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Estimating Commercial Real Estate (CRE) Stressed Loss Measures Under Federal Reserve 2017 Comprehensive Capital Analysis and Review (CCAR) Scenarios

Authors

Jun Chen
Wenjing Wang
Megha Watugala

Contact Us

Americas
+1.212.553.1653
clientservices@moodys.com

Europe
+44.20.7772.5454
clientservices.emea@moodys.com

Asia-Pacific (Excluding Japan)
+85 2 3551 3077
clientservices.asia@moodys.com

Japan
+81 3 5408 4100
clientservices.japan@moodys.com

Abstract

The Comprehensive Capital Analysis and Review (CCAR) program is an annual capital adequacy exercise conducted under the requirements of the Dodd-Frank Wall Street Reform and Consumer Protection Act rules. For the 2017 CCAR program, the Federal Reserve published three macroeconomic and financial scenarios to be used in stress testing 34 CCAR financial institutions. In this study, we analyze 27 institutions, with a total of more than $760 billion in exposures to commercial real estate loans, using Moody's CMM Stress Testing framework.

This report describes how we derive credit loss estimates for the CRE loan portfolios held by CCAR firms. This is our first study leveraging the loan-level commercial banks' data collected via Moody's Analytics CRE Credit Research Database (CRD™). Our analysis estimates that the expected nine-quarter, cumulative CRE portfolio loss through the first quarter of 2019 is 6.5% under the CCAR 2017 Severely Adverse Scenario. The primary factors behind the higher loss estimate compared to last year's stressed scenario (5.1% loss) is that this year's scenario features a slightly more severe economic downturn and a significantly larger decline in commercial real estate prices.

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1. Introduction

1.1 Context

The Comprehensive Capital Analysis and Review (CCAR) is an annual exercise conducted under the Dodd-Frank Wall Street Reform and Consumer Protection Act rules. CCAR's goal is to ensure that the largest financial institutions have: a) robust and forward-looking capital planning processes that account for their unique risks, and b) adequate capital to continue operations during times of economic and financial stress. As part of CCAR, the Federal Reserve evaluates institutions' capital adequacy, internal capital adequacy assessment processes, and capital distribution plans, such as dividend payments or stock repurchases. On the other hand, the Dodd-Frank Act Stress Test (DFAST) is a distinct regulatory tool that differs from CCAR. DFAST requires the Federal Reserve to conduct forward-looking stress tests for financial companies regulated by the Fed to help ensure institutions have sufficient capital in order to absorb losses and support operations during adverse economic conditions. Currently, while only 34 firms participate in CCAR, the DFAST requirements apply to a broader range of companies, including bank holding companies, savings and loan companies, state member banks with total assets greater than the $10 billion, and non-bank financial firms designated by the Financial Stability Oversight Council for supervision by the Federal Reserve.

Although CCAR and DFAST are distinct exercises, the Federal Reserve deems capital planning and stress tests complementary in nature, as they frequently rely upon similar processes, data, supervisory exercises, and requirements. The Fed coordinates these processes in order to reduce duplicative requirements and to minimize burdens. As such, the Fed uses the same CCAR scenarios and assumptions the bank holding companies (BHC) are required to use under the DFAST rules, in order to project revenues, losses, net income, and *pro forma* capital ratios.[1] Consequently, in the discussions of scenario-based credit loss estimates throughout this paper, there is practically no difference between whether or not they are CCAR scenarios or stressed scenarios under the DFAST rules, because they are the same within the regulatory setting.

For the 2017 CCAR program, the Federal Reserve published three macroeconomic and financial scenarios to be used in stress testing the 34 CCAR financial institutions.[2] The three scenarios include Baseline, Adverse, and Severely Adverse Scenarios. While acknowledging that the Baseline Scenario represents the expectation of private sector forecasters,[3] the Fed has also made it clear that the Adverse and Severely Adverse Scenarios are not forecasts, but rather hypothetical scenarios designed to assess the strength and resilience of CCAR firms during stressful economic and financial environments.[4] For each scenario, a BHC must conduct an assessment of the expected uses and sources of capital over the planning horizon.

An important part of a BHC's submission is the estimates of projected losses by asset class in each scenario; the main objective of this study focuses on credit loss estimates for commercial real estate (CRE) loans.

Key Fed guidelines relevant for our exercise, either current or previously published:

» Loans held in accrual portfolios: "The losses to be estimated for loans held in accrual portfolios in this exercise are generally credit losses due to failure to pay obligations (cash flow losses) …"

» Loan-loss estimates: "BHCs should describe the underlying models and methods used to project loan losses, and provide background on the derivation of estimated losses… Hypothetical behavioral responses by BHC management should not be considered as mitigating factors for the purposes of this analysis."

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[1] See "2017 Supervisory Scenarios for Annual Stress Tests Required under the Dodd-Frank Act Stress Testing Rules and the Capital Plan Rule," published by the Federal Reserve February 3, 2017.

[2] The 34 bank holding companies participating in the 2017 CCAR: Ally Financial Inc.; American Express Company; BancWest Corporation; Bank of America Corporation; The Bank of New York Mellon Corporation; BB&T Corporation; BBVA Compass Bancshares, Inc.; BMO Financial Corp.; Capital One Financial Corporation; CIT Group Inc.; Citigroup Inc.; Citizens Financial Group, Inc.; Comerica Incorporated; Deutsche Bank Trust Corporation; Discover Financial Services; Fifth Third Bancorp; The Goldman Sachs Group, Inc.; HSBC North America Holdings Incorporated.; Huntington Bancshares Incorporated; JPMorgan Chase & Co.; Keycorp; M&T Bank Corporation; Morgan Stanley; MUFG Americas Holdings Corporation; Northern Trust Corporation; The PNC Financial Services Group, Inc.; Regions Financial Corporation; Santander Holdings USA, Inc.; State Street Corporation; SunTrust Banks, Inc.; TD Group US Holdings LLC; U.S. Bancorp; Wells Fargo & Company; and Zions Bancorporation.

[3] For the CCAR 2017 Baseline Scenario, the Fed comments that "… The baseline scenario follows a similar profile to the average projections from a survey of economic forecasters… The baseline outlook for U.S. real activity, inflation, and interest rates is similar to the January 2017 consensus projections from Blue Chip Economic Indicators. This scenario does not represent the forecast of the Federal Reserve."

[4] See various press releases by the Federal Reserve, for example, February 3, 2017: https://www.federalreserve.gov/newsevents/pressreleases/bcreg20170203a.htm. Note, the Fed developed scenarios in consultation with the Federal Deposit Insurance Corporation (FDIC) and the Office of the Comptroller of the Currency (OCC), and both will use the same scenarios as the Fed during the upcoming stress testing cycle for their supervised institutions.

» Allowance for loan losses: "BHCs should estimate the portion of the current allowance for loan losses available to absorb credit losses on the loan portfolio for each quarter under each scenario, while maintaining an adequate allowance along the scenario path and at the end of the scenario horizon."

» Declines in real estate prices: "Declines in aggregate U.S. commercial and residential real estate prices should be assumed to be concentrated in regions that have experienced rapid price gains over the past several years."

» Declines in prices of multifamily properties: "In particular, given that prices of multifamily properties have risen rapidly in recent years, they should be assumed to decline by more than the CRE index."

» Credit losses on CRE loans: "Domestically, credit losses on commercial real estate loans backing commercial mortgage-backed securities are greater than would be expected, given the general economic and financial stress in the scenario, prompting widespread investor pull-back."

This paper describes how Moody's Analytics derives credit loss estimates for the CRE loan portfolios held by CCAR firms. Throughout the study, we rely heavily upon Moody's Commercial Mortgage Metrics (CMM™), a credit risk measurement model developed and marketed by Moody's Analytics.

1.2 Composition of CRE Portfolios Held by CCAR Banks

Our current analysis focuses on 27 of 34 CCAR banks: those with more than $4 billion in CRE loans on their balance sheets.

Banks hold two types of commercial real estate loans: permanent and construction. Permanent loans are loans backed by existing commercial properties, such as apartments, office buildings, retail stores, hotels, etc., while construction loans are loans for commercial properties under construction. Banks must report their CRE holdings to regulators, including the FDIC and the Federal Reserve. Reported data are publicly available.[5] We report permanent loans in two parts: Non-farm, Non-residential and Multifamily Residential. Table 1 summarizes the CRE holdings of the 27 CCAR banks as of December 31, 2016 from data obtained from the FDIC.

Table 1   CRE HOLDINGS OF THE 27 CCAR BANKS AS OF DECEMBER 31, 2016 ($,000,000)

Financial Institution	Construction Loans	Non-farm, Non-residential Loans	Multifamily Residential Loans	Total Commercial Real Estate Loans
Bank of America, National Assn.	9,069	57,024	5,974	72,067
Bank of the West	1,528	12,181	1,414	15,123
BMO Harris Bank National Assn.	1,910	6,378	701	8,989
Branch Banking and Trust Company	5,576	27,393	3,539	36,508
Capital One, National Assn.	2,063	16,936	11,172	30,171
CIT Bank, National Assn.	1,035	3,490	1,513	6,038
Citibank, National Assn.	4,143	7,512	3,767	15,422
Citizens Bank, National Assn.	2,141	7,820	485	10,446
Comerica Bank	3,201	7,768	614	11,583
Compass Bank	2,125	9,470	1,741	13,335
Fifth Third Bank	4,506	6,231	376	11,113
HSBC Bank USA, National Assn.	1,784	7,273	1,858	10,915
JPMorgan Chase Bank, National Assn.	8,679	34,293	66,576	109,548
KeyBank National Assn.	2,350	12,215	3,738	18,303
M&T Bank	8,034	20,762	4,542	33,338
Morgan Stanley Bank, National Assn	142	9,116	650	9,908
MUFG Union Bank, National Assn.	2,199	10,191	4,626	17,016
PNC Bank, National Assn.	7,572	23,407	5,938	36,916
Regions Bank	3,136	10,113	1,063	14,312

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[5] FDIC data downloadable from http://www2.fdic.gov/sdi/main.asp, and the Fed's data downloadable from http://www.chicagofed.org/webpages/banking/financial_institution_reports/bhc_data.cfm.

Santander Bank	2,240	6,584	8,655	17,479
SunTrust Bank	4,997	12,388	1,193	18,578
TD Bank, National Assn.	2,299	20,849	3,106	26,255
The Huntington National Bank	1,867	8,802	897	11,566
The Northern Trust Company	513	3,235	785	4,533
U.S. Bank National Association	11,380	23,887	4,267	39,534
Wells Fargo Bank, National Assn.	23,139	104,535	15,422	143,096
Zions Bancorporation	2,703	13,848	1,902	18,453
27 CCAR Banks Total	120,330	483,701	156,514	760,546

Compared to the CRE holdings of the 26 CCAR banks in 2015, total CRE portfolio size increased by 9.4%. As of 4Q 2016, the construction sector continued its increasing trend, rising by 15.8% to $120.3 billion. The 27 CCAR banks also added $14.6 billion of multifamily residential loans, which suggests a significant increase in the demand for these loans. The rising composition of construction loans reflects banks' willingness to take on more risk and participate in the broader economic recovery, after pulling back construction lending programs since the 2008–2009 housing/financial crisis.

1.3   CRE Loan Performance Status

Corresponding to the economic recovery underway, commercial real estate markets have improved during the last couple of years. As a result, the credit performance of banks' CRE portfolios has improved across both construction and permanent loans, shown in Figure 1. The total nonaccrual rate of all CRE loans is 0.47%, as Q4 2016, slightly less than the 0.62% nonaccrual rate last year and about 1/12th of the 7.2% nonaccrual rate reached at the end of 2009.

Figure 1   Non-accrual rates, total CRE holdings of the 27 CCAR banks.
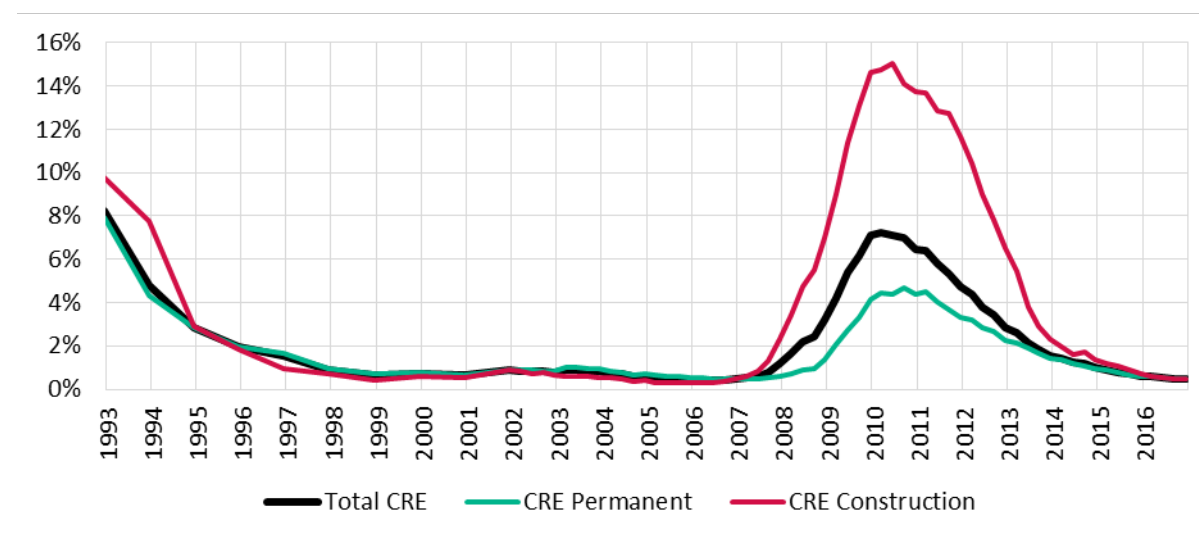
Figure 2 shows CRE loan portfolio improvement for individual CCAR banks as well over the past three years. This change stems from the fact that CRE markets have improved for most parts of the country, and financial institutions have been more stringent with new CRE loan originations when compared to the pre-financial crisis era. New originations during the last year or two have also not yet reached the peak default-seasoning curve. Additionally, with time, legacy bad loans from the last cycle have been worked out or liquidated, and older, lower quality loans are maturing or amortizing themselves.

Figure 2   Non-accrual rates, total CRE holdings of the 27 CCAR banks during recent quarters.
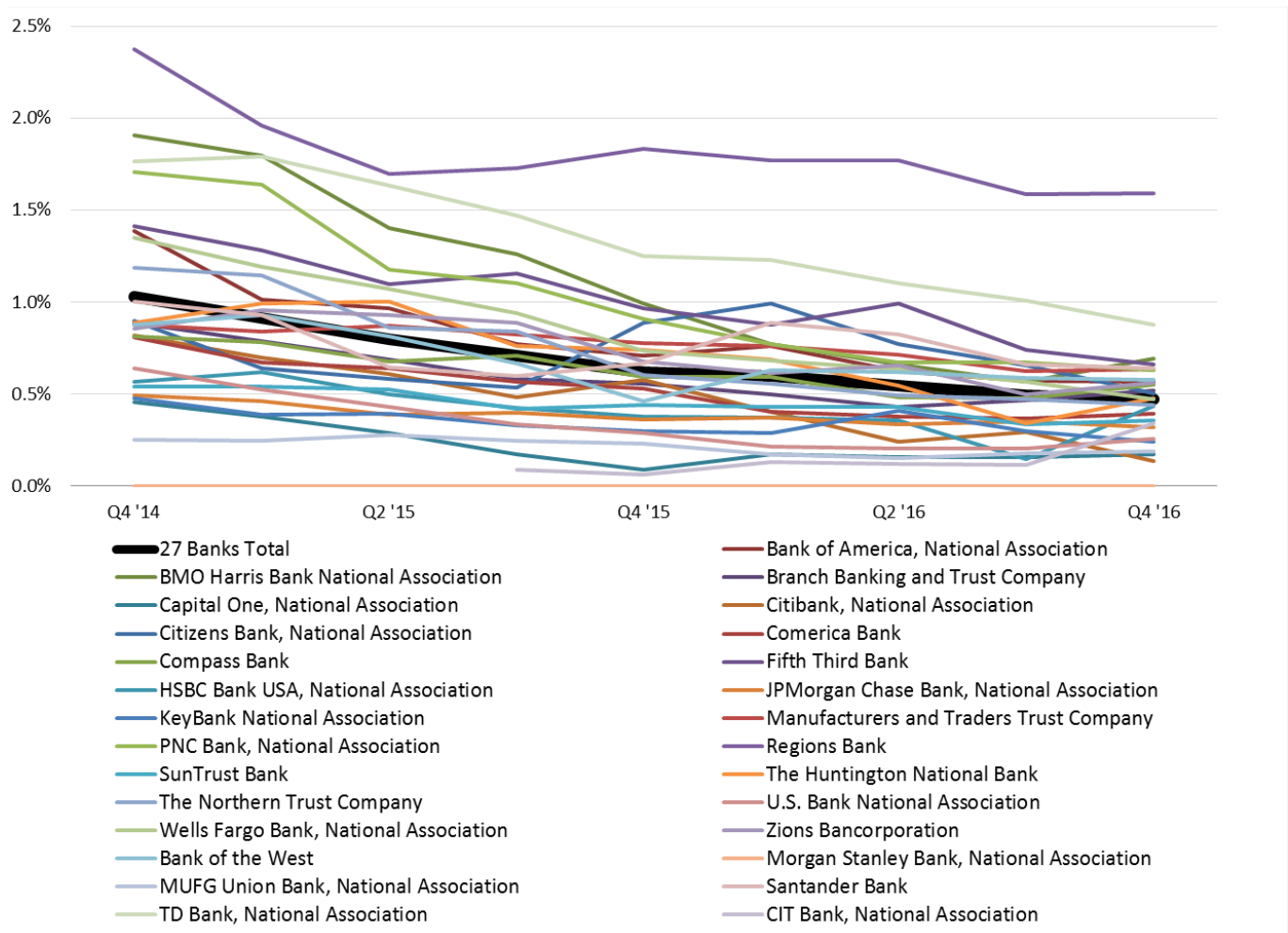

Figure 2 shows that, for all major banks, CRE non-accrual rates continue to fall.[6] The four quarter, average non-accrual rates are also lower at present, compared to one year ago. We observe similar patterns with charge-off rates as well.

1.4 CCAR 2017 Scenarios and the CCAR 2016 Scenarios

Similar to CCAR 2016, for the 2017 CCAR program, the Federal Reserve presents three macroeconomic scenarios: Baseline, Adverse, and Severely Adverse. While the Baseline Scenario reflects the Federal Reserve's interpretation of market expectations, the other scenarios act as hypothetical scenarios for stress testing purposes. The CCAR 2017 Severely Adverse Scenario is comparable to the CCAR 2016 Severely Adverse Scenario, in terms of the decline in Real GDP, increase in unemployment, etc., and other macroeconomic factors, shown in the following graphs and in Appendix A.

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[6] **Data source:** Federal Deposit Insurance Corporation (FDIC).

Figure 3 Real GDP growth under the CCAR 2016 and CCAR 2017 scenarios.
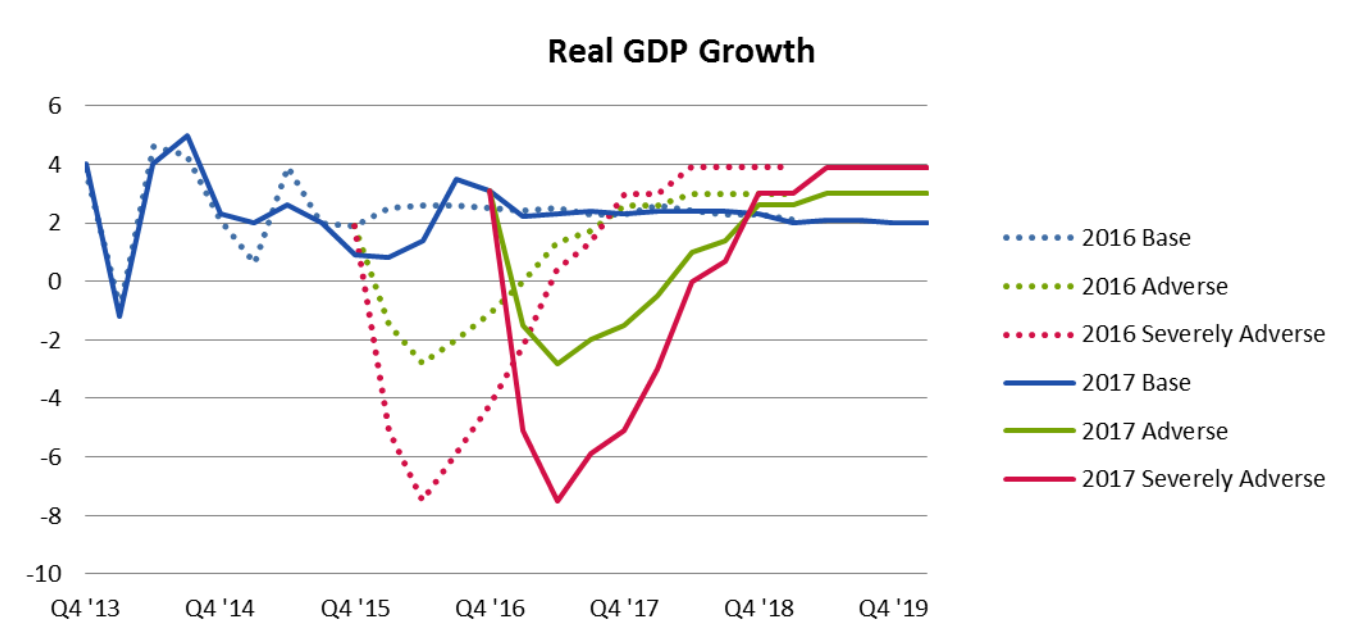
Real GDP Growth

For the 2017 Baseline Scenario, real GDP grows at an average rate of 2.3% per year, slightly lower than last year's projection. Real GDP declines from the first quarter of 2017 to the recessionary trough during the first quarter of 2018 for the Moderate Recession Scenario. In the Severely Adverse Scenario, real GDP growth rate falls to -7.5% during the second quarter of 2017, and the real GDP level is approximately 6.5% below the pre-recession peak when reaching the trough during the second quarter of 2018.

Figure 4 Unemployment rates under the CCAR 2016 and CCAR 2017 scenarios.
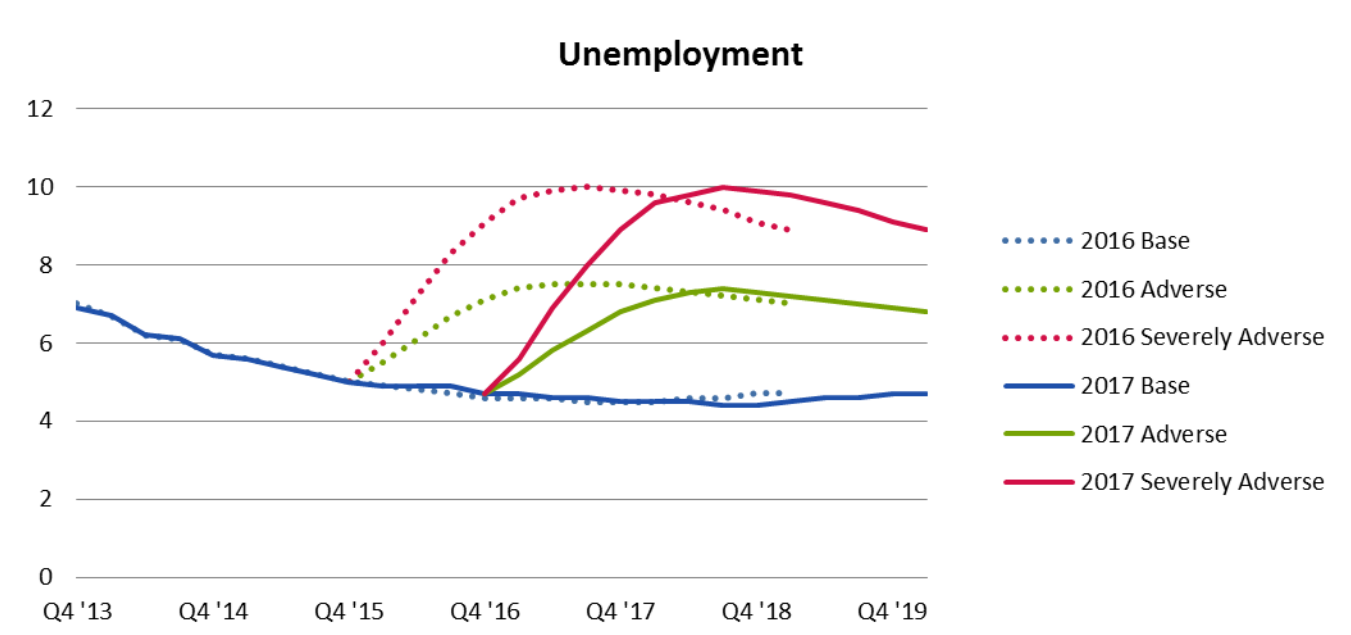
Unemployment

The unemployment rate continued to fall as projected to 4.7% by the end of 2016. In the Baseline Scenario, the unemployment rate declines to slightly under 4.5% during the fourth quarter of 2018, and subsequently rising slightly above that level throughout the rest of the scenario period. The rise in the unemployment rate in the Adverse Scenario this year is comparable to last year. The

unemployment rate in the 2017 Severely Adverse Scenario reaches the same peak of 10% as during the 2016 Severely Adverse Scenario, but it begins from a lower starting rate, reflecting a more severe economic downturn.

Figure 5   CRE Price Index under the CCAR 2016 and CCAR 2017 scenarios.
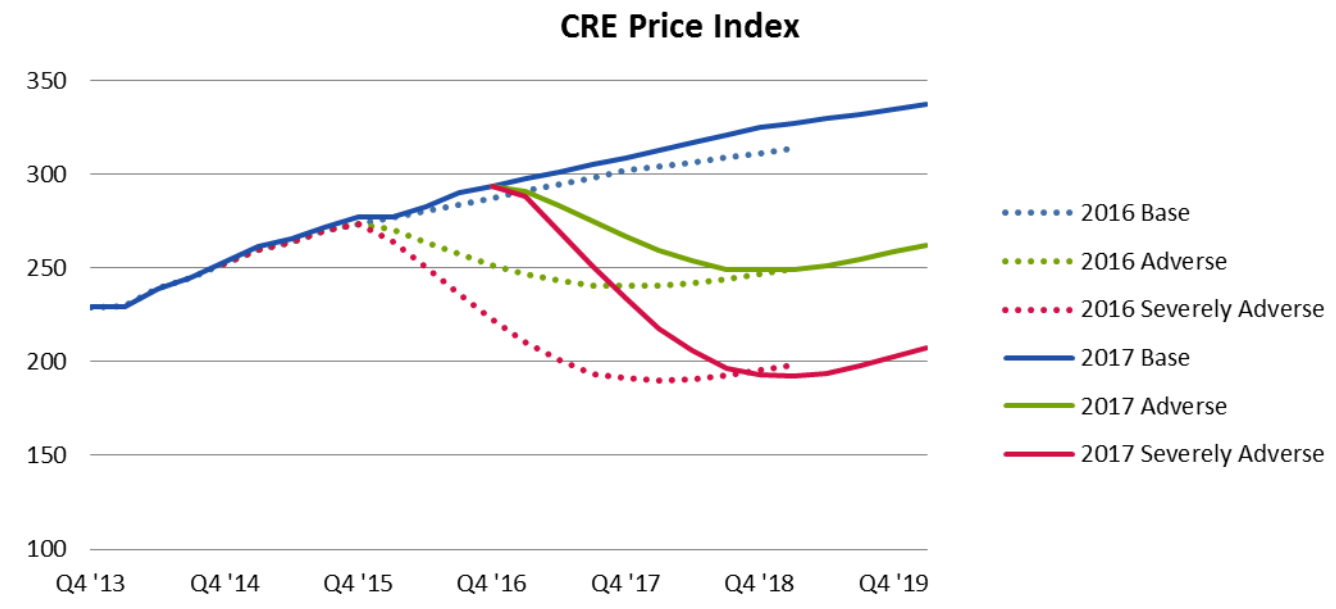
The commercial real estate price Index continued to outperform the market forecast during CCAR 2016's Baseline Scenario. From Q4 2015–Q4 2016, the Fed's CRE price index increased 6.0%, less than the increase of 9.6% during 2015. CRE price continues rising, with an annual average rate of 4.3% in the Baseline Scenario, and it falls approximately by 15% and 35% in the Adverse and Severely Adverse Scenarios, respectively. This year's Adverse and Severely Adverse Scenarios feature larger commercial real estate price declines.

As shown in the previous figures, the economy kept improving during the past year. The CCAR 2017 Baseline Scenario's forecasts suggest that the economy is expected to experience moderate expansion. On the other hand, this year's Severely Adverse Scenario features a slightly more severe economic downturn compared to last year's comparable scenario, with heightened stress in commercial real estate markets.

2.   Translating CCAR Scenarios into Specific CRE Scenarios

The Fed's CCAR guideline only describes the macroeconomic and financial variables in the scenarios. As described in our earlier papers,[7] Moody's Analytics has developed a proprietary methodology for translating the macroeconomic scenarios into market factors specific to the CRE industry: vacancy rates, rental growth rates, NOI growth rates, and cap rates. The following graphs present the forecasted national average vacancy rates, rental growth rates, and NOI growth rates for Multifamily and Office properties for the three 2017 CCAR scenarios.

The following graphs indicate that the stress to the CRE industry resulting from the Fed's Severely Adverse Scenario is more severe than the stress seen during 2008–2009's Great Recession. Multifamily and Office vacancy rates are projected to increase by 3.9% and 6.7%, respectively, over the Severely Adverse Scenario, more than what they did during the recent Great Recession. Similarly, the decrease in rent and NOI estimated for the Multifamily and Office properties over the Severely Adverse Scenario are more than the decrease in the respective rent and NOI observed during the Great Recession. The deterioration of the commercial real estate market condition is consistent with the Fed's CCAR 2017 guideline that the decline in CRE prices under the Severely Adverse Scenario outpaces last year, and prices of multifamily properties should be assumed to decline by more than the CRE index.

Figure 6   Multifamily property vacancy rates, rent, and NOI index by CCAR scenario.
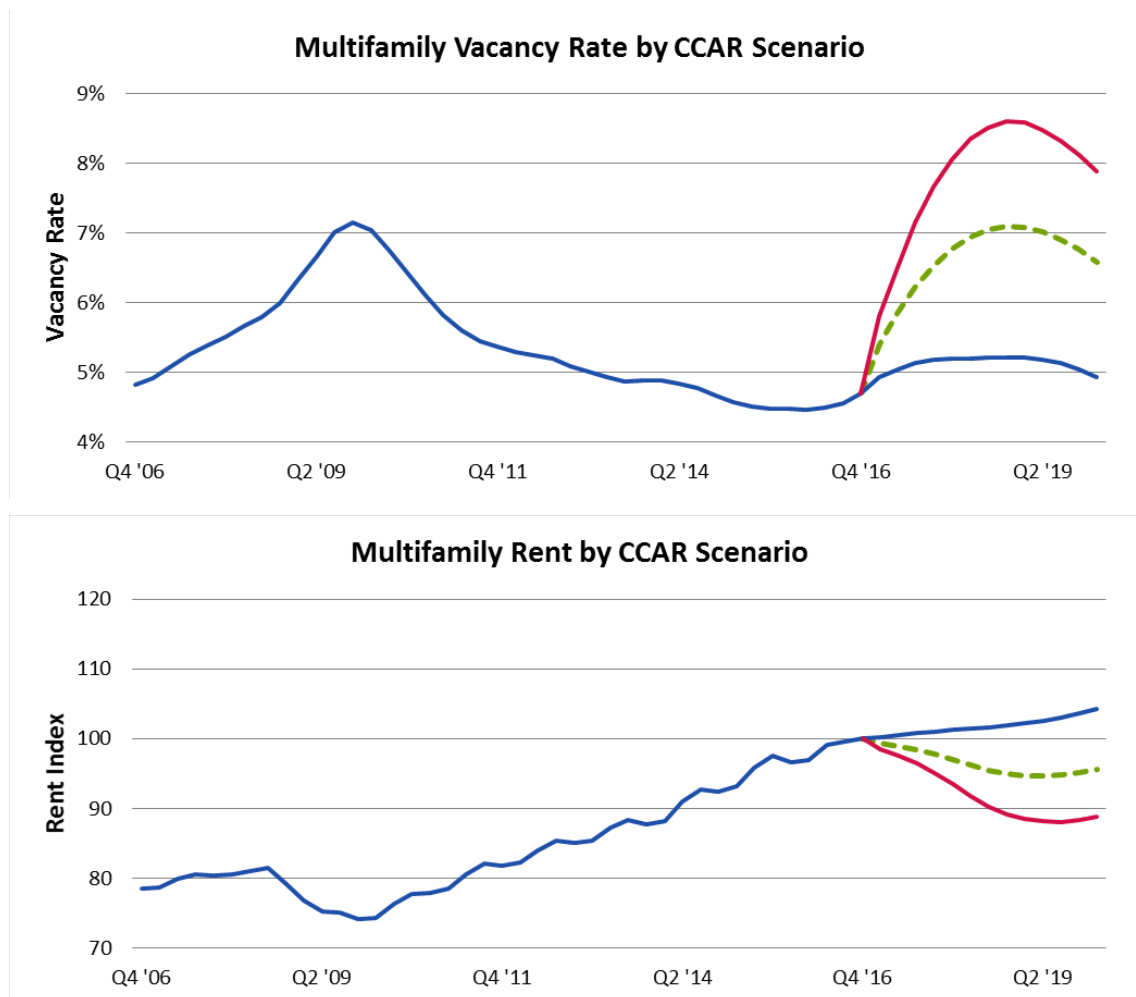
Multifamily NOI by CCAR Scenario
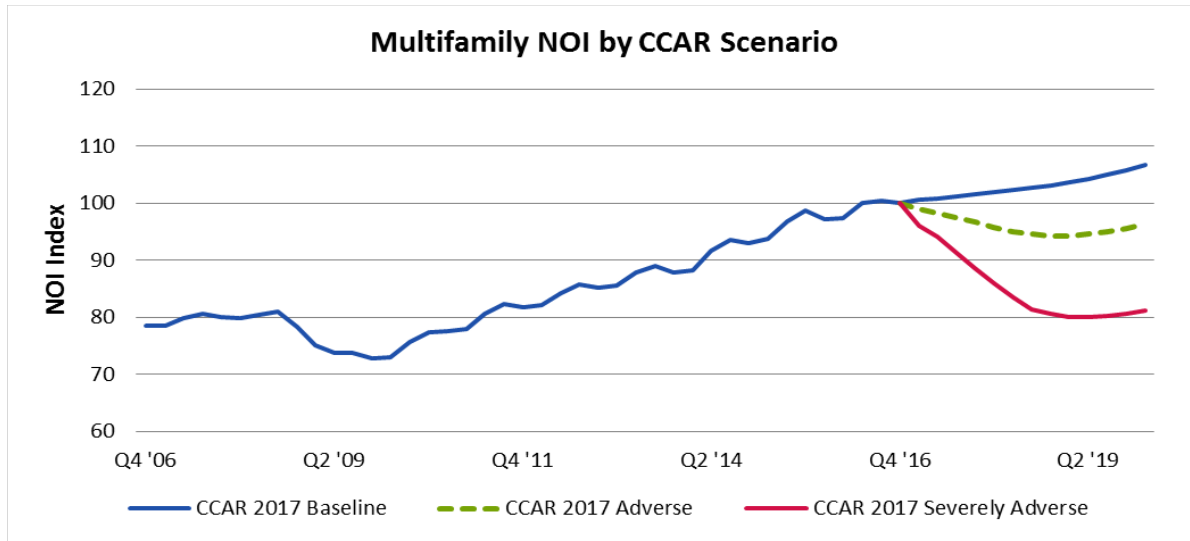
Figure 7   Office property vacancy rates, rent, and NOI index by CCAR scenario.

Office NOI by CCAR Scenario
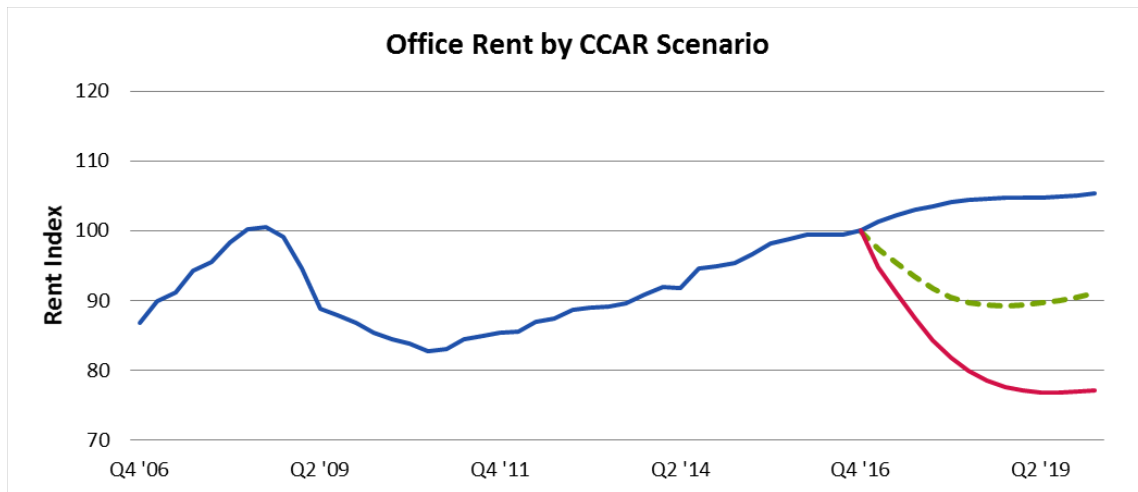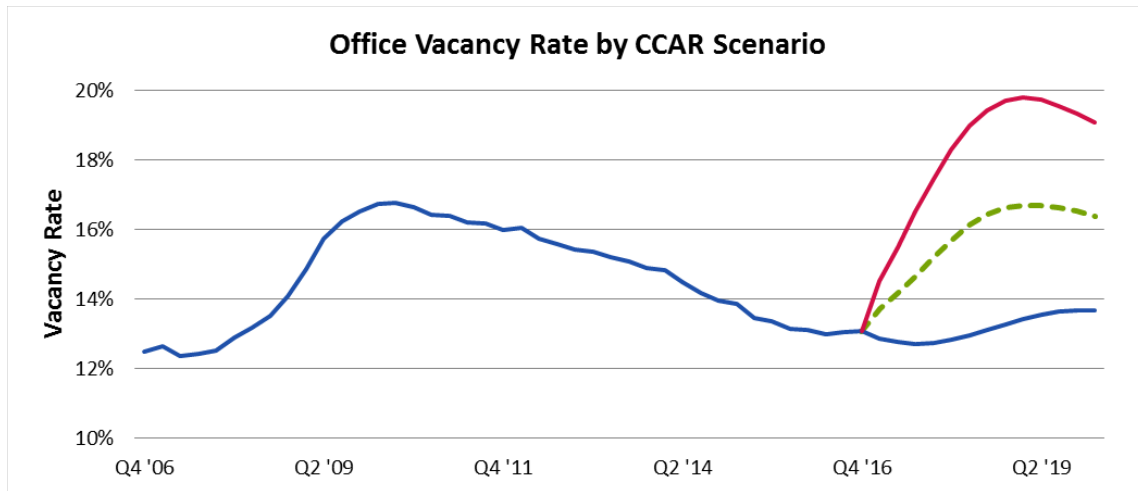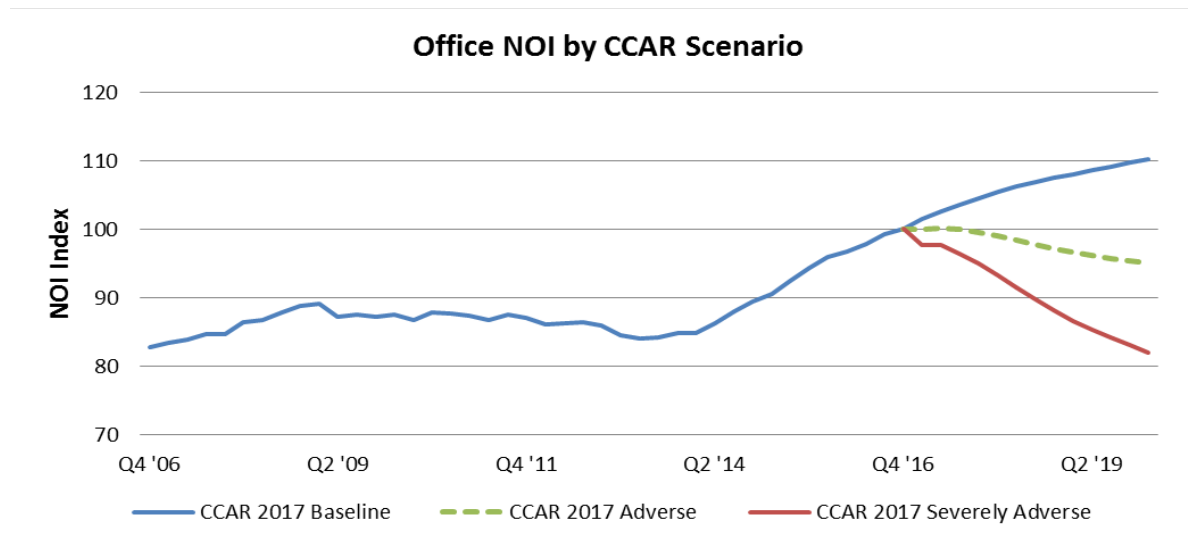
During the quarter when the Fed releases CCAR scenarios and guidelines, we generate the CRE forecasts using CMM's macro-translation engine. We review the resulting forecasts from both quantitative and qualitative perspectives. In particular, for CCAR 2017, following the Fed's instructions of "a period of heightened stress in … commercial real estate markets," we review the CCAR Severely Adverse Scenario projections for each market and for each property type with a special emphasis on property value projections.

The macro-translation engine in CMM is designed to produce CRE market forecasts that mimic historical market fluctuations in corresponding economic episodes. While the engine captures the overall effect of economic shocks on CRE markets, certain market segments have recently experienced unprecedented value growth, especially the multifamily sector. As stated in the description of 2017's Severely Adverse Scenario, "given that prices of multifamily properties have risen rapidly in recent years, they should be assumed to decline by more than the CRE index." Hence, additional shocks are applied to value projections across all multifamily markets, such that multifamily property value declines by more than Fed's CRE price index at the national level, shown in Figure 8. Meanwhile, the value projections of other property types are adjusted correspondingly, to ensure that CMM's national value projection aligns with the Fed's CRE index projection, on average.

The Fed further instructs, "Declines in aggregate U.S. commercial and residential real estate prices should be assumed to be concentrated in regions and property types that have experienced rapid price gains over the past several years." Accordingly, we review the value projection for each MSA and property type and ensure that markets with significantly above average growth in recent years undergo sharp declines under the CCAR 2017 Severely Adverse Scenario. We achieve this step by: 1) Identifying the markets with significantly above average growth in Value index. 2) Determining an appropriate additional decline during the course of the Severely Adverse Scenario for these markets to ensure the scenario's stress offsets the significant growth during recent years. 3) Applying the MSA-specific value declines to all corresponding submarkets. Based on our review, most of the markets with substantial recent price gains are concentrated in coastal regions or other areas with a strong high-tech industry presence. These findings are consistent with common perceptions of "bubble" markets, most likely subject to acute declines in a severe global recession as depicted in the CCAR 2017 Severely Adverse Scenario.

Figure 8   National property value forecasts under Severely Adverse Scenario.

National Value Forecast under Severely Adverse Scenario
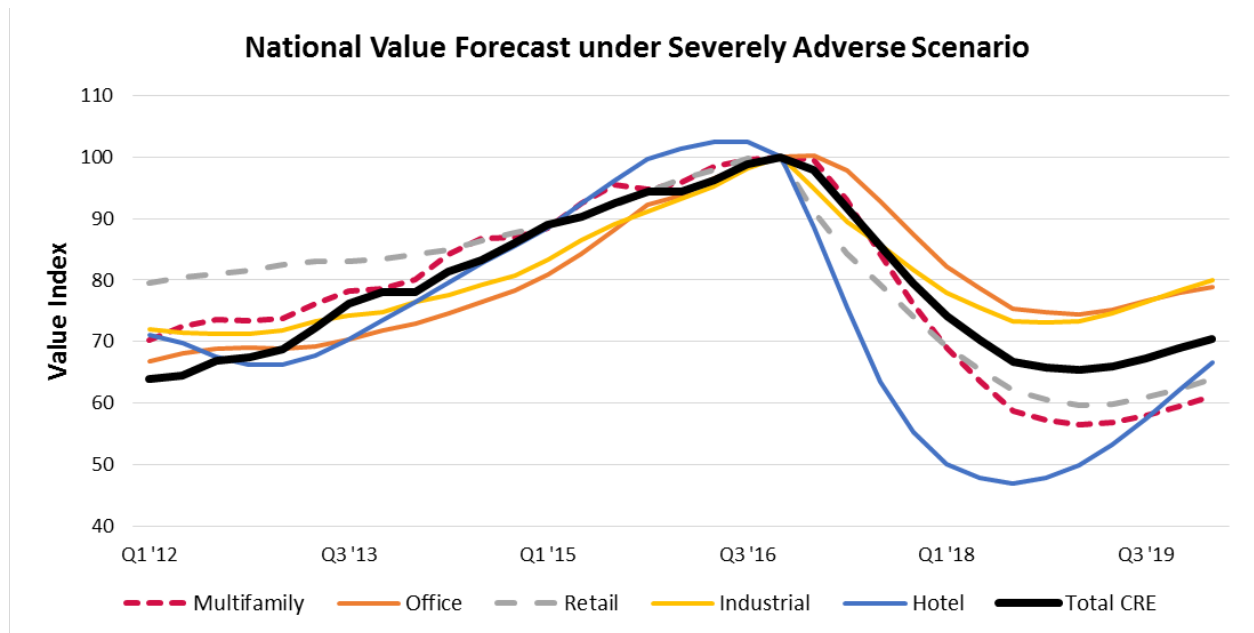
Figure 9 depicts an example of the office value index projection under the CCAR 2017 Severely Adverse Scenario. San Francisco is widely considered a "bubble" area, with much faster price appreciation than the national average since the recent financial crisis. For the Severely Adverse projection, we ensure that San Francisco experiences a rapid value decline, where the price index returns to a sustainable level relatively free of "bubbles." Over the course of the scenario, the national office value index declines by 25%, while San Francisco decreases by about 40%. These projections are consistent with Fed guidelines.

Figure 9   Office property value forecast under Severely Adverse Scenario.

Office Value Forecast under Severely Adverse Scenario
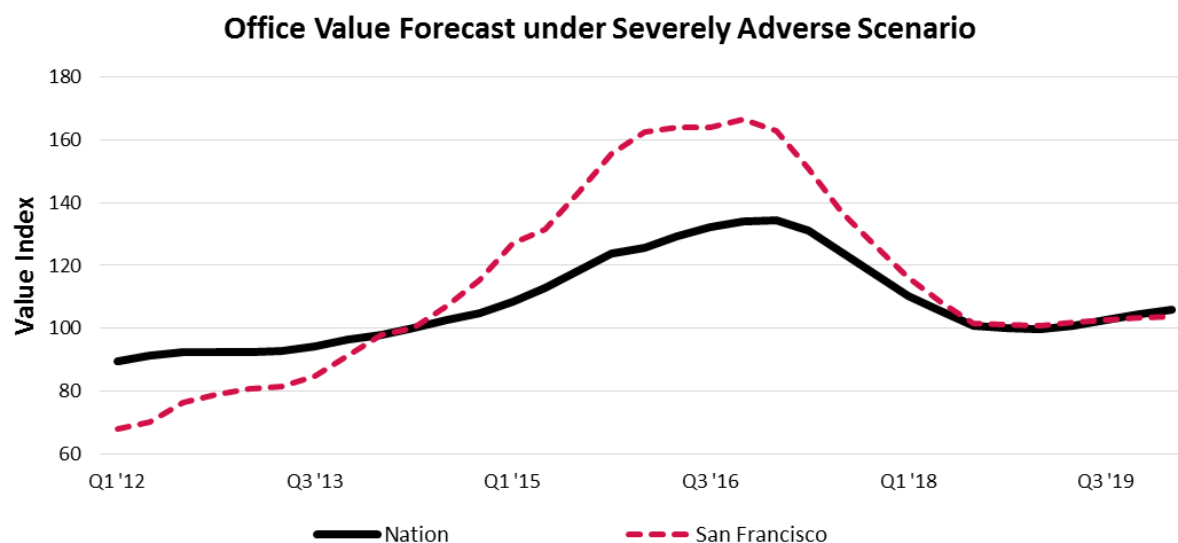
3. Estimating CRE Portfolio Credit Losses

This section describes our methodology for estimating CCAR banks' CRE portfolio credit losses. In general, we begin by creating synthetic loan-level portfolios, sampling from Moody's Analytics CRE CRD database. We then run the bank-specific synthetic portfolios through the CMM application. Finally, we aggregate loan-level results into portfolio-level loss estimates, which we also compare and evaluate within a historical context to support their reasonableness.

3.1 Moody's CRE CRD Consortium

We have loan-level details on participating banks' holdings though Moody's CRE Credit Research Database (CRD) consortium. The CRE CRD consortium currently has over 15 participation including banks and insurance companies, and the consortium membership continues to grow. Participants submit quarterly snapshots of CRE portfolio to Moody's Analytics, which cleanses the data submissions and helps identify and resolve data issues with participants. Moody's also scrutinizes the CMM model results and presents portfolio review report to participants, allowing them to benchmark their portfolio on various metrics including risk, pricing, and default rate relative to CRE CRD. CRE CRD currently contains over 27,000 loans with total issued balance of over $180 billion, which covers all 50 states and 332 Metropolitan Statistical Areas (MSA).

The CRD portfolio, as of 2016 Q4, consists of 11,000+ loans from commercial banks with total outstanding balances of more than $64 billion, among which about 20% are construction loans. Figure 10 shows property type and MSA distributions of the CRE CRD portfolio, based on outstanding balance. The CRE CRD portfolio has healthy LTV and DSCR, with median LTV of 51.4% and median DSCR of 1.66. Bank loans tend to have shorter terms than those in the CMBS and insurance universe. In the portfolio, 73% of the loans originated during the most recent three years, and 58% of loans will mature in three years. Appendix B provides a detailed CRE CRD portfolio summary.

Figure 10   Property type and MSA distributions of CRE CRD portfolio.
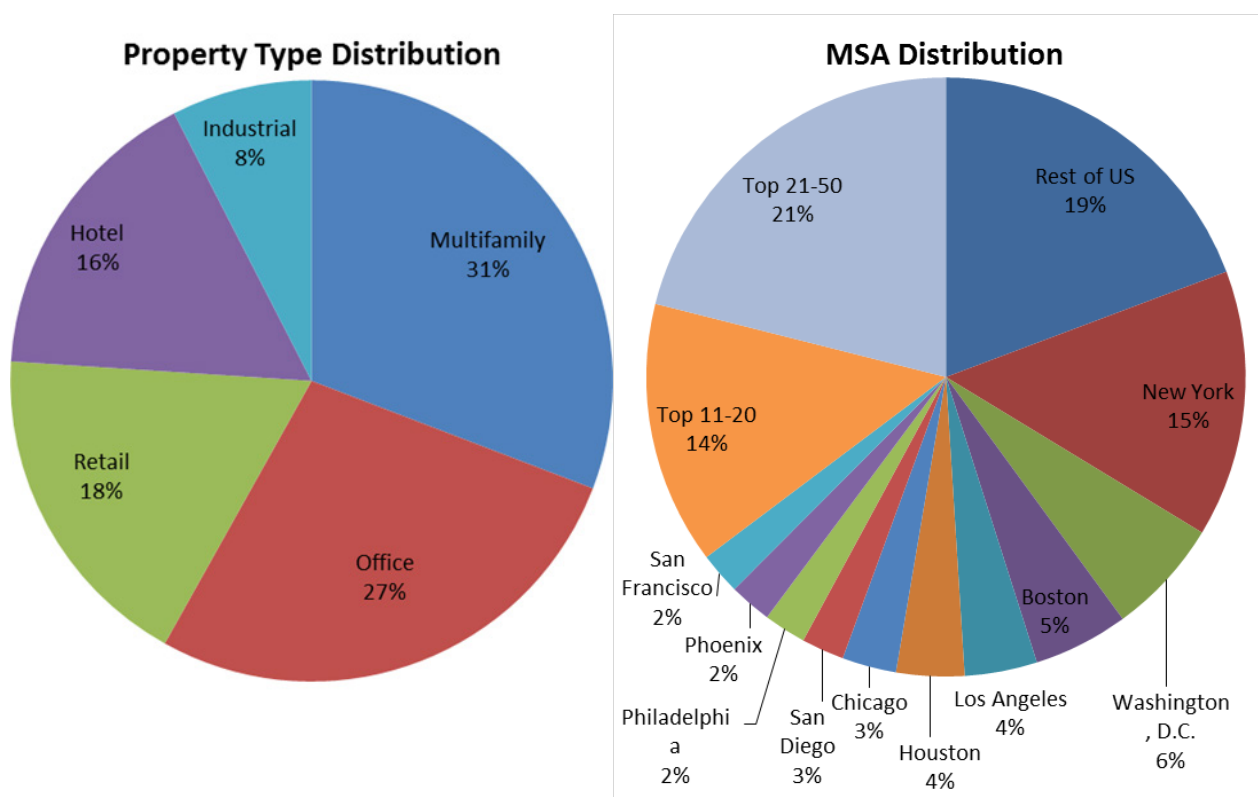
3.2 Reconstructing a Bank's CRE Loan Portfolio

Aggregate statistics related to banks' loan portfolios, such as non-accrual rates, charge-off rates, 30-day delinquent rates, 90-day delinquent rates, etc., are available by asset class, including CRE. The CRE CRD consortium contains actual bank holdings of CRE loans and provides an indication of the average CCAR bank holding, given a number of CCAR Banks participate in the consortium.

We construct portfolios for each of the CCAR banks, such that, each of the portfolios matches with the reported CRE sector allocations and credit performance measures among these sectors for each bank. [8] Note, we perform this process in a manner that aligns the reported average measures of the banks with the average measures of the constructed portfolio. To construct a loan portfolio that can be used for stress testing within CMM, we require loan-specific details such as geography and property type and other financial information such as LTV, DSCR, coupon rate, etc. To this end, we simulate banks' CRE loans by referencing loan-level details in Moody's CRE CRD.

At present, the risk profiles of the average commercial bank's CRE loans fall in-line with the CRE CRD consortium, so each of the bank portfolios can be simulated via the CRE CRD consortium, depending of the risk profile of each bank's CRE footprint. We construct a hypothetical portfolio for each bank by appropriately sampling the detailed loans available in the CRE CRD. As noted earlier, these portfolios will, by construction, match the reported average credit performance measures from which the sampling process is based upon.

Figure 11   Illustration of the sampling method used to construct Bank X's CRE portfolio.
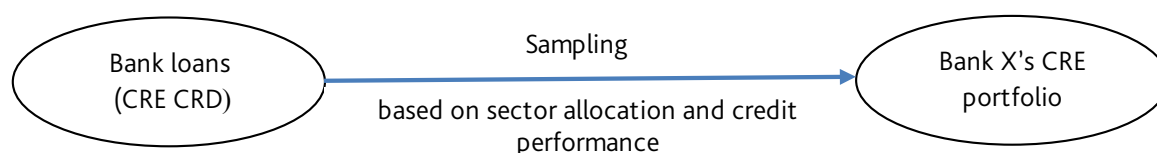
Public filings provide information on the share of construction loans in these banks' CRE portfolios, including non-accruals in construction loans and multifamily loans and other permanent (non-farm) loans. Banks' portfolios differ in their composition of construction, multifamily, and other permanent loans, as well as risk characteristics with respect to these segments. A particular bank may have a relatively safe construction CRE segment, but their permanent CRE segment might be relatively riskier and vice-versa. We use such information to create bank-specific construction, multifamily, and other permanent CRE portfolios, modeled accordingly.

Non-accrual rate is an important indicator of the credit performance of a bank's portfolio. The non-accrual rate of a particular bank is also a reflection of the quality of the holdings still performing. A bank currently demonstrating a persistently high non-accrual rate is expected to possess a lower quality portfolio, as it is the underlying portfolio causing the loans now falling into non-accruable state. As such, we use the past four quarters' average reported non-accrual rates as a proxy measure for the quality of a bank's CRE holdings. [9]

3.3 Stress Testing the Synthetic Bank Portfolios

Using a synthetic portfolio for each bank, we estimate the total expected loss for the 27 banks under the various CCAR 2017 scenarios. The following figures show the quarterly expected loss for the average bank through three CCAR 2017 scenarios. Expected loss fluctuates with CRE market conditions. Specifically, the expected loss decreases as commercial real estate values appreciate in the Baseline Scenario. When CRE price encounters significant downward pressure, expected loss rises to 0.37% under the Adverse Scenario and to 1.32% under the Severely Adverse Scenario during the Q1 2018. As property value gradually rises during the last several quarters of the stress scenarios, expected loss decreases accordingly.

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[8] Specifically, these sectors are multifamily, non-farm, non-residential CRE, and construction.

[9] For example, Morgan Stanley's CRE portfolio reported a 0% non-accrual rate during the last four quarters, while Regions Bank reported a 1.6% rate, suggesting a potentially significant difference in the credit quality of underlying loans and properties between the two CRE portfolios.

Figure 12   Quarterly expected loss for the average bank through three CCAR 2017 scenarios.
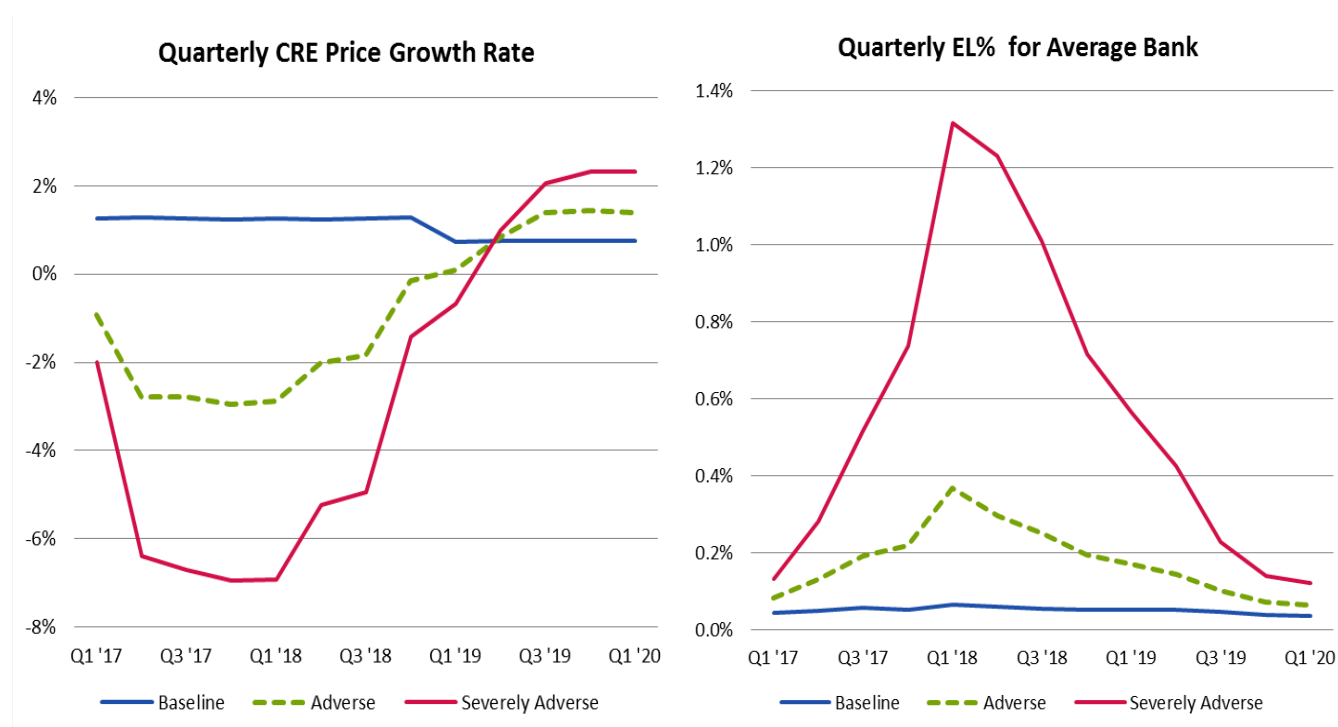
Table 2 presents the total expected loss for an average bank through the three CCAR 2017 scenarios. [10] For the 27 major banks selected for our CCAR 2017 stress testing analysis, the expected loss from their CRE portfolios after nine quarters under the Severely Adverse Scenario is 6.5%, while, after thirteen quarters, we expect the loss to increase to 7.4%. In the Baseline Scenario, the expected loss is 0.49% and 0.66%, at the end of nine and thirteen quarters, respectively.

Table 2   TOTAL EXPECTED LOSS FROM AN AVERAGE CCAR BANK'S CRE PORTFOLIO FOR CCAR 2017 SCENARIOS

27 CCAR Banks		Portfolio Composition %	Fed Baseline (Total Expected Loss)		Fed Adverse (Total Expected Loss)		Fed Severely Adverse (Total Expected Loss)	
			Q9 ('19Q1)	Q13 ('20Q1)	Q9 ('19Q1)	Q13 ('20Q1)	Q9 ('19Q1)	Q13 ('20Q1)
Performing	Multifamily	20.3%	0.3%	0.5%	1.2%	1.5%	6.3%	7.3%
	Non Residential CRE	63.8%	0.2%	0.3%	1.1%	1.3%	3.7%	4.3%
	Construction	15.4%	1.3%	1.8%	5.4%	6.5%	16.8%	19.2%
Non-accrual	Permanent	0.4%	15.8%	15.8%	26.8%	26.8%	48.5%	48.5%
	Construction	0.1%	15.8%	15.8%	35.1%	35.1%	69.7%	69.7%
CRE Total		100.0%	0.49%	0.66%	1.9%	2.3%	6.5%	7.4%

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[10] CCAR guidelines require that institutions estimate the expected loss through the first quarter of 2019 (nine quarters (Q9) from Q4 2016) and make provisions for an additional year, through to the first quarter of 2020 (thirteen quarters (Q13) from Q4 2016). For CCAR stress testing purposes, as we are concerned with the results at Q9 and Q13, the tables and charts in this paper present those results.

3.4 Evaluating Moody's CRE Loss Estimates in the Historical Context

The FDIC provides quarterly charge-off amount and portfolio balance for all banks, from which we can compute the cumulative nine-quarter charge-off rates. Our nine-quarter expected losses under the three CCAR scenarios are generally in-line with the cyclical charge-off rates observed over the longer history. The nine-quarter expected loss under Severely Adverse Scenario is higher than the nine-quarter charge-off rates during historical stress periods, primarily because this year's Severely Adverse Scenario assumes a larger decline in commercial real estate prices. Appendix C presents a detailed comparison by CRE sector.

Figure 13   Cumulative nine-quarter charge-off rates and expected loss under CCAR 2017 scenarios.
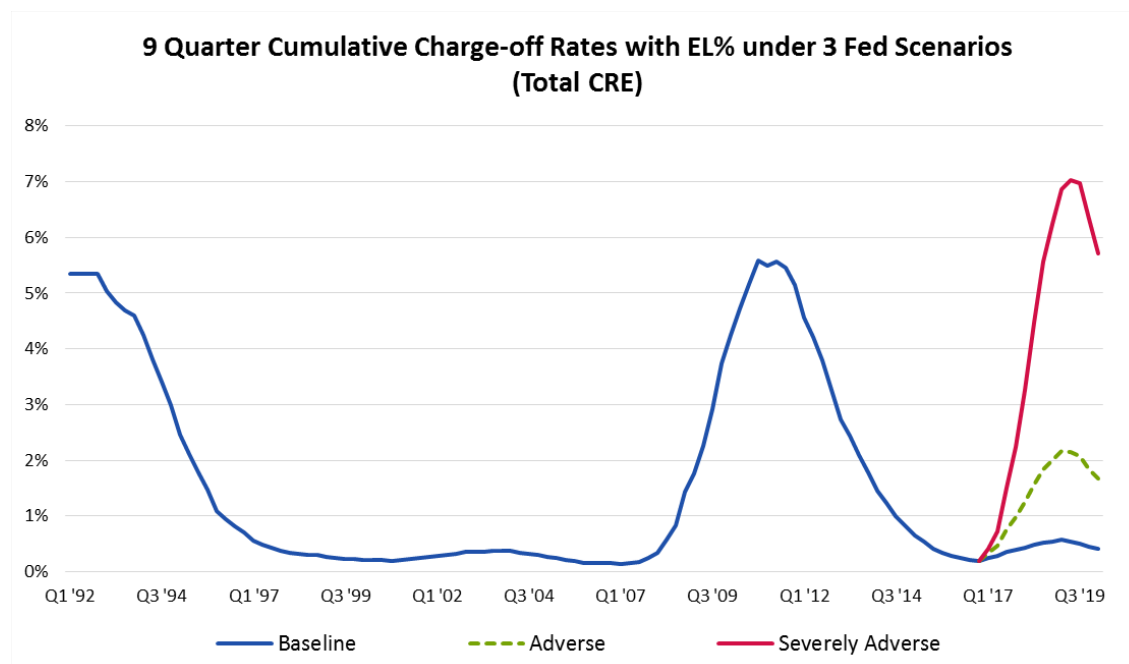
4. Concluding Remarks

The nine-quarter expected losses estimated under all three scenarios for CCAR 2017 are higher than the corresponding figures from the CCAR 2016 analysis. This finding is the cumulative result of several factors. CCAR 2017's Severely Adverse Scenario features a larger decline in commercial real estate prices, which results in higher expected loss. Additionally, multifamily properties, usually considered less risky than other commercial real estate property types, are assumed to decline by more than the overall CRE index, which pushes expected loss higher. Overall, our analysis points to higher expected losses under the Severely Adverse Scenario for CCAR 2017, relative to the corresponding CCAR 2016 analysis.

Table 3 summarizes average expected loss, given the CCAR 2017 scenarios for the 27 CCAR banks selected for our analysis.

Table 3   27 BANKS' TOTAL EXPECTED LOSS BY CCAR 2017 SCENARIO

CCAR 2017 Scenario	Nine-quarter Expected CRE Loss	13-quarter Expected CRE Loss
Fed Baseline	0.5%	0.7%
Fed Adverse	1.9%	2.3%
Fed Severely Adverse	6.5%	7.4%

Appendix A   CCAR 2017 Scenarios and the CCAR 2016 Scenarios

The following graphs compare some of the key macroeconomic variables published by the Fed under the CCAR 2016 and CCAR 2017 scenarios.

Figure 14   CCAR 2017 and CCAR 2016 scenario comparisons.

10-Y Treasury

Legend:
- 2016 Base
- 2016 Adverse
- 2016 Severely Adverse
- 2017 Base
- 2017 Adverse
- 2017 Severely Adverse

3-mo Treasury

Legend:
- 2016 Base
- 2016 Adverse
- 2016 Severely Adverse
- 2017 Base
- 2017 Adverse
- 2017 Severely Adverse

House Price Index

Legend:
- 2016 Base
- 2016 Adverse
- 2016 Severely Adverse
- 2017 Base
- 2017 Adverse
- 2017 Severely Adverse
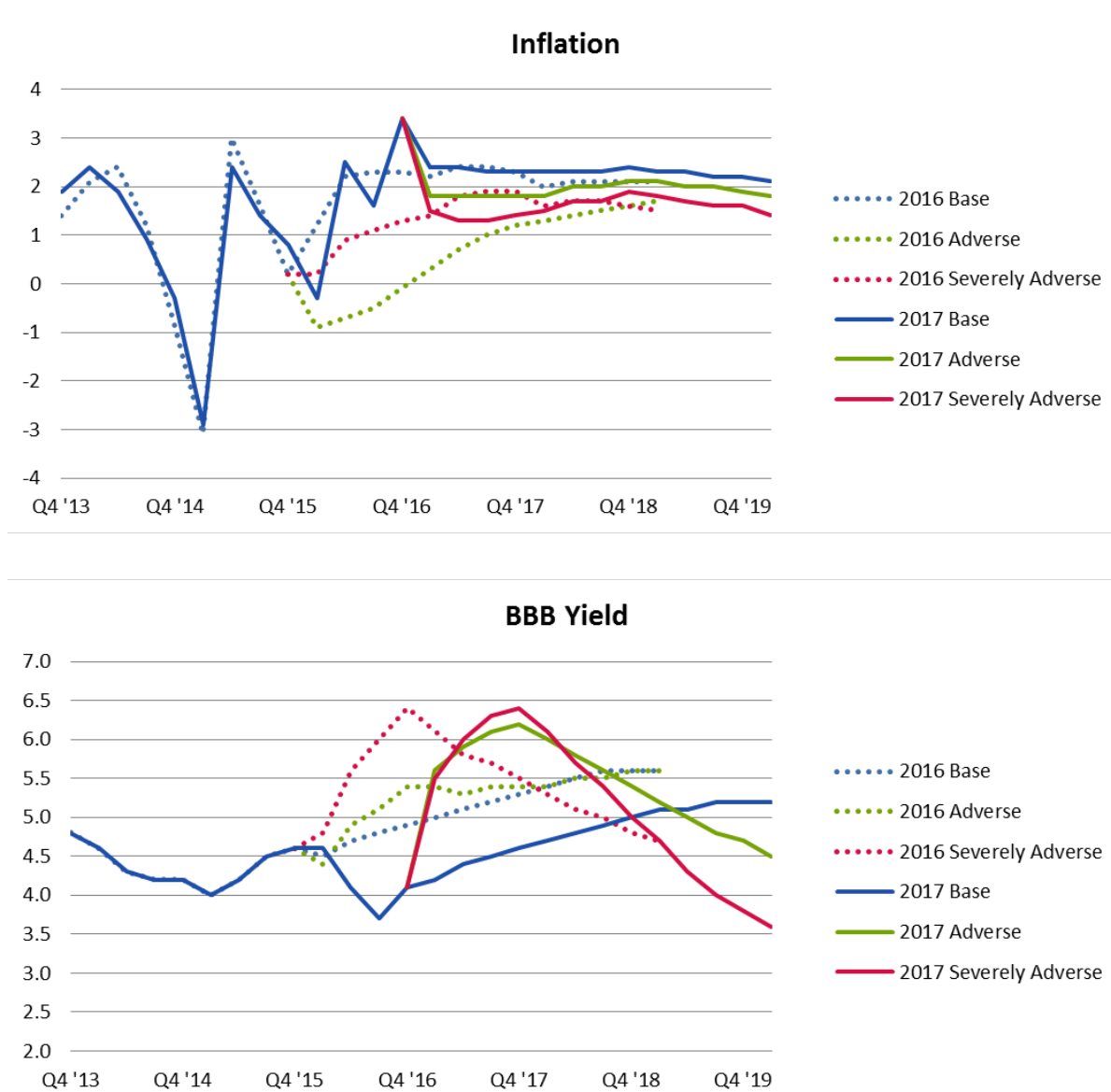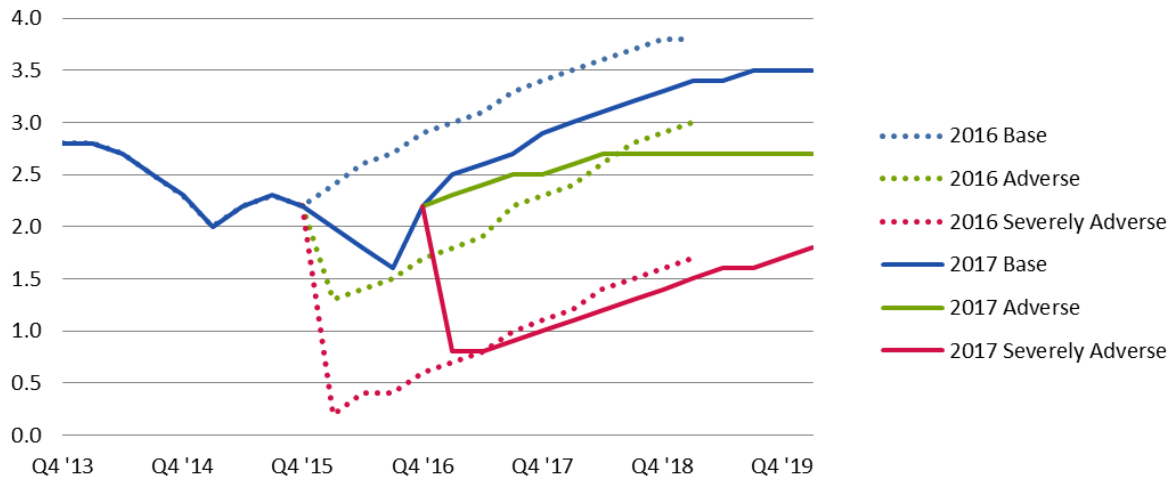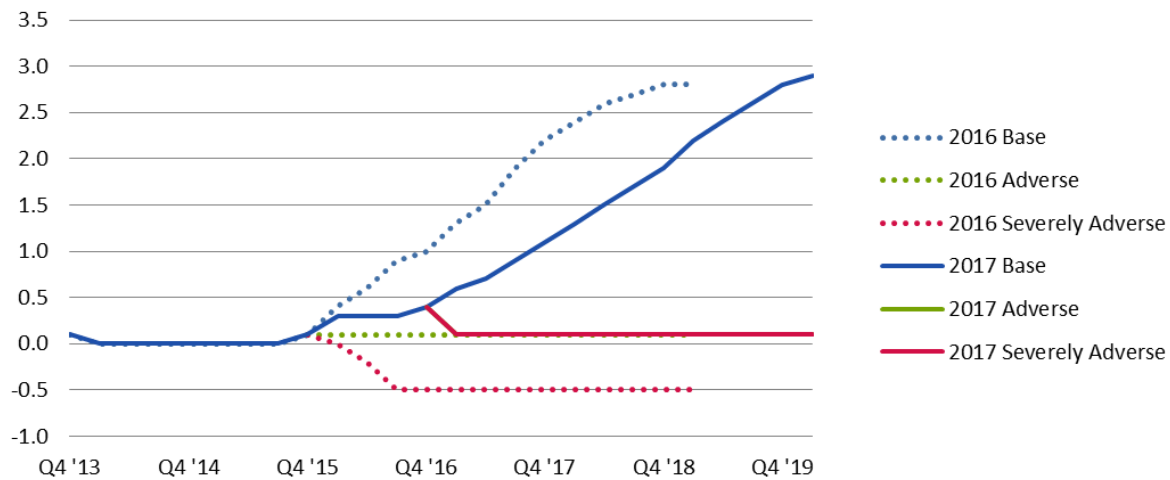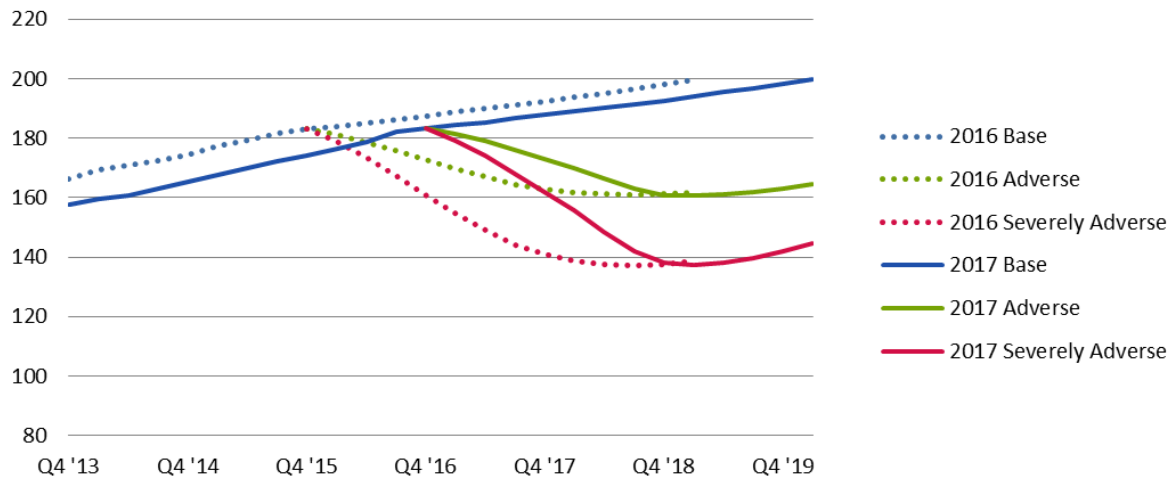
Appendix B   Summary on CRE CRD Portfolio

The following graphs summarize CRE CRD portfolio from key dimensions, LTV, DSCR, vintage, and maturity year.

Balance by LTV
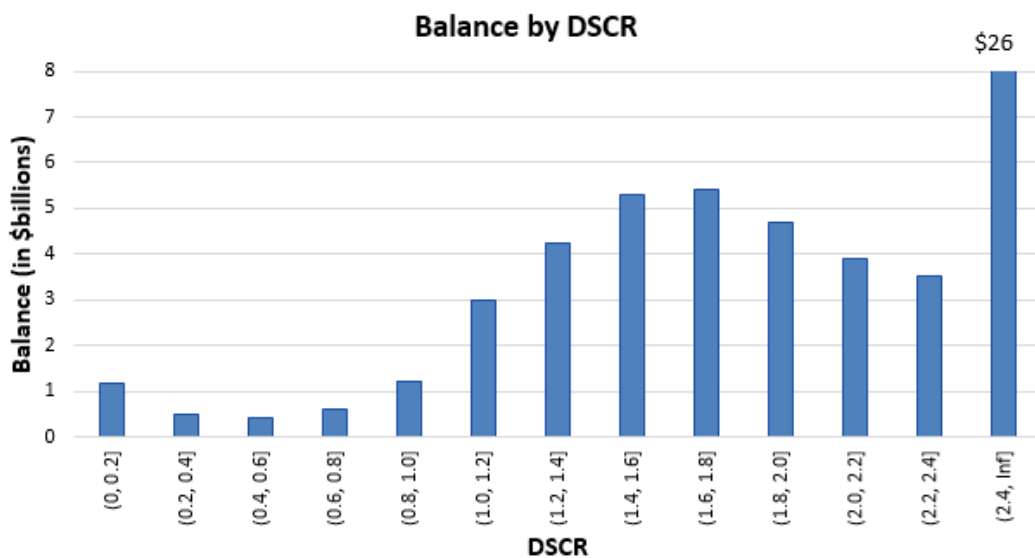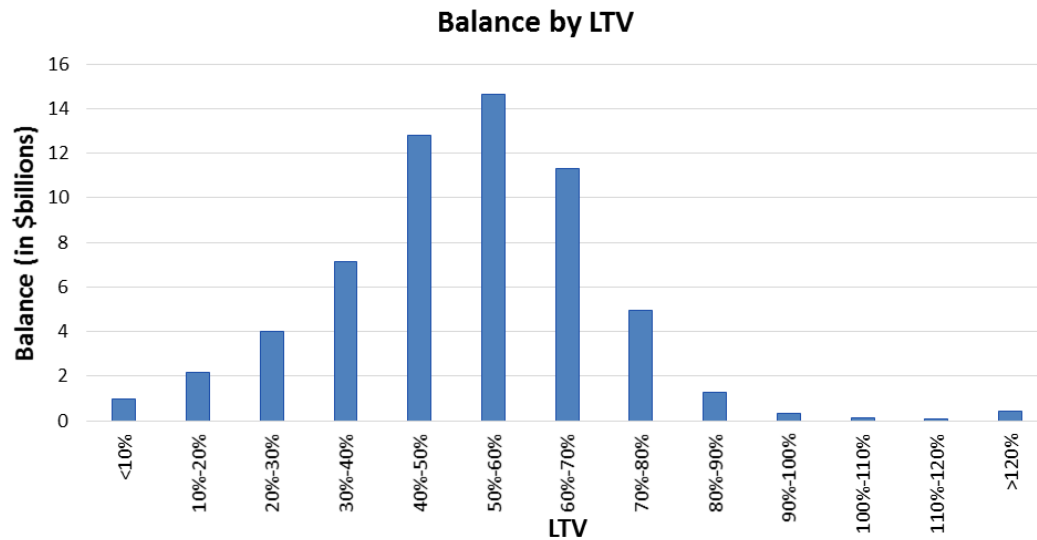
Balance by DSCR

Balance by Origination Year
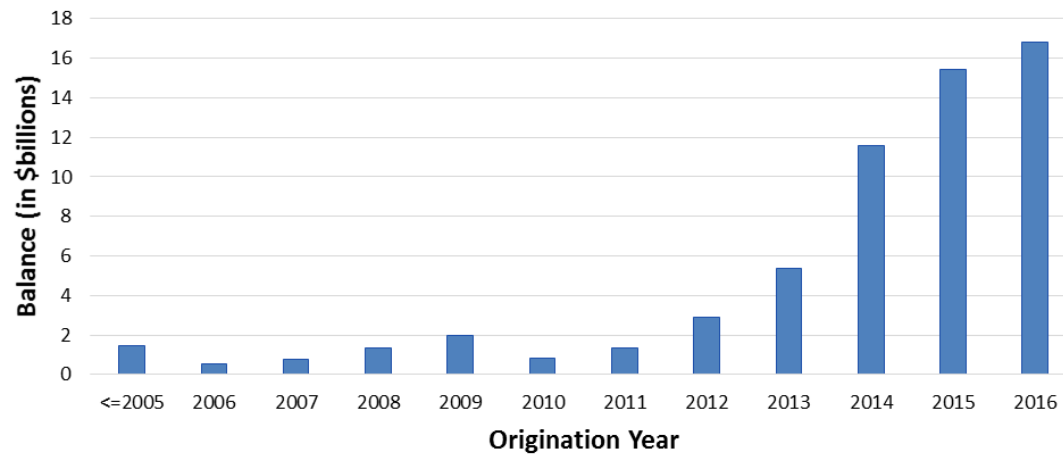
Balance by Maturity Year
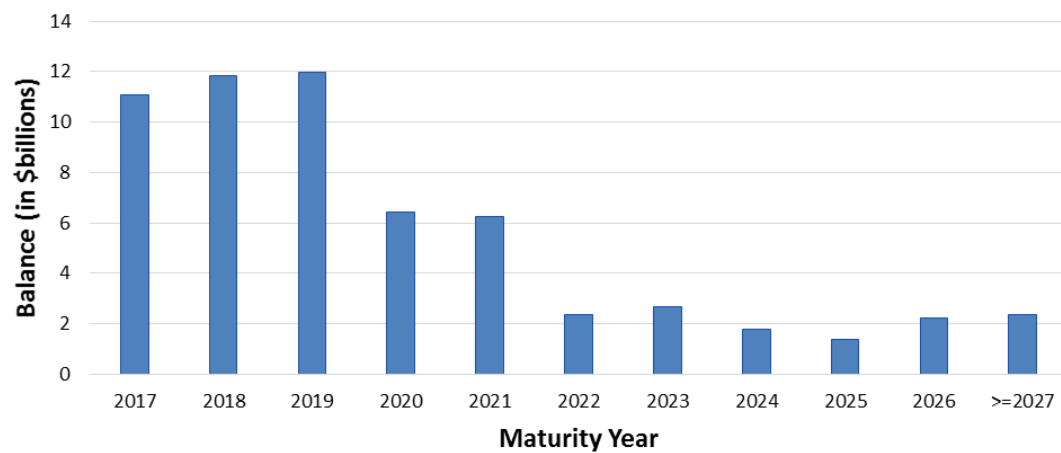
Appendix C   Cumulative Nine-Quarter Charge-off Rates

The following graphs show historical cumulative nine-quarter charge-off rates with expected losses under the three CCAR scenarios by CRE sectors, multifamily, non-residential CRE, and under construction CRE. Following the Fed's guideline, multifamily prices are assumed to decline by more than CRE index, which results in high EL for the residential segment. Non-residential CRE loans are projected to have slightly higher loss rates compared to that experienced during the 2008–2009 financial crisis. Comparing to the historical charge-off rates for the construction sector, our loss estimates are reasonable, though slightly conservative. Overall, expected losses under the three CCCAR scenarios for different CRE sectors are reasonable, and they align with historical observations on charge-off rates.

9 Quarter Cumulative Charge-off Rates with EL% under 3 Fed Scenarios (Multifamily)

9 Quarter Cumulative Charge-off Rates with EL% under 3 Fed Scenarios (Non Residential CRE)
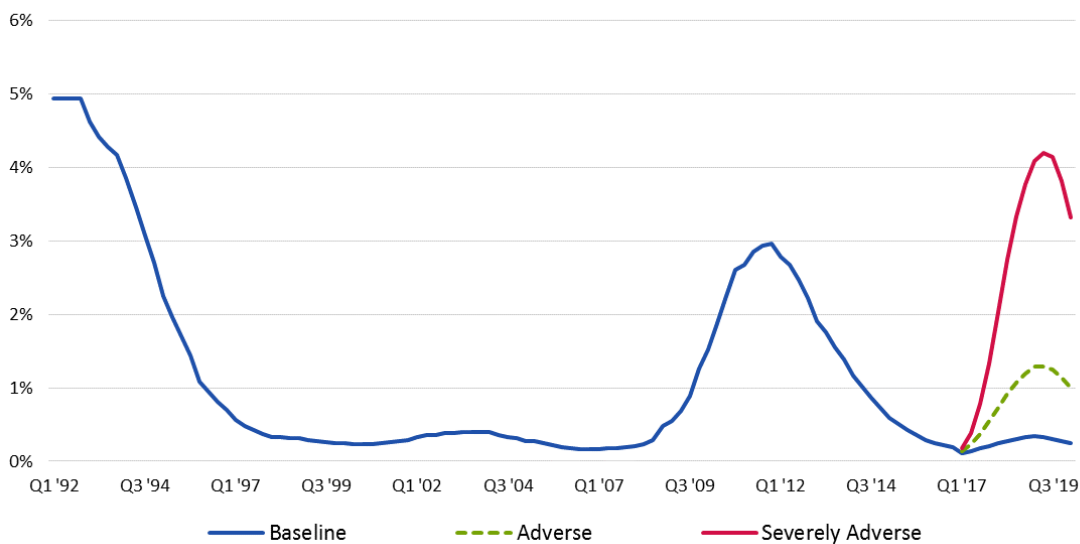
9 Quarter Cumulative Charge-off Rates with EL% under 3 Fed Scenarios (Construction)
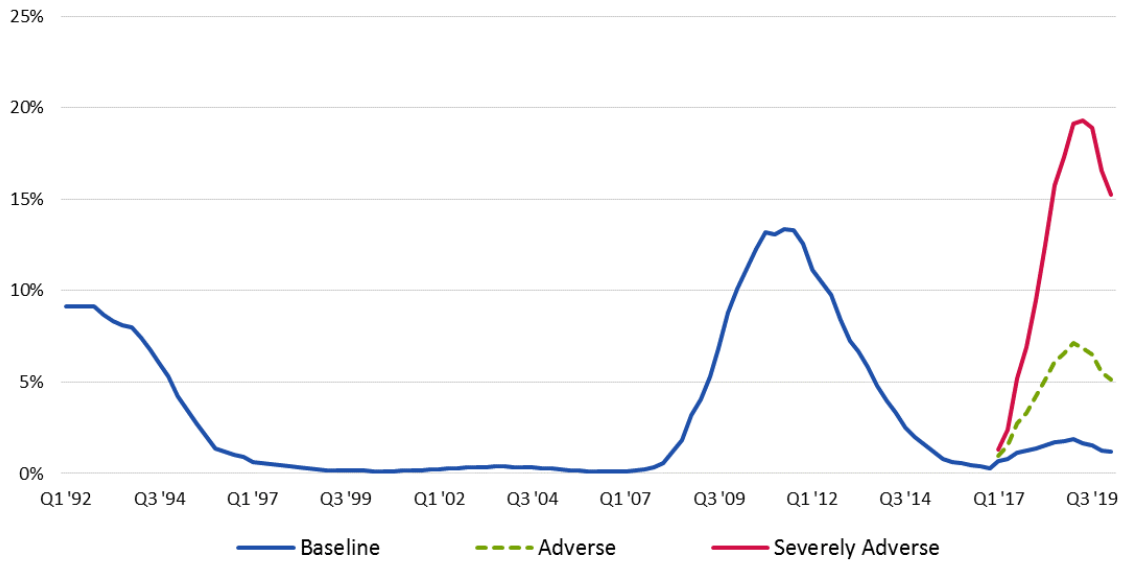
Appendix D   Total Loss from Banks' CRE Portfolio, CCAR 2017

The following graphs show details of total loss in the various categories, for each bank's CRE portfolios, for the various 2017 CCAR stress testing scenarios.

Bank Total EL% through the Fed Base Scenario

Bank 1	Bank 2	Bank 3	Bank 4
Bank 5	Bank 6	Bank 7	Bank 8
Bank 9	Bank 10	Bank 11	Bank 12
Bank 13	Bank 14	Bank 15	Bank 16
Bank 17	Bank 18	Bank 19	Bank 20
Bank 21	Bank 22	Bank 23	Bank 24
Bank 25	Bank 26	Bank 27	27 Bank Average
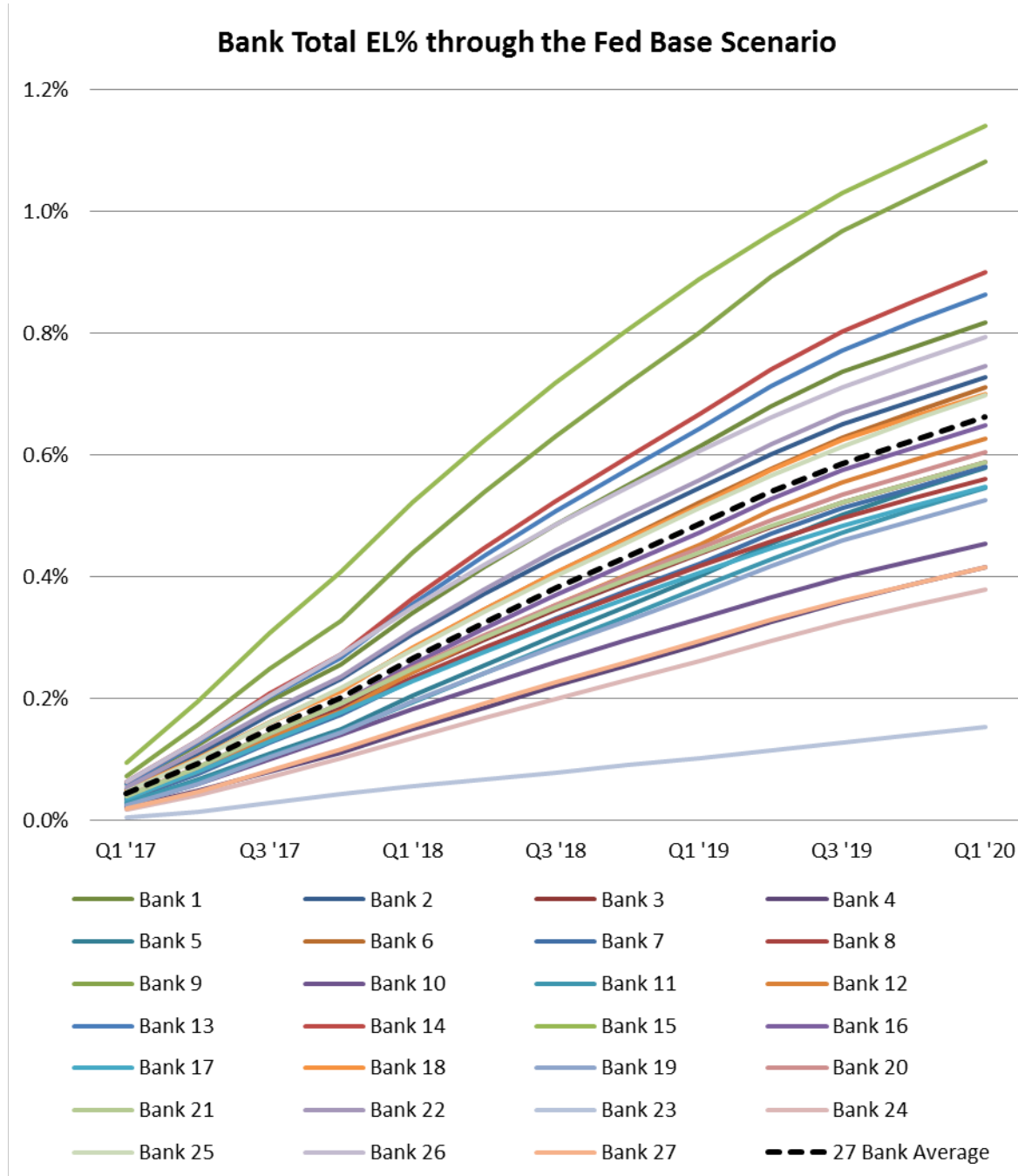
Bank Total EL% through the Fed Adverse Scenario
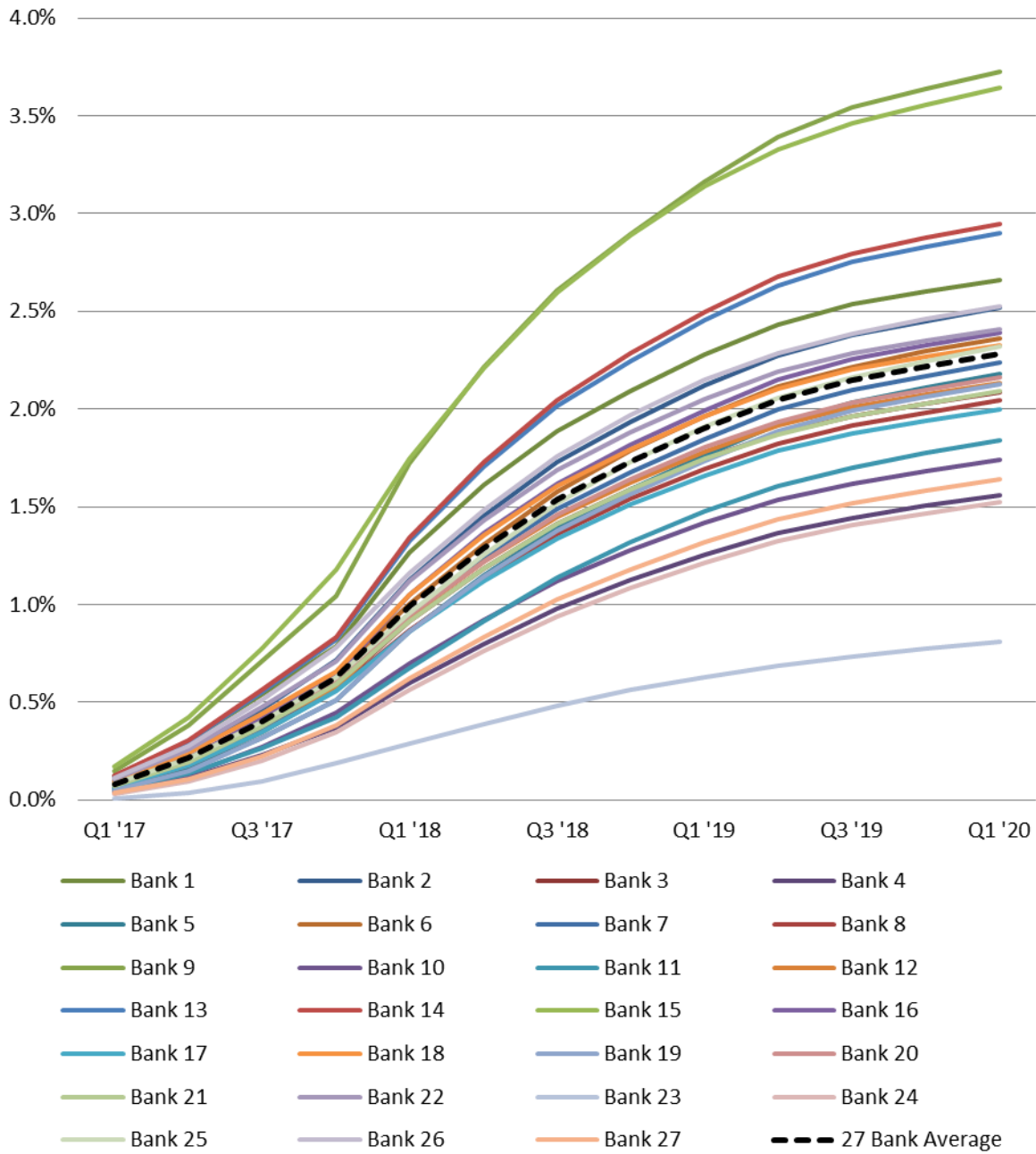
Bank Total EL% through the Fed Severe Scenario
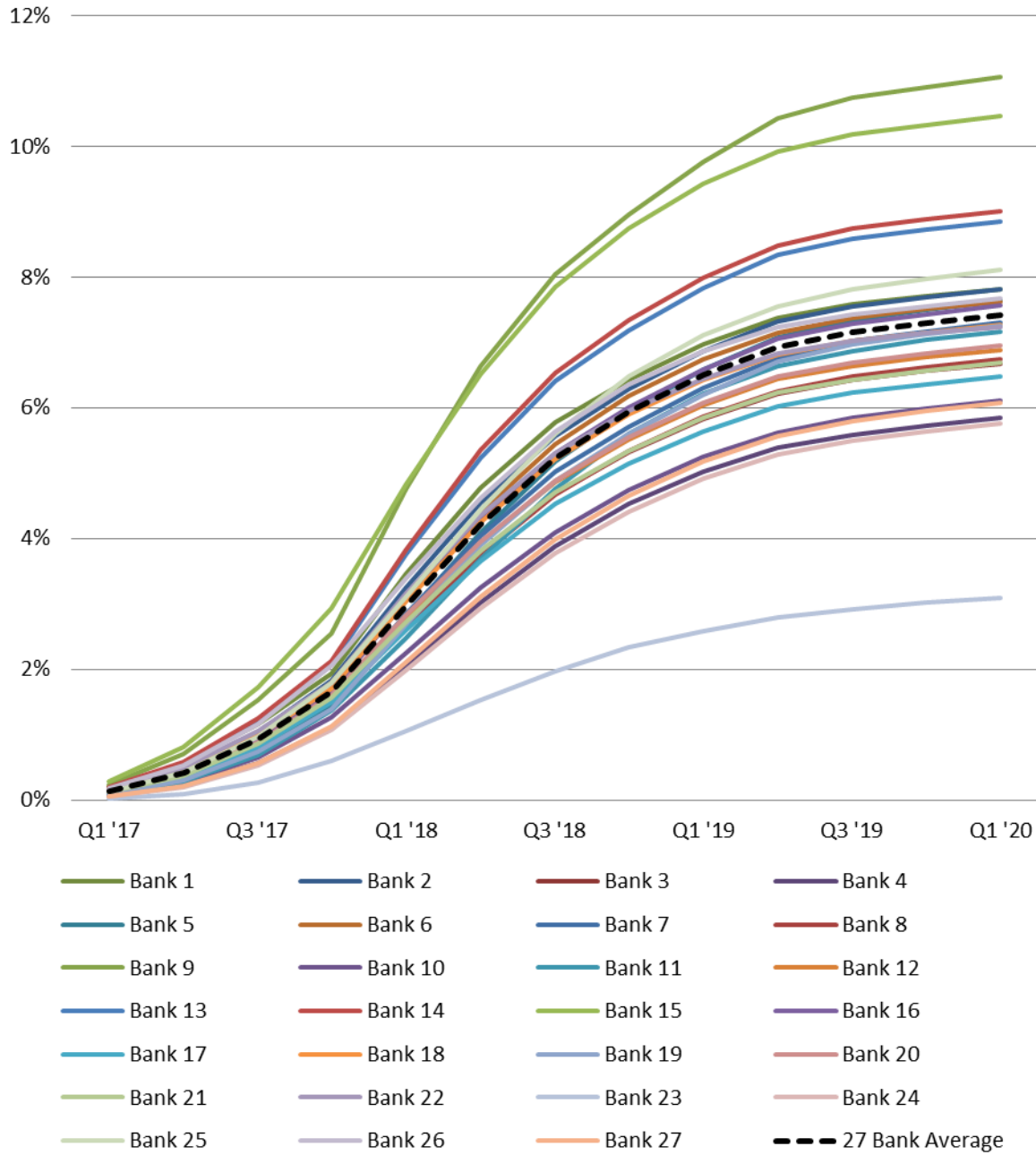
Bank Total EL% by Scenario at Q9 for CRE
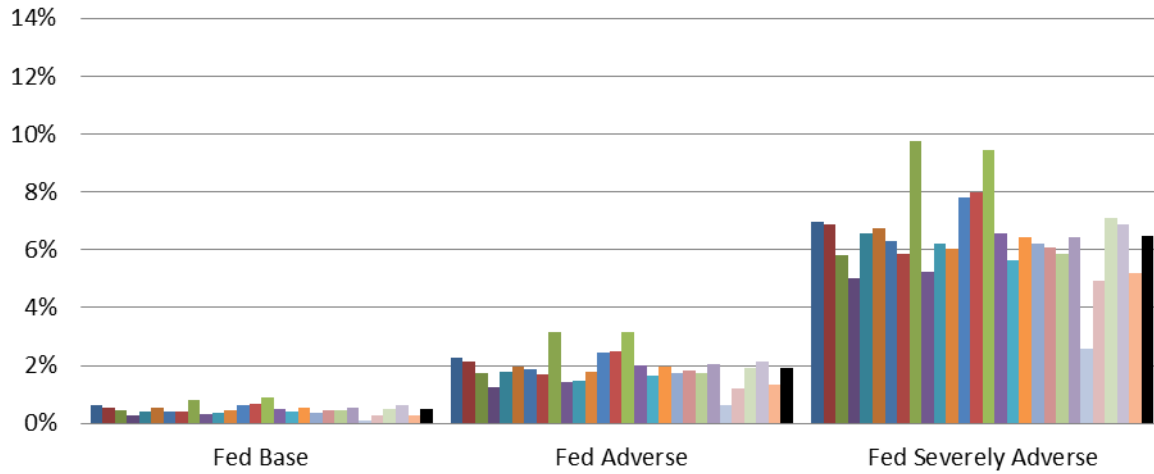
Bank Total EL% by Scenario at Q13 for CRE

Bank 1, Bank 2, Bank 3, Bank 4, Bank 5, Bank 6, Bank 7, Bank 8, Bank 9, Bank 10, Bank 11, Bank 12, Bank 13, Bank 14, Bank 15, Bank 16, Bank 17, Bank 18, Bank 19, Bank 20, Bank 21, Bank 22, Bank 23, Bank 24, Bank 25, Bank 26, Bank 27, 27 Bank Average
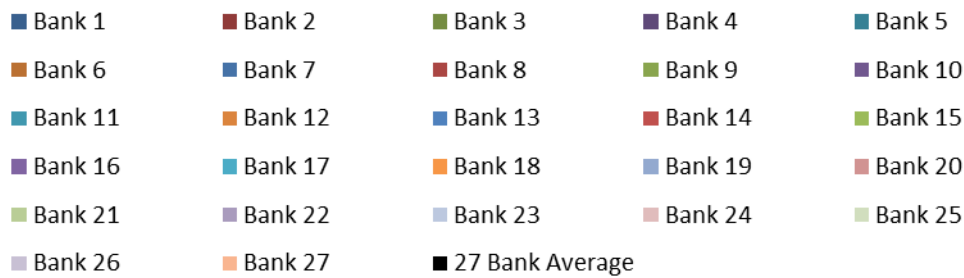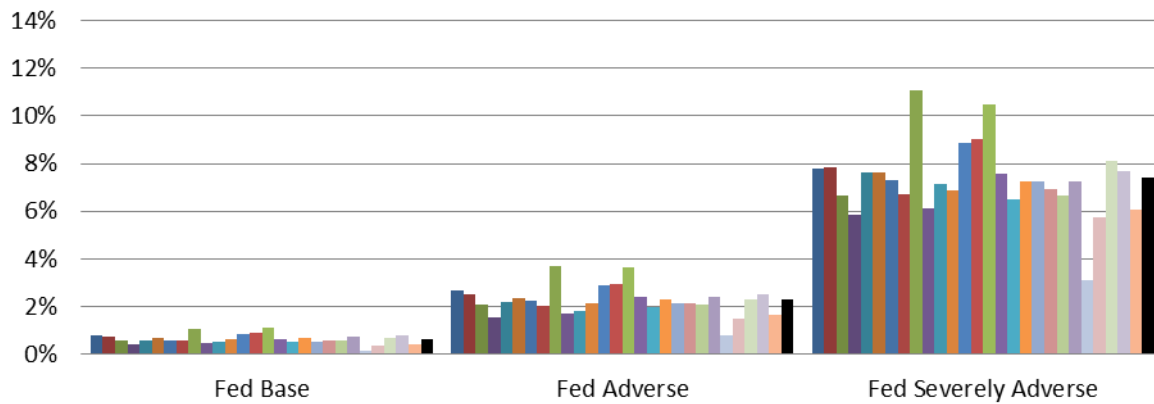
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