The Clearing House®

At the Center of Banking Since 1853®

Comparison between United States and European Union Stress Tests

May 2016

Francisco Covas
+1.202.649.4605
francisco.covas@theclearinghouse.org
Bill Nelson
+1.202.649.4602
william.nelson@theclearinghouse.org

Summary

On February 24, 2016, the European Banking Authority (EBA) released its methodology and macroeconomic scenarios for the 2016 EU-wide stress tests. In this research note we compare the EU-wide stress tests to the Federal Reserve's (FR) stress tests along three dimensions: (i) choice of macroeconomic scenarios, (ii) models and assumptions used to translate the macroeconomic scenarios to banks' capital ratios; and (iii) choice of post-stress capital thresholds. Table 1 summarizes the most important features of the U.S. and EU-wide stress tests along these three dimensions. Our key takeaways are as follows.

» **CHOICE OF SCENARIO.** The EBA's stress scenario for the 2016 EU-wide stress tests assumes a moderate recession while the FR's stress scenario entails a recession that is considerably worse than the recession experienced during the 2007-2009 financial crisis.[1] As discussed on a previous TCH research note, the FR's stress scenario diverges significantly from actual post-war recession experience, the FR's standard for the design of the stress scenario.

» **TRANSLATION OF SCENARIOS INTO POST-STRESS CAPITAL RATIOS.** The EBA's methodology for assessing the resilience of the largest EU banks is more transparent and may result in more accurate estimates of post-stress capital ratios. In particular, a key feature of the EU-wide stress tests is its use of banks' internal models to estimate stressed loan losses and net revenues under a common, public set of assumptions provided by the EBA. In contrast, the FR uses its own models to estimate stressed credit losses and net revenues, with very little detail regarding those models and the assumptions embedded therein. Moreover, unlike the FR, the EBA's approach allows banks to capture their own past loss experience and account for differences in business models, which may result in more accurate bank-specific projections for post-stress capital ratios.

» **CHOICE OF POST-STRESS CAPITAL THRESHOLD.** The EBA does not define hurdle rates or capital thresholds for its 2016 EU-wide stress tests, but does publish the post-stress capital ratios of all banks and leverage the results to assess remaining vulnerabilities. In contrast, the FR sets the stress test hurdle rates to be equal to a minimum common equity tier 1 capital ratio of 4.5 percent and a tier 1 leverage ratio of 4 percent, and effectively makes the ability to pay dividends or otherwise return capital to shareholders contingent on meeting those thresholds. Moreover, U.S. banks have to satisfy a qualitative assessment of its capital planning process.

1 *See* "TCH Research Note: 2016 Federal Reserve Stress Testing Scenarios" (March 2016).

Choice of Macroeconomic Scenarios

OVERVIEW OF THE EU APPROACH

Each year, the EBA, in cooperation with the European Systemic Risk Board (ESRB), conducts EU-wide stress tests to assess the resiliency of EU banks to aggregate shocks. The EBA publishes two supervisory scenarios for the EU-wide stress tests: baseline and adverse. The macroeconomic scenarios consist of hypothetical set of economic and financial variables over a three-year time horizon, including measures of economic activity, prices, developments in equity and property markets, and interest rates. The adverse scenario is designed to capture major systemic risks as identified by the ESRB. For instance, the 2016 adverse scenario assumes a widening of global risk premia, which is amplified by low liquidity in secondary markets. The developments are assumed to lead to a weakening of domestic demand, a decline in asset prices and a deterioration of financial conditions, as well as a sell-off by nonbanks that would amplify the effect of these shocks.

OVERVIEW OF THE US APPROACH

The FR assesses the resilience of U.S. banks under three supervisory scenarios: baseline, adverse and severely adverse. For the 2016 stress tests, the severely adverse scenario in the U.S. entails a sharp domestic recession, weakness in the euro area as well as a sharp slowdown in developing Asia.

FEDERAL RESERVE'S STRESS SCENARIO IS SIGNIFICANTLY MORE SEVERE THAN EUROPEAN BANKING AUTHORITY'S STRESS SCENARIO

As shown in Figures A through D below, the recession implied by the FR's severely adverse scenario is much more severe than implied by the EBA's adverse scenario.[2] As discussed in our earlier research note, the FR's severely adverse scenario entails a recession that is considerably worse than the recession experienced during the 2007-2009 financial crisis. In contrast, the EBA's adverse scenario reflects a recession that is slightly less severe than the one experienced 2008-2010 period.[3] In summary:

- The unemployment rate increases 5 percentage points to 10 percent by 2017 in the FR's severely adverse scenario, while it increases 2¾ percentage points by the end of 2018 in the adverse scenarios published by EBA. Moreover, the increase in the unemployment rate is very sudden in the FR's stress scenario causing losses to ramp up quickly.

- Real GDP declines 6 percent in the FR's severely adverse scenario, while it falls 1¾ percent in EBA's adverse scenario. As with the case of the unemployment rate, the decline in GDP growth is much more abrupt in the FR's stress scenario.

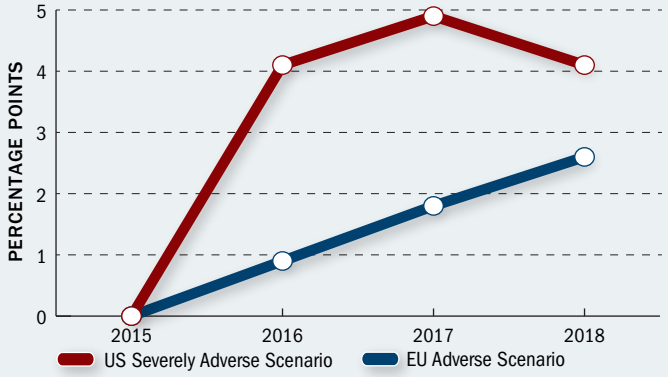
- The declines in the stock market and house prices are also considerably more pronounced and abrupt in the FR's severely adverse scenario relative to EBA's adverse scenario.

2 The supervisory macroeconomic scenarios provided by the FR are available at a quarterly frequency but are included in Figures A-D at an annual frequency to ease the comparison against the EBA's macroeconomic scenario.

3 The EU unemployment rose by about 3 percentage points and real GDP contracted by about 2 percent between 2008 and 2010.

FIGURE A

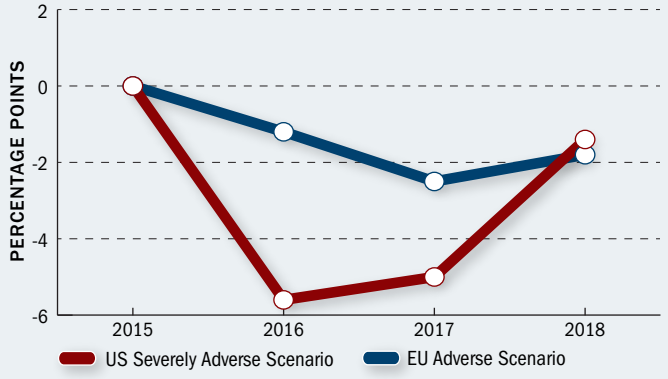
Change in Unemployment Rate



Source: Federal Reserve Board, European Banking Authority

FIGURE B

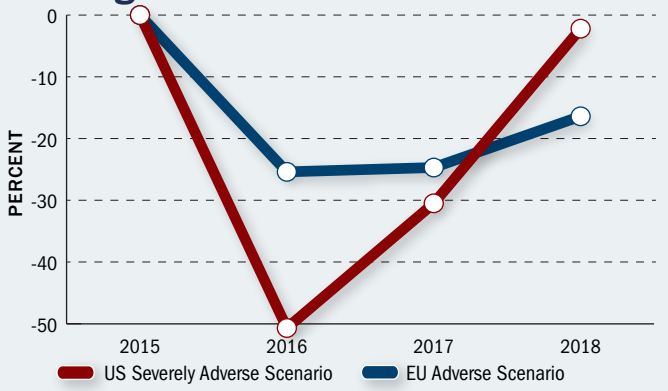
Change in Real GDP



Source: Federal Reserve Board, European Banking Authority

FIGURE C

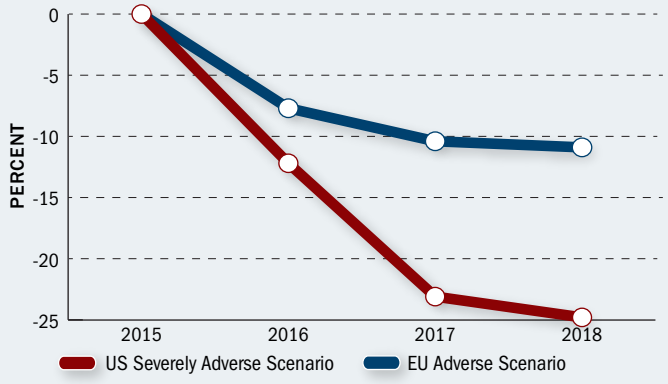
Change in Stock Market Index



Source: Federal Reserve Board, European Banking Authority

FIGURE D

Change in House Price Index



Source: Federal Reserve Board, European Banking Authority

Methodology for Translating Scenarios into Post-Stress Capital Ratios

OVERVIEW OF THE EU APPROACH

The EU-wide stress tests apply to banks with at least EUR 30 billion in consolidated assets, which captured 53 European banks in 2016. The EU-wide stress test assesses the impact of the supervisory macroeconomic scenarios on three main risk areas: credit risk, market risk and operational risk. In addition, banks are required to estimate the impact of the macroeconomic scenarios on net interest income and on other areas not covered above, such as noninterest income, expenses and capital. In the EU-wide stress tests, banks (rather than supervisors) estimate the impact of the supervisory macroeconomic

scenarios on risk-based capital ratios using their own internal models, which must be prepared in accordance with a common set of assumptions and an analytical framework that are specified by the EBA. When preparing their projections, EU banks maintain the assumption of a static balance sheet, and assets and liabilities that mature within the stress test time horizon are replaced with similar financial instruments.

To measure the impact of the macroeconomic scenario on credit risk, banks' use the same internal models that they use to calculate risk-weighted assets under Basel III to calculate the probability of default and loss given default for each exposure. The impact of market risk is assessed by applying a common set of stressed market parameters consistent with the adverse macroeconomic scenario to estimate mark-to-market losses in their trading portfolio. Banks must account for counterparty credit risk by assuming that the two most vulnerable of their 10 largest counterparties default and by estimating losses from credit valuation adjustments that arise from a deterioration in the credit quality of their counterparties. In contrast, debt valuation adjustments are assumed to remain constant throughout the stress testing horizon.

Banks also estimate the performance of the remaining subcomponents of pre-provision net revenue under the two scenarios. Banks estimate net interest income using their own models, subject to a general rule that net interest income cannot increase under the baseline or the adverse scenarios. Banks also use their own models to estimate other noninterest income not covered by credit risk, market risk or operational risk. Estimates of losses from operational risk are deducted from pre-provision net revenue, and the capital charge for operational risk is also included in risk-weighted assets. Estimates of losses due to operational risks are subject to a minimum floor (the floor is higher in the adverse scenario). Finally, with respect to capital actions, banks are required to assume a path for dividends that maintains the same dividend-earnings payout ratio as their publicly declared projected dividend policies, and banks cannot include in their estimates any capital-raising measures; that is, any increase in banks' capital must result from retained earnings alone.

OVERVIEW OF THE U.S. APPROACH

In the U.S., BHCs with consolidated assets of $50 billion or more must submit annual capital plans to the Federal Reserve (encompasses 33 banks in the 2016 CCAR). The key aspects of FR's approach are as follows. The FR runs its own simulations, using its own models, to estimate credit losses, net revenues, balance sheet, risk-weighted assets, and post-stress capital levels. These estimates use an industry-wide, portfolio-specific, and instrument-specific approach and generally do not incorporate bank-specific effects. Specifically, for loan losses the FR estimates the probability of default, loss given default and exposure at default for each loan. For corporate loans, the FR uses the banks' internal ratings to inform the estimation of the probability of default. Similarly, losses related to a global market shock and from counterparty defaults are based on banks' internal models and methodologies and subject to specific assumptions that are common to all banks. In contrast, for net revenues the FR uses top-down models that relate revenue subcomponents to banks' own characteristics and macroeco-

nomic variables. The FR also estimates losses related to operational risk which are deducted from net revenues. Finally, the estimation of risk-weighted assets is done under the standardized approach and banks' paths for the levels of dividends and share repurchases are restricted to be the same as the capital actions provided in the BHC's baseline scenario.

THE FR'S APPROACH TO STRESS TEST METHODOLOGY IS LESS TRANSPARENT AND MAY RESULT IN LESS ACCURATE ESTIMATES OF POST-STRESS CAPITAL RATIOS

The use of a common set of models requires the Federal Reserve to make important simplyfying assumptions, which may lead to inaccurate estimates of loan losses, net revenues, balance sheet and risk-weighted assets. [4] On the loan loss side, the FR does not incorporate bank-specific effects in its projections of loan losses, as there will be unique characteristics of each bank's loan portfolios that cannot be captured by the variables included in the Federal Reserve's models. However, banks have data on the historical performance of their loan portfolios that would enable them to develop more accurate bottom-up models for loan losses. Many of the simplyfying assumptions made by the FR are not disclosed, which makes it impossible to evaluate their appropriateness or compare in any detail to banks' own models (or those used in the EU-wide stress tests). In addition, there may be supervisory concerns with banks' use of their own models, which may weigh in favor of the use of standardized supervisory models and assumptions, but it is not possible to assess the relative tradeoffs among these two modelling choices since there is very little detail regarding the models and the assumptions embedded in the models used by the FR.

On the revenue side, the FR projects PPNR using models that link the subcomponents of revenues and expenses to macroeconomic variables. All subcomponents of revenues and expenses are taken from the regulatory reports. But as pointed out by Duane, Schuermann and Reynolds (2014), successfully modeling bank profitability requires a BHC-specific approach and the reliance on the limited level of granularity available on regulatory reports such as the FR Y9C poses considerable challenges.[5] First, the net income subcomponents available on the regulatory reports are not sufficiently granular to capture the diversity of business activities of a given bank (e.g., at least one large bank has nearly all of its noninterest income reported in "other noninterest income" which includes a wide range of business activities across all 33 banks). Second, other revenue items that are known to move in opposite directions in response to macro shocks are reported in the same line item on the FR Y9C (most notably, fees from mortgage prepayments are reported in the same line item as interest income). In contrast, banks' internal models are much more granular than those reported in the FR Y9C categories and are likely to yield higher-quality models for net interest income and subcomponents of noninterest income compared with the FR's top-down models that rely on the FR Y9C reports.

4 *See* "Dodd-Frank Act Stress Test 2015: Supervisory Stress Test Methodology and Results," March 2015 p.11.

5 *See* "Stress Testing Bank Profitability," *Journal of Risk Management in Financial Institutions*, Volume 7 (1), 2014, pp. 72-84.

Choice of Post-Stress Capital Threshold

THE EBA DID NOT DEFINE CAPITAL THRESHOLDS FOR THE 2016 EU-WIDE STRESS TESTS

The FR's quantitative assessment of a BHC's capital plan requires that, after making all proposed capital actions, the bank is able to have the regulatory ratios above the following thresholds: (i) common equity tier 1 capital ratio at or above 4.5 percent; (ii) tier 1 risk-based capital ratio at or above 6 percent; (iii) total risk-based capital ratio at or above 8 percent; and (iv) tier 1 leverage ratio at or above 4 percent. Moreover, U.S. BHC's have to satisfy a qualitative assessment of its capital planning process. The EBA's stress tests are reported in terms of common equity tier 1 capital, however the EBA concluded that banks no longer required immediate recapitalization actions and dispensed with the 'pass or fail' feature of the crisis stress tests. Thus, the EBA did not define capital thresholds for the 2016 EU-wide stress test. Instead, the results of the stress tests will be used as an input to the Supervisory Review and Evaluation Process to assess remaining vulnerabilities on banks' balance sheets. In addition, the EBA will publish the stressed common equity tier 1 capital ratio to market participants which will be able to interpret the results by themselves on how banks and supervisors are addressing the remaining vulnerabilities.

TABLE 1: Summary of Differences between the US and EU Stress Tests

	SCENARIOS	MODELS	REQUIREMENTS
Federal Reserve	• Three macroeconomic scenarios: (1) baseline, (2) adverse scenario; (3) severely adverse scenario. • Three macroeconomic scenarios: (1) baseline, (2) adverse scenario, (3) severely adverse scenario. • Add-ons: (1) Global market shock applied to BHCs with significant trading operations; (2) Large counterparty-default shock applied to BHCs with substantial trading or processing operations. • BHC need to develop two scenarios: (1) baseline; (2) stress.	• Fed runs own simulations for credit losses, net revenues, balance sheet, risk-weighted assets, and pro forma capital levels. • Projections for credit losses do not incorporate bank-specific effects. • Projections for net revenues are based on top-down models that are not very granular. • Advanced approaches risk-weighted assets are disallowed (standardized approach used instead).	• Common equity tier 1 capital ratio of 4.5%. • Tier 1 risk-based capital ratio of 6%. • Total risk-based capital ratio of 8%. • Tier 1 leverage ratio of 4%. • Satisfy a qualitative assessment of its capital planning process.
European Banking Authority	• Two macroeconomic scenarios: (1) baseline; and (2) adverse scenario. • Macroeconomic scenarios cover the period of 2016 to 2018 (annual). • Stressed market risk factors provided by EBA.	• EBA develops common methodology applied by banks. • Market risk, CCR losses and CVA are included. • Banks project net interest income. • Balance sheet outstandings remain unchanged throughout the exercise. • Banks needs to estimate the impact of scenarios in risk-weighted assets.	• Capital thresholds not defined. • Results of the stress tests used as an input to the Supervisory Review and Evaluation Process.