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TCH Research Note:
2016 Federal Reserve's Stress Testing Scenarios

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Francisco Covas
+1.202.649.4605
francisco.covas@theclearinghouse.org

I. Executive Summary

On January 28, the Federal Reserve announced the supervisory macroeconomic scenarios that it will use in its 2016 capital stress tests. The Federal Reserve's stress tests have become an important driver of the capital levels for banks subject to the exercise, and the Federal Reserve's choice of scenarios plays a crucial role in determining those banks' ability to pay dividends and repurchase shares – that is, to return capital to shareholders. By affecting bank capital levels, scenario choice ultimately affects credit supply and economic growth. In this research note we provide an overview of the design of the supervisory stress test scenarios and describe several key components of the Federal Reserve's 2016 macroeconomic scenarios:

- The 2016 scenarios assume a recession that includes an increase in the unemployment rate that is more severe than prior years' scenarios, and considerably more severe than the 2007-2009 financial crisis.
- Moreover, the increase in the unemployment rate in the 2016 scenario is substantially more sudden than was experienced during the 2007-2009 financial crisis, which is likely to cause simulated losses to accumulate rapidly and in greater amounts over the stress period.
- These increases in the severity of the scenarios relative to previous scenarios and historical experience are likely to result in continuing tight constraints on bank dividends and share repurchases, notwithstanding recent improvements in the U.S. economy and the current strong capital positions of U.S. banks, which are at historically high levels.
- By more severely stressing unemployment rate changes, the 2016 Federal Reserve scenarios are likely to discourage household lending and, more broadly, create incentives for banks to shift away from loans whose performance is especially sensitive to unemployment rates.

II. About the Federal Reserve's Stress Tests

Following the height of the financial crisis, a series of stress tests implemented by the Federal Reserve was critical to restoring confidence among market participants and depositors in the health of the U.S. banking system. Since that time, annual supervisory stress testing exercises have become a key component of how the Federal Reserve attempts to ensure that banks subject to the exercise are sufficiently resilient to survive and continue to support economic activity even if another set of severe financial and economic shocks were to affect the financial system. Banks also conduct their own stress tests as a valuable measure of risk relative to static measures.

The U.S. Federal Reserve's stress tests serve as the main tool for the Federal Reserve to assess the adequacy of the capital plans of large bank holding companies (BHCs) domiciled in the U.S. Under the Federal Reserve's regulations, these BHCs must pass these exercises in order to proceed with planned dividends, share repurchases or other return of capital to shareholders. The stress tests have two key components:

» The first component is a quantitative set of stress tests known as the Dodd-Frank Act stress tests (DFAST). Under DFAST, banks submit detailed information about their balance sheets and activities to the Federal Reserve. Using this data, the Federal Reserve and each bank run separate simulations to determine the effects of various supervisory scenarios on the bank's capital adequacy – that is, the estimated losses and reduction in capital of the consolidated BHC under the stress scenarios.

» In the second component, also referred to as the Comprehensive Capital Analysis and Review (CCAR), the Federal Reserve reviews the capital plan submitted by each BHC and, using data submitted by the banks, the Federal Reserve runs its own simulations to determine the effects of various supervisory scenarios on the bank's capital adequacy using the Federal Reserve's proprietary models. A BHC's proposed capital distributions, including any dividend payouts, repurchases of common stock, and issuance of shares, are only approved if the BHC would continue to meet a range of post-stress minimum capital requirements, notwithstanding the declines in capital ratios that the Federal Reserve projects would occur as a result of the supervisory stress scenarios, and satisfies a qualitative assessment of its capital planning process (which latter aspect we do not address in this note).

Both DFAST and CCAR are conducted under the same supervisory scenarios and use the same projections of the balance sheet, risk-weighted assets and net income which are estimated by the Federal Reserve. The Federal Reserve annually publishes three supervisory scenarios for its supervisory stress tests: baseline, adverse, and severely adverse. The macroeconomic scenarios consist of hypothetical paths of a set of economic and financial variables including measures of economic activity, prices, developments in equity and property markets, and interest rates. The baseline scenario is generated based on the consensus views of private-sector forecasters, but has never operated as a binding constraint under the test. The adverse and severely adverse scenarios, designed by Federal

Reserve staff, are used to assess the resilience of banking organizations under adverse economic environments. In particular, the Federal Reserve employs a "recession approach" to develop the severely adverse scenario and uses the unemployment rate as the primary factor to construct the scenario. As a matter of calibration, the Federal Reserve has stated that the severely adverse scenario will consist of "a set of economic and financial conditions that reflect the conditions of post-war U.S. recessions." (12 CFR 252). In particular under the Dodd-Frank Act stress test rules, this scenario includes an increase in the unemployment rate of at least 3 to 5 percent, but, at a minimum, an increase sufficient to result in a projected unemployment rate of at least 10 percent. After specifying the path of the unemployment rate, the Federal Reserve postulates the path of the remaining macroeconomic and financial variables based on the underlying structure of the scenario (for example, weakness in euro area accompanied by a sharp slowdown in developing Asia in the 2016 scenario) and other determinations and consideration by the Federal Reserve. For purposes of this note, we focus on the Federal Reserve's severely adverse scenario, because it appears likely to have the greatest effect on the exercise's outcomes and banks' ability to return capital.

THE FEDERAL RESERVE'S 2016 SEVERELY ADVERSE SCENARIO IN PERSPECTIVE

The 2016 severely adverse scenario is characterized by a severe global recession, accompanied by a period of heightened corporate financial stress and negative short-term rates, as follows:

» The unemployment rate increases 5 percentage points to 10 percent by mid-2017.

» Real GDP reaches a trough in early-2017, and is 6¼ percent below the pre-recession level.

FIGURE A

Change in Unemployment Rate

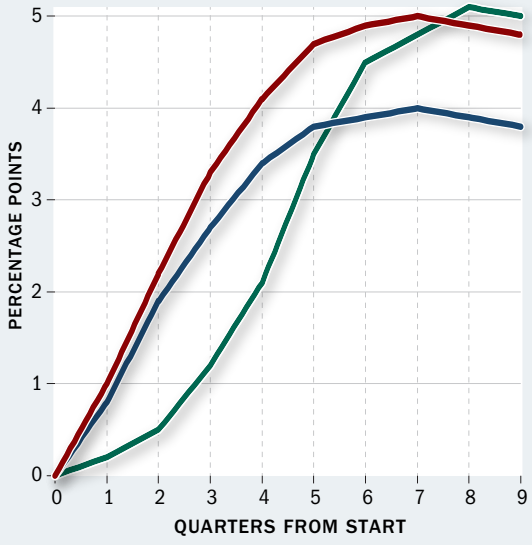
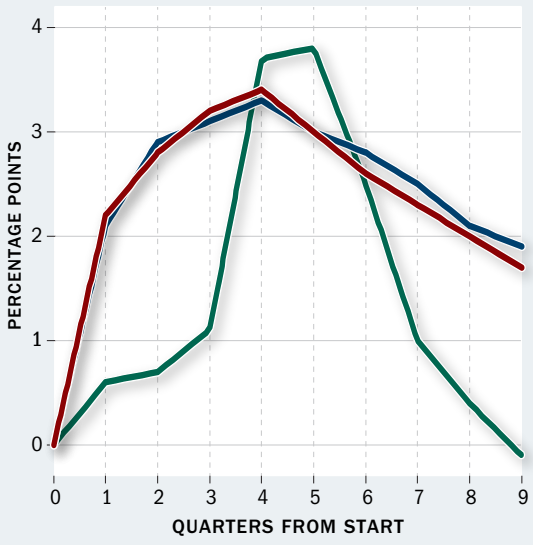


FIGURE B

Change in BBB Corporate Bond Spread



Sources: Federal Reserve Board, FRED

2016 Severely Adverse Scenario | 2015 Severely Adverse Scenario | Financial Crisis

FIGURE C

Change in Real GDP

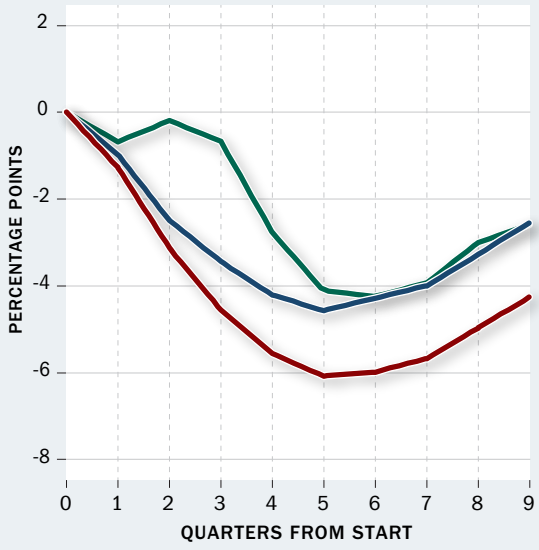
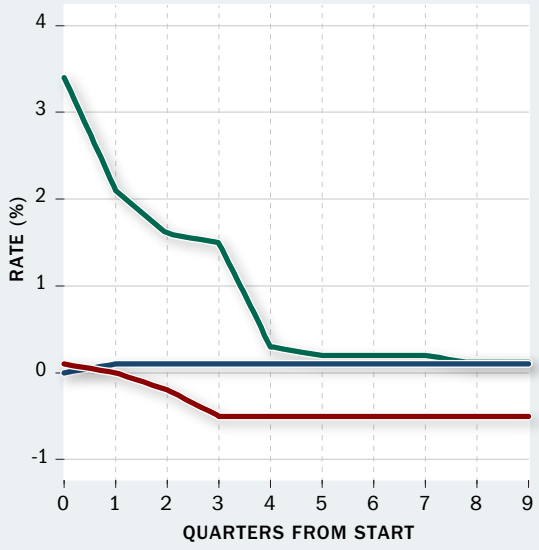


FIGURE D

3-Month Treasury Rate



Sources: Federal Reserve Board, FRED

2016 Severely Adverse Scenario | 2015 Severely Adverse Scenario | Financial Crisis

» There are dramatic movements in asset prices:

- The equity market loses half of its value by the end of 2016;
- The BBB corporate bond spread increases 340 basis points by the end of 2016;
- House and commercial real estate prices decline 25 and 30 percent through the middle of 2018, respectively.

» Short-term interest rates reach negative ½ percent by mid-2016 and long-term interest rates fall 200 basis points in the first quarter of 2016.

As a comparative matter, the 2016 severely adverse scenario features a downturn in the U.S. economy that is significantly more severe than both prior years' stress tests and the 2007-2009 financial crisis in several key areas.

Most significantly, the 2016 scenario assumes a sudden jump in unemployment that is both larger and more abrupt than prior scenarios and the financial crisis experience. As show in Figure A, the 2016 severely adverse scenario assumes that the unemployment rate would rise 5 percentage points (from 5% to 10%) during the first 7 quarters of the scenario, while it increased only 4 percentage points from its initial level to peak in last year's severely adverse scenario. Moreover, the increase in the unemployment rate in the 2016 scenario is substantially more rapid than actual experience during the 2007-2009 financial crisis. Although the level of the unemployment rate is lower in the 2016 scenario relative to last year's scenario, it is more relevant to compare the change in this series. Namely, it is the change in employment status that reduces the ability of borrowers to repay their loans and leads to the build-up of credit losses. In addition, as shown in Figure B, the rise in the BBB corporate bond spread also occurs

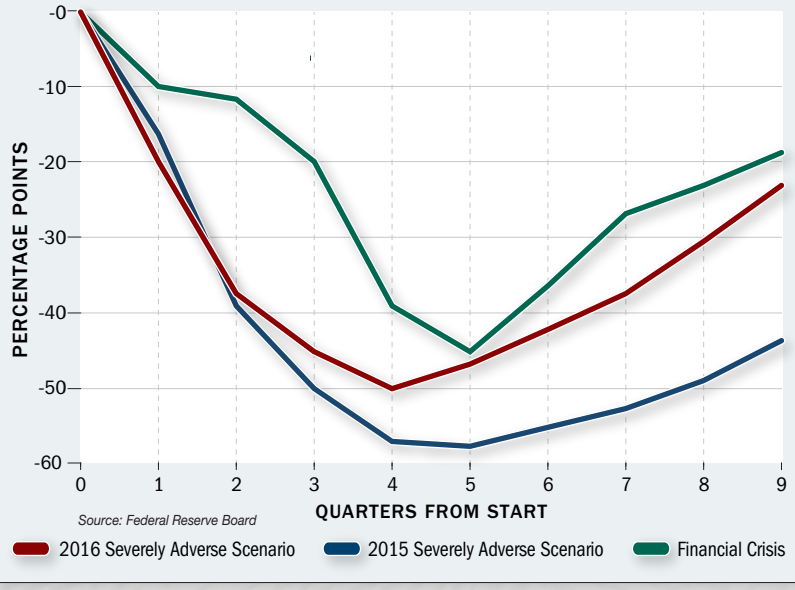
very abruptly at the start of the scenario, similar to the behavior of the unemployment rate. As described below, the suddenness of the increase of these macroeconomic variables is an important element to the outcome of the test.

This overall increase in severity relative to the 2007-2009 financial crisis is mirrored in other aspects of the scenario. In particular, as shown in Figures C and D, the more severe downturn in the 2016 scenario is also evident in a sharper and steeper decline of real gross domestic product and the emergence of negative short-term interest rates. Similarly, the decline in equity prices – shown in Figure E – is also more pronounced relative to the past financial crisis, while the fall in house prices is in line with the experience during 2007-2009 (not shown).

As the Federal Reserve noted in its release, the more severe downturn featured in the 2016 scenario is expected to result in a higher path of credit losses on a wide range of loans and securities relative to last year's projections, and negative interest rates are expected to reduce banks' net interest margins (the difference between interest income and interest expense to interest earning assets).

FIGURE E

Change in Dow Jones Total Stock Market Index



III. Key Observations

Most public discussion of the 2016 scenarios has focused on the assumption of negative interest rates, which we do not evaluate in this note. Instead, we focus on unemployment and GDP assumptions that are also likely to have a material impact on the results of the test, and are more significantly at odds with historical experience and the Federal Reserve's stated policy for stress test design.

Trends in U.S. economic outlook influence stress test scenario design.

As the economic recovery gains momentum and employment and GDP improve, reasonable supervisory stress scenarios are likely to yield less stressful peaks for the unemployment rate and declines in GDP, resulting in lower projected losses and smaller projected capital declines, keeping constant the assumed capital distributions. Put another way, the "severity" of a scenario is always relative, and starting points matter: as economic conditions improve, any given scenario is likely to predict fewer bank losses over the next 9 quarters, which in turn should leave greater leeway for banks to maintain adequate capital cushions while also returning capital to shareholders.

However, we do not see this phenomenon in the Federal Reserve's 2016 scenarios, as the Federal Reserve has limited the potential for improved stress test results for BHCs by increasing the relative severity of its scenarios. By following its rule that the unemployment rate will always rise in the scenario to at least 10 percent, and by assuming that the 10 percent level is approached quickly, the Federal Reserve has provided a scenario that diverges significantly from actual post-war recession experience, the Federal Reserve's stated standard for the severity of the severely adverse scenario. As discussed above, the increase in the unemployment rate in the 2016 scenario is substantially more sudden than what was experienced during the 2007-2009 financial crisis.

As noted above, under the rule for scenario design the Federal Reserve indicated that the unemployment rate would increase between 3 and 5 percentage points from its initial level over the next two years, or by an amount sufficient to result in an unemployment rate of at least 10 percent. Since the unemployment rate was 5 percent at the end of 2015, the increase in the unemployment in the 2016 scenario is 5 percentage points, resulting in a projected unemployment rate of 10 percent. The Federal Reserve indicated in its rule that it would choose a rate at the high end of the 3 to 5 percent range when cyclical systemic risks are increasing and the U.S. economy is experiencing a period of "robust expansion." However, neither condition would appear to hold currently. For instance, the Federal Reserve Chair's semi-annual Monetary Policy Report to the Congress earlier in February states that economic growth has slowed and financial vulnerabilities have remained moderate. Instead, the choice of a 5 percentage point increase in the unemployment rate appears to be driven exclusively by the requirement that the projected unemployment rate rise to at least 10 percent.

The Federal Reserve characterizes the increase in scenario severity as introducing "countercyclical elements" into its framework – in other words, an approach that would ratchet up the severity of its scenarios as economic conditions improve and (presumably) imply similar and corresponding downward adjustments if and when conditions deteriorate. The statement does not describe on what standard the countercyclical element was quantified, or what its quantum is. The introduction of countercyclical elements into scenario design, which does not appear to have precedent in academic literature or the current practices of other central banks, would appear likely to effectively reorient CCAR away from an objective assessment of how banks would endure a set of economic and financial conditions that reflect the conditions of postwar U.S. recessions, and towards a subjective, opaque approach to scenario developments that by design will vary year-to-year in ways that are less likely to accurately evaluate the actual resiliency of the banks.

As shown in Figure F, the level of net charge-offs is currently quite low by historical norms. In addition, charge-offs exhibit a very persistent time-series behavior especially during cyclical downturns, which implies that the projections for charge-offs and provisions should be driven importantly by their past behavior and should be less dependent to changes in macroeconomic conditions (see Guerrieri and Welch, 2012 and Covas, Rump and Zakrajsek, 2014). The lower sensitivity of credit losses to changes in macroeconomic conditions is particularly pronounced for models, like those employed by the Federal Reserve in its stress tests, that use a "top-down" approach by relying on bank-level net charge-off data to generate estimates of institution-specific losses (Hirtle et al, 2014).

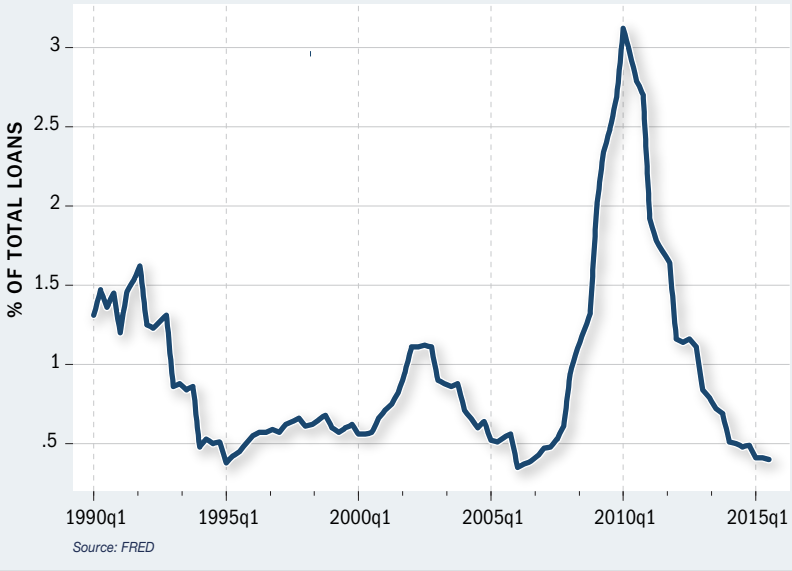
Given the current low levels of net charge-offs and provisions in the U.S. banking system, stress test results should be expected to improve and capital distributions to increase, absent any changes to the severity of macroeconomic scenarios or other key elements of the test.

When net charge-offs and provisions are low, as they currently are, this relative insensitivity can be offset by assuming that the recession featured in the severely adverse scenario is sudden and deep because a sudden and deep recession would make credit losses accumulate rapidly. As we describe, this approach is precisely that taken by the Federal Reserve in the 2016 scenarios.

Given the level of diversification of large banks, pre-provision net revenue (PPNR) is not very sensitive to changes in the macroeco-

FIGURE F

Net Charge-Offs



Source: FRED

nomic variables included in the stress scenarios (see Guerrieri and Welch, 2012 and Covas, Rump and Zakrajsek, 2014, Duane, Shuermann and Reynolds, 2014) and provide some resilience against the rapid build-up of credit losses in stress periods. The 2016 severely adverse scenario has the effect of lowering PPNR through the use of negative short-term rates and a flatter yield curve. In addition, the recently announced changes to the Federal Reserve's methodology used to derive losses related to operational-risk events also make PPNR lower in the severely adverse scenario. In particular, such revisions will weigh more heavily the projections of models that are driven by the macroeconomic variables included in the supervisory scenarios, thereby increasing operational risk losses and lowering PPNR projections in the 2016 severely adverse scenario. As a result, the projected size and the timing of operational risk losses could be far worse – and far more sudden – than what was experienced during the 2007-2009 financial crisis.

The Federal Reserve's 2016 scenarios serve as a helpful reminder that the selection of the key parameters of stress is likely to have a significant impact on which types of lending are most affected by the stress test. In the 2016 scenarios, for example, the emphasis on unusually large and sudden movement in the unemployment rate disproportionally affects certain categories of lending, such as loans to households, the performance of which is highly correlated with the unemployment rate. Put another way, BHCs that assume a repeat or even increase of the prescribed severity of unemployment rate in future CCAR tests – even if they view that specification as counterfactual – would be incented to improve performance under the test by reducing employment rate-sensitive lending, particularly household lending. Furthermore, the lack of sensitivity of income from activities that generate fees and other types of noninterest income to the supervisory scenarios will provide further incentives towards the rebalancing of banks' balance sheets in favor of such activities. ■

By stressing unemployment rate changes, the 2016 scenarios have a disproportionate impact on household lending and other specific types of bank activities.

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