FHLBank
San Francisco

Federal Home Loan Bank of San Francisco

2016 Annual Stress Test Disclosure:
Results of the Federal Housing Finance Agency
Supervisory Severely Adverse Scenario

November 17, 2016

As required by the Dodd-Frank Wall Street Reform and Consumer Protection Act

Executive Summary

Background

- The Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) requires certain financial companies with total consolidated assets of more than $10 billion and which are regulated by a primary Federal financial regulatory agency to conduct annual stress tests to determine whether the company has the capital necessary to absorb losses as a result of adverse economic conditions.
- In September 2013, the Federal Housing Finance Agency (FHFA), the regulator of the Federal Home Loan Banks (FHLBanks), implemented annual stress testing for the FHLBanks as required by the Dodd-Frank Act. These rules were amended in November 2015.
- In accordance with these rules and the FHFA order received in March 2016, the Federal Home Loan Bank of San Francisco (Bank) filed the results of its stress test with the FHFA by August 31, 2016, and is publicly disclosing the summary results of the severely adverse scenario in this document.

Requirements

- The FHFA provided the inputs and key assumptions for the severely adverse scenario. New in 2016, the assumptions included a negative interest rate environment and an expanded list of counterparties to consider for counterparty defaults.
- The stress tests are based on portfolios as of December 31, 2015. The time horizon for the stress test is nine quarters, starting with the first quarter of 2016 and extending through the first quarter of 2018.
- The stress test results under the FHFA severely adverse scenario, as disclosed in this document or otherwise, are not forecasts of expected or likely outcomes of future results. Rather, these modeled simulations are based solely on the FHFA's severely adverse scenario and other specific required assumptions.

Results

- Our historical financial information, prepared under accounting principles generally accepted in the United States of America (GAAP), is available in reports filed with the Securities and Exchange Commission, including our Annual Report on Form 10-K for the year ended December 31, 2015.
- Our stress test results demonstrate capital adequacy under the FHFA's severely adverse economic conditions as of March 31, 2018, and we remain in compliance with all regulatory capital requirements under the severely adverse scenario throughout all nine quarters covered by the stress test.
    - Our regulatory capital ratio (which is permanent capital divided by total assets) at March 31, 2018, is 8.84%, exceeding the minimum regulatory requirement of 4.00%.
    - Our regulatory leverage capital ratio (which is permanent capital multiplied by 1.5 divided by total assets) at March 31, 2018, is 13.26%, exceeding the minimum regulatory requirement of 5.00%.
    - Total GAAP Capital at March 31, 2018, is $2.0 billion.

Use/Governance

- Stress testing has evolved as an important analytical tool for evaluating capital adequacy under severely adverse economic conditions. The Bank regularly uses stress tests, including those annual stress tests required by the Dodd-Frank Act, in its capital planning to measure our exposure to material risks and evaluate the adequacy of capital resources available to absorb potential losses arising from those risks.
- We take the stress test results into account when making changes to our capital structure; when assessing our exposures, concentrations, and risk positions; and when evaluating our overall risk profile.
- The overall stress test process and these results have been reviewed with our Board of Directors.

Stress Test Components

- Net Interest Income + Other Non-Interest Income, Net: Net interest income/(expense), operating expenses, and other non-interest income/(expense).
- (Provision)/Benefit for Credit Losses on Mortgage Loans: Provisions for credit losses related to mortgage loans held for portfolio.
- OTTI Credit Losses: Other-than-temporary impairment (OTTI) credit losses for investment securities.
- Mark-to-Market Gains/(Losses): Mark-to-market gains/(losses) related to changes in fair value of derivatives and other gains/(losses) on assets and liabilities held at fair value.
- Global Market Shock Impact on Trading Securities: Instantaneous global shocks of option adjusted spreads (OAS) applied to mortgage-backed securities (MBS) and other agency trading securities.
- Counterparty Default Credit Losses: Instantaneous and unexpected default of largest counterparty across secured and unsecured lending, repurchase/reverse repurchase agreements, derivatives exposures, and single-family mortgage insurance providers.
- Other Comprehensive Income/(Loss): Instantaneous global shocks of interest rates, housing price index (HPI), and non-agency MBS prices applied to available-for-sale (AFS) securities and other-than-temporarily-impaired held-to-maturity (HTM) securities.
- Total Comprehensive Income/(Loss): The sum of net income/(loss) and other comprehensive income/(loss).

Results

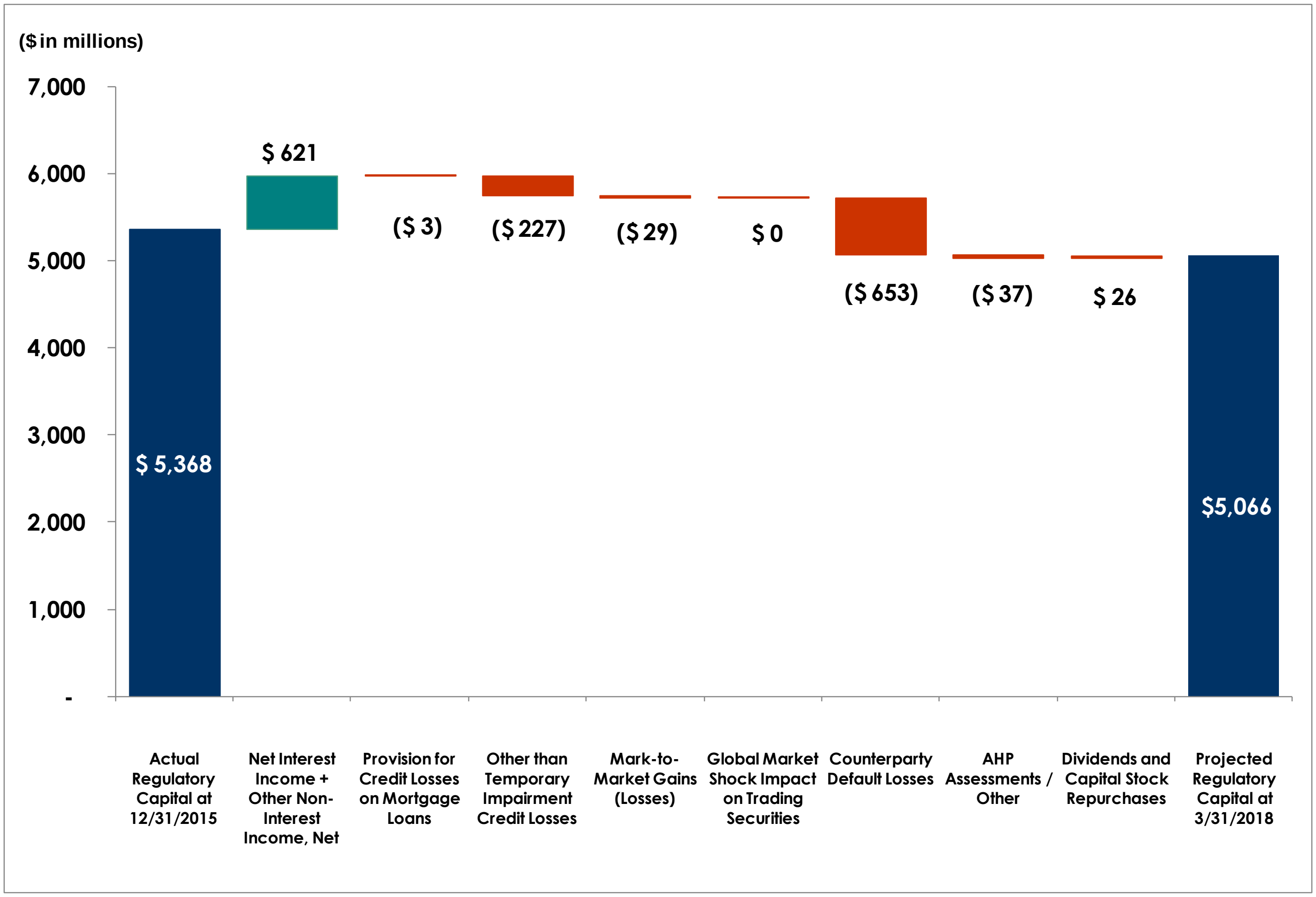
The severely adverse scenario is not an expected forecast, but a hypothetical severely adverse stress scenario using internal modeled simulations based on applying the rules and conditions set forth by the FHFA.

Cumulative Projected Financial Metrics: Q1 2016 – Q1 2018
($ in millions)

Net interest income + other non-interest income, net	$621
(Provision)/benefit for credit losses on mortgage loans	(3)
OTTI credit losses	(227)
Mark-to-market gains/(losses)	(29)
Global market shock impact on trading securities	-
Counterparty default credit losses	(653)
AHP assessments	(37)
Net income/(loss)	(328)
Other comprehensive income/(loss)	(2,519)
Total comprehensive income/(loss)	(2,847)
Total capital (GAAP) – Starting (12/31/15)	4,896
Total capital (GAAP) – Ending (3/31/2018)	2,023
Regulatory capital ratio – Starting (12/31/15)	6.26%
Regulatory capital ratio – Ending (3/31/2018)	8.84%

Severely Adverse Scenario Results – Regulatory Capital Analysis

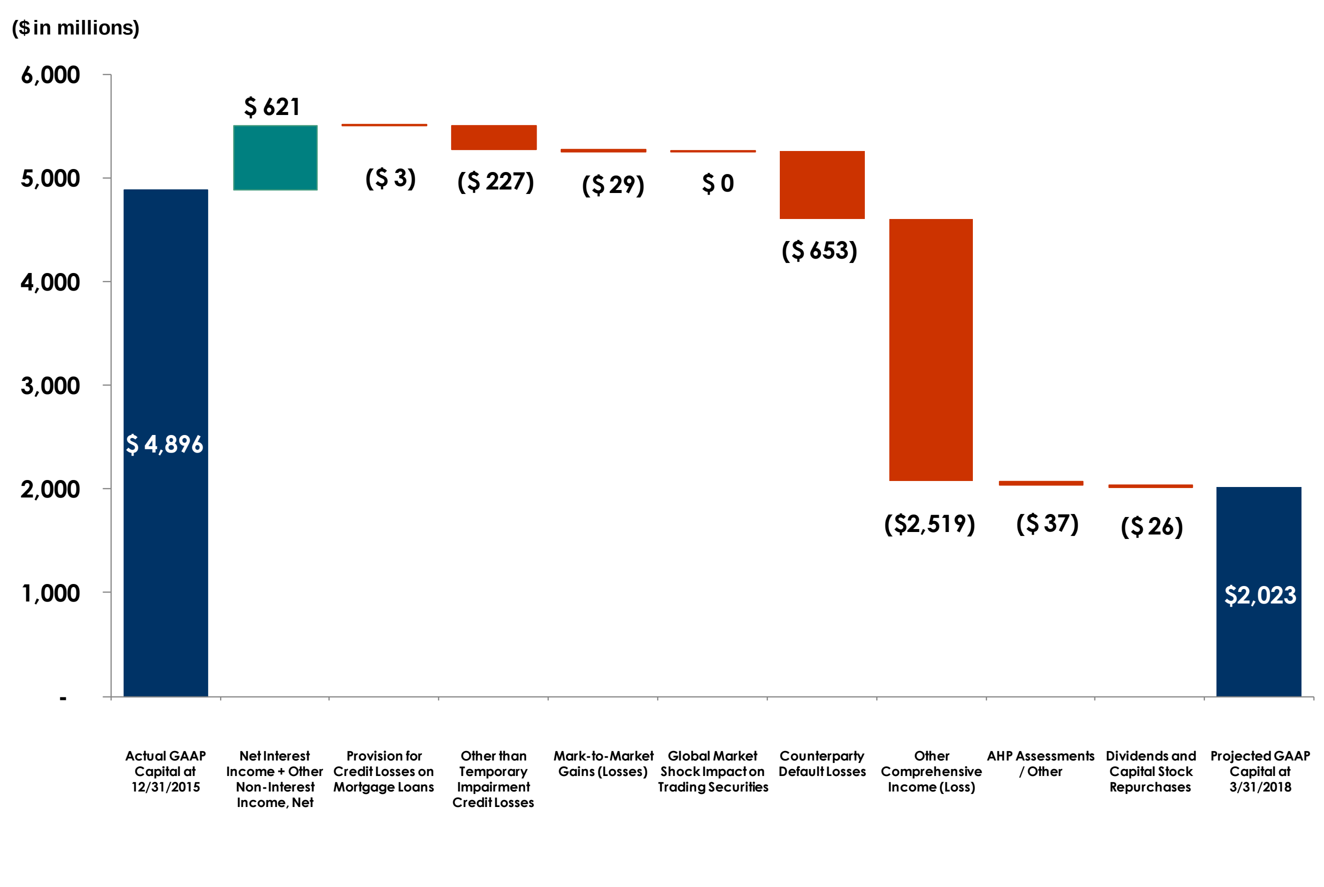
- Regulatory capital, which is defined as the sum of capital stock, retained earnings, and mandatorily redeemable capital stock, decreases from $5.4 billion as of December 31, 2015, to $5.1 billion as of March 31, 2018.
- All results shown below are modeled simulations, except for actual regulatory capital as of December 31, 2015.



The Severely Adverse Scenario is not an expected forecast, but a hypothetical stress scenario using internal modeled simulations based on applying the rules and conditions set forth by the FHFA.

Severely Adverse Scenario Results – GAAP Capital Analysis

- GAAP capital, which is defined as the sum of capital stock, retained earnings, and accumulated other comprehensive income/(loss), decreases from $4.9 billion as of December 31, 2015, to $2.0 billion as of March 31, 2018.
- All results shown below are modeled simulations, except for actual GAAP capital as of December 31, 2015.



The Severely Adverse Scenario is not an expected forecast, but a hypothetical stress scenario using internal modeled simulations based on applying the rules and conditions set forth by the FHFA.

Severely Adverse Scenario Key Assumptions

Provided by FHFA

Macroeconomic Variables

Residential house prices (Peak to trough decline with no recovery during the 9-quarter time horizon)[1]	-24%
Real gross domestic product (Annual GDP growth rate)	-5.7% (2016) +0.6% (2017)
Unemployment rate (Peak)	10.0% (Q3 2017)

Interest Rate Variables

3-month Treasury rate (Lowest/Average during the 9-quarter time horizon)	-0.5%/-0.4%
10-year Treasury rate (Lowest/Average during the 9-quarter time horizon)	0.2%/0.7%
30-year mortgage rate (Lowest/Average during the 9-quarter time horizon)	3.2%/3.9%

Global Market Shock

Instantaneous price shocks on non-agency securities:	
Range of price shocks	-12.8% to -91.5%
Dollar weighted price shock	-63%
Instantaneous OAS shocks on:	
Agency security passthroughs	MBS OAS +170 bps
Agency security CMOs	CMO OAS +200 bps

Component Methodologies

Net Interest Income + Other Non-Interest Income, Net

Description

- Reflects projections of net interest income/(expense), operating expenses, and other non-interest income/(expense) over the nine-quarter time horizon.
- Material risks covered include market risk, operational risk, and business risk.

Methodologies

- Estimates net interest income by projecting portfolio balances, funding mix, and spreads using the macroeconomic variables provided by the FHFA and management assumptions.
- Non-interest income and expenses estimated by management.
- Estimates operational risk losses estimated by the Bank's historical operational loss experience and relevant external data consistent with supervisory expectations.

[1] For modeling OTTI losses, residential house prices decrease for three years, start recovering in year four, and reach a long-term average growth rate of 4.3 percent per year starting in year five.

(Provision)/Benefit for Credit Losses on Mortgage Loans

Description

- Reflects credit loss provisions related to estimated losses on mortgage loans held for portfolio.
- Captures mortgage credit risk.

Methodologies

Loan loss reserves forecasted by projecting the population of loans 90+ days delinquent or in foreclosure, and corresponding loss severity over the nine-quarter time horizon. Specifically:

- Forecasts the cumulative default curve under the FHFA-provided macroeconomic scenario.
- Forecasts loss severity by combining the current loan-to-value of the mortgage loan population with stressed house price index curves.
- Combines the projected cumulative defaults and loss severities to compute projected losses.
- Distributes the projected losses across the nine quarters prescribed by the FHFA stress testing template.

OTTI Credit Losses

Description

- Reflects credit-related OTTI losses for non-agency investment securities.
- Material risks covered include credit risk associated with the investment portfolio.

Methodologies

- Estimates OTTI of non-agency MBS by projecting cash flow shortfalls. Incorporates FHFA-provided and internal assumptions for housing prices, interest rates, mortgage rates, and monoline insurer performance.
- Estimates credit losses on Housing Finance Agency (HFA) securities, incorporating analysis performed by the California Housing Finance Agency (CHFA) and rating agencies (Standard & Poor's and Moody's).

Mark-to-Market Gains/(Losses)

Description

- Reflects mark-to-market gains/(losses) from changes in fair value of derivatives and other gains/(losses) on assets and liabilities held at fair value resulting from changes in interest rates.
- Material risk covered includes market risk.

Methodologies

- Applies FHFA-provided interest rates and internal interest rate assumptions through the use of valuation models to estimate changes in fair value of derivatives and other gains/(losses) on assets and liabilities held at fair value.

Global Market Shocks

Description

- The Global Market Shock is an instantaneous decline in market value of trading and AFS securities, and other-than-temporarily-impaired HTM securities. The instantaneous losses and corresponding reduction of capital are taken in the first quarter of the testing horizon without any future recoveries during the nine-quarter time horizon. This shock is treated as an add-on to the macroeconomic and financial market environment specified in the stress test. Global shocks applied to AFS and other-than-temporarily-impaired HTM securities are included in other comprehensive income/(loss).

Methodologies

- Applies FHFA-provided shocks, as of the first quarter of the forecast horizon, to trading and AFS securities and other-than-temporarily-impaired HTM securities:
  - Non-agency securitized products: Relative market value shock
  - Municipals: Spread widening
  - Agencies: OAS widening

Counterparty Default Losses

Description

- Reflects instantaneous and unexpected default of largest counterparty net exposure.
- Material risks covered include secured and unsecured lending, repurchase/reverse repurchase agreements, derivative exposures, and single-family mortgage insurance providers, but excludes advances and overnight positions.

Methodologies

- Estimates credit loss arising from largest counterparty net stressed exposure by applying global market shock to non-cash securities/collateral held or received and derivatives positions including non-cash collateral exchanged.
- Incorporates the FHFA-provided and management assumptions for:
  - Interest rates
  - Credit spreads
  - Recovery rates

Key Risks Considered

Market Risk

The risk to earnings or capital arising from changes in the market value of mortgage loans, investment securities, or other financial instruments as a result of changes in the level, volatility, or correlations among financial market rates or prices, including interest rates. Specifically, market risk to the Bank's earnings and capital includes the risk that the market value of the Bank's portfolio will decline as a result of changes in interest rates and/or changes in spreads.

Credit Risk

The risk to earnings or capital arising from the default, inability, or unwillingness of a borrower, obligor, or counterparty to meet the terms of any financial obligation with the Bank or otherwise perform as agreed. Specifically, credit risk to the Bank as it pertained to the stress test includes the risk of loss due to defaults on principal and interest payments on advances, mortgage-backed securities, mortgage loans and other investments, interest rate exchange agreements, and unsecured extensions of credit. Based on the Bank's collateral management practices and further analysis of existing and supplemental collateral support, the Bank projected no credit losses on advances. This is consistent with the history of the FHLBank System, which has never experienced a loss on a member advance, even in highly stressful economic environments.

Operational Risk

The risk of loss resulting from inadequate or failed processes, systems, human factors, or external events. Operational risk is inherent in the Bank's business activities and can manifest itself in various ways, including accounting or operational errors, business interruptions, fraud, and technology failures. This definition includes legal risk, which is the risk of loss arising from defective transactions, litigation or claims made, or the failure to adequately protect company-owned assets.

Business Risk

The risk of an adverse effect on the Bank's profitability resulting from external factors that may occur in both the short and long term. Business risk includes the impact of regulatory risk. Declines in business may affect the Bank's capital levels by reducing its activity-based capital stock balance and slowing the pace at which the Bank can build retained earnings. In addition, the reduction in capital levels will limit the Bank's ability to purchase additional investments, thereby further limiting potential income and growth.