers in bank stress tests. With such a change, some banks will need to hold more capital to pass stress tests. However, another potential change would permit banks to use static balance sheets (that is, balance sheets unchanged from the prior period) in stress tests, which could make the tests less effective.

After the financial crisis, bank regulators developed stress tests and revised capital rules to make banks more resilient to shocks. In 2012, the Federal Reserve began conducting stress tests of banks with \$50 billion or more in assets as part of its annual Comprehensive Capital Analysis and Review (CCAR). In these tests, the Federal Reserve assesses the capital a bank is likely to have during a future economic downturn and evaluates the quality of banks' capital planning.

U.S. regulators also began phasing in three new capital buffers in the beginning of 2016. The buffers add to the minimum capital requirements banks must hold. These capital buffers are scheduled to be fully phased in by 2019.² In June 2016, two Federal Reserve Board governors said the full amount of one of the capital buffers would likely be included in post-stress test capital requirements for the eight U.S. banks identified as global systemically important banks (G-SIBs).³ In September 2016, Federal Reserve Governor Daniel Tarullo outlined how these capital buffers might be integrated into CCAR through future rulemaking.⁴

Earlier OFR research addressed aspects of supervisory stress tests, including CCAR.⁵ This brief describes the new

capital requirements that are phasing in, including capital buffers for banks, depending on their size. It discusses how these new buffer requirements might affect CCAR results and how the Federal Reserve is proposing to integrate the requirements into CCAR. The analysis suggests that the Federal Reserve proposal to integrate two of the capital buffers into CCAR (the buffer for G-SIBs and the capital conservation buffer) would be positive steps that would reduce potential unintended consequences. At the same time, the Federal Reserve's proposal to allow banks' balance sheets to be static under CCAR may reduce the efficacy of stress tests.

Minimum Capital Requirements

Sufficient capital is essential to the banking system's ability to provide credit to the rest of the economy, even in economic downturns. U.S. regulators require all banks to meet minimum standards for the amount of capital they hold in relation to the risks they take. For risk-based capital requirements, risks are measured as risk-weighted assets, and the requirements are expressed as ratios of capital to risk-weighted assets. A bank must hold more capital for its investments in riskier assets, such

as construction loans, and may hold less capital for investments in safer assets, such as U.S. Treasury bills.

Banks have to meet three minimum risk-weighted capital requirements (see the first three rows of **Figure 1**). Together, they help ensure that banks have enough high-quality capital to absorb losses in a wide range of circumstances.

All three risk-based capital ratios use risk-weighted assets as the denominator. In the numerator, the definitions of capital vary among the three.

Smaller, less complex banks use a standard set of risk weights defined by regulators, known as the standardized approach. Larger banks must determine their own capital requirements based on internal models reviewed by regulators, known as the advanced approaches. These models can be complex, and they differ among banks. In

the United States, the Dodd-Frank Wall Street Reform and Consumer Protection Act sets the standardized approach as a minimum for all banks' risk-based capital requirements.

All banks must meet a minimum leverage ratio of 4 percent (see **Figure 1**). Leverage ratios are simpler than risk-based capital ratios because they use unweighted total assets in the denominator. Regulators also now require banks that use the advanced approaches to meet a supplementary leverage ratio, which adds off-balance-sheet risks to the denominator. Off-balance-sheet risks include guarantees, repurchase agreements, and a broad measure of derivative exposures. In addition, the eight U.S. G-SIBs face an enhanced supplementary leverage ratio.

All three leverage ratios are calculated using Tier 1 capital in the numerator. Tier 1 capital is calculated using a bank's core equity and reserves.

Figure 1. U.S. Capital and Leverage Ratio Definitions

| Capital or Leverage Ratio | Applies to | Ratio Numerator | Ratio Denominator |
|-----------------------------------------------|----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| Total risk-based capital ratio | All U.S. banks | Total capital (Tier 1 capital plus Tier 2 capital. Tier 2 capital includes some allowances for loan losses, additional preferred stock, and subordinated debt) | Risk-weighted assets |
| Tier 1 risk-based capital ratio | All U.S. banks | Tier 1 capital (common equity Tier 1 capital plus some preferred stock) | Risk-weighted assets |
| Common equity Tier 1 risk-based capital ratio | All U.S. banks | Common equity Tier 1 capital (common equity plus retained earnings) | Risk-weighted assets |
| Tier 1 leverage ratio | All U.S. banks | Tier 1 capital (common equity Tier 1 capital plus some preferred stock) | Assets |
| Supplementary leverage ratio | Advanced-approaches banks | Tier 1 capital (common equity Tier 1 capital plus some preferred stock) | Assets plus off-balance-sheet exposures |
| Enhanced supplementary leverage ratio | Global systemically important banks (G-SIBs) | Tier 1 capital (common equity Tier 1 capital plus some preferred stock) | Assets plus off-balance-sheet exposures |

Sources: Basel Committee on Banking Supervision, Federal Deposit Insurance Corporation, Federal Reserve Board of Governors, Office of the Comptroller of the Currency, authors' analysis

Capital buffers

Basel III introduced three capital buffers to help banks absorb unexpected losses. Each buffer is added to capital required to meet a bank's existing minimum risk-based capital ratios. U.S. regulators built these buffers into U.S. rules. Their implementation began in 2016.

- The **capital conservation buffer** applies to all U.S. banks. It is designed as a safety margin to reduce the chance banks will fall below regulatory minimums.
- The **countercyclical capital buffer** is a temporary buffer that the Federal Reserve can require based on economic conditions. It applies to banks with at least \$250 billion in total consolidated assets or foreign exposures of at least \$10 billion. Sixteen advanced-approaches banks currently would be subject to this buffer.⁶ The Federal Reserve plans to require banks to build this buffer when financial markets are strong

so they are better prepared for an economic downturn. To date, the Federal Reserve has not required any countercyclical capital buffer.

- The **G-SIB buffer** applies to the eight U.S. G-SIBs. Each of these banks is considered systemically important because its failure would result in broad disruptions in the financial system. This buffer is intended to reduce the chance of such a failure.

In 2019, after the capital buffers are fully phased in, all U.S. banks will be required to maintain total risk-based capital of at least 10.5 percent of risk-weighted assets. That requirement reflects a minimum risk-based capital ratio of 8 percent plus a capital conservation buffer of 2.5 percent (see **Figure 2**). Large banks will have higher requirements. If the Federal Reserve activates the countercyclical capital buffer, the total risk-based capital requirement for advanced-approaches banks could be

Figure 2. U.S. Capital Buffer and Leverage Requirements for Bank Holding Companies

| | No. of U.S. Bank Holding Companies | Risk-Based Requirements | Leverage Requirements |
|---------------------------------------------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|
| All U.S. banks | 627 | All risk-based capital ratios + Capital conservation buffer of 2.5 percent | Tier 1 leverage ratio of 4 percent |
| Advanced - approaches banks (\$250 billion or more in assets) | 16 | All risk-based capital ratios + Capital conservation buffer of 2.5 percent + Countercyclical capital buffer of up to 2.5 percent | Tier 1 leverage ratio of 4 percent and Supplementary leverage ratio of 3 percent |
| Global systemically important banks (G-SIBs) | 8 | All risk-based capital ratios + Capital conservation buffer of 2.5 percent + Countercyclical capital buffer of up to 2.5 percent + G-SIB buffer of 1 percent to 4.5 percent | Tier 1 leverage ratio of 4 percent and Enhanced supplementary leverage ratio of 5 percent |

Notes: Maximum amounts are shown for the capital conservation and countercyclical buffers. The countercyclical capital buffer is activated only at certain stages in the economic cycle. The Federal Reserve administered its 2016 Comprehensive Capital Analysis and Review for 33 banks. The group included G-SIBs, advanced-approaches banks with assets of \$250 billion or more, and banks with assets between \$50 billion and \$250 billion.

Sources: Basel Committee on Banking Supervision, Federal Reserve, Office of the Comptroller of the Currency, authors' analysis

as high as 13 percent of risk-weighted assets. The total requirement for a G-SIB assessed the maximum G-SIB buffer of 4.5 percent could be as high as 17.5 percent.

Any bank that cannot meet buffer requirements at any time must provide banking supervisors a plan to rebuild capital. A bank that dips into its buffers faces restrictions on dividends, share buybacks, and executive bonuses.

Stress tests and buffers

The new capital buffers are not yet integrated into CCAR. The 2016 CCAR covered 33 banks, including the U.S. G-SIBs, advanced-approaches banks, and several other U.S. banks with total assets of more than \$50 billion.

In CCAR, regulators give banks severe yet plausible stress scenarios. Using internal models, a covered bank must demonstrate that, under the stress, it can maintain risk-based capital levels above the required minimums for nine quarters. Each bank must meet these capital requirements while conducting business as usual. In other words, a bank must continue to execute its plans for lending, capital distributions, and previously approved extraordinary actions, such as acquiring or selling a business.⁷ Banks cannot propose additional extraordinary actions to meet capital requirements. The consequences for banks that fail to meet required capital minimums are similar to banks that have buffer shortfalls. Specifically, a bank must amend its capital plan so it can pass the stress test.

The Federal Reserve's CCAR calculations are based on the existing minimum risk-based capital requirements. But CCAR's current approach to capital distributions is to assume banks continue dividend payments and buybacks as they have forecast under the baseline scenario. This approach could conflict with the new capital buffer framework being phased in, which restricts capital distributions when buffers are breached. Changes are needed to integrate the new capital standards into CCAR, inclusive of their buffers.⁸

Estimating the Impact of Including G-SIB Buffers in CCAR

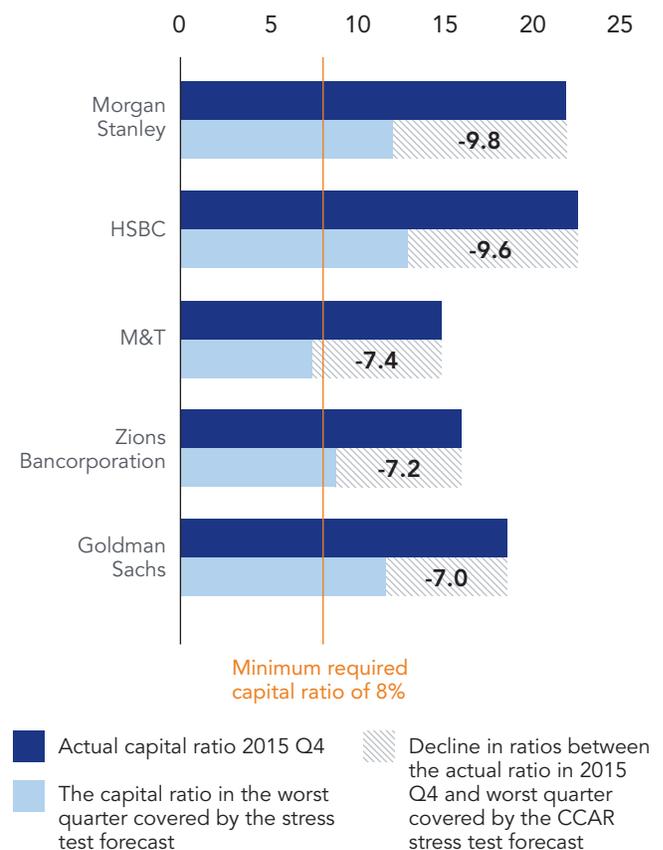
In their stress test, banks typically forecast a decline in their capital ratios during the nine quarters of the test. The amount of the decline varies from year to year, depending on the nature of the economic scenarios and changes in a bank's portfolios and businesses. Under the severely

adverse scenario in the 2016 exercise, the deepest forecast declines in banks' risk-based capital ratios ranged from 0.6 percentage points to nearly 10 percentage points. In 2015, the most severe declines among banks ranged from 2 percentage points to 12 percentage points.

Morgan Stanley, HSBC North America Holdings, Inc., M&T Bank Corp., Zions Bancorporation, and Goldman Sachs Group, Inc., had the largest declines in risk-based capital ratios in the 2016 CCAR (see **Figure 3**).⁹ In the figure, the dark blue row indicates each bank's capital ratio at the start of the stress test. The light blue row represents the lowest capital ratio forecast for the bank in any of the nine quarters of the test.

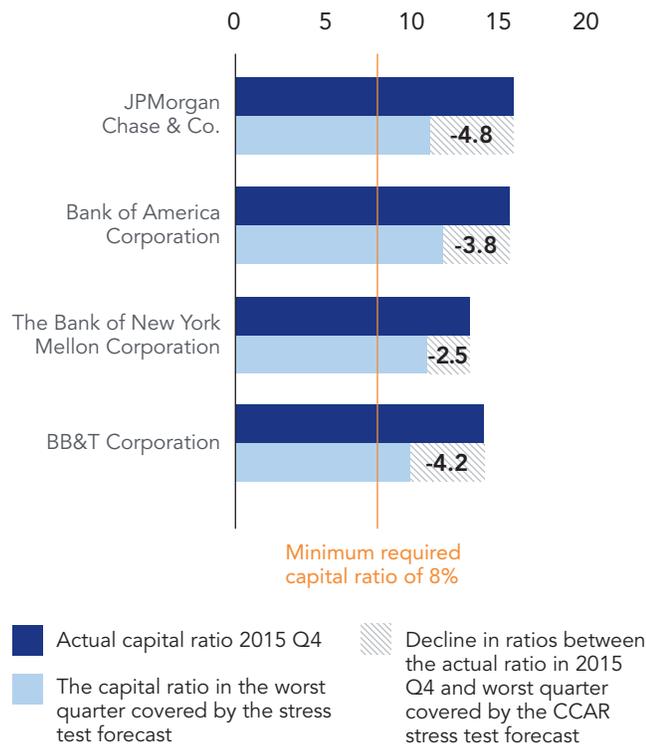
Under the 2016 CCAR exercise, the U.S. bank with the largest G-SIB buffer, JPMorgan Chase & Co., had a forecast decline of 4.8 percentage points in its total risk-based

Figure 3. Largest Declines in Forecast Total Risk-Based Capital Ratios in the 2016 CCAR Stress Test (percent)



Note: HSBC North America, M&T, and Zions are not U.S. G-SIBs. Sources: Federal Reserve Board of Governors, authors' analysis

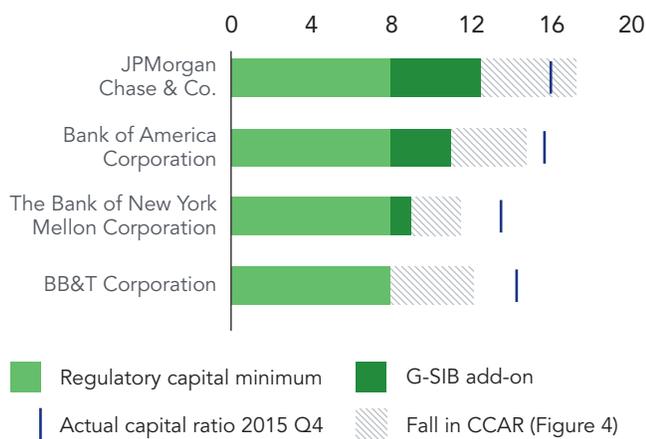
Figure 4. Impacts on Risk-Based Capital Ratio in 2016 CCAR (percent)



Note: BB&T is not a G-SIB.

Sources: Federal Reserve Board of Governors, authors' analysis

Figure 5. Impact of Including the G-SIB Buffer in CCAR Risk-based Capital Ratios



Note: BB&T is not a G-SIB.

Sources: Federal Reserve Board of Governors, authors' analysis

capital ratio (see **Figure 4**). Of the eight G-SIBs, Bank of America Corp. had the median and Bank of New York Mellon Corp. had the smallest G-SIB buffer. A representative non-G-SIB bank, BB&T, is shown in **Figure 4** for comparison. Its maximum forecast change in total risk-based capital ratio during the test was the median for covered banks.¹⁰

Publicly available data from the 2016 stress tests indicate that JPMorgan would not meet its required total risk-based capital ratio if the fully phased-in G-SIB buffer were included. Including the G-SIB buffer, JPMorgan would be required to hold risk-based capital of 12.5 percent of risk-weighted assets (see **Figure 5**). To pass the stress test while sustaining the maximum stress of 4.8 percent of risk-weighted assets, JPMorgan would need a total risk-based capital ratio of 17.3 percent when the test began. That figure is about 1.3 percentage points more (totaling more than \$30 billion) than the bank held at the start of the 2016 exercise.

If JPMorgan breached the CCAR minimum, it would need to resubmit its capital plan. JPMorgan is the only U.S. bank that would not pass the 2016 CCAR stress test with the G-SIB buffer included, assuming all other conditions of the stress test were the same. Other G-SIBs have enough capital today to pass a future stress test that included their fully phased-in G-SIB buffer (with other elements of CCAR held constant).¹¹

Reasons to include G-SIB buffers in stress tests

Should G-SIBs be required to retain their G-SIB buffers during stress tests, or allowed to dip into them? Several arguments support the more rigorous standard.

First, buffers are needed most at the worst moments of economic turmoil, when individual institutions, the U.S. financial system, and the economy are most vulnerable. Requiring banks to retain their G-SIB buffers during stress tests would make the financial system more resilient under extreme stress.

Second, allowing G-SIBs to dip into their G-SIB buffers during stress tests may have unintended consequences. For example, banks are not allowed to restrict their dividends during a stress test. They must forecast business as usual in every scenario. However, in an actual crisis, capital buffer rules require banks that dip into their capital buffers to restrict their dividends. Banks facing

those dividend restrictions might reduce lending to rebuild their capital ratios. Such action by many banks at the same time could significantly reduce the availability of credit in the U.S. financial system. A lower overall credit supply would subvert a key objective of stress tests — to ensure that banks have enough capital to continue lending during a downturn.

Third, the purpose of the G-SIB buffer is to address the systemic importance of large U.S. banks and prevent the broad disruptions in the financial system that a G-SIB failure could trigger. When the buffer is fully phased in, G-SIBs would start stress tests with more capital. This extra cushion would make them more likely to meet forecast capital requirements under adverse scenarios because they could dip into their buffers. As a result, stress tests could hit less systemically important non-G-SIB banks, who do not have such buffers, harder than G-SIBs.

Finally, the leverage ratio is an important consideration. The leverage ratio has typically been the most binding constraint for G-SIBs in CCAR exercises (see **Figure 6**). During the tests, banks have been closer to breaching the leverage ratio requirement than the risk-based capital

ratio requirement. Regulators intended the leverage ratio to serve as a backstop to the risk-based capital ratio, rather than the more binding constraint.

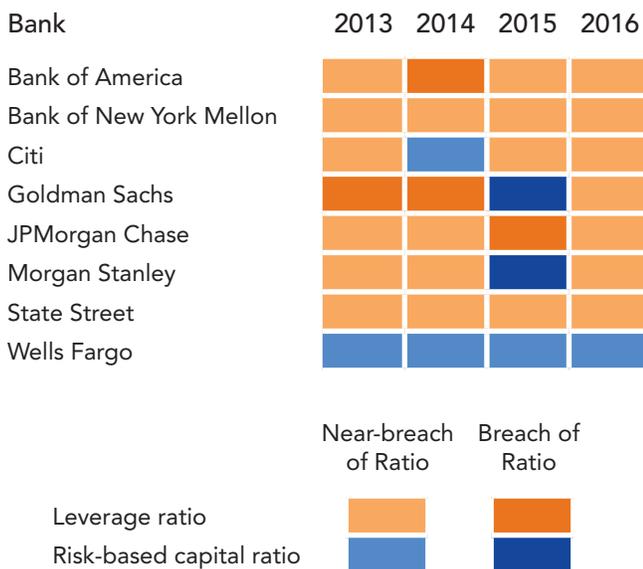
Some observers have argued that a binding leverage ratio could contribute to financial stability risks by encouraging banks to take riskier positions because the ratio does not include risk-weighted assets.¹² If G-SIB buffers are not retained intact during stress tests, the leverage ratios of the largest banks might continue to be the most binding regulatory capital measure in CCAR.

How will capital buffers be replenished?

Whether or not capital buffers are included in stress tests, their replenishment after a period of stress will have implications for economic recovery. A bank can restore capital in a number of ways. It can sell assets, limit lending, raise equity, and retain more earnings. A bank chooses its strategy based on regulatory pressures, market perceptions, and its own assessment of risks. Under the capital buffer rules, compensation for senior executives is limited when capital buffers are breached. This limitation might give bank managers incentives to replenish buffers quickly by selling assets and restricting loan growth. Such actions might worsen the tightening of credit in a downturn.

To prevent systemic impact, bank supervisors may encourage a large bank to rebuild capital quickly to reduce the risk of default. At the same time, regulators would not want a large bank to behave procyclically and cut lending sharply, which could make a downturn worse.

Figure 6. CCAR Binding Ratios



Note: Breach of ratio indicates that during the first round of the stress test for that year, the bank’s regulatory ratio fell below regulatory requirements. In cases of no breach of the bank’s regulatory ratio, the ratio that came closest to a breach was indicated as a near-breach of the ratio.

Sources: Federal Reserve Board of Governors, authors’ analysis

Integrating Capital Buffers into CCAR

In September 2016, Federal Reserve Governor Tarullo outlined potential changes to CCAR, including a new stressed capital buffer (SCB).¹³ The SCB would replace the capital conservation buffer for banks subject to stress tests. The SCB would be the larger of two numbers: the current 250-basis-point conservation capital buffer or the maximum change in a bank’s risk-based capital ratio over the nine forecast quarters in the latest CCAR test. SCB would be similar to the changes highlighted in Figures 3, 4, and 5, and fill the same cushioning role as the capital conservation buffer.

In the 2016 severely adverse CCAR scenario, the common equity Tier 1 capital of covered banks changed by 0.1 to 8.7 percentage points. The SCB is approximated using the current 250-basis-point capital conservation buffer or the CCAR changes, whichever is greater. The proposal would also include the G-SIB buffer as part of the required minimums in CCAR. If implemented, this proposal would integrate CCAR with the new risk-based capital regulations.

However, another important element of the proposal would relax capital requirements under the CCAR stress tests. Banks would no longer be required to assume that lending would continue to grow under the severely adverse scenario. Instead, banks' balance sheets would be held constant. Such static balance sheets were not part of CCAR in 2015 or 2016, but were used in the 2014 CCAR and previously. Banks have argued that assuming lending growth after a shock would be unrealistic. Tarullo estimated that the benefit of higher capital due to the proposed SCB would be "somewhat less than half offset" by the change in assumptions about bank lending during times of severe stress.¹⁴

Using a static balance sheet in CCAR could have three adverse effects.

First, it could result in banks failing to have enough capital to extend new credit under stress. Among the eight U.S. recessions since 1960, the aftermath of the 2007-09 financial crisis is the only period with a decline in total U.S. banking system credit. Limited growth in bank lending could magnify an economic downturn. Additionally, unplanned balance sheet growth at Lehman Brothers and Wachovia Corp. contributed to their failures.¹⁵ A stress test using a static balance sheet would not detect such a risk.

Second, a static balance sheet under CCAR would be unlikely to capture dynamics that can strain banks' capital adequacy under stress. For example, the increase in risk-weighted assets that can occur when credit fundamentals deteriorate would not be captured under a static balance sheet approach. As a result, such an approach may overstate banks' resilience to stress.

Third, a static balance sheet assumption would impede integration of funding shocks into CCAR. Banks experienced shocks to their funding during the crisis.¹⁵ Risks associated with unplanned growth in banks' balance sheets would also remain outside the CCAR framework. These risks include mortgage putbacks, loan pipeline backups, or loan commitment drawdowns.

Conclusion

Work is underway to reconcile the new bank capital framework introduced in Basel III, including its capital buffers, with U.S. bank stress tests. In the future, banks that dip into their capital buffers in the CCAR stress tests will face regulatory consequences. Including buffers in stress tests would make banks more resilient in a real crisis but would result in higher capital requirements in less-stressed times. It also could prevent CCAR from having a bigger impact on less systemic non-G-SIB banks than G-SIBs. A change to a static balance sheet assumption could limit the efficacy of stress tests. Static balance sheets are arguably not consistent with extreme but plausible stress scenarios. The static balance sheet assumption could also result in covered banks with insufficient capital, reducing their lending and deepening a downturn. Covered banks could be unable to withstand an increase in risk-weighted assets or unplanned balance sheet growth that could occur in a stress event.

Endnotes

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² See Basel Committee on Banking Supervision, "Basel III Phase-in Arrangements" (available at www.bis.org/bcbs/basel3/basel3_phase_in_arrangements.pdf, accessed Dec. 20, 2016).

³ See Daniel K. Tarullo, "Fed's Tarullo on Bank Regulations, Fed Policy, Economy," Bloomberg video, June 2, 2016 (available at <https://www.bloomberg.com/news/videos/2016-06-02/fed-s-tarullo-on-bank-regulations-fed-policy-economy>, accessed Feb. 2, 2017); "Q&A: Jerome Powell at the Prudential Bank Regulation Conference," WSJ Pro Financial Regulation, June 2, 2016 (available at <https://www.wsj.com/articles/q-a-jerome-powell-at-the-prudential-bank-regulation-conference-1464893900>, accessed Feb. 2, 2017). See also the Federal Reserve Board's "Amendments to the Capital

Plan and Stress Test Rules," Federal Register 80, no. 231, Dec. 2, 2015 (available at www.federalregister.gov/articles/2015/12/02/2015-30471/amendments-to-the-capital-plan-and-stress-test-rules, accessed Dec. 6, 2016).

⁴ See Daniel K. Tarullo, "Next Steps in the Evolution of Stress Testing," at the Yale University School of Management Leaders Forum, Sept. 26, 2016 (available at www.federalreserve.gov/newsevents/speech/tarullo20160926a.htm, accessed Dec. 6, 2016).

Endnotes continued

- ⁵ The OFR's stress testing program is described on the OFR's website, including links to research on the topic. See www.financialresearch.gov/stress-tests/ (accessed Jan. 17, 2017).
- ⁶ This group of banks also includes those with at least \$10 billion in total on-balance-sheet foreign exposure and the depository institution subsidiaries of those firms. The Federal Reserve said it is likely to trigger the countercyclical buffer (CCyB) when it sees an elevated risk of above-normal losses. "By requiring institutions to hold a larger capital buffer during periods when systemic risk is increasing and reducing the buffer requirement as vulnerabilities diminish, the CCyB also has the potential to moderate fluctuations in the supply of credit over time." See the Federal Reserve Board, Regulatory Capital Rules: The Federal Reserve Board's Framework for Implementing the U.S. Basel III Countercyclical Capital Buffer, final policy statement, Sept. 8, 2016 (available at www.federalreserve.gov/newsevents/press/bcreg/bcreg20160908b1.pdf, accessed Dec. 6, 2016).
- ⁷ See Federal Reserve Board, "Dodd-Frank Act Stress Test 2015: Supervisory Stress Test Methodology and Results," March 2015 (available at www.federalreserve.gov/newsevents/press/bcreg/bcreg20150305a1.pdf, accessed Dec. 6, 2016).
- ⁸ The most recent CCAR did not include the supplementary leverage ratio or the enhanced supplementary leverage ratio that apply to large U.S. banks and G-SIBs.
- ⁹ This analysis assumes constant dividend payouts and buybacks over the nine-quarter simulation as CCAR is conducted today. According to Federal Reserve Governor Tarullo's speech, future CCAR exercises will require firms to fund planned dividends only over the first year of the CCAR scenario.
- ¹⁰ The countercyclical capital buffer is left out of this calculation. If it was a part of the point-in-time requirement at the beginning of a stress test, presumably it would fall to zero or close to zero during the test horizon and before the lowest point in capital for most of the covered banks was reached.
- ¹¹ For G-SIBs, the Federal Reserve's total loss absorbing capacity (TLAC) requirement will add a layer of complexity. This would require G-SIBs to keep total loss absorbing capacity equal to 18 percent or more of risk-weighted assets. But everything that qualifies as loss absorbing also qualifies as part of total risk-based capital, so that all G-SIBs will in effect have point-in-time total capital in excess of 18 percent of risk-weighted assets when the TLAC requirement is fully phased in. For a bank like Bank of New York Mellon Corp. with a G-SIB buffer of only 1 percent, that means the TLAC requirement will exceed its maximum point-in-time total risk-based capital requirement by 2 percent.
- ¹² See Basel Committee on Banking Supervision, "Basel III Leverage Ratio Framework," January 2014 (available at www.bis.org/publ/bcb270.pdf, accessed Dec. 6, 2016) and the Federal Reserve Board, "Regulatory Capital Rules: Regulatory Capital, Revisions to the Supplementary Leverage Ratio," Federal Register 79, no. 187, Sept. 26, 2014 (available at www.gpo.gov/fdsys/pkg/FR-2014-09-26/pdf/2014-22083.pdf, accessed Dec. 6, 2016). Also see Ilkka Kiema and Esa Jokivuolle, "Does a Leverage Ratio Requirement Increase Bank Stability?," *Journal of Banking and Finance* 39, February 2014: 240-254, and Darrell Duffie, "Financial Regulatory Reform After the Crisis: An Assessment," Stanford University Working Paper, June 2016.
- ¹³ See Tarullo, September 2016.
- ¹⁴ See Tarullo, September 2016.
- ¹⁵ See Jill Cetina, "Incorporating Liquidity Shocks and Feedbacks in Bank Stress Tests," OFR Brief no. 15-06, July 22, 2015 (available at <https://www.financialresearch.gov/briefs/files/OFRbr-2015-06-Incorporating-Liquidity-Shocks-and-Feedbacks-in-Bank-Stress-Tests.pdf>, accessed Jan. 29, 2017).