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# Coronavirus (COVID-19): Credit Risk Impact on Commercial Real Estate Loan Portfolios (September 2020 Update)

## Abstract

The coronavirus (COVID-19) continues to inflict serious damage to both the US and global economies. Commercial real estate (CRE) is one of the industries taking the hardest hits, thanks to various public health measures to counter the virus. Lockdowns, social distancing, remote working, and other tactics all work against the current demand for and usefulness of many commercial properties.

Despite unprecedented monetary and fiscal relief programs to stimulate the economy, we have already observed and expect to continue to observe elevated default and loss rates for CRE loans over the next several years. We recently revised our credit loss estimates based on the latest data, and our baseline is now predicting a 3.5% cumulative two-year loss rate for the CRE loan portfolios held on the balance sheets of financial institutions. This is close to five times our estimate from just prior to the pandemic.

Given the extraordinary amount of uncertainty regarding the epidemiological path and the real economy, we also conducted sensitivity analysis under the Federal Reserve's two alternative downside scenarios: U-shaped and W-shaped recoveries. Our analysis shows 7.7% two-year expected loss under the Fed's U-shaped recovery scenario and 8.0% two-year expected loss under the Fed's W-shaped recovery scenario. Expected loss rates under both alternative scenarios will significantly surpass those of the financial crisis.

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## Introduction

This study serves as a sequel to our previous paper published in March: “Coronavirus (COVID-19): Credit Risk Impact on Commercial Real Estate Loan Portfolios.” Five months later, the US continues to have some forms of lockdown in many parts of the country due to the unabating pandemic. By now, most major states and metropolitan areas have experienced a significant number of cases, despite varying degrees of “phases” they are each in. The main street economy has suffered severely as the pandemic is taking much longer to unfold than many people initially expected. Without effective medical solutions to control the virus in the near term, the “new normal” and the resulting economic pain is almost certain to last months more, if not years.

Besides some obvious casualties such as airlines, restaurants, leisure and entertainment businesses, the commercial real estate (CRE) industry is clearly one of the most severely impacted. Not only do prolonged public health measures and guidelines continue to discourage businesses to fully reopen in the physical and social sense, the still-elevated cases and mortalities are also making American consumers more wary of going to crowded places. This new normal of social distancing goes against the very purpose of many types of commercial real estate, which is primarily built for main street business and social gathering, not distancing. In particular, without sufficient travel and social activities, hotel and retail properties are feeling the most pain despite occasional bright spots in certain subsectors of these property types.

The outsized damage that the pandemic has caused CRE is already showing up in the latest statistics. In the most transparent public debt market, commercial mortgage backed securities (CMBS) reported 7.95% delinquency rate as of July 2020.<sup>1</sup> For the balance sheet lenders, financial institutions have released their last quarter’s financials, including many details regarding CRE loan performance during the second quarter of 2020, which was entirely clouded by COVID-19 lockdowns. All federally regulated banks have also filed Call Reports as of 6/30/2020, making it worthwhile to examine the latest data and update our credit risk assessment for the CRE loan portfolios held by financial institutions on their balance sheets.

**Figure 1** Non-construction commercial real estate loans (\$ in millions) in nonaccrual status for all FDIC-insured banks

	2019Q4	2020Q2	% INCREASE
Loans secured by multifamily properties	\$ 466	\$ 778	67.1%
Loans secured by nonfarm nonresidential properties	\$ 7,070	\$11,248	59.1%
Owner-occupied nonfarm nonresidential	\$ 4,302	\$ 5,197	20.8%
Other nonfarm nonresidential	\$ 2,768	\$ 6,051	118.6%
Total	\$14,605	\$23,273	59.3%
Total as a percentage of outstanding balance	0.74%	1.15%	

Source: FDIC

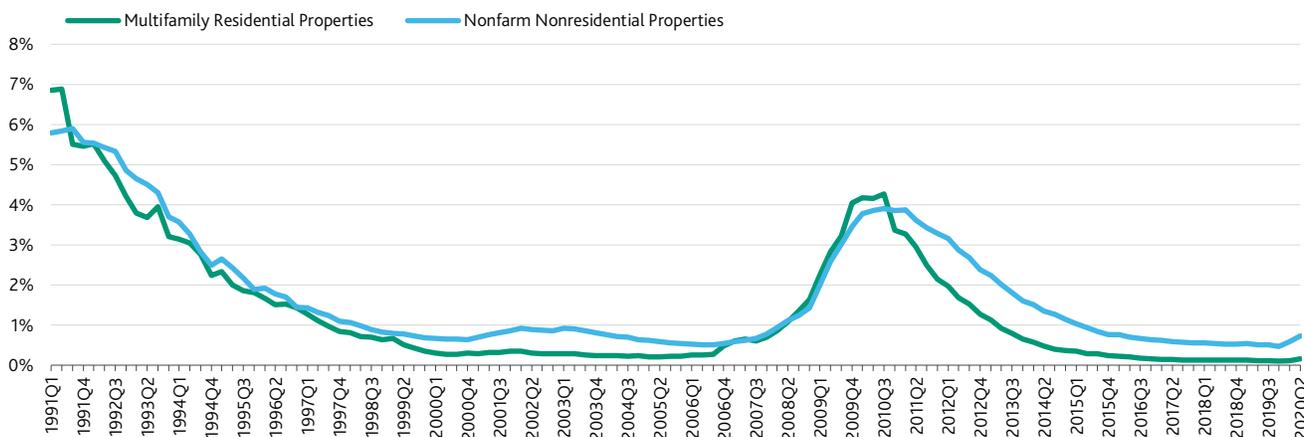
Note that the “Other nonfarm nonresidential” category includes CRE loans secured by hotel and retail properties, hence the highest percentage increase for loans put into the nonaccrual status. Compared to the delinquency statistics of CMBS loans, commercial banks’ noncurrent/nonaccrual loans are still a very small percentage, likely reflecting the mortgage payment deferment and modification practice prevailing in the current environment for balance sheet lenders. While it’s unclear how bad banks’ CRE loan portfolios would look without forbearance or modification, it’s worthwhile to note that for comparable life insurance companies’ CRE loan portfolios, while the reported delinquency rate was merely 0.2% as of 6/30/2020, the insurance industry also reported that COVID-19-related modifications accounted for over 3% of insurance companies’ total portfolios.<sup>2</sup> In the same report (by the American Council of Life Insurers), they noted that the retail property type accounted for over 50% of all COVID-19 modifications, and the hotel property type had the highest rate of modifications among all property types at about 26%. We suspect that commercial banks engaged in similar modification practice, especially for loans collateralized by retail and hotel properties, which are universally affected regardless of lender type.

<sup>1</sup> See Moody’s Investors Service report (August 14, 2020), “Moody’s DQT - Second-largest one month increase in CMBS delinquency history as coronavirus impact persists.” Moody’s conduit DQT defines delinquent loans as loans that are 60 or more days in payment arrears; performing matured; nonperforming matured; foreclosure in progress; or real-estate owned. The rate does not include loans in arrears within a grace period or less than 60 days delinquent.

<sup>2</sup> American Council of Life Insurers (ACLI), Investment Bulletin No. IB20-007, “Mortgage Loan Portfolio Profile – Monthly Flash” (July 6, 2020).

Now, let's also examine the latest loan performance statistics in the context of historical cycles.

**Figure 2** Nonaccrual rates over the last three cycles



Source: FDIC; Moody's Analytics

While Q2 nonaccrual rates were still substantially lower compared to the peaks observed over the financial crisis, we should also note that commercial real estate cycles tend to be long and lagged. Also, due to prevailing practice in granting mortgage forbearance and modification, nonperforming loan ratios are likely artificially "suppressed" at the moment. If history is any guide, the CRE credit cycle should not reach its worst until two or three years from now, so it's most likely that nonaccrual rates will continue to climb in the foreseeable future for CRE loan portfolios. The main uncertainty here is really about the severity of this credit cycle two to three years down the road—will be it like the financial crisis or like the "dot-com" bust?

Another noteworthy lesson from examining the historical credit cycles is that while multifamily loans are widely perceived to be less risky than other types of CRE loans, history has not convincingly proven that's the case. Out of the last three recessions, only the mild CRE market downturn during the "dot-com" bust saw multifamily loans outperforming other CRE loans in terms of credit risks. For the other two big CRE market downturns, multifamily loans' nonaccrual rates were either on par, or even slightly higher, than other CRE loans at the peak of credit events.

To help financial institutions make more informed and better decisions, in this update we aim to share our latest thinking on CRE loan loss estimates—while acknowledging the extremely uncertain future of the macroeconomy and the CRE financing market. This paper is organized as follows:

We start by describing the Moody's Analytics baseline macroeconomic forecast, augmented by a couple of additional downside scenarios, namely the Fed's U-shaped and W-shaped recoveries. We then briefly explain our methodology to translate macroeconomic scenarios into CRE market factors such as rent, vacancy, and cap rates. As the main purpose here is to estimate credit losses for CRE loan portfolios, we present key statistics on our CRE loan dataset, followed by detailed analysis to illustrate various dimensions of credit risk measures under the baseline and alternative macroeconomic scenarios. Finally, we discuss how loan allowance could be affected under these scenarios, a key consideration for many financial institutions given the allowance's impact on bank earnings.

## 1. Overview of COVID-19 Scenarios

The COVID-19 pandemic continues to ravage the global economy. The confirmed cases and deaths in the US continue to climb at an alarming rate with total fatalities now topping 180,000. The deadly virus has also dealt a devastating blow to the American economy with over 58 million American workers having filed for unemployment benefits since March<sup>3</sup> and with continued claims still hovering around 15 million despite recent rehiring of many furloughed workers. Meanwhile, GDP plunged at a 32.9%

<sup>3</sup> U.S. Employment and Training Administration.

annualized rate in the second quarter.<sup>4</sup> As the virus is continuing to sweep through California, Texas, Florida, and other populous states, and with a vaccine still months away at best, a full reopening of the economy and a rapid recovery for main street businesses is anything but certain.

As noted in another Moody's Analytics report, "Qualitative Overlay Factors for CRE Credit Risk Models in the Context of COVID-19" (May 12, 2020), this recession is very different from those in the past due to both the extraordinary uncertainty around the epidemiological assumptions as well as the massive scale of policy responses. These contribute to a very high degree of uncertainty in our baseline forecast. To examine alternative, especially downside, scenarios, we follow the Federal Reserve's approach to undertake a sensitivity analysis to explore the vulnerabilities of financial institutions to the downside risks to the economy posed by COVID-19. We consider two alternative downside scenarios from the Fed, U- and W-shaped recovery paths, to complement our baseline forecast in a relevant and meaningful way.

1. Moody's current *Baseline* forecast (July vintage) is judged to be the most likely scenario, supported by a comprehensive analysis of historical data, current conditions, and policy responses. Under our baseline forecast, travel, tourism, and trade will remain impaired and the global economy will continue to suffer. Businesses are not expected to be seriously disrupted again by a second wave of the virus, and it is projected that a vaccine will be widely distributed and adopted by Summer 2021. The baseline forecast assumes economic recovery resembling somewhat of a V-shape—the economy strongly rebounds in the third quarter as the result of reopening, with real GDP rising at an 17.2% annualized rate. However, the economy still has a long way to go to make up the second-quarter GDP decline. After a strong third quarter, fourth-quarter GDP is forecast to rise 1.8% at an annualized rate as the economy gradually returns to a steady growth.
2. The Fed's *U-shaped recovery* scenario assumes a much slower economic recovery with only a small share of lost output and employment regained in 2020. Under this scenario, there is no strong rebound in the economy with real GDP further declining at 8.1% annualized rate in the third quarter after the disastrous second quarter. GDP is forecast to start growing at a slow rate of 1.6% in the fourth quarter, and the deeper downturn means it will take longer for GDP to return to the pre-crisis level.
3. The Fed's *W-shaped double dip recession* scenario features a short economic recovery followed by a severe downturn later this year due to a second wave of coronavirus. Under this scenario, GDP growth surges in the second half of 2020, almost returning GDP to the pre-crisis level. However, with a projected second wave of coronavirus, GDP growth dips negative again in the first quarter of 2021. While the second recession is not as deep as the first, it is forecast to last longer as GDP growth remains negative through 2021.

Figure 3 Annualized real GDP growth rate by scenario



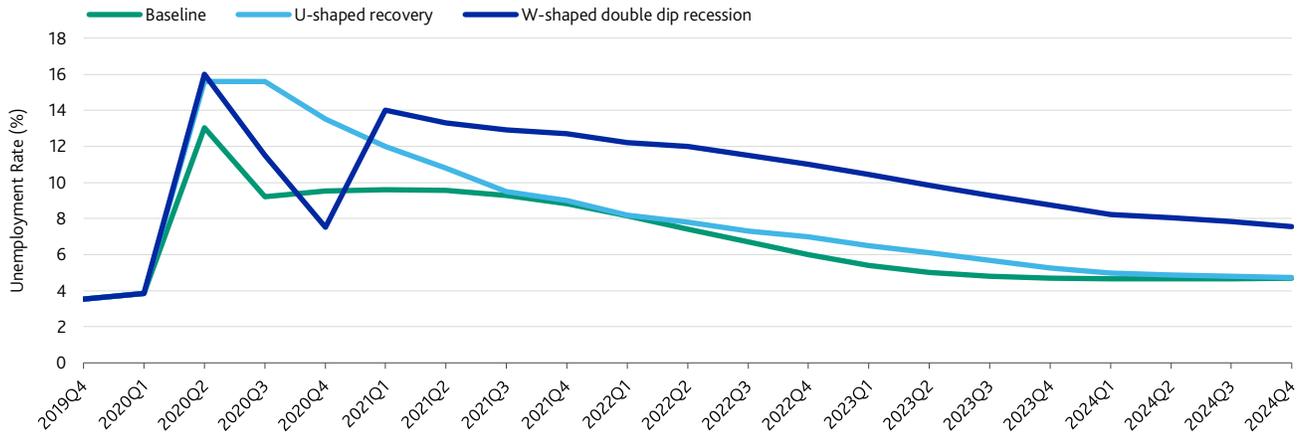
Source: Moody's Analytics

More long-term impact will be felt in the labor market given the sharp increase in unemployment rate in the second quarter. While the baseline forecast assumes a considerable decrease in unemployment rate in the third quarter, it will remain relatively

<sup>4</sup> [https://www.bea.gov/news/2020/gross-domestic-product-2nd-quarter-2020-advance-estimate-and-annual-update#:~:text=Real%20gross%20domestic%20product%20\(GDP,the%20Bureau%20of%20Economic%20Analysis](https://www.bea.gov/news/2020/gross-domestic-product-2nd-quarter-2020-advance-estimate-and-annual-update#:~:text=Real%20gross%20domestic%20product%20(GDP,the%20Bureau%20of%20Economic%20Analysis).

high and stay above 6% until late 2022. By contrast, the *U-shaped recovery* scenario assumes unemployment rate will remain close to the peak for a few quarters before slowly returning to a steady state over the next four to five years. On the other hand, the *W-shaped double dip recession* scenario projects a second peak in unemployment rate in the first quarter of 2021 and an even slower recovery of the labor market after a brief rebound in late 2020.

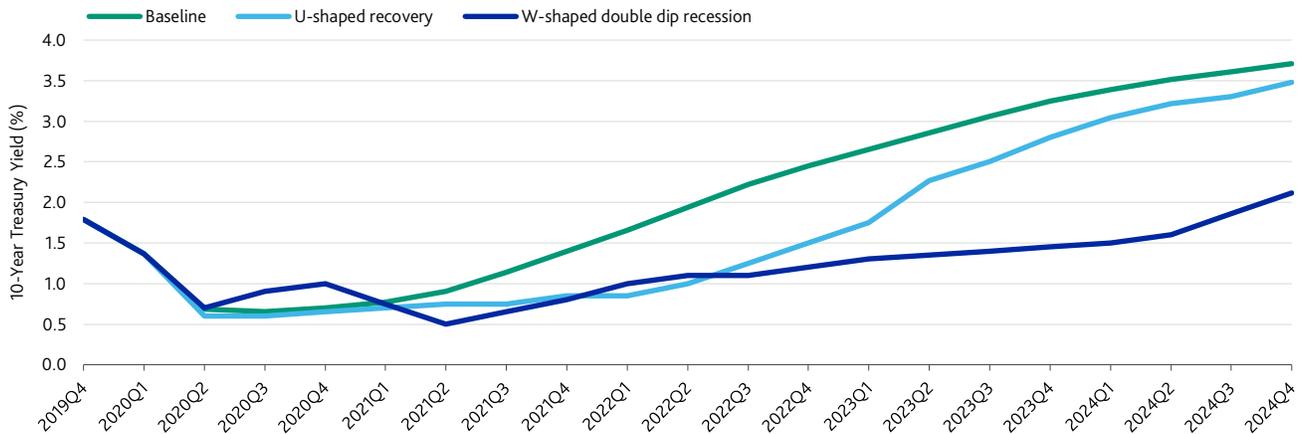
**Figure 4** Unemployment rate by scenario



Source: Moody's Analytics

Under all three scenarios, the 10-year Treasury yield will stay low for several quarters as the Federal Reserve is surely prepared to stimulate the economy with all available policy tools, including interest rates. Under the baseline forecast, it does not rise above 1% until the second half of 2021. Under the *U-shaped recovery* scenario, this will occur even later, in the second half of 2022, given the longer duration of the recession. Under the *W-shaped double dip recession* scenario, the 10-year Treasury yield will dip for a second time down to 50 bps—even lower than its current level—as a result of a second recession.

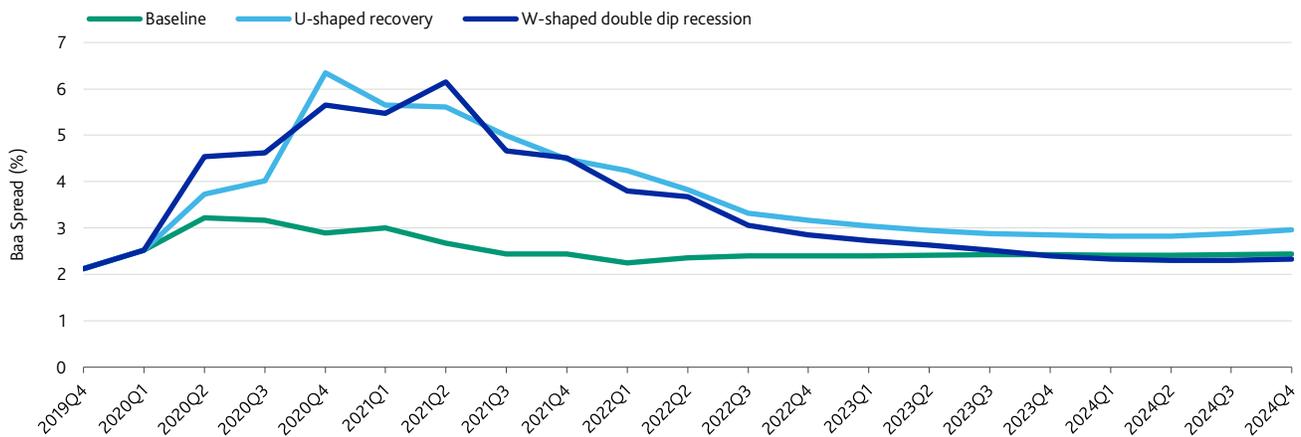
**Figure 5** 10-year Treasury yield by scenario



Source: Moody's Analytics

Meanwhile, credit spreads are expected to widen as investors flee to the safety of risk-free assets. Under the baseline forecast, the spread between Baa corporate yield and 10-year Treasury yield will top 3% for the next three to four quarters. Under the *U-shaped recovery* and *W-shaped double dip recession* scenarios, the spread will peak even higher, above 6%, consistent with the longer duration of the recession.

Figure 6 Baa spread by scenario



Source: Moody's Analytics

## 2. Translating Macroeconomic Scenarios into Specific CRE Scenarios

As an integral part of the economy that offers places for people to gather, the CRE sector has taken a heavy hit from the pandemic, although the impact is not evenly felt across different property types and subtypes. Hotels are undoubtedly the biggest casualty of the pandemic as evidenced by the abysmal second-quarter revenues reported by major hotel chains. Although domestic travel has resumed to a limited degree since the reopening, the most lucrative business travel, large events, and international tourism has not returned in the US.<sup>5</sup> Retail is another big victim of the pandemic, which has immensely accelerated the proliferation of e-commerce. The hardest-hit subsector in retail is enclosed shopping malls, due to both mandated government restriction and consumers' hesitation to shopping in crowded indoor space. Even restaurants and bars, which have traditionally served as social venues and which were largely considered immune from the e-commerce threat pre-pandemic, have significantly less demand for space as they remain largely confined to takeout and outdoor dining. Sadly, many have closed permanently, casting a longer-term shadow for retail real estate even when people start to go out again.

Office and multifamily apartments are two other property types whose trajectories can be altered by the pandemic as well. The success of remote working across many industries and the consequent relocation of many workers away from central cities has raised critical questions regarding the future demand, locational preference, and design elements of office space and apartments once we get to the other side of the crisis. There will be losers and winners across subsectors within these two property types. On the bright side, the industrial property type, and particularly the logistics and warehouse subsectors, is likely to emerge as a winner, benefiting from the surging popularity of e-commerce. While the trend was there pre-COVID, the industrial segment's stellar performance is now further cemented.

As in our macroeconomic forecast, Moody's Analytics also formulates its latest baseline forecast by taking into consideration myriad sources of information including historical data, current market condition, local demand/supply, and unique characteristics of this cycle such as the unprecedented monetary and fiscal responses. Our CRE market forecast, produced by Moody's Analytics REIS, is granular at the property type, market, and submarket levels, providing critical information for decision-makers who often operate at the local level (after all, real estate is still about "location, location, location"—the pandemic has not changed that!). Built upon the baseline forecast, we further translate alternative macroeconomic scenarios into market factors specific to the CRE industry<sup>6</sup> using well-tested analytical models. Together, the baseline forecast and alternative scenarios all include localized CRE

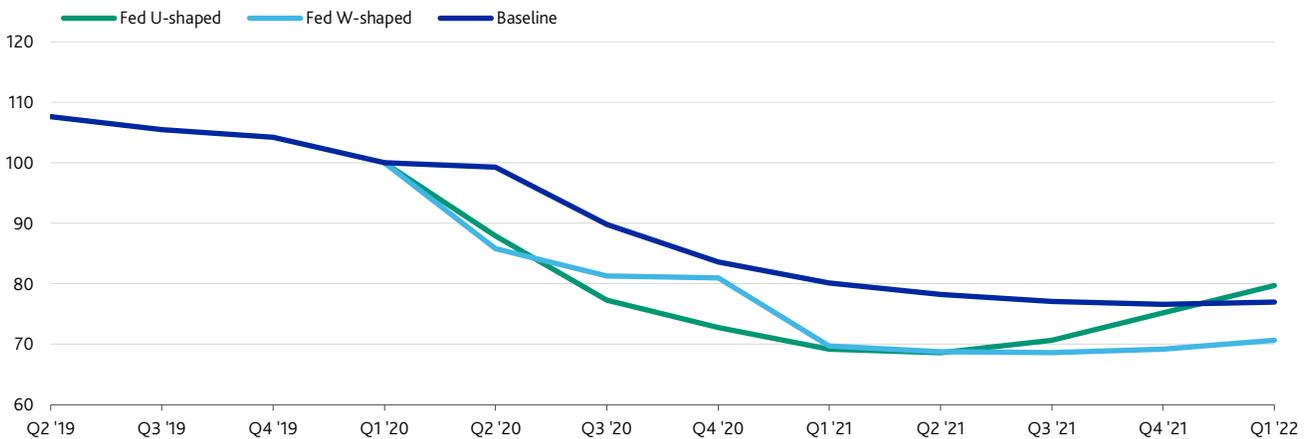
<sup>5</sup> Major US hotel chains, such as Marriott, Hilton, and Hyatt all reported in their recent earnings release a relatively faster recovery for limited service hotels than full service hotels. The former category typically caters to leisure travelers at less central locations, while the latter caters more to business travelers and events and are more likely to be in urban centers. There is currently a stark difference in occupancy rates between the different types of hotels depending on the types of guests they were designed for.

<sup>6</sup> See Chen and Cai (2011), "Stress Testing Commercial Real Estate Loan Credit Risk: A Scenario Based Approach" and Chen, Cai and Watugala (2013), "Stress Testing Commercial Real Estate Loan Credit Risk: Translating Macroeconomic Scenarios Into CRE Market Factors – Detailed Methodology."

market factors, namely vacancy, rent, cap rate, net operating income (NOI), and property value, all of which serve as critical input to our CRE credit risk models.

Under the baseline forecast, we expect commercial property values to continue declining through next year, mostly driven by relatively high unemployment rates, which lead to reduced demand for real estate space for most property types. Commercial property values are projected to drop by 23.1%, 21.3%, and 29.3% during the next two years under the baseline, Fed U-shaped and Fed W-shaped alternative downside scenarios, respectively. As comparison, the Fed's CCAR Severely Adverse scenario, designed before COVID-19, features a similar level of severity to the Fed's alternative downside scenarios but with a different path forecasted, namely a gradual decline in the CRE value index.

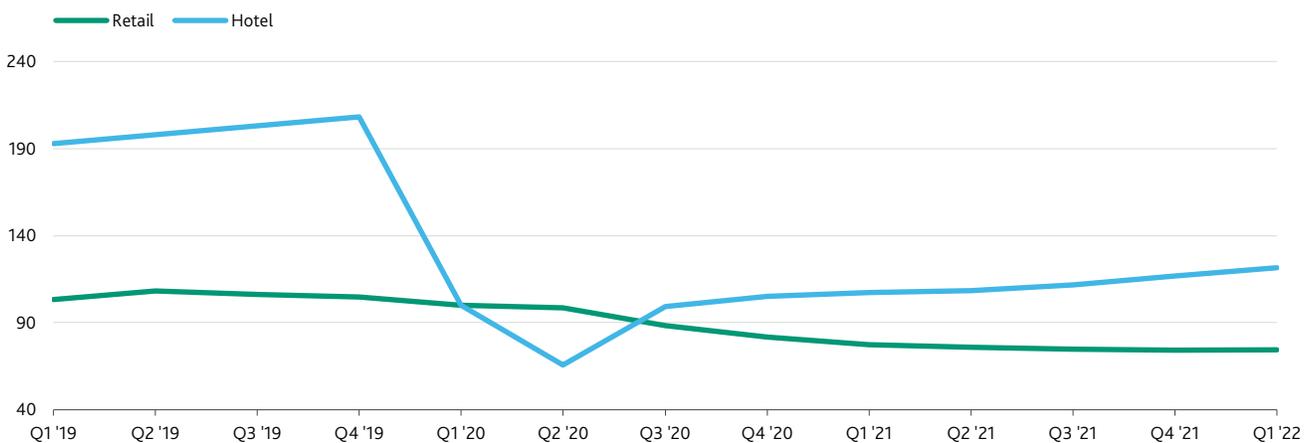
**Figure 7** CRE value index by macroeconomic scenario



Source: Moody's Analytics

As mentioned previously, the hotel industry has been feeling the outsized effect of travel pullbacks, and hotel property value is estimated to decline by 68% and is not projected to recover to the pre-pandemic level over the next several years. The retail industry is also struggling with store closings and shortened hours. According to our model, retail property values will fall by 29% due to the big drop in retail sales (Figure 8).

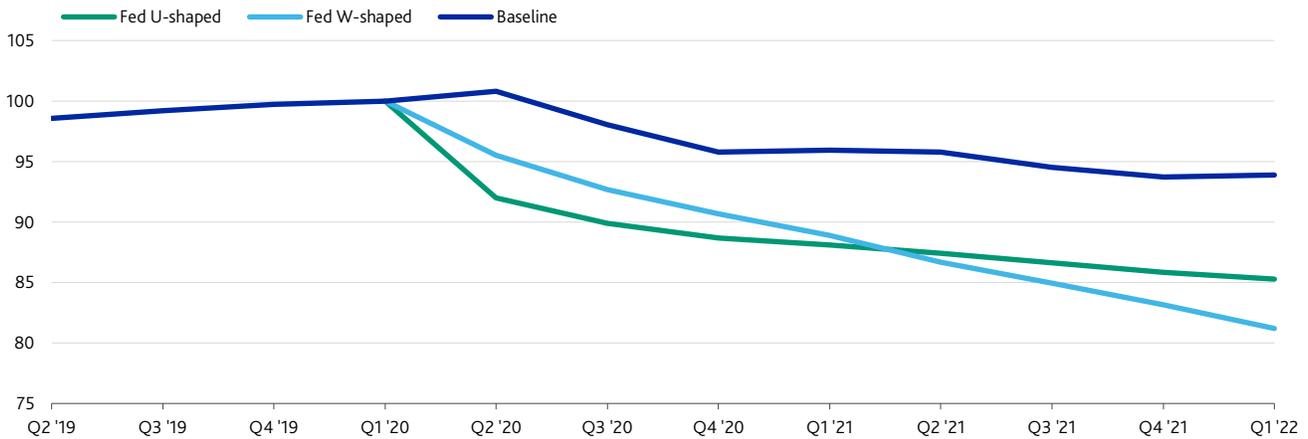
**Figure 8** Value indices of hotel and retail properties under baseline



Source: Moody's Analytics

Similarly, while property NOIs are still expected to decline by 2.5% annually under our baseline forecast, they are projected to decline by 6.1% and 9.7% annually under the Fed U-shaped and Fed W-shaped alternative downside scenarios, respectively.

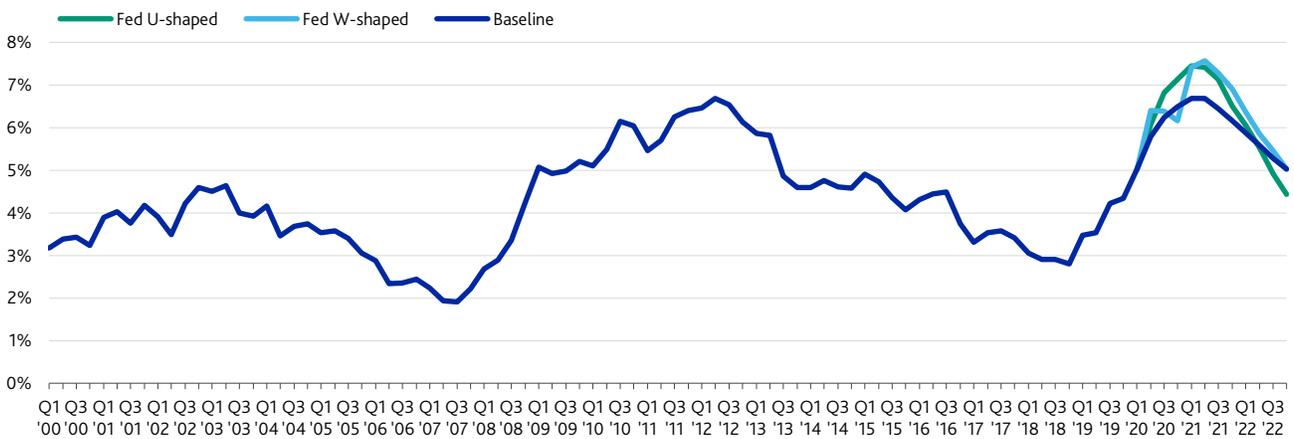
Figure 9 NOI index by macroeconomic scenario



Source: Moody's Analytics.

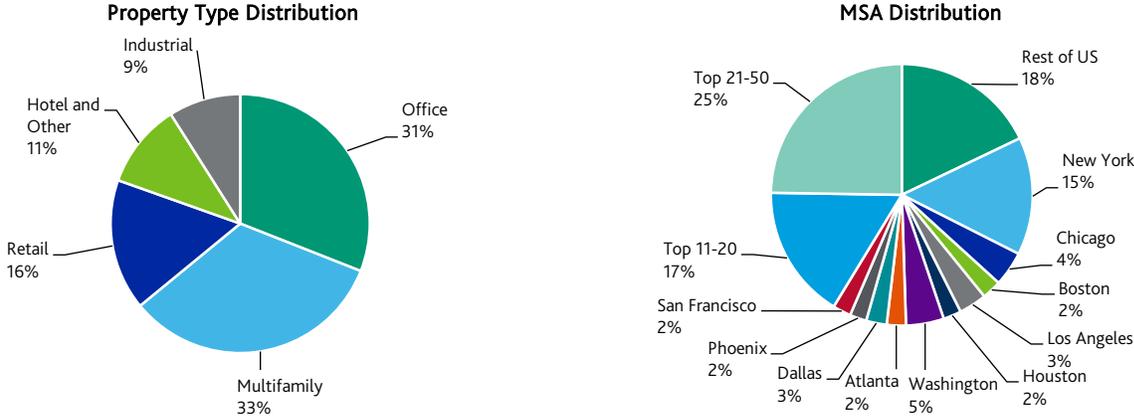
Although cap rate spread was expected to keep declining before COVID-19, the spread has now widened and is forecast to reach a peak of 6.7% under the baseline scenario, and around 7.5% under both the Fed U-shaped and Fed W-shaped alternative downside scenarios, due to elevated risks from a much-weakened global economy. The magnitude of cap rate spread widening is comparable to, or slightly higher than, the previous two recessions, partially thanks to the ultra-low Treasury rates in these scenarios (Figure 10).

Figure 10 Cap rate spreads by macroeconomic scenarios



(LTV) and debt service coverage ratio (DSCR), with a median LTV of 49.8% and a median DSCR of 1.7. Within the portfolio, 60% of the loans originated during the last three years, and 43% of the loans mature within three years.

Figure 11 Property type and MSA distributions



Source: Moody's Analytics Data Alliance CRE portfolios

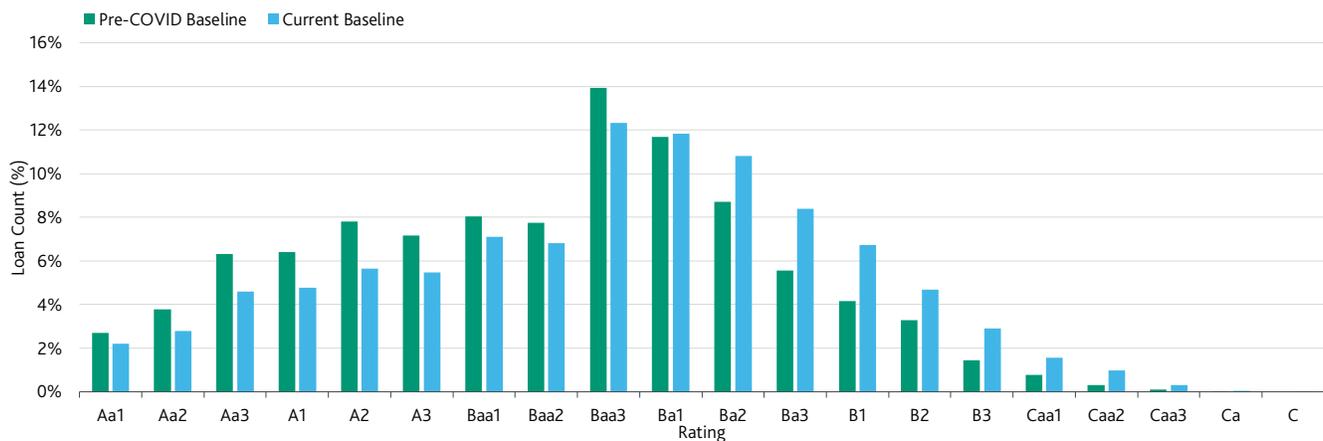
Noticing drastic market movement over the last quarter in certain property types, our model and analysis also adjusts NOI and property value, together with portfolio level delinquency rates, to reflect the current market condition.

### 3.2 Implied Credit Rating Migration<sup>7</sup>

This section describes our findings on implied rating migration for CRE loans as a result of COVID-19. To estimate the credit risk ratings for CRE loans, we use the Market Cycle Neutral (MCN) specification in CMM™. The MCN model tends to produce risk measures that closely reflect the Through-the-Cycle (TTC) concept, which measures credit risk largely free of the credit cycle's effect by not using market-wide information. Therefore, the MCN model, by design, naturally fits into the credit risk rating purpose. Although market factors such as vacancy rates are not directly incorporated in the model specification, the collateral performance, in terms of NOI and value, deteriorates due to the evolution of the pandemic. DSCR and LTV are adjusted accordingly based on the latest estimated NOI and value, which then result in updated credit risk measures. The performance deterioration of certain property types and locations can be material to the triggering of rating changes.

The implied rating migration from the pre-COVID-19 baseline to present is prominent as shown in Figure 12. Although we continue to observe the largest percentage of loans in Baa3 and Ba1 categories under both baselines, a significant number of loans are now downgraded below Ba2. Before COVID-19, 56.6% of loans were investment grade with ratings at Baa3 or higher, while only 46.2% of loans are investment grade under the current baseline. While the loan-level rating migration depends on loan and property characteristics, the average rating downgrade is approximately one notch.

Figure 12 Rating distribution under pre-COVID-19 baseline and current baseline



Source: Moody's Analytics

The impact of COVID-19 is not evenly spread across markets, with some more affected than others due to local economic differences. Figure 13 shows the top 10 markets with the largest rating downgrades from pre-COVID-19 baseline and current baseline. Hotel and retail markets are hit the hardest by the pandemic with evaporation of hotel occupancy and crushed retail sales. For tourist destination cities such as San Diego and Orlando, their hotel and retail loans will experience three notches downgrade on average. The surge in unemployment rates also poses pressure on office properties. The deterioration of property performance leads to an average downgrade of two and a half notches for office loans in Riverside, Orange County, and Portland.<sup>8</sup>

<sup>7</sup> We should emphasize that this section has no bearing with Moody's Investors Service ratings. Rather, our analysis proxies how financial institutions, such as a commercial bank, would change their internal CRE loan ratings given the CRE market's movement and loan quality deterioration.

<sup>8</sup> We should also note that our study is based on the loans in our dataset, and there exist substantial loan-level differences across markets. A significantly deteriorated market may not see its loans downgraded more than a less impacted market if the former consists of more higher quality properties and loans to begin with.

Figure 13 Top 10 markets with largest average rating downgrades from pre-COVID-19 baseline to current baseline

MARKET	AVERAGE RATING DOWNGRADE (NOTCHES)
San Diego-Hotel	3
Orlando-Retail	3
Chicago-Hotel	3
Detroit-Hotel	3
Riverside-Office	2.5
Tampa-Retail	2.5
Orange County-Office	2.5
Jacksonville-Retail	2.5
Portland-Office	2.5
Charlotte-Retail	2.5

Source: Moody's Analytics

### 3.3 Total Expected Losses

We analyze and compare the total expected losses (EL) in this section under three scenarios:<sup>9</sup>

- » The baseline forecast that was published in July 2020.
- » The Fed U-shaped alternative downside scenario designed in April 2020, characterized by a persistent, "U-shaped" recession.
- » The Fed W-shaped recovery scenario in which a second COVID-19 event begins in late 2020 and leads to a second increase in unemployment and drop in GDP.

In order to fully reflect the magnitude of future default and loss rates, we use the MCA (Market Cycle Adjusted) configuration of our CMM model, which includes all explanatory variables both at the loan level and the market level. By taking into account the timely marketwide cyclical indicators, this configuration is more appropriate for loss forecasting and scenario analysis.

We analyze the total expected loss (EL) results by different dimensions including property status, property type, and coupon rate type. Figure 14 shows the term structure of total EL over the next three years as well. Noteworthy here is the heavily front-loaded EL estimate, reflecting a rapid and severe recession.

Figure 14 Total cumulative expected loss by property status

LOAN TYPES	PORTFOLIO COMPOSITION %	BASELINE			FED U-SHAPED			FED W-SHAPED		
		(TOTAL EXPECTED LOSS)			(TOTAL EXPECTED LOSS)			(TOTAL EXPECTED LOSS)		
		1 YEAR (21Q2)	2 YEAR (22Q2)	3 YEAR (23Q2)	1 YEAR (21Q1)	2 YEAR (22Q1)	3 YEAR (23Q1)	1 YEAR (21Q1)	2 YEAR (22Q1)	3 YEAR (23Q1)
Permanent	84.4%	2.1%	2.8%	3.2%	5.7%	7.0%	7.4%	4.0%	7.3%	8.3%
Construction	15.6%	5.8%	7.5%	8.2%	8.6%	11.4%	12.0%	6.6%	12.2%	13.7%
<b>CRE Total</b>	<b>100.0%</b>	<b>2.7%</b>	<b>3.5%</b>	<b>3.9%</b>	<b>6.1%</b>	<b>7.7%</b>	<b>8.1%</b>	<b>4.4%</b>	<b>8.0%</b>	<b>9.2%</b>

Source: Moody's Analytics.

The total one-year ELs for the overall CRE portfolio under the Fed U-shaped and the Fed W-shaped scenarios are 6.1% and 4.4%, compared to 2.7% under the baseline forecast. With a persistent recession assumed in the Fed U-shaped scenario, the cumulative two-year loss rate climbs to 7.7%, compared to 3.5% under the Moody's Analytics baseline forecast, which assumes a more rapid recovery. Loss rates are expected to be even higher in the Fed W-shaped scenario, where the real GDP growth dips negative for a

<sup>9</sup> Source: Moody's Analytics

second time with a resurgence of cases of the virus in the winter; two-year EL reaches 8.0%, more than two times the loss estimates as under the baseline (Figure 14). As a comparison, the two-year loss rate under the CCAR Severely Adverse scenario is 4.7% for the same portfolio, and 3.2% under the Fed V-shaped scenario—close to the Moody’s Analytics baseline estimate.

Figure 15 Total cumulative expected loss rates by property types

CRE TYPE	BASELINE			FED U-SHAPED			FED W-SHAPED		
	(TOTAL EXPECTED LOSS)			(TOTAL EXPECTED LOSS)			(TOTAL EXPECTED LOSS)		
	1 YEAR	2 YEAR	3 YEAR	1 YEAR	2 YEAR	3 YEAR	1 YEAR	2 YEAR	3 YEAR
	(21Q2)	(22Q2)	(23Q2)	(21Q1)	(22Q1)	(23Q1)	(21Q1)	(22Q1)	(23Q1)
Multifamily	1.8%	2.6%	3.0%	5.0%	6.4%	6.7%	3.7%	7.0%	8.1%
Office	1.9%	2.6%	3.2%	3.9%	5.1%	5.5%	2.9%	5.3%	6.4%
Retail	2.4%	3.2%	3.6%	5.2%	7.0%	7.5%	3.9%	6.8%	7.9%
Industrial	0.8%	1.5%	1.6%	2.5%	3.5%	3.6%	1.8%	4.0%	4.4%
Hotel and Other	9.7%	10.8%	11.3%	20.0%	23.0%	23.9%	13.5%	24.0%	26.1%
<b>CRE Total</b>	<b>2.7%</b>	<b>3.5%</b>	<b>3.9%</b>	<b>6.1%</b>	<b>7.7%</b>	<b>8.1%</b>	<b>4.4%</b>	<b>8.0%</b>	<b>9.2%</b>

Source: Moody’s Analytics.

Looking at the property type dimension, we expect hotel loans to be hit the hardest while industrial appears to be the most resilient sector. Since our loss estimates are also conditional upon the loan-level characteristics that may make certain property types look better or worse because of mitigating loan-level attributes, it is also important to examine each property type’s sensitivities across scenarios.

Under the Fed alternative downside scenarios, all sectors are significantly affected, and the impact lingers for the next three years. Industrial remains the more resilient sector in both the U-shaped and the W-shaped scenarios (Figure 15).

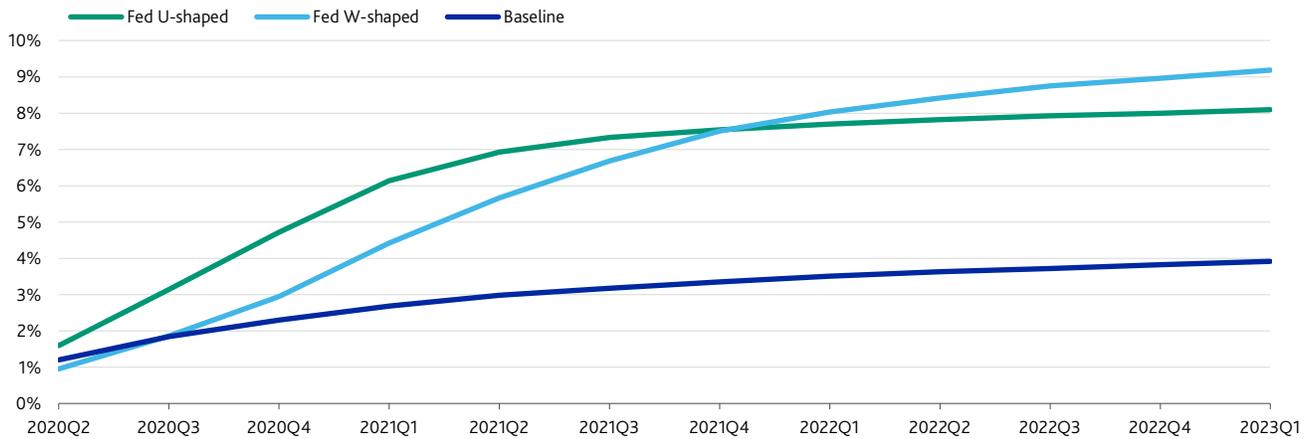
Figure 16 Total expected loss by rate type

RATE TYPE	PORTFOLIO COMPOSITION %	BASELINE			FED U-SHAPED			FED W-SHAPED		
		(TOTAL EXPECTED LOSS)			(TOTAL EXPECTED LOSS)			(TOTAL EXPECTED LOSS)		
		1 YEAR	2 YEAR	3 YEAR	1 YEAR	2 YEAR	3 YEAR	1 YEAR	2 YEAR	3 YEAR
		(21Q2)	(22Q2)	(23Q2)	(21Q1)	(22Q1)	(23Q1)	(21Q1)	(22Q1)	(23Q1)
Fixed	48.4%	1.9%	2.7%	3.1%	4.9%	6.4%	6.7%	3.5%	6.8%	8.0%
Floating	51.6%	3.5%	4.4%	4.8%	7.3%	9.0%	9.4%	5.3%	9.2%	10.4%
<b>CRE Total</b>	<b>100.0%</b>	<b>2.7%</b>	<b>3.5%</b>	<b>3.9%</b>	<b>6.1%</b>	<b>7.7%</b>	<b>8.1%</b>	<b>4.4%</b>	<b>8.0%</b>	<b>9.2%</b>

Source: Moody’s Analytics.

Although fixed-rate loans are generally considered lower risk compared to floating-rate loans, they are more sensitive under stressed scenarios. This is likely due to limited mortgage payment reduction benefits from historically low interest rates described in the scenarios.

Figure 17 Term structure of cumulative expected loss rates



Source: Moody's Analytics

Examining the cumulative EL term structure across the three scenarios, we can clearly observe the differences increase quickly between the baseline and the Fed alternative downside scenarios. The velocity of EL increase decelerated after the first few quarters under baseline, while staying around the same speed under the Fed U-shaped scenario and even accelerating under the Fed W-shaped scenario. The cumulative EL under the U-shaped scenario will plateau after about two years, while it continues rising through the third year under the W-shaped scenario.

#### 4. Impact on Allowance Estimate for Credit Losses

This section describes our process of estimating loss allowance on commercial mortgage portfolios under the COVID-19 scenarios. Compared with the near-term focus of the previous section, there are a few important differences in allowance estimation under CECL guidelines:

- » The CECL standard requires institutions to estimate credit losses over the entire lifetime of each instrument.
- » The CECL standard also requires a reasonable and supportable period over which credit losses can be estimated using appropriate economic forecasts, while mean reversion is applied after this period.

The CMM model we used in this report is compliant with the first requirement because it produces lifetime expected losses for each loan in a CRE portfolio. For the second requirement, we adopt a two-year reasonable and supportable period, over which we estimate expected losses under the COVID-19 scenarios and mean-reverting the probability of default (PD)/loss-given default (LGD) outputs linearly over the next one-year horizon until both PD and LGD reach their long-term means starting from Year 4. We determined the long-run PD/LGD values based on historical non-accrual rates and net charge-off rates for all banks recorded in the FDIC database. Given the markedly different credit histories of permanent and construction loans, we calibrated the long-run values for these two sectors separately. The long-run PD and LGD values are listed in Figure 18.

Figure 18 Long-run PD and LGD values

	CONSTRUCTION	PERMANENT
Long-Run PD	3.5%	1.2%
Long-Run LGD	30.5%	23.8%

Source: Moody's Analytics

Using the mean reversion settings above, we estimated CECL loss allowances for the sample CRE portfolio under the three macroeconomic scenarios shown in Figure 19.

Figure 19 CECL loss allowance by property status

LOAN TYPES	OUTSTANDING BALANCE	BASELINE	FED U-SHAPE	FED W-SHAPE
Construction	16.6 %	9.0%	12.9%	15.4%
Permanent	83.4%	3.9%	8.4%	9.7%
<b>CRE Total</b>	<b>100.0%</b>	<b>4.8%</b>	<b>9.1%</b>	<b>10.6%</b>

Source: Moody's Analytics

As we can see, the allowance estimates are in line with the severity of the three scenarios. The allowance for the baseline scenario is 4.8% while the allowance under the Fed-U shaped scenario is 9.1% and under the Fed W-shaped scenario is 10.6%. While the baseline scenario assumes an almost V-shaped recovery, the Fed U-shaped and W-shaped scenarios are more stressed scenarios. Again, note that the Fed U-shaped recovery assumes a slow recovery while the W-shaped alternative scenario assumes a double-dip recession with the second dip caused by a resurgence of COVID-19 cases in winter 2021.

Given the lifetime nature of these estimates, even though the pattern of recovery for the U-shaped and W-shaped is quite different, the difference in total allowance in the two scenarios is not that pronounced: both scenarios return to a steady state within two to three years. Since the allowance estimates are expected losses over the entire lifetime of the loans, it is not surprising that the short-term volatilities in the economic forecast are partially offset by the long-term reverting to means.

Figure 20 shows the estimated loss allowance by property type for our CRE portfolio. Not surprisingly, the hotel sector is the most affected, as its estimated loss allowances soar above 10% under the baseline scenario. The retail sector is expected to have the second highest allowance rate with allowance at 5.8% under the baseline scenario. Furthermore, for each property type loss allowance almost doubles under the Fed U-shaped and W-shaped recovery.

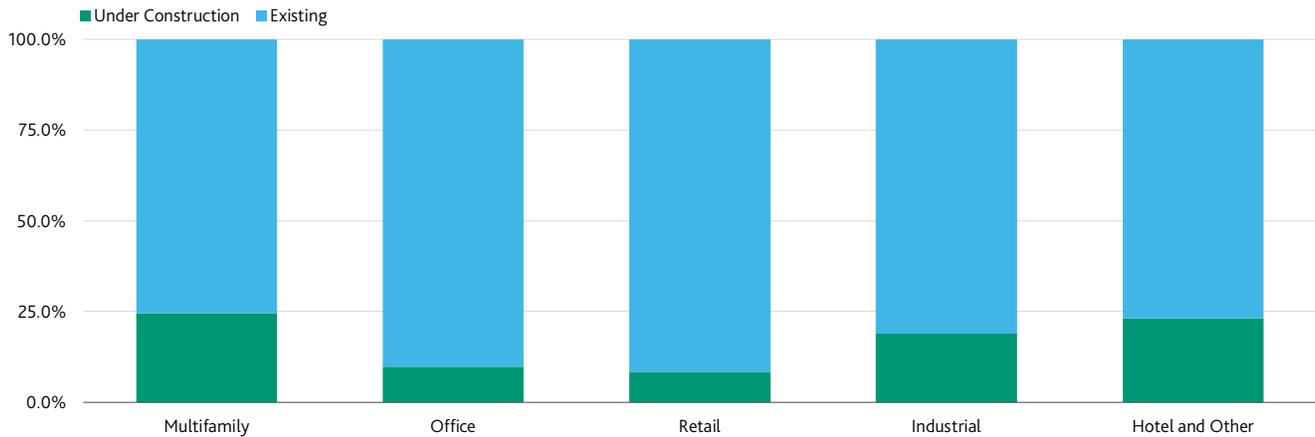
Figure 20 CECL loss allowance by property types and macroeconomic scenarios

PROPERTY TYPES	OUTSTANDING BALANCE	BASELINE	FED U-SHAPE	FED W-SHAPE
Multifamily	32.9%	3.5%	7.4%	8.8%
Office	31.1%	4.0%	6.4%	8.1%
Retail	16.3%	5.8%	10.3%	10.8%
Industrial	9.2%	1.8%	4.0%	5.2%
Hotel and Other	10.6%	12.0%	25.2%	28.0%
<b>CRE Total</b>	<b>100.0%</b>	<b>4.8%</b>	<b>9.1%</b>	<b>10.6%</b>

Source: Moody's Analytics

Once again, it's important to keep in mind that this is an allowance for a real portfolio. Hence, when we summarize the allowance by property type it's also conditional upon other deal characteristics like property status, starting DSCR, and LTV. For example, the average starting DSCR of multifamily portfolio at an aggregate level is lower than that of retail, which makes the allowance for retail only 1.6 times higher than for multifamily property, even though the market forecast for retail property suggests that it should be even more stressed. Also, the mix of under-construction and existing properties in the above sectors is different, as shown in Figure 21. Again, we can see that multifamily has a higher share of under-construction properties as compared to retail.

Figure 21 Property status by property type



Source: Moody's Analytics

One major risk driver for CRE loans is the DSCR. DSCR depends on both the NOI of the collateral and on the borrower's debt obligation. While CRE properties are generally expected to perform poorly in the current market environment, default risk may be mitigated to some extent by sustained low interest rates, particularly if the economy continues to slide into further instability. Figure 22 shows estimated loss allowance by interest rate type. Interestingly, both fixed- and floating-rate loans are equally vulnerable to the pandemic. Although low interest rates may reduce credit risk for floating-rate loans in the short run, this effect dissipates over the long run, as interest rates return to normal levels.

Figure 22 Loss allowance by interest rate type by macroeconomic scenario

RATE TYPES	OUTSTANDING BALANCE	BASELINE	FED U-SHAPE	FED W-SHAPE
Fixed	48.4%	3.6%	7.3%	8.8%
Floating	51.6%	5.9%	10.8%	12.4%
<b>CRE Total</b>	<b>100.0%</b>	<b>4.8%</b>	<b>9.1%</b>	<b>10.6%</b>

Source: Moody's Analytics

## 5. Conclusion

More than half a year later since the initial outbreak of COVID-19 in the US, the virus is still spreading at an alarming pace in many parts of the country. While it has already caused one of the sharpest recessions in US history and its impact on the economy continues to be devastating, there remains a high degree of uncertainty regarding the epidemiological path and consequently the recovery path of the real economy. With uncertainty the only certainty in today's environment, we continue to believe that the best way to grasp the sensitivities and credit impacts of the current situation is to conduct meaningful scenario analyses based on a range of plausible scenarios.

We continue to use available datasets and well-tested analytical tools and models to conduct such scenario analysis. Our bottom-up, loan-level model is again able to incorporate a variety of nuanced factors, including specific loan terms that could be undergoing modification, unique property characteristics, and differential interest rate paths under different scenarios. In addition to the latest Moody's Analytics baseline forecast, we also conducted sensitivity analysis under the Federal Reserve's two alternative downside scenarios: U-shaped and W-shaped recoveries.

Given that a severe recession has already become a reality in just a few short months, we find substantial increase in expected loss estimates for our representative CRE portfolio. Our latest research predicts a baseline credit loss rate of 3.5% over a two-year horizon, which is slightly less than what incurred during the financial crisis. By comparison, we expected two-year loss rate to be 0.73% for the same portfolio prior to the onset of the pandemic. If the epidemiological path deviates from the baseline forecast

and the real economy continues to suffer as a result, our sensitivity analysis shows a 7.7% two-year expected loss under the Fed's U-shaped recovery scenario and 8.0% two-year expected loss under the Fed's W-shaped recovery scenario. Expected loss rates under both U- and W-shaped scenarios will significantly surpass that of the financial crisis.

Despite the recent pickup and stabilization in capital markets, there clearly exists extraordinary uncertainty regarding the real economy, which the CRE industry serves at its core. Furthermore, the waves of coronavirus infections evolve quickly and vary substantially across US regions, making local CRE market forecasts less than certain. We continue to highlight and recommend that model users and decision makers test additional plausible yet divergent scenarios to gain holistic insight into the credit risk sensitivities inherent in their CRE loan portfolios.

## Additional resources from Moody's Analytics and Moody's Investors Service:

- » Moody's research on COVID-19 (both Moody's Analytics and Moody's Investors Service)  
<https://www.moodys.com/Coronavirus>
- » Moody's Analytics: "COVID-19 Alternative Scenarios"  
<https://www.moodysanalytics.com/-/media/article/2020/global-convid19-scenario-narratives.pdf>
- » Moody's Investors Service: "Global insurers to feel coronavirus impact through financial market volatility"  
[https://www.moodys.com/research/Moodys-Global-insurers-to-feel-coronavirus-impact-through-financial-market--PBC\\_1216059](https://www.moodys.com/research/Moodys-Global-insurers-to-feel-coronavirus-impact-through-financial-market--PBC_1216059)
- » Moody's Analytics Economic Scenario Generator for Property and Casualty Businesses  
<https://www.moodysanalytics.com/product-list/property-casualty-economic-scenario-generator>
- » Moody's Analytics: "Structured Finance solutions help improve portfolio insight and risk analysis"  
<https://www.moodysanalytics.com/microsites/structured-finance-solutions>
- » Moody's Analytics: "Coronavirus (COVID-19): Looming Threats to US Multifamily and Commercial Real Estate"  
<https://vimeo.com/397013363>
- » Moody's Analytics: "Coronavirus (COVID-19): Credit Risk Impact on Commercial Real Estate Loan Portfolios" (22 March 2020)
- » Moody's Analytics: "Stress Testing Commercial Real Estate Loan Credit Risk: A Scenario-Based Approach"  
<https://www.moodysanalytics.com/-/media/whitepaper/2011/2011-16-12-st-cre-credit-risk-scenario-approach.pdf>
- » Moody's Analytics: "Estimating Commercial Real Estate (CRE) Stressed Loss Measures Under Federal Reserve 2020 Comprehensive Capital Analysis and Review (CCAR) Scenarios" (March 2020)
- » Moody's Analytics: "Qualitative Overlay Factors for CRE Credit Risk Models in the Context of COVID-19" (May 2020)

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