Dodd-Frank Act Company-Run Stress Test Disclosures

June 21, 2019

The PNC Financial Services Group, Inc.

Table of Contents

INTRODUCTION 3

BACKGROUND 3

2019 SUPERVISORY SEVERELY ADVERSE SCENARIO 3

CAPITAL ACTION ASSUMPTIONS 4

CAPITAL FRAMEWORK FOR 2019 STRESS TEST 5

DETAILED RESULTS OF 2019 COMPANY-RUN STRESS TEST 6

OVERVIEW OF PNC'S STRESS TEST METHODOLOGY AND SCENARIO DEVELOPMENT 9

GOVERNANCE 13

INTRODUCTION

Pursuant to regulations issued by the Board of Governors of the Federal Reserve System ("Federal Reserve") and the Office of the Comptroller of Currency ("OCC") under the Dodd-Frank Wall Street Reform and Consumer Protection Act ("Dodd-Frank Act"), The PNC Financial Services Group, Inc. ("PNC") (NYSE: PNC) and PNC Bank, National Association ("PNC Bank") are required to conduct an annual company-run stress test and disclose certain summary results of the test. For 2019 (the "2019 Stress Test") this stress test is based on balance sheet information as of December 31, 2018.

BACKGROUND

The annual Dodd-Frank Act company-run stress test is a forward-looking exercise under which PNC and PNC Bank each must estimate the impact of a hypothetical severely adverse macroeconomic scenario provided by the Federal Reserve and OCC on its financial condition and regulatory capital ratios over a nine-quarter planning period (the "stress period"). For the 2019 Stress Test, the stress period covers the period of January 1, 2019, through March 31, 2021. The test is designed to help assess whether PNC and PNC Bank have sufficient capital to absorb losses and support operations during hypothetical severely adverse economic conditions. While the 2019 Stress Test is conducted in conjunction with the Federal Reserve's Comprehensive Capital Analysis and Review ("CCAR") process, the results of this stress test do not reflect, nor should they be interpreted as, any decision by the Federal Reserve on the capital plan that PNC submitted on April 5, 2019, as part of the 2019 CCAR exercise. The Federal Reserve previously announced that it will release the results of the 2019 CCAR exercise at 4:30 p.m. (EDT) on June 27, 2019.

2019 SUPERVISORY SEVERELY ADVERSE SCENARIO

The supervisory severely adverse scenario for the 2019 Stress Test was released by the Federal Reserve on February 5, 2019 and revised on February 13, 2019. It is important to note that this hypothetical scenario involves economic conditions that are more adverse than currently expected by the Federal Reserve or PNC.

Accordingly, the scenario is not a forecast of anticipated economic conditions, and the estimates produced under the 2019 Stress Test are not forecasts of expected losses, revenues, net income before taxes, or capital ratios. Rather, the supervisory severely adverse scenario is designed to test the strength and resilience of large banking organizations, including PNC and PNC Bank, and their ability to continue to meet the needs of consumers and businesses should severe economic and financial conditions develop in the future. In light of PNC's limited trading and custodial activities, PNC was not required to apply the additional global market shock and counterparty default components of the supervisory severely adverse scenario.

The 2019 supervisory severely adverse scenario is characterized by a severe global recession that is accompanied by a period of heightened stress in commercial real estate ("CRE") markets and corporate debt markets, as well as a sharp drop in asset prices.

- In the United States, the level of real Gross Domestic Product ("GDP") begins to decline in the first quarter of 2019 and is at a trough in the third quarter of 2020 that is 8.0% below the pre-recession peak.
- The unemployment rate increases by 6.2 percentage points, peaking at 10.0% in the third quarter of 2020, and the inflation rate, as measured by the Consumer Price Index ("CPI"), declines from 1.8% in the fourth quarter of 2018 to a low of 1.2% in the first quarter of 2019, before rising to 2.1% in the first quarter of 2021.
- Equity prices, as measured by the U.S. Dow Jones Total Stock Market Index, fall by 50.0% from their level in the fourth quarter of 2018 to the trough in the fourth quarter of 2019, accompanied by a surge in equity market volatility, as measured by the U.S. Market Volatility Index.

- Housing prices, as measured by the CoreLogic House Price Index, fall sharply from their level in the fourth quarter of 2018, decreasing by 26.4% through the first quarter of 2021. Commercial real estate prices, as measured using the Federal Reserve's U.S. Commercial Real Estate Price Index, also experience a considerable decline of 35.0% from the fourth quarter of 2018 to their trough in the first quarter of 2021.
- Financial conditions in corporate and real estate lending markets are stressed severely in the hypothetical scenario. The spread between yields on investment-grade corporate bonds and yields on long-term Treasury securities increases to 5.5 percentage points by the third quarter of 2019. The spread between mortgage rates and 10-year Treasury yields widens to 3.4 percentage points over the same time period.
- As a result of the severe decline in real economic activity, short-term Treasury rates fall and remain near zero through the end of the stress period. The 10-year Treasury yield falls to a lesser degree, resulting in a mildly steeper yield curve.
- Additional information on the supervisory severely adverse scenario is available on the Federal Reserve's web site at https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20190213a1.pdf.

Capital Action Assumptions

Pursuant to the Federal Reserve's current Dodd-Frank Act company-run stress test regulations (12 C.F.R. § 252.50-58), bank holding companies, including PNC, must make a uniform set of assumptions regarding capital actions over the stress period.

- These assumptions are designed to assist the public in comparing disclosed results across the bank holding companies subject to the tests and reduce the effect of company-specific assumptions related to capital distributions on disclosed results.
- Under these regulations, financial information and capital ratios are calculated for the first quarter of 2019 taking into account the actual capital actions expected to be undertaken in that quarter.
- For the remaining eight quarters of the stress period, firms must assume that:
  - i) there are no repurchases or redemptions of regulatory capital instruments;
  - ii) there are no issuances of common stock or preferred stock (other than issuances pursuant to expensed employee compensation programs);
  - iii) the dollar amount of quarterly common stock dividends is equal to the quarterly average dollar amount of common stock dividends paid during the second quarter of 2018 through the first quarter of 2019 (for PNC, the quarterly average amount of common dividends during this period was $420 million); and
  - iv) payments on other regulatory capital instruments are made equal to the stated dividend, interest, or principal due.

The financial information and capital ratios for PNC are calculated using the assumptions required by the Federal Reserve's stress test regulations.

These assumptions may not represent the actual capital actions that PNC would take should severely adverse economic conditions develop. For example, if the extreme economic conditions specified in the supervisory severely adverse scenario were indeed to develop, PNC would expect to respond by adjusting its capital actions to preserve or improve its capital and liquidity positions (e.g., by reducing capital distributions). Moreover, the Basel III capital rules would limit the ability of a banking organization to make capital distributions and certain discretionary incentive compensation payments if the organization's actual risk-based regulatory capital levels fall below the required minimum levels plus a capital conservation buffer amount that was fully phased in as of January 1, 2019.

The OCC's stress test regulations (12 C.F.R. Part 46) applicable to PNC Bank do not require the use of the capital action assumptions described above. Thus, the capital ratios for PNC Bank included in Table 2 are calculated using management's estimate of the capital actions (e.g., dividends and capital issuances and redemptions) that PNC Bank would take in the assumed macroeconomic scenario.

CAPITAL FRAMEWORK FOR 2019 STRESS TEST

With the exception of certain non-qualifying trust preferred securities included in PNC's total risk-based capital, the definitions of, and deductions from, capital under the Basel III rules were fully phased-in as of January 1, 2018, and, thus, are reflected in the projected post-stress capital ratios calculated for the 2019 Stress Test. We refer to these capital ratios as the Basel III ratios. Additional information on the Basel III capital framework can be found in PNC's 2018 Form 10-K within the Supervision and Regulation section of Item 1 Business and the Capital Management section within the Liquidity and Capital Management portion of the Risk Management section of Item 7.

Table 1 illustrates the minimum required capital ratios in effect during the stress period:

Table 1: Minimum Regulatory Capital Ratios in Effect during the Stress Period

	Minimum Regulatory Capital Ratios in Effect
	2019 - 2021
Common Equity Tier 1 ("CET") Risk-Based Capital Ratio	4.5%
Tier 1 Risk-Based Capital Ratio	6.0%
Total Risk-Based Capital Ratio	8.0%
Tier 1 Leverage Ratio	4.0%
Supplementary Leverage Ratio	3.0%

DETAILED RESULTS OF 2019 COMPANY-RUN STRESS TEST

The following tables provide the results of the 2019 Stress Test. All projections represent hypothetical outcomes under the assumed severely adverse scenario conditions and are not forecasts of expected losses, revenues, net income before taxes, risk-weighted assets, or capital ratios.

Table 2: Actual Q4 2018 and Projected Basel III Capital Ratios through Q1 2021 under the Supervisory Severely Adverse Scenario

	Actual Basel III Ratios	Projected Stressed Basel III Capital Ratios (a)	
	Q4 2018	Ending Q1 2021	Minimum
The PNC Financial Services Group, Inc.			
CET1 Risk-Based Capital Ratio	9.6%	8.0%	8.0%
Tier 1 Risk-Based Capital Ratio	10.8%	9.3%	9.3%
Total Risk-Based Capital Ratio (b)	13.0%	12.0%	12.0%
Tier 1 Leverage Ratio	9.4%	8.1%	8.1%
Supplementary Leverage Ratio	7.8%	6.7%	6.7%
PNC Bank, N.A.			
CET1 Risk-Based Capital Ratio	9.8%	9.7%	9.6%
Tier 1 Risk-Based Capital Ratio	9.8%	9.7%	9.6%
Total Risk-Based Capital Ratio	11.9%	12.5%	12.1%
Tier 1 Leverage Ratio	8.3%	8.3%	8.0%
Supplementary Leverage Ratio	6.9%	6.8%	6.6%

(a) The capital ratios for PNC through the stress period are calculated using the capital action assumptions included in the Federal Reserve's Dodd-Frank Act stress testing rules. The capital ratios for PNC Bank through the stress period are calculated using management's estimate of the capital actions that PNC Bank would take in the supervisory severely adverse scenario. All risk-based regulatory capital ratios are calculated based on the Basel III Standardized Approach for the risk-weighting of assets. These projections represent hypothetical estimates that involve an economic outcome that is more adverse than expected. The projected minimum capital ratios presented are the minimum quarter-end ratios for the relevant metrics during the stress period.
(b) The Basel III Total Risk-Based Capital Ratio for PNC from 2018 through 2021 includes certain nonqualifying trust preferred capital securities that are subject to a phase-out period that runs through 2021.

Table 3: Actual Q4 2018 and Projected Q1 2021 Standardized Approach Risk-Weighted Assets under the Supervisory Severely Adverse Scenario for The PNC Financial Services Group, Inc.

In billions	Actual Q4 2018	Projected Q1 2021
Risk-Weighted Assets (a)	$320.6	$293.8

(a) Risk-weighted assets are calculated under the Basel III Standardized Approach.

Table 4: Projected Losses, Revenue, and Net Income Before Taxes for Q1 2019 through Q1 2021 under the Supervisory Severely Adverse Scenario for The PNC Financial Services Group, Inc.

		Dollars in Billions		% of Avg Assets (a)
Pre-Provision Net Revenue (b)	$	9.1		2.5%
Other Revenue (c)		-		-
Less: Provision		11.1		3.0%
Realized (Gains)/Losses on Securities (AFS & HTM)		0.0		0.0%
Trading and Counterparty Losses (d)		-		-
Other Losses/(Gains) (e)		0.0		0.0%
Equals: Net Income/(Loss) Before Taxes	$	(2.1)		(0.6)%
Memo Items				
Other Comprehensive Income (f)	$	0.3		
Other effects on capital		*2018 Q4*		*2021 Q1*
Accumulated Other Comprehensive Income included in capital (AOCI) (g)	$	(0.8)	$	(0.7)

* Numbers may not foot due to rounding.

(a) Average assets is the nine-quarter average of total assets.
(b) Pre-provision net revenue includes losses from operational risk events, mortgage repurchase expenses, other real estate owned ("OREO") costs, and expenses associated with the change in the allowance for unfunded commitments.
(c) Other revenue includes one-time income and (expense) items not included in pre-provision net revenue.
(d) Trading and counterparty losses include mark-to-market losses and credit valuation ("CVA") losses. PNC was not subject to the global market shock or counterparty default scenario components of the stress test.
(e) Other losses/gains include projected change in fair value of loans held for sale and loans held for investment measured under the fair-value option, and goodwill impairment losses.
(f) Represents cumulative net change over the stress period of the following primary components of other comprehensive income ("OCI"): net unrealized gains/(losses) on available for sale securities and cash flow hedge derivatives, and adjustments related to pension and other postretirement benefit plans.
(g) Includes the after-tax AOCI related primarily to the net unrealized gains/(losses) on available for sale securities and adjustments related to pension and other postretirement benefit plans.

Table 5: Projected Loan Losses by Type of Loans for Q1 2019 through Q1 2021 under the Supervisory Severely Adverse Scenario for The PNC Financial Services Group, Inc.

		Dollars in Billions	Portfolio Loss Rates (%) (a)
Loan Losses (Net Charge-offs):			
First Lien Mortgage, Domestic	$	0.4	1.6%
Junior Lien Mortgages & HELOCs, Domestic		0.8	4.4%
Commercial and Industrial (b)		3.6	4.5%
Commercial Real Estate, Domestic (c)		1.1	3.6%
Credit Cards		1.0	19.0%
Other Consumer (d)		1.2	5.9%
Other Loans (e)		0.7	2.6%
Total Loan Losses (Net Charge-offs)	$	8.9	4.2%
Change in Allowance for Loan and Lease Losses	$	2.1	
Total Provision	$	11.1	

* Numbers may not foot due to rounding.

(a) Average loan balances used to calculate portfolio loss rates exclude loans held for sale and loans held for investment under the fair-value option, and are calculated over the nine quarters.
(b) Commercial and industrial loans include small- and medium-enterprise loans and corporate cards.
(c) Commercial real estate includes loans secured by farmland.
(d) Other consumer loans include student loans and automobile loans.
(e) Other loans include loans to non-profit organizations, commercial leases, other commercial loans not classified elsewhere, and international real estate loans (if any).

In the hypothetical severely adverse scenario, depressed earnings, losses and provision, and the capital actions assumed to occur reduce projected regulatory capital. The loan loss estimates in Table 5 represent estimates of the net charge-off activity recorded during the nine-quarter stress period. Wholesale Loans (C&I, CRE, and Other Loans) account for 61% of total loan losses, with 49% of losses coming from C&I/Other Loans and 13% from CRE. Of the remaining total loan losses, approximately $1.2 billion, or 14% of total losses, are from Residential Real Estate (First and Junior Lien Mortgages and Home Equity Lines of Credit ("HELOCs")), while Other Consumer Loans and Credit Cards together account for 25% of total losses.

Projected total provision expense is $11.1 billion over the stress period, which provides for both the cumulative net charge-offs during the period of $8.9 billion as well as an increase in the Allowance for Loan and Lease Losses ("ALLL") of $2.1 billion for expected future losses.

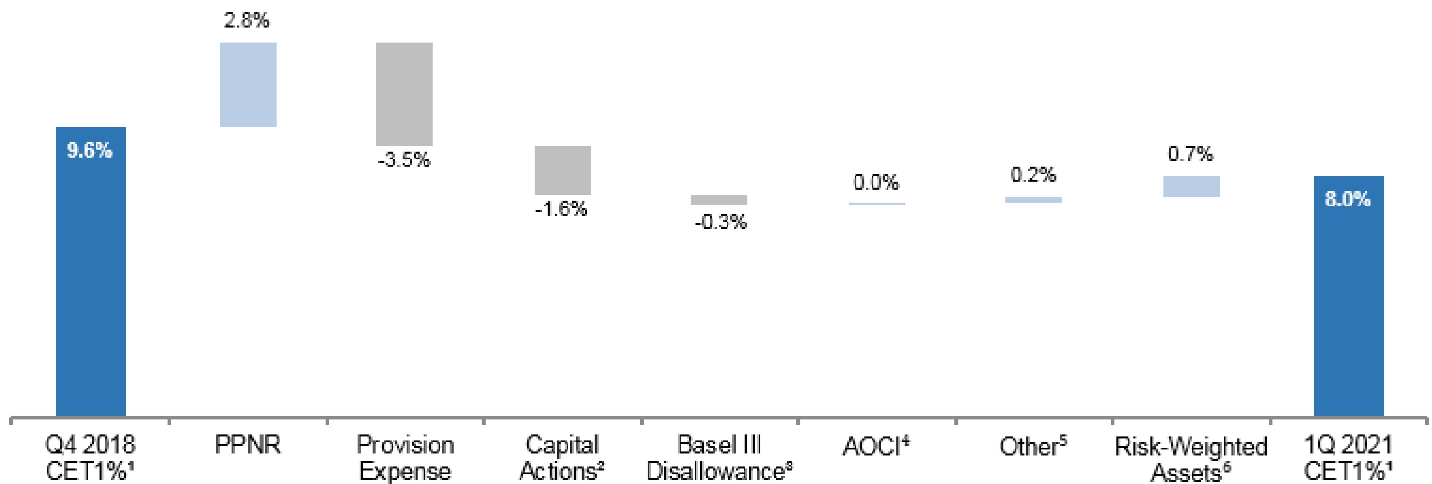
Consistent with regulatory instructions, the projections do not take into account any estimated impact from the future adoption or implementation of Accounting Standards Update 2016-13, Financial Instruments—Credit Losses (Topic 326): *Measurement of Credit Losses on Financial Instruments*, commonly referred to as the Current Expected Credit Losses ("CECL") standard.

Pre-provision net revenue ("PPNR") of $9.1 billion over the stress period, which reflects, among other things, a projected decline in loan balances, net interest income, and noninterest income resulting from the economic stress in the hypothetical scenario, as well as projected losses from operational risk events, is insufficient to cover provision expense.

PNC's Basel III CET1 risk-based capital ratio declines from 9.6% (actual) as of the fourth quarter of 2018 to a minimum of 8.0% at the end of the stress period. This level of decline is primarily due to losses and depressed earnings, the required

assumption that common and preferred dividends continue at historical levels, as well as the adjustments to and deductions from CET1 risk-based capital, including those related to Accumulated Other Comprehensive Income ("AOCI"), net operating loss carry forwards, and the threshold deductions for mortgage servicing rights, deferred tax assets, and significant common stock investments in unconsolidated financial institutions, which are only partially offset by the benefit from a reduction in risk-weighted assets. The following graph illustrates the key drivers of the CET1 risk-based capital ratio change over the stress period.

Common Equity Tier 1 Ratio Attribution Analysis



*Numbers may not foot due to rounding.

[1] Basel III CET1 ratio based on Basel III standardized approach risk-weighted assets.

[2] Includes common dividends, preferred dividends, 1Q2019 share repurchases of common stock, and other items as prescribed in the Federal Reserve's Dodd-Frank Act company-run stress test regulations (12 CFR 252.50-58).

[3] Under the Basel III rules, certain items such as significant common stock investments in unconsolidated financial institutions (primarily BlackRock), mortgage servicing rights and deferred tax assets, in each case net of associated deferred tax liabilities, must be deducted from CET1 capital to the extent they individually exceed 10%, or in the aggregate exceed 15%, of PNC's adjusted CET1 capital.

[4] After-tax AOCI related primarily to the net unrealized gains/(losses) on available for sale securities and adjustments related to pension and other postretirement benefit plans.

[5] Represents other items, including income taxes, net operating loss carryforwards, employee benefit related issuances, and goodwill and intangibles.

[6] Risk-weighted assets are calculated under the Basel III Standardized Approach.

PNC's minimum 8.0% Basel III CET1 risk-based capital ratio occurs in the 9th quarter in this 2019 Stress Test, which covers the period from the first quarter of 2019 through and including the first quarter of 2021. This minimum ratio is higher than the 6.5% minimum ratio, which occurred in the 7th quarter, in PNC's 2018 annual company-run stress test results released in June 2018, which covered a nine-quarter period ending March 31, 2020 (the "2018 Stress Test"). This increase in the minimum ratio is primarily driven by a less severe supervisory severely adverse scenario resulting in less punitive impacts from AOCI and capital deductions and higher net income, which are partially offset by higher projected capital distributions and a lower starting capital position.

OVERVIEW OF PNC'S STRESS TEST METHODOLOGY AND SCENARIO DEVELOPMENT

The 2019 Stress Test conducted by PNC incorporates a broad spectrum of risks that affect PNC including, among others, credit risk, operational risk, mortgage repurchase risk, realized losses on securities, and AOCI included in capital.

- Credit risk represents the risk that losses will be incurred as a result of customers, counterparties, or issuers not performing in accordance with contractual terms. Credit risk primarily affects the loan classes identified in Table 5.
- Operational risk refers to the risk of financial loss, adverse customer experience, or negative regulatory or reputational impacts resulting from inadequate or failed internal processes or systems, human error or misconduct, or adverse external events. Operational risk losses are estimated for all businesses and segments of PNC.
- Mortgage repurchase risk refers to the risk of loss arising from demands or legal action initiated by mortgage investors as a result of claims that PNC breached representations or warranties in selling mortgages. Mortgage repurchase risk arises primarily in association with first-lien residential mortgages that have been sold.
- AOCI risk relates primarily to the unrealized gain/loss attributable to the change in market value of PNC's investment portfolio as well as the unrecognized change in value of PNC's defined benefit plan. AOCI risk is driven by market risk factors, including interest rates and credit spreads.

PNC applies both quantitative and qualitative methods to project losses, balances, income, and risk-weighted assets over the stress period. PNC continues to enhance its approach to capital stress testing through improvements to risk identification, scenario design, ongoing model development, and internal controls, as well as through increased usage of quantitative approaches where sufficient relevant data and relationships exist, enhanced qualitative (non-model) approaches, and actions performed to address supervisory guidance and feedback.

Estimated losses for C&I loans are primarily modeled by projecting the Probability of Default ("PD"), estimated Loss Given Default ("LGD"), and estimated Exposure at Default ("EAD"). The PD model uses a credit migration approach, and its inputs include macroeconomic variables and obligor-specific characteristics such as industry segment and internal credit ratings. The EAD and LGD models use a facility-level approach that takes into account macroeconomic conditions.

CRE losses on Construction, Stabilized, and Multifamily loans are modeled using PNC's historical data and loss experience. The inputs to the models include, among other things, macroeconomic variables and loan-level inputs such as collateral property type, geography, loan-to-value ratio, and debt service coverage ratio. The CRE modeling framework utilizes a three-stage approach, with the first stage model converting the macroeconomic scenarios into a projection of CRE property market expectations, and the second and third stage models forecasting default rates and losses for PNC's portfolio based on the first stage model's output.

For Residential Real Estate loans, including First Lien Mortgages, Junior Lien Mortgages, and Domestic HELOCs, a suite of econometric PD, LGD, and EAD models is used to forecast losses at the loan level. These models use a combination of loan attributes, borrower characteristics, and macroeconomic variables to forecast losses over the stress period. For mortgages, there are distinct model approaches for prime and subprime (small legacy acquired portfolio), adjustable and fixed rate mortgages, and jumbo loans. For home equity, there are separate model approaches for senior and junior lien Home Equity Installment Loans and senior and junior lien HELOCs. In addition, separate non-model loss projection frameworks are utilized for modified loans.

Losses for Credit Card loans are modeled based on a loan-level regression approach that forecasts PD and EAD, and a segment-level model that forecasts LGD. These models use loan-level origination attributes, such as origination FICO score, loan age, and type of customer relationship, as well as macroeconomic variables.

Losses for Auto loans are modeled based on a loan-level regression approach that forecasts PD and LGD. These models use loan-level characteristics at origination and key data attributes such as delinquency status and updated FICO scores as well as macroeconomic variables. EAD follows an analytical (non-model) framework that is a function of the amortization curve.

Losses for Small Business loans are modeled based on a segment-level regression model that forecasts PD, EAD, and LGD. The model uses segment-level risk characteristics as well as macroeconomic variables.

For certain smaller loan segments, a mix of model and non-model frameworks based on historical data and qualitative factors is used to estimate losses.

The amount of the ALLL established for stress testing purposes, at any point in time, is derived from projected future expected losses. The provision expense is reflected in net income and consequently is reflected in capital levels and ratios during the stress test period.

Projected realized losses on investment securities are estimated through Other Than Temporary Impairment ("OTTI") included in the income statement. Such losses are generally driven by declining housing prices and rising unemployment, which often result in a deterioration of credit quality.

OTTI on Available-for-Sale ("AFS") and Held to Maturity ("HTM") securities is estimated using internally and vendor-developed models that are applied at the security level. Major inputs to the OTTI models include macroeconomic variables and collateral characteristics (if applicable); the output for each model includes projected cash flows for each security. These cash flows are then discounted at the original, credit-adjusted book yield on the security to calculate the estimated OTTI.

AOCI is estimated by projecting unrealized gains/(losses) on AFS securities and derivatives designated as cash flow hedges, and adjustments related to pension and other postretirement benefit plans. Unrealized gains/(losses) on AFS securities included in AOCI reflect projected market and book values of AFS securities which depend on maturities/run-off, interest rates, spreads, and economic conditions.

PNC uses an internally developed model that leverages a third party vendor model in projecting AOCI on its AFS holdings and on forecasted security additions during the stress period. Adjustments related to the pension and other postretirement benefit plans are estimated using a third party vendor model. Unrealized gains/(losses) of derivatives designated as cash flow hedges are estimated by a model that uses maturities/run-off, new positions, and level of interest rates as inputs.

Cash flow models are used to project noninterest income and balance sheet items related to capitalized Commercial Mortgage Servicing Rights ("CMSRs") and capitalized Residential Mortgage Servicing Rights ("RMSRs") under the relevant stressed market scenario. These calculations require the projection of cash flows over the stress period as well as the projection of any changes to the CMSR and RMSR asset fair values to be realized over the stress period.

PNC estimates Operational risk-related losses using the following framework:

- PNC estimates non-legal losses within operational risk segments using regression models developed from historical internal loss data, when a significant relationship to either economic stress or business drivers can be found for the relevant risk segment.
- When a significant relationship to either economic stress or business drivers cannot be found for event frequencies, non-legal losses are estimated based on stressed forward-looking loss projections resulting from scenario analysis for the relevant risk segments which reflect significant input from PNC's lines of business.
- Historical average losses are also utilized for business as usual risks.
- Loss projections for legal matters are based on a combination of: (i) historical average losses (with a stress adjustment) for small legal losses, (ii) a quarterly loss-based regression model for legal losses within an estimated dollar range, (iii) stressed loss projections resulting from scenario analysis for legal losses estimated to be above this range, and (iv) stressed estimates of potential outcomes on significant current, pending, or threatened matters.

Using the limited set of macroeconomic variables provided by the Federal Reserve for the hypothetical supervisory severely adverse scenario, PNC utilizes four internal models to construct a comprehensive, fully integrated severely adverse scenario that is benchmarked against the historical experience of recessions in the U.S. since World War II. These models are:

- A macroeconomic model of the U.S. economy that projects approximately 100 variables;
- A regional model that projects housing prices and unemployment rates for all U.S. metropolitan areas based on projected macroeconomic and local economic conditions;
- An interest rate projection framework that projects approximately 40 interest rate variables including swap, treasury, mortgage, and corporate rates; and
- A residential mortgage origination model that projects U.S. national level single-family refinance and purchase mortgage originations.

These four models allow for a broad set of variables to be used as modeling inputs for the balance sheet estimates, as well as for the models, assumptions, or other processes used to estimate interest and noninterest income, expense, credit loss, securities losses, and other losses over the stress period.

Estimates of loan balances over the stress period are used as inputs to the various credit models to estimate losses for each portfolio for the duration of the stress period. Additionally, the balance sheet projections serve as the primary input utilized in calculating projected risk-weighted assets for each quarter of the stress period.

Risk-weighted assets are calculated under the Basel III Standardized Approach framework utilizing projections of PNC's balance sheet and certain off-balance sheet exposures. The projected Standardized Approach risk-weighted assets are then used together with estimated levels of regulatory capital to calculate the risk-based capital ratios in Table 2.

A combination of model and non-model approaches is used to project loan and deposit balances, noninterest income, and noninterest expense categories. When employing a non-model approach, significant focus is placed on sound and thoroughly documented assumptions and effective challenge provided through Line of Business, Finance, Independent Risk Management, and senior management reviews.

Pre-provision net revenue is estimated based on the net interest income projection, which is derived from balance sheet estimates and the impact of the respective interest rate and spread forecasts in the hypothetical supervisory severely adverse scenario, combined with outputs of noninterest income and noninterest expense projections.

PNC's forecast models are developed using historical data when sufficient relevant data and relationships exist to support robust modeling.

- This data reflect the performance and behavior of PNC's portfolios and business through historical periods and in different parts of the credit cycle.
- The models estimate the baseline and stress-scenario effects of changes in macroeconomic variables on balances and deposits, revenues, and in the case of credit models, on charge-off behavior, including accounting for customer credit migration, changes in delinquency status, and other effects.
- PNC's stress testing models utilize a variety of modeling techniques and functional forms and may use different variables for different asset classes.
- As part of PNC's overall model risk management and stress testing processes, significant management review of the assumptions, performance, and fit of stress testing models is undertaken.

- All of the models employed by PNC to conduct the 2019 Stress Test were subject to PNC's internal model risk governance framework and procedures. Additional information on PNC's Model Risk Management framework and the risks associated with the use of models can be found in Item 1A Risk Factors and the Operational Risk Management portion of the Risk Management section of Item 7 in PNC's 2018 Form 10-K.
- When considering the appropriateness of models for stress testing and, in particular, the models' sensitivities to macroeconomic variables, both management as well as PNC's Model Risk Management Group within Independent Risk Management compare the models' projections under a range of stress scenarios to the experience in the 2007-2009 economic downturn.
- For a limited set of portfolios or segments, management applies overlays on model outputs in light of, among other things, actual historical performance, or the particular characteristics of the portfolio or segment that may not have been adequately reflected in the model.
- PNC employs benchmarking approaches to assess model performance and gain comfort with model estimates utilized in the stress testing process. Benchmark models and non-models are used to assess the performance of primary models for all material portfolios, or to supplement, where appropriate, the primary models.

In addition to modeled outcomes, PNC utilizes various assumptions in estimating its income and capital ratios through the stress period. For example, management uses assumptions related to projected interest rates, rates paid on deposits, spreads on certain loans, credit quality of new loan originations, forecasts for certain balance sheet items, and potential expense changes. Sensitivity analyses are conducted for key assumptions, and considered when assessing projected results.

GOVERNANCE

PNC has established a robust governance framework to oversee its stress testing and capital planning processes, consistent with the expectations outlined by the Federal Reserve for capital adequacy processes at large banking organizations.

PNC's governance framework includes oversight by the Board of Directors, its Risk Committee, the Executive Capital Committee, and senior management, including the review of internal capital goals and targets, the economic scenarios, PPNR and loss estimates utilized in the stress testing process, significant assumptions, and compensating measures to address model limitations and uncertainties in the stress testing and capital planning process, and approval of capital actions.

PNC's Executive Capital Committee is the senior management committee responsible for overseeing PNC's stress testing and capital planning process, including the review and approval of any overlays to model outputs.

In considering the appropriateness and size of any such overlay, the committee may consider, among other things, the expected timing of losses, model uncertainty, model quality, data quality, actual historical experience of losses (including PNC's historical losses in recent economic downturns), past supervisory estimates of losses and provision, the characteristics of the specific economic scenario developed, and the evolution of the firm's business strategy or balance sheet that may influence the relevance of model results.

PNC's Capital Plan and stress test results are reviewed with and approved or affirmed by the Risk Committee and Board of Directors prior to submission. As part of this review, management provides the Risk Committee and Board of Directors with final stress test results, the proposed Capital Plan (for the annual Comprehensive Capital Adequacy and Review process), and proposed capital actions, among other things.

PNC has implemented a robust capital adequacy process to evaluate its capital adequacy in light of a wide range of inputs. The Board of Directors, its Risk Committee, and senior management use the firm's capital adequacy assessment process to evaluate the appropriate level of capital for the firm to maintain in light of the range of risks it faces, the firm's business strategy, and its risk appetite.

PNC has established a comprehensive independent review and challenge framework for key components of its stress testing framework. PNC's Independent Risk Management and Finance Governance & Oversight groups are responsible for performing independent review and challenge of individual processes and related results which are utilized in developing PNC's capital projections and capital plan.

Internal Audit employs a risk-based audit approach to help ensure comprehensive coverage of the end-to-end capital adequacy process over a multi-year period. Internal Audit conducts regular audits, continuous monitoring activities, and issues management/validation activities related to the adequacy and effectiveness of the processes and controls supporting PNC's capital adequacy process. Internal Audit also ensures that appropriate independent review and challenge occur at key points in the capital planning process.

The results of Internal Audit's evaluation of the framework supporting PNC's capital adequacy process are formally presented in an annual capital assessment, which is distributed to and considered by PNC's senior management, the Executive Capital Committee, and the Risk Committee and Audit Committee of the Board of Directors.

* * *