Dodd-Frank Act Company-Run Stress Test Disclosures

June 21, 2018

The PNC Financial Services Group, Inc.

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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 2018 (the "2018 Stress Test") this stress test is based on balance sheet information as of December 31, 2017.

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 2018 Stress Test, the stress period covers the period of January 1, 2018, through March 31, 2020. 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 2018 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, 2018, as part of the 2018 CCAR exercise. The Federal Reserve previously announced that it will release the results of the 2018 CCAR exercise, including its determination whether to object or not object to the proposed capital actions included in the capital plans submitted as part of the 2018 CCAR exercise, at 4:30 p.m. (EDT) on June 28, 2018.

2018 SUPERVISORY SEVERELY ADVERSE SCENARIO

The supervisory severely adverse scenario for the 2018 Stress Test was released by the Federal Reserve on February 1, 2018. 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 2018 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 2018 supervisory severely adverse scenario is characterized by a severe global recession that is accompanied by a global aversion to long-term fixed-income assets. As a result, long-term rates do not fall, and the yield curve steepens. Together, these factors lead to a broad-based and deep correction in asset prices, including in the domestic equity, corporate bond, and real estate markets, that is, on balance, more severe than prior supervisory severely adverse scenarios.

- In the United States, the level of real Gross Domestic Product ("GDP") begins to decline in the first quarter of 2018 and is at a trough in the third quarter of 2019 that is 7.5% below the pre-recession peak.
- The unemployment rate increases by 5.9 percentage points, peaking at 10.0% in the third quarter of 2019, and the inflation rate, as measured by the Consumer Price Index ("CPI"), declines from 3.7% in the fourth quarter of 2017 to a low of 0.9% in the second quarter of 2018, before rising to 1.8% in the fourth quarter of 2019 and first quarter of 2020.

- Equity prices, as measured by the U.S. Dow Jones Total Stock Market Index, fall by 65.0% from their level in the fourth quarter of 2017 to the trough in the first 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 2017, decreasing by 30.0% through the third quarter of 2019. Commercial real estate prices, as measured using the Federal Reserve's U.S. Commercial Real Estate Price Index, also experience a considerable decline of 40.0% from the fourth quarter of 2017 to their trough in the third quarter of 2019.
- 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 5.75 percentage points by the first quarter of 2019.
- As a result of the severe decline in real activity, short-term Treasury rates fall and remain near zero through the end of the stress period. However, the assumed investor aversion to long-term fixed-income assets keeps 10-year Treasury yields unchanged through the stress period.
- 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/bcreg20180201a1.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 2018 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 2017 through the first quarter of 2018 (for PNC, the quarterly average amount of common dividends during this period was $338 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 will be 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 2018 STRESS TEST

As a result of the phase-in schedule (or "Transition Provisions") of the final Basel III capital rules issued in July 2013, the actual transitional Basel III regulatory capital ratios as of December 31, 2017, are based on the definitions of, and deductions from, regulatory capital under the Basel III rules as such definitions and deductions were phased-in for 2017. We refer to the capital ratios calculated using the phased-in Basel III Transition Provisions in effect for 2017 as the 2017 Transitional Basel III ratios. 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 are fully phased-in as of January 1, 2018, and, thus, are reflected in the projected post-stress capital ratios calculated for 2018 and thereafter. We refer to these capital ratios as the Basel III ratios. The regulatory capital ratios provided below reflect the following:

- Based on the Basel III Transition Provisions, the individual and aggregate deductions from Basel III common equity tier 1 ("CET1") risk-based capital for mortgage servicing rights, deferred tax assets, and significant common stock investments in unconsolidated financial institutions were phased-in at 80% in 2017 and are fully phased-in for 2018 and thereafter.
- Risk-weighted assets used to calculate actual December 31, 2017 Transitional and projected Basel III regulatory risk-based capital ratios for PNC and PNC Bank are based on the Basel III Standardized Approach.
- Additional information on the Basel III capital framework can be found in PNC's 2017 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
	2018 - 2020
CET1 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 2018 COMPANY-RUN STRESS TEST

The following tables provide the results of the 2018 Stress Test. All projections represent hypothetical outcomes under the assumed supervisory 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 2017 Transitional Basel III Capital Ratios and Projected Basel III Capital Ratios through Q1 2020 under the Supervisory Severely Adverse Scenario

	Actual Transitional Basel III Ratios	Projected Stressed Basel III Capital Ratios (a)	
	Q4 2017	Ending Q1 2020	Minimum
The PNC Financial Services Group, Inc.			
CET1 Risk-Based Capital Ratio	10.4%	6.7%	6.5%
Tier 1 Risk-Based Capital Ratio	11.6%	8.0%	7.9%
Total Risk-Based Capital Ratio (b)	13.7%	10.6%	10.5%
Tier 1 Leverage Ratio	9.9%	7.0%	6.7%
Supplementary Leverage Ratio	8.3%	5.8%	5.6%
PNC Bank, N.A.			
CET1 Risk-Based Capital Ratio	9.6%	8.4%	8.0%
Tier 1 Risk-Based Capital Ratio	9.7%	8.4%	8.0%
Total Risk-Based Capital Ratio	11.7%	10.9%	10.3%
Tier 1 Leverage Ratio	8.2%	7.3%	6.7%
Supplementary Leverage Ratio	6.8%	5.9%	5.6%

(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 includes certain nonqualifying trust preferred capital securities that are subject to a phase-out period that runs through 2021.

Table 3: Actual Q4 2017 and Projected Q1 2020 Standardized Approach Risk-Weighted Assets under the Supervisory Severely Adverse Scenario for The PNC Financial Services Group, Inc.

In billions	Actual Q4 2017	Projected Q1 2020
Risk-Weighted Assets (a)	$309.5	$290.4

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

Table 4: Projected Losses, Revenue, and Net Income Before Taxes for Q1 2018 through Q1 2020 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)	$	8.8		2.5%
Other Revenue (c)		-		-
Less: Provision		11.3		3.2%
Realized (Gains)/Losses on Securities (AFS & HTM)		0.1		0.0%
Trading and Counterparty Losses (d)		-		-
Other Losses/(Gains) (e)		0.1		0.0%
Equals: Net Income/(Loss) Before Taxes	$	(2.7)		(0.7)%
Memo Items				
Other Comprehensive Income (f)	$	(2.2)		
Other effects on capital		*Q4 2017*		*Q1 2020*
Accumulated Other Comprehensive Income included in capital (AOCI) (g)	$	(0.3)	$	(2.2)

(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) For 2017 and 2018-2020, includes 80% and 100%, respectively, of 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 2018 through Q1 2020 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	$	0.6	2.2%
Junior Lien Mortgages & HELOCs, Domestic		1.2	5.8%
Commercial and Industrial (b)		3.0	3.9%
Commercial Real Estate, Domestic (c)		1.4	4.5%
Credit Cards		0.8	16.1%
Other Consumer (d)		1.1	5.5%
Other Loans (e)		0.8	2.7%
Total Loan Losses (Net Charge-offs)	$	8.9	4.2%
Change in Allowance for Loan and Lease Losses	$	2.4	
Total Provision	$	11.3	

(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).

The loan loss estimates in Table 5 represent estimates of the net charge-off activity recorded during the nine-quarter stress period. In the supervisory severely adverse scenario, depressed earnings, losses and provision, and the capital actions assumed to occur reduce projected regulatory capital. Wholesale Loans (Commercial and Industrial ("C&I"), Commercial Real Estate ("CRE"), and Other Loans) account for 59% of total losses, with 43% of losses originating from C&I/Other Loans and 16% from CRE. Of the remaining total losses, approximately $1.8 billion, or 20% 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 approximately 21% of the total losses.

Projected total provision expense is $11.3 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 $2.4 billion for expected future losses.

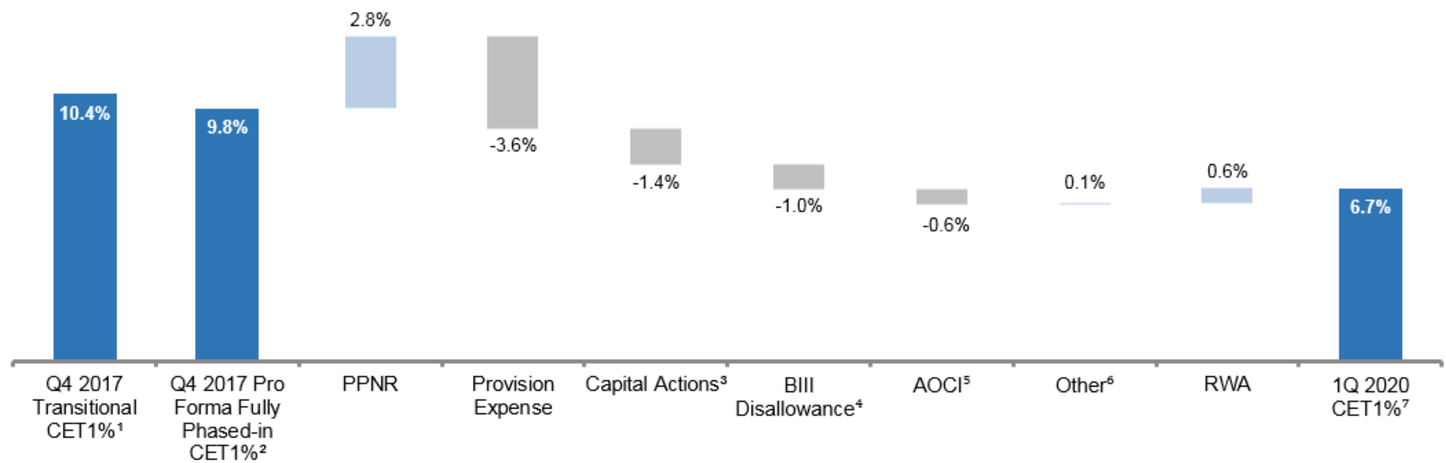
Consistent with regulatory instructions, the projections (1) reflect the impact of the tax law instituted by the Tax Cut and Jobs Act of 2017 (Public Law No. 115-97), which was enacted on December 22, 2017, and (2) do not take into account any estimated impact from the future adoption or implementation 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 $8.8 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 9.8% (pro forma fully phased-in) as of the fourth quarter of 2017 to 6.7% (fully phased-in) at the end of the stress period in the first quarter of 2020. This level of decline is primarily due to

increased provision expense driving earnings lower, the required assumption that PNC continues to pay common dividends at historical levels, as well as adjustments to and deductions from Basel III 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



[1] Calculated using the transitional Basel III regulatory capital methodology applicable to PNC as of 12/31/2017.

[2] Pro forma fully phased-in Basel III CET1 ratio as of 12/31/2017 based on Basel III standardized approach risk-weighted assets.

[3] Includes common dividends, preferred dividends, net repurchases of common stock, and payments on other regulatory capital instruments as prescribed in the Federal Reserve's Company Run Stress Test regulations (12 CFR 252, 50-58).

[4] 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 must be deducted from capital to the extent they individually exceed 10%, or in the aggregate exceed 15%, of PNC's adjusted common equity tier 1 capital.

[5] 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.

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

[7] Fully phased-in Basel III CET1 ratio as of 3/31/2020 based on Basel III standardized approach risk-weighted assets.

PNC's Basel III CET1 risk-based capital ratio declines from 10.4% (actual Transitional ratio) as of the fourth quarter of 2017 to a minimum of 6.5% (fully phased-in) in the third quarter of 2019. PNC's minimum 6.5% Basel III CET1 risk-based capital ratio in this 2018 Stress Test, which covers the period from the first quarter of 2018 through and including the first quarter of 2020, is lower than the 8.3% minimum ratio in PNC's 2017 annual company-run stress test results under the supervisory severely adverse scenario released in February 2017, which covered a nine-quarter period ending March 31, 2019 (the "2017 Stress Test"). This decrease in the minimum ratio is primarily driven by a harsher supervisory severely adverse scenario resulting in a more punitive impact to capital from net income, AOCI, and capital deductions, as well as a lower starting capital position.

Overview of PNC's Stress Test Methodology and Scenario Development

The 2018 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 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 has continued 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 an increased focus on the use 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-level 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 model 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 models for prime/subprime, adjustable/fixed rate mortgages, and jumbo loans. For home equity, there are separate models 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, EAD, and LGD. These models use loan-level characteristics at origination and key data attributes such as delinquency status and FICO scores as well as macroeconomic variables.

Losses for Small Business loans are modeled based on a segment-level regression model that forecasts PD, EAD, and LGD. The models use 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.

ALLL for portfolios or segments is modeled using processes similar to those for estimating losses in the relevant portfolio or segment and is calculated in accordance with the applicable regulatory guidance for stress testing. The amount of the ALLL established for stress testing purposes, at any point in time, is derived from the forecasted future net charge-offs to be incurred, with the exception of C&I. For C&I loans, the ALLL leverages a methodology consistent with the methodology followed by PNC for its Wholesale quarterly reserves estimation. For non-defaulted loans, the C&I ALLL estimate leverages the macro conditional PD grade, LGD percentage, EAD, and the remaining life of the loan. The provision expense, which includes both net charge-offs and the change in ALLL, 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 may result in deterioration in the credit quality for investment securities that are not guaranteed by the U.S. government.

Generally, 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) on 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.
- Historical average losses also may be 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 forecasts housing prices and unemployment rates for all U.S. metropolitan areas based on projected macroeconomic and local economic conditions;
- An interest rate model that forecasts approximately 40 interest rate variables including swap, treasury, mortgage, and corporate rates; and,
- A residential mortgage origination model that forecasts U.S. national level single-family refinance and purchase mortgage originations.

These four models allow for a broader 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 reflects the performance and behavior of PNC's portfolios and business through historical periods and in different parts of the credit cycle.
- The models also take into account macroeconomic variables and their relation to, in the case of credit models, customer credit migration, changes in delinquency status, and charge-off behavior.
- 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 performance and fit of stress testing models is undertaken.
- All of the models employed by PNC to conduct the 2018 Stress Test are subject to PNC's internal model 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 2017 Form 10-K.

- When considering the appropriateness of models for stress testing, both management as well as PNC's Model Risk Management Group within Independent Risk Management consider the models' projections across the stress scenarios against the performance experienced in prior economic downturns.
- For a limited set of portfolios or segments, management applies overlays on model outputs in light of, among other things, the actual historical performance, or the particular characteristics of the portfolio or segment that may not have been reasonably 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, we use assumptions related to projected interest rates and spreads on deposits and certain loans, forecasts for certain balance sheet items, and potential expense changes. Sensitivity analyses are conducted for key assumptions.

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, 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 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 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 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 and capital actions, among other things.

PNC implements 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 process to assess 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 robust independent review and challenge framework for key components of its stress testing framework. PNC's Independent Risk Management and Finance and 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 to assess the adequacy and effectiveness of the controls supporting PNC's capital planning and forecasting processes, including governance, qualitative assessments, the detail and quality of reporting, and the process by which deficiencies are identified and remediated.

On a sample basis, as part of its risk-based approach, Internal Audit also assesses the accuracy of the spot capital data that is being relied on by senior management and the regulators and independently challenges the reasonableness of the forecasted results.

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

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