

## BRIEFING

# Bank stress testing: stock taking of challenges

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*This briefing takes stock on bank stress testing exercises, in view of the publication of the EBA 2016 EU-wide stress test [results on 29 July 2016 at 22:00 CET](#) summer time (21:00 British Summer Time). The results of the exercise will later on feed into the Supervisory Review and Evaluation Process (see [EBA's statement](#)).*

## Purpose and methodological aspects

### General purpose

Stress tests originate either from a bank's own initiative or from a supervisor's request. The general aim of bank stress testing is to find out whether a bank would be able to deal with a hypothetical economic crisis and, more specifically, to estimate how much of its own capital basis it would lose if that hypothetical crisis scenario materialized, essentially judging a bank's prospect to stay solvent.

A more recent development is that bank supervisors increasingly use the results of stress tests to set prudential requirements, for example to set minimum capital requirements or capital buffers (see in this context the [information](#) published by the European Banking Authority (EBA)).

### Defining a meaningful crisis scenario

Defining a meaningful crisis scenario is the first crucial step in a stress test. The crisis scenario is typically presented in form of a general storyline, complemented by tables indicating which specific macroeconomic parameters would be affected to what extent if that scenario materialized (specifying, for example, assumed decreases of Gross Domestic Products and currency exchange rates, assumed falls in house prices, and assumed increases in unemployment figures).

A crisis scenario that is optimally tailored to address a bank's individual risk profile and business exposures can be used for stress tests that are autonomously run by an individual bank as a pure in-house exercise - such a stress test has a high informative value, but its results cannot easily be compared. A specific stress test might focus, for example, on freight rate developments on shipping markets, which is only relevant for banks holding shipping loans.

Coordinated stress tests that are run by several banks at the same time, like those initiated by EBA or the European Central Bank (ECB) in its supervisory capacity, are therefore based on common macroeconomic crisis scenarios and common methodologies. The common scenario facilitates a comparison, but one has to have in mind that the chosen scenario may not have the same relevance in all participating banks. If a different common scenario was used (for example, a scenario that also included all risks attached to government bonds and the effects of a protracted period of the current low interest rate environment), the outcomes could be very different among tested banks.

Irrespective of whether the hypothetical crisis scenario is meant for an individual or for a coordinated stress test exercise, one has to make a choice how severe the scenario shall be and how likely it seems that the scenario comes true. Using a too optimistic scenario creates an illusion of safety, while a too pessimistic scenario can make banks look more fragile than they probably are.

Stress tests often use more than one scenario: There is typically a “base case” and an “adverse case” scenario, the latter being less likely to happen but more demanding to cope with. The “[Dodd-Frank Act Stress Tests](#)”, initiated by the U.S. Federal Reserve, for example even use three scenarios (baseline, adverse, and severely adverse; for more details, see last section of this briefing).

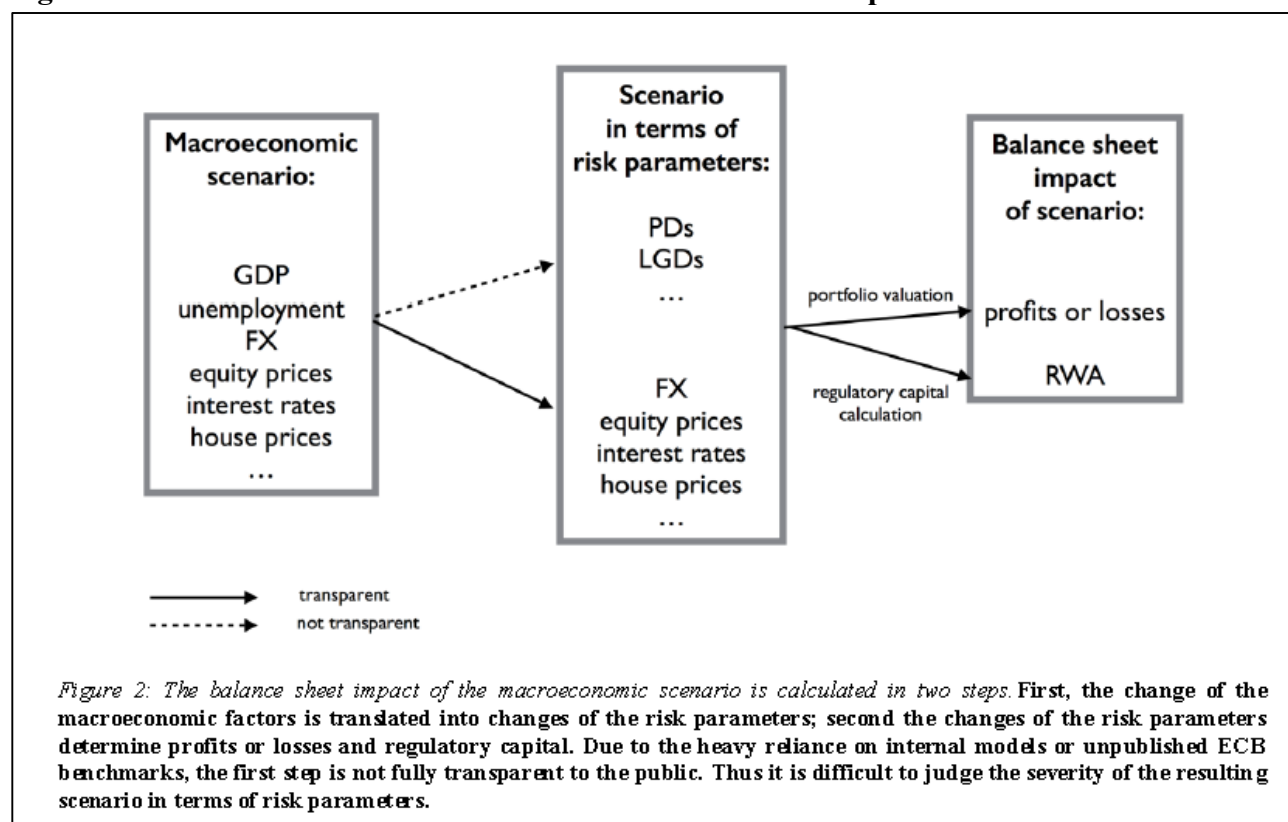
If a “base case” just reflects the most likely future economic situation, not adding any unfavourable development, it has some value as a reference but not as a stress test in the classical meaning of the term. Using a “doom scenario”, on the other hand, which generates the heaviest possible losses conceivable will not lead to meaningful conclusions either, as by definition no bank would be able to withstand such scenario.

To conclude: A stress test only delivers meaningful results if the assumptions are plausible as regards what can go wrong and how likely that is to happen. The design - the assumed crisis scenario - therefore warrants receiving as much attention in a public debate as the outcome of a stress test.

### The use of banks’ internal models

Once the crisis scenario is defined, the next step, as described by [Thomas Breuer](#) (2014, p. 9), is that “...the scenario values of the macroeconomic indicators have to be translated into risk parameter values”.

**Figure 1: “Translation” of macroeconomic indicators into risk parameters**



Source: Thomas Breuer “[Robustness, Validity and Significance of the ECB’s Asset Quality Review and Stress Test Exercise](#)”, p.10; briefing provided to ECON in November 2014

In other words, in order to calculate what effect a specific parameter in given crisis scenario will have on a bank’s income statement and balance sheet, that parameter needs to be “translated” into a likelihood that the bank’s clients will default on their contractual obligations, and into an estimate of the bank’s associated losses.

Banks use their internal models for the “translation” of the macroeconomic crisis scenario into risk parameter values, technically speaking into “probabilities of default” and “losses-given-default”. Supervisory authorities coordinating the stress test, such as EBA and ECB, provide methodological guidance to limit the amount of discretion that is inevitably involved in using internal models.

## Thresholds

Stress test exercises coordinated by a banking supervisor often include thresholds or hurdle rates, typically related to a certain amount of equity or equity-like capital, that banks are supposed to meet in the adverse scenario in order “to pass the stress test”.

The technical details, however, often differ, making a comparison difficult: The applicable threshold in EBA’s 2010 EU-wide stress testing exercise, for example, was a “Tier 1 capital ratio” of 6% that banks were expected to meet over a two-year horizon<sup>1</sup>, in the 2011 exercise it was a 5% “Core Tier 1 ratio” over a similar two-year horizon<sup>2</sup>, and in 2014 it was a 5.5% “Common Equity ratio” for the adverse scenario over a three year horizon<sup>3</sup>.

Thresholds make the results look straight forward, as a clear cut separates those banks that passed from those that failed. Such judgement may, however, be misleading if the pass rate is taken as a general clean bill of health; in 2010, for example, EBA was widely criticised for its pass ratings of Ireland’s two biggest banks just months before the Irish banking system collapsed.

In the 2016 EU-wide stress test EBA no longer uses a threshold, avoiding the simplistic binary logic. The lack of a threshold will encourage market discipline, as pointed out by [Andrea Resti](#) (2016, p. 12), since “...informed investors will still be able to learn about each bank’s prospective capital and profitability levels, but will have to read the small print and become familiar with the methodology used to generate the stress test results”.

The Bank of England took a different approach to thresholds and recently refined its respective framework: According to the [2016 stress test design for the UK banking system](#), the individually applicable hurdle rate now takes into account whether a bank is designated as a “global systemically important bank”, thereby holding systemic banks to higher standards.

## Transparency of the results

In the EU, coordinated EU-wide stress test exercises were set up in the wake of the 2008 financial crisis not least to restore confidence into the soundness of the banking system. [José Manuel Barroso](#), at that time President of the European Commission, stated that he “*made a strong plea to make the results public on a bank by bank basis. [...] This should reassure investors by either lifting unfounded suspicion or by dealing with the remaining problems that may exist.*”

If the aim of a coordinated stress test is to restore confidence, transparency as regards both the methodology applied and the results obtained is key. This view was also taken by the International Monetary Fund (IMF) [in a technical note](#) on stress testing of banks (2013, p. 10): “*Were relevant data not provided, the market would look on the exercise with increased skepticism*”.

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<sup>1</sup> See Report on the “[Aggregate outcome of the 2010 EU wide stress test exercise coordinated by CEBS in cooperation with the ECB](#)”, p. 6

<sup>2</sup> See “[European Banking Authority 2011 EU-wide stress test Aggregate Report](#)”, p. 3

<sup>3</sup> See Report on the “[Results of 2014 EU-wide stress test - Aggregate results](#)”, p. 8; contrary to what is stated in the [keynote address](#) by the Vice-President of the ECB at the London School of Economics Conference on Stress Testing, the hurdle rates for the adverse scenario were not tightened in the 2014 exercise, but rather reduced compared to the base scenario.

Consequently, EBA<sup>4</sup> has so far published [all results](#) of its EU-wide stress test exercises on a bank-by-bank basis, and [announced](#) to publish the results of the 2016 EU-wide stress test on 29 July 2016. EBA's 2016 EU-wide stress test sample<sup>5</sup> includes 39 banks that are directly supervised by the ECB. In total, however, the ECB at present directly supervises 129 banks. As [mentioned by Danièle Nouy](#), the Chair of ECB's supervisory arm, those banks that are directly supervised by the ECB but that are not included in EBA's stress test sample are therefore subject to a parallel euro area-wide stress test exercise conducted by the ECB. The ECB has so far not made any announcement as to when or in which form it will publish the results of its parallel stress test exercise.

## Debate on the design of stress tests

### Contagion effects

In the debate on how to design stress tests, a recurrent topic is the question whether stress tests should incorporate more dynamic elements in order to capture the development of real crisis situations, and whether the additional level of complexity in the design of stress tests is justified by the gain in the model's predictive power.

Proponents in any case argue that the neglect of second round or contagion effects is one of the main shortcomings in current stress testing practices, as pointed out by [Thomas Breuer](#) (2014, p. 15): *"In reality the reaction of banks feeds back to the markets. [...] Second round effects include chain reactions triggered by defaults or value adjustments of interbank assets and liabilities, as well as market effects of fire sales. Banks as market participants will react to developments on the market, and in turn their reaction will contribute to development of markets."* The argument is that a stress test will only deliver meaningful results if contagion effects in the financial system are taken into account.

### Static balance sheet assumption

Not only markets and market participants will react to a financial crisis, banks will also take action. The EBA and ECB stress test exercises, however, have so far been conducted under the "static balance-sheet assumption", whereby all balance-sheet elements are kept constant throughout the horizon of the test.

Banks have to leave out that they could take action and restructure in order to counter a crisis (e.g. by divesting parts of their business), making the exercise somewhat spiritless. The "static balance-sheet assumption" is hence a simplifying feature, and in the [view of Vítor Constâncio](#), Vice-President of the ECB, *"clearly not very realistic"*.

Special rules, however, were applied in EBA's and ECB's stress test exercises for those banks that in the financial crisis received financial support from the state and became subject to a mandatory restructuring plan under [State Aid rules](#): Rescued banks were allowed to use a "dynamic balance sheet assumption" instead, taking all envisaged measures in their restructuring plan into account and taking their implementation for granted, in the end making it easier for them to pass the stress test.

In its 2016 EU-wide stress test exercise, though, EBA no longer makes exemptions from the static

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<sup>4</sup> In contrast, EBA's institutional predecessor, the Committee of European Banking Supervisors (CEBS), did not yet disclose details of the outcome of its 2009 stress test exercise.

<sup>5</sup> In total, EBA's 2016 stress test sample comprises 53 banks, considerably less than in previous exercises. The reduced coverage may be considered a problem in particular with regard to banks in countries that received financial assistance (e.g. Greece and Portugal).

balance sheet assumption<sup>6</sup>; while that approach ensures comparability and equal treatment, it sacrifices some realism.

### **ECB's approach to tackle limitations and add a macro perspective**

The ECB, well aware of the limitations of current stress test approaches, pursues improvements to its framework that sets out how to conduct stress tests, a number of which are described in Vítor Constâncio's recent [keynote address](#) given in October 2015 in London. He sets out that the improvements shall on the one hand address the known limitations, in particular the static balance-sheet approach, the neglect of banks' reactions to the situation, the insufficient treatment of liquidity aspects, and the absence of interaction between banks and other specific sectors of the economy, and on the other hand they shall add a macro-perspective to the whole exercise. Currently, bank stress test exercises have mainly a micro-prudential function, they are basically solvency assessments of individual banks. Adding a macro-perspective takes a broader view, aiming to measure the resilience of the entire financial system.

In 2013, the ECB already published an [occasional paper](#) describing the ECB's macro stress testing framework; in the meantime, new elements have apparently been added to the framework that shall complement it, namely tools to assess household sector vulnerabilities, and models that better catch liquidity aspects, looking at the effects of fire-sales (the quick disposal of assets at very low prices), closure of funding markets and margin calls (additional deposits required in the context of trading activities), credit rating downgrades, and increases in non-performing loans.

As the appropriate inclusion of "dynamic" elements into the design of stress test may increase the predictive power of stress tests, an updated stress testing framework could help to show how to best incorporate those dynamic elements from a technical point of view.

### **Specific new elements in EBA's 2016 EU-wide stress tests**

The European Parliament's panel of external Banking Union experts recently looked into the design of EBA's 2016 EU-wide stress test, assessing in particular the relevance of the new elements included therein. The two briefing papers received on this subject can be summarised as follows:

In his [briefing paper](#), [Andrea Resti](#) finds that the 2016 EU-wide stress test has mainly four new elements, as it 1) includes "conduct risk" (also known as financial misconduct risk), 2) pays greater attention towards risks originated by foreign exchange ("FX") exposures, including the risk that the bank's debtors may struggle to repay foreign currency-denominated loans following a sharp devaluation in their home currency, 3) no longer uses a "pass/fail" threshold that partitions tested banks into "safe" and "unsafe" ones, and 4) makes use of a smaller sample of tested banks.

Resti points out that first two items cover areas that, at least in principle, were already included in the previous stress test exercises. However, by specifying the methodology how to address them, the 2016 stress test may help enhance the accuracy and reliability of the results, stepping up pressure on banks (and local supervisors) on issues that are increasingly sensitive for the European banking industry. Nevertheless, those refinements are unlikely to address the traditional weaknesses of the European stress tests: the lack of a unified supervisory culture, differences across legal and fiscal frameworks, ambiguity about the political will to rescue weak institutions and uncertainty on how "burden sharing" is to be achieved in practice.

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<sup>6</sup> See [EBA's methodological note](#), p. 13, point 32.



According to Resti, the decision to move away from a binary outcome (which can provide a false sense of security for “pass banks” or cast stigma on “fail” ones) has a real advantage, as investors who take stress results into account are now forced to make themselves more familiar with the technicalities behind them, gaining a better awareness of the simplifying (and sometimes unrealistic) assumptions that are used to simulate stressed capital levels.

The reduction in the EBA sample is from his point of view on the one hand welcome, as it eases the workload faced by supervisors, but on the other hand Resti warns that it may end up generating additional opacity, rather than restoring transparency and market confidence, as the EU-wide stress test is paralleled by similar exercises carried out by competent authorities, sometimes on the basis of different scenarios and methodologies.

Given that several tens of banks are no longer part of the publically disclosed sample, investors may wonder whether supervisors have reservations about their financial shape; the fact that, for example, in 2016 none of the Portuguese banks is part of the sample anymore could trigger concerns about their current resilience levels.

Resti therefore recommends that in order to offset the informational damage caused by the reduction in the 2016 stress test sample, EBA should consider to deploy a new “transparency exercise” to provide detailed historical data for institutions not participating in the stress test, which would also improve comparability with past exercises.

In a second [briefing paper](#), [Harry Huizinga](#) focusses in particular on the appropriateness of the exchange rate (FX) risk assessment and related hedges, as well as on loss projections related to conduct risk. As regards FX lending, Huizinga points out that this new element in the stress test is in principle useful, given that it may have only a weak correlation with overall macroeconomic risk, and that its independent impact on bank solvency cannot otherwise be inferred from stress test results.

Huizinga criticises, however, that the adverse macroeconomic scenario is limited to a one sided test only, looking only at the effects of a depreciation of the euro vis-à-vis other major currencies such as the US dollar. That is somewhat arbitrary given the unpredictability of the euro exchange rate. Alternatively, it would have made sense to require banks to perform a two-sided exchange rate risk test by considering scenarios of both euro depreciation and appreciation against other major currencies.

Huizinga furthermore criticises that banks are not required to report the independent, marginal impact of exchange rate movements on the revaluation of both assets and offsetting hedges. The partial consideration, looking only at the exchange rate risk for FX lending but not for asset revaluation, will not deliver sufficient information to infer the overall marginal exchange rate risk for bank solvency.

Huizinga concludes in more general terms that the innovations in the 2016 stress test only go half-way in providing the information necessary to assess the impact of exchange rate movements on overall bank stability.

Analysing data provided by the Bank for International Settlements (BIS) on the currency composition of banks’ claims and liabilities on an aggregate level. While the picture is in any case incomplete, as the data does not capture off-balance-sheet items, Huizinga finds that liabilities by themselves provide an incomplete hedge of the exchange rate risk associated with foreign currency bank claims in the Eurozone, given that on average, more assets than liabilities are denominated in foreign currencies (the net position is nevertheless small).

As regards the conduct risk assessment, Huizinga picks up on the fact that banks are required to use either a more sophisticated qualitative approach or a simpler quantitative approach to project future losses from misconduct, depending on the severity of past misconduct losses; specifically, banks that lost more than 10 basis points of CET1 capital due to misconduct fines during the 2011-2015 period are required to apply the qualitative approach.

In order to put that 10 basis point threshold into perspective, Huizinga analyses the impact of fines and settlements related to the LIBOR manipulation for some of the major EU banks involved, and finds that the impact relative to CET1 capital was in all cases well beyond the threshold level, ranging from an impact equivalent to 64 basis points for Barclays to a staggering impact of 495 basis points for Deutsche Bank.

Huizinga concludes that by asking banks to essentially recalculate their provisions for historical risk events, the 2016 stress test appears to recognize that existing provisions may be inadequate, if banks have unduly applied too much discretion in determining their provisions for known misconduct events, and that at least supervisors can gain some additional insight into the situation.

### **In comparison: Stress Tests in the United States**

The Federal Reserve (Fed) carries out annual stress tests required by the Dodd-Frank Act, scrutinizing the largest bank holding companies (BHCs) in the U.S., with total consolidated assets of \$50 billion or more.

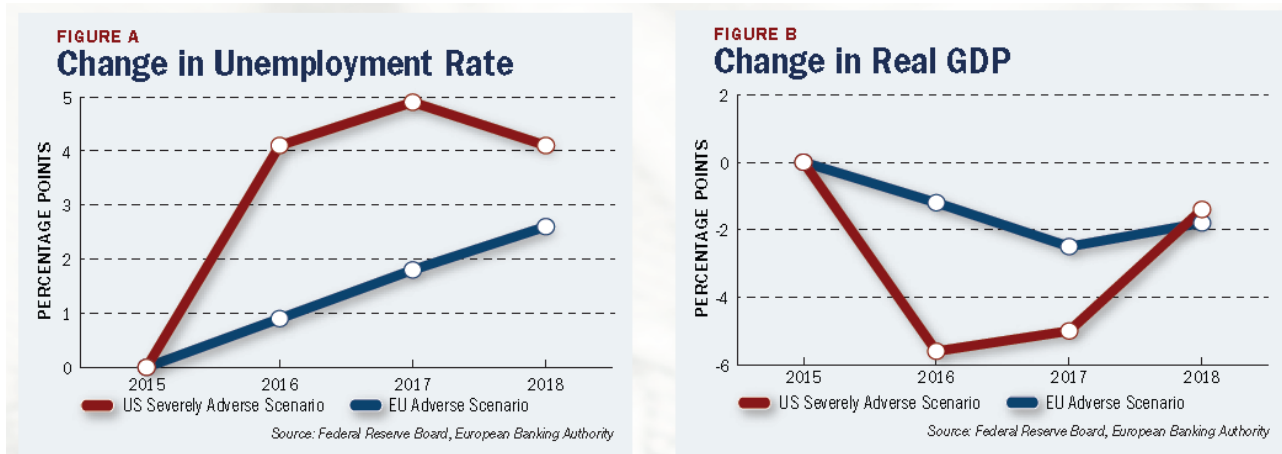
In addition to the annual supervisory stress test as defined by the Fed, each BHC is required by the Dodd-Frank Act to run its own stress tests under company-developed scenarios, the so called “midcycle” test”, and to report its results to the Fed. By the same law, smaller financial companies, namely those with more than \$10 billion in total consolidated assets, are also required to conduct an annual company-run stress test, making stress tests an obligatory and frequently used monitoring tool for significant banks in the U.S.

In order to achieve its objectives, that is to inform both supervisors and the public with forward looking information to help gauge the potential effect of stressful conditions on the ability of the largest banking organizations to absorb losses, the Dodd-Frank Act requires transparency, both BHCs and the Federal Reserve therefore disclose a summary of their stress test results.

The [results of the Dodd-Frank Act stress test 2016](#) exercise have been published on 23 June 2016. The participating 33 BHCs in total account for more than 80 per cent of US banking assets; among them were five subsidiaries of European banking groups (BBVA Compass Bancshares, Deutsche Bank Trust Corporation, HSBC North America Holdings, Santander Holdings USA, as well as BancWest Corp., a subsidiary of France’s BNP Paribas SA).

As customary, the Fed uses three scenarios, with a baseline, adverse, and severely adverse case. In the toughest scenario designed by the Fed, characterized by a severe global recession, stock prices drop about 50 per cent, unemployment raises by 5 percentage points to 10 percent, and gross domestic product declines sharply. The key drivers in the Fed’ severely adverse scenario are hence much more difficult to cope with than in EBA’s adverse scenario (see figure 2).

**Figure 2: EBA Stress Scenario vs. Federal Reserve Severely Adverse Scenario**



Source: The Clearing House “[Comparison between United States and European Union Stress Tests](#)”, May 2016, p. 4

The Fed’s final report concludes that in aggregate, all BHCs would experience substantial losses under both the adverse and the severely adverse scenarios: “Over the nine quarters of the planning horizon, aggregate losses at the 33 BHCs under the severely adverse scenario are projected to be \$526 billion. This includes losses across loan portfolios, losses from credit impairment on securities held in the BHCs’ investment portfolios, trading and counterparty credit losses from a global market shock, and other losses.”

95 percent of the projected losses for the 33 BHCs would therefore stem from accrual loan portfolios and trading and counterparty positions subject to the global market shock and counterparty default.

In the severely adverse scenario, the aggregate Common Equity Tier 1 (CET1) capital ratio would hence fall from an actual 12.3 percent in the fourth quarter of 2015 to a post-stress level of 8.4 percent in the first quarter of 2018, which is in any case still higher than regulatory minimum capital requirements.

In the end, the results of the Fed’s stress test feed into a supervisory, all-encompassing assessment of the banks’ capital adequacy named Comprehensive Capital Analysis and Review (CCAR), which looks both into quantitative factors (like projected capital ratios), and qualitative factors (like the capital planning process itself, risk management, internal controls, and governance practices). The Fed’s principle that stress test results are used in a wider supervisory assessment is also applied in the European Union, where the results of the EU-wide stress test feed into the supervisory assessment called Supervisory Review and Evaluation Process ([SREP](#)).

According to the Fed’s [report on the CCAR results 2016](#), the Fed did not object to the capital plan and planned capital distribution for 31 of the 33 participating BHCs. As in the previous year, however, the Fed objected the capital plans of both [Deutsche Bank Trust Corporation](#) and [Santander Holdings USA](#) on a qualitative, though not on a quantitative basis.

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