



MONETARY AND CAPITAL MARKETS

Global Financial Stability Notes

Commercial Real Estate and Financial
Stability: Evidence from the US
Banking Sector

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This note analyzes the implications of changes in commercial real estate (CRE) prices for the stability of the US banking sector. Using detailed bank-level and CRE price data for US metropolitan statistical areas, the analysis shows that, following a decline in CRE prices, banks with greater exposures to CRE loans perform worse than their counterparts, experiencing higher non-performing CRE loans, lower revenues, and lower capital. These effects are particularly pronounced if the drop in CRE prices turns out to be persistent because of possible structural shifts in CRE demand—for example, because of an increased trend toward e-commerce and teleworking—even after the coronavirus disease (COVID-19) pandemic is over. The impact of a decline in CRE prices is especially true for small and community banks, which tend to have the highest CRE loan exposures. While the US banking sector has remained resilient during the pandemic crisis due to strong capital buffers and massive policy support, these findings suggest that continued vigilance is warranted with regard to potential downside risks to CRE prices amidst ongoing structural shifts in the sector.

INTRODUCTION[†]

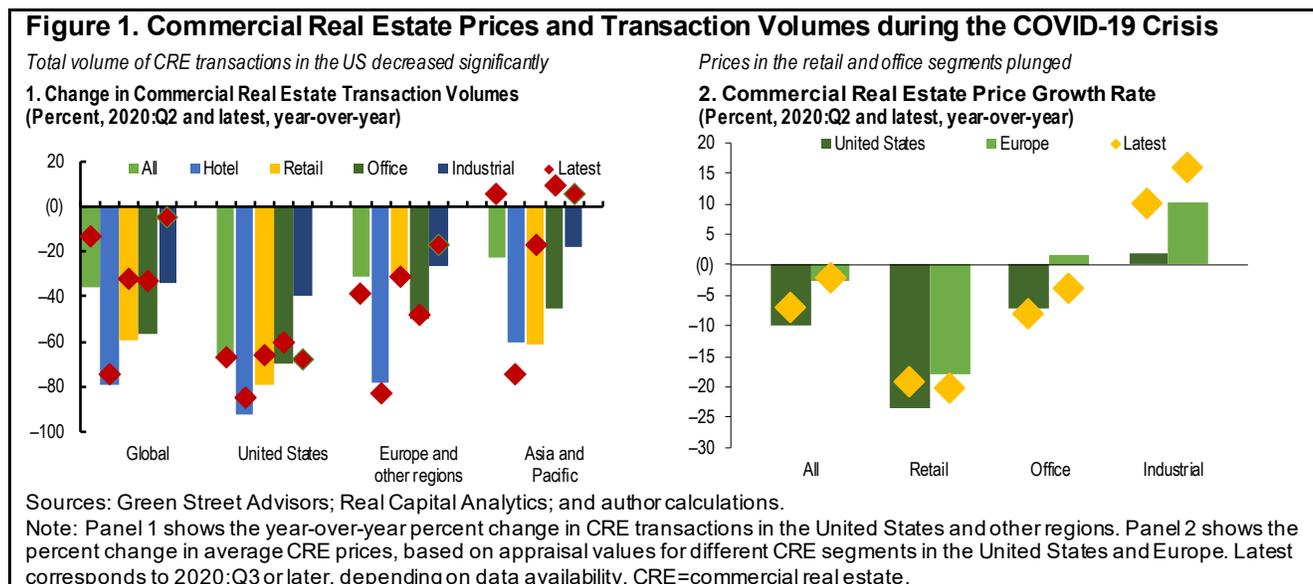
The commercial real estate (CRE) sector in the United States has been hit hard during the COVID-19 pandemic. Following lockdown measures introduced to contain the spread of the virus and the associated decline in social mobility, the demand for contact-intensive CRE spaces such as traditional brick-and-mortar retail, restaurants, hotels, and offices plunged significantly in 2020. Consequently, CRE transaction volumes and prices, particularly, in the hotel, retail, and office segments, declined sharply (Figure 1). Compared to other regions, the decline in CRE transactions and prices has been more pronounced in the United States.

While the adverse shock to the CRE sector could be considered as temporary, at least partly reversing as the pandemic is brought under control and the economy recovers, the preexisting structural trends towards increased digitalization, e-commerce, and working-from-home—which have further accelerated during the pandemic crisis—create considerable uncertainty around the outlook for the sector and suggest that further price declines may be possible, at least in some CRE segments. Given the heavy reliance of the sector on bank financing in the United States,¹ a significant downward pressure on CRE valuations as a result of a persistent

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¹ Banks are the largest providers of CRE debt financing in the US and globally, but nonbank financial institutions such as pension funds, insurers and investment funds also play an important role. The share of total outstanding CRE debt held by banks is 54 percent in the US

drop in demand could be a potential source of stress for banks, especially for those with large CRE exposures, and pose financial stability risks (IMF, 2021).²



Against this backdrop, this note uses detailed US bank-level data and location-specific CRE prices over the period 2001–2020 to investigate the following questions:

- How does a decline in CRE prices affect banks' profitability and solvency?
- How large bank capital losses could be if CRE prices were to remain depressed permanently?

To address these questions, the analysis proceeds in three steps. First, the effect of CRE loan exposure on bank performance is empirically identified. Next, these estimates are used to conduct a capital loss scenario, which assesses the credit and revenue losses that banks may incur under different CRE price forecasts, and potential bank capital losses based on a forward-looking provisioning rule.³

The findings show that, following a decline in CRE prices, banks with ex-ante higher CRE loan exposures perform considerably worse. They experience a significantly higher CRE non-performing loans ratio, higher CRE loan charge-off rates, lower revenues, and lower capital. Bank capital losses are estimated to be modest on average under a variety of CRE price scenarios, but significantly larger for small and geographically concentrated community banks, especially if the CRE price drop were to be persistent. As such, policymakers should remain vigilant amidst ongoing structural shifts in the CRE sector, and may benefit from maintaining the frequency of stress tests for small/community banks to assess financial stability risks in a timely way.⁴

(and about 70 percent in Europe and Asia), while that held by nonbank financial institutions is 24 percent in the US (and less than 20 percent in Europe and in Asia; IMF, 2021).

² Lower CRE prices—which generally coincide with lower economic activity and reduced cash flow for firms—could affect financial stability by adversely impacting the credit quality of borrowers. Concurrently, loan-to-value (LTV) constraints may also be triggered, especially when the price drop is steep and/or for loans with already high LTV ratios. In extreme cases, a loan balance could even be worth more than the property value, making it excessively risky for lenders to retain the exposure, in particular if the price drop appears persistent. Eventually, following an increase in non-performing CRE loans and lower revenues, bank capital could decline (D'Erasmus, 2019).

³ Identifying how changes in CRE prices could affect bank capital ideally requires supervisory loan-level data and a real-time appraisal value of real estate assets backing each loan. Such granular data is not publicly available, and the analysis in this note relies on bank-level data on CRE loan exposures (Call Reports) and Metropolitan Statistical Area (MSA)-level data on average CRE prices (obtained from the MSCI).

⁴ See IMF (2020) for a detailed assessment of US financial system stability and policy recommendations to strengthen financial system resilience.

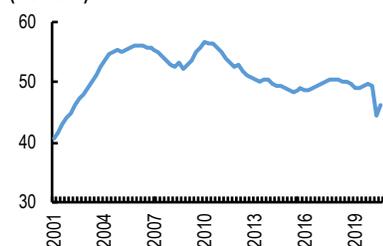
BANK FINANCING OF THE COMMERCIAL REAL ESTATE SECTOR

Commercial banks are important players in the CRE debt market in the US, and CRE lending is a significant component of their overall business lending.⁵ On average, CRE loans accounted for nearly half of the total business loans made by banks over the last decade (Figure 2, panel 1). Beyond the sheer volume, which surpassed \$2.3 trillion prior to the pandemic, a disproportionately large share of these loans has been extended by small- and medium-sized banks (defined as banks with total assets less than \$100 billion). Although such banks collectively account for about 30 percent of total banking sector assets, they hold a much larger share (two-thirds) of overall CRE loans (Figure 2, panel 2). CRE loans also make up a significant share of US banking sector assets, constituting about 6 percent for large banks and 30 percent for small banks (Figure 2, panel 3).

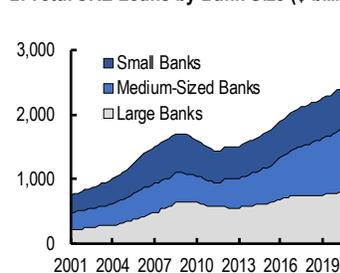
Figure 2. Commercial Real Estate Loans in the United States

CRE loans make up a significant fraction of overall business lending, and are mostly concentrated in smaller banks.

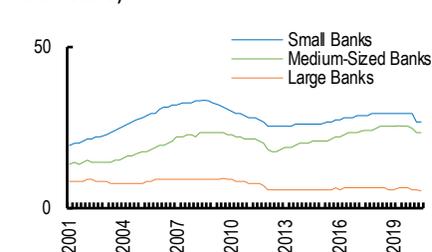
1. Total CRE Loans-to-Overall Business Loans (Percent)



2. Total CRE Loans by Bank Size (\$ billions)



3. CRE Loan Exposures by Bank Size (Percent of total assets)

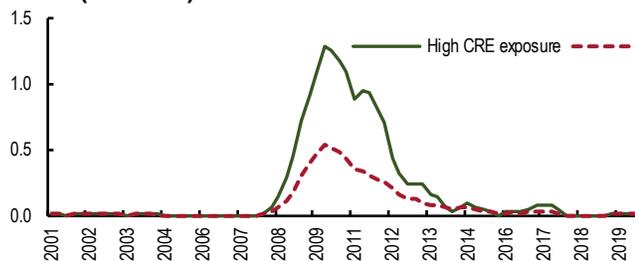


Sources: Call Reports; and author calculations.

Notes: Panel 1 shows the ratio of total CRE loans to the sum of total business and CRE loans by US banks. Panel 2 shows total CRE loans made by banks of different sizes, with banks considered as small if their total assets do not exceed \$5 billion during the sample period (2001:Q1–2020:Q3), as medium if their total assets exceed \$5 billion at least once but do not exceed \$100 billion, and as large if their total assets exceed \$100 billion at least once. Panel 3 shows the total CRE loans-to-total assets ratio. CRE = commercial real estate.

A high bank exposure to CRE loans can raise financial stability concerns. In fact, high CRE loan exposures have historically been a key determinant of bank failures in the US, as observed for instance in the aftermath of the global financial crisis during which overall CRE prices declined by 30 percent (Figure 3).⁶ The high concentration of CRE loans in smaller banks is also a cause for concern, as these banks tend to have a lower capacity to raise external funds especially during episodes of market stress (Kashyap and Stein 2000). Given that these banks have more geographically concentrated exposures,⁷ stress in these banks could have important regional implications.

Figure 3. Commercial Bank Failure Rate in the United States (Percent)



Sources: Federal Deposit Insurance Corporation; and author calculations.

Note: The figure plots the frequency of failures for commercial banks with “high CRE exposure” versus failures for all banks in the United States. High CRE exposure is defined according to the Federal Reserve Guideline “Concentration in Commercial Real Estate Lending, Sound Risk Management Practices” and meet the following criteria: CRE loans of the institution increased by at least 50 percent over the past 3 years, and outstanding CRE loans are at least three times the institution’s total risk-based capital. CRE = commercial real estate.

⁵ The Federal Deposit Insurance Corporation (FDIC) Banker Resource Center defines CRE lending as “... acquisition, development, and construction financing and the financing of income-producing real estate.”, where “(I)ncome-producing real estate includes real estate held for lease to third parties and nonresidential real estate that is occupied by its owner or a related party.” For a detailed overview of the US banking sector’s exposure to CRE market developments, see Adams-Kane (2018).

⁶ In the context of the global financial crisis, Cole and White (2012) find that real estate construction and development loans, commercial mortgages, and multi-family mortgages were significantly associated with a higher likelihood of bank failure, whereas residential single-family mortgages did not play a significant role.

⁷ Based on FDIC Survey of Deposits database, more than 90 percent of small banks (in particular, banks with total assets that never exceeded \$5 billion throughout our sample period) have offices in a single state and in at most two metropolitan statistical areas (MSAs). In contrast,

CRE PRICE CHANGES AND BANK STABILITY

The empirical analysis shows that a decline in CRE prices has a significant impact on bank CRE loans, revenues and capital.⁸ Following a decline in CRE prices, banks with ex-ante higher CRE loan exposures experience significantly higher CRE non-performing loan ratios and CRE loan charge-off rates (Figure 4, panel 1a). As CRE loans underperform and the resulting provisioning expenses are higher for banks with a greater CRE exposure, they experience a stronger decline in pre-provision net revenues and regulatory capital (Figure 4, panel 2a).



top 41 banks (that correspond to banks with total assets that exceed \$100 billion at least once throughout the sample period) have offices in 9 states or 45 MSAs on average (and 42 states and 253 MSAs at the maximum).

⁸ See the Annex for details on the empirical methodology and data.

Quantitatively, following a one standard deviation decline in local CRE prices over an eight quarter horizon—which corresponds to a 16 percent cumulative decline in CRE prices—banks at the 75th percentile of the distribution of CRE loan exposure experience an 8 percentage points higher non-performing CRE loan ratio and a 3 percentage points higher CRE loan charge-offs rate (compared to banks with no CRE loan exposure).⁹ Following these, their pre-provision net revenues and total regulatory capital are lower (by 12 percent and 5 percent, respectively). Banks with low CRE loan exposure experience milder effects, while still performing worse than banks with no CRE loan exposure.

These results are broadly similar in the sample that considers only small banks, for which the price and location of CRE assets can be captured more accurately (Figure 4, panels 1b and 2b), and when a shorter horizon (four quarters) is considered for the CRE price decline (Figure 4, panels 1c and 2c).

BANK CAPITAL ADEQUACY UNDER CRE SECTOR STRESS

Using the sensitivities of banks' CRE loan charge-offs rates and pre-provision net revenues to CRE price changes estimated previously, this section analyzes how bank capital adequacy could be affected if CRE prices were to drop persistently.¹⁰ To do so, two approaches are followed. First, the marginal impact of bank CRE loan exposures on bank capital adequacy is reported, without considering the impact of other macroeconomic factors. Second, macroeconomic factors are also incorporated into the picture, by taking into account time-varying location-specific effects.

The exercise is conducted with two stressed CRE price scenarios, where the price paths are derived from the valuation model in IMF (2021). The first scenario, labeled as "mild", assumes a cumulative one-standard-deviation decline in CRE prices after eight quarters and corresponds to a 1¼ percent permanent increase in the CRE vacancy rate. The second scenario, labeled as "severe", assumes a CRE price path consistent with a permanent increase in the CRE vacancy rate by 5 percentage points (which corresponds to the rate observed during the global financial crisis), and implies a decline in CRE prices by about 30 percent in the long-run. For simplicity, projected price paths are considered to be common across all metropolitan statistical areas (MSAs) (Figure 5, panel 1).

The results presented in Figure 5 show that while the average projected drop in capital adequacy is mild (0.14 percentage point on average), there is noticeable heterogeneity across banks (driven primarily by the variation in banks' CRE loan exposures). Projected credit and revenue losses could reach more than 1 percent of pre-shock total risk-weighted assets for banks with very high CRE loan exposures (that is, those in the top 3 percent of CRE loan exposure). Nearly all banks in the left tail (5th percentile of the distribution of loss ratio) are small or community banks.¹¹ Moreover, a permanently high CRE vacancy rate implies significantly higher losses, with average capital losses almost twice as large as under the mild (first) scenario.

Next, macroeconomic effects are incorporated into the analysis by taking into account location-specific effects (as described in the Annex). The average decline in capital adequacy ratio turns out to be larger in this case, reaching 1.4 percentage points (Figure 6, panel 1).¹² This stronger effect is hardly surprising given that CRE price declines, especially when they are steep, coincide with lower economic activity and market stress (for example, lower GDP, higher unemployment, higher stock market volatility). Consistent with the findings

⁹ The third quartile of the distribution of CRE loan exposure corresponds to the total CRE loans-to-total assets ratio of 43 percent. For further details on banks' CRE loan exposures, see Annex Table A1.

¹⁰ The methodology adopted here broadly follows Hirtle et al. (2015), and is not intended to be strictly comparable to a formal top-down stress test, where the entire bank balance sheet is assumed to be under stress under certain macroeconomic scenarios and given assumptions about tax, dividend and other capital distributions over the forecast horizon. See the Annex for a detailed description of the methodology.

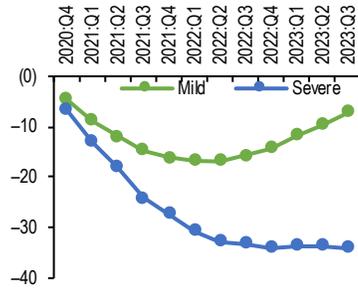
¹¹ In the left tail (the lowest 5th percentile) of the distribution of projected capital losses, 90 percent are small banks, 10 percent are medium-sized banks, and 99 percent are community banks.

¹² To incorporate macroeconomic effects into the picture, a path for time-varying locational factors is assumed over the forecast horizon (proxied by fixed effects). See the online annex for further details.

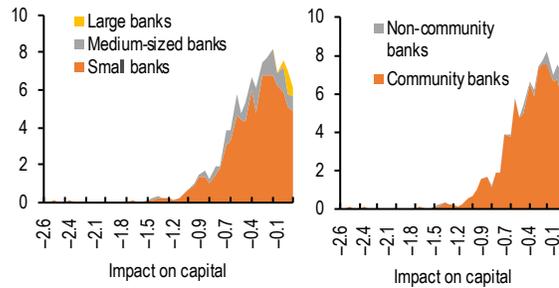
discussed previously, the results also show that banks at the left tail of the distribution of losses are small or community banks (panel 1), and that their losses reach 1.5 percentage points in this scenario (panel 2).

Figure 5. Decline in Bank Capital under Different Price Scenarios: Marginal Impact

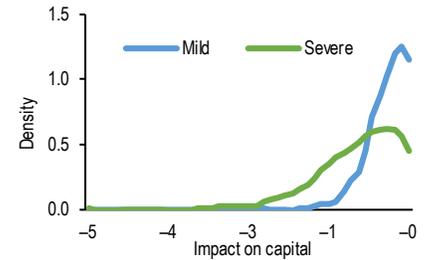
1. Cumulative Change in Average CRE Prices under Different Scenarios (Percent)



2. Distribution of Projected Capital Losses under the Mild Adverse Scenario (Percent of pre-shock risk-weighted assets)



3. Distribution of Projected Capital Losses with Permanent Shocks to Vacancy Rates (Percent of pre-shock risk-weighted assets)

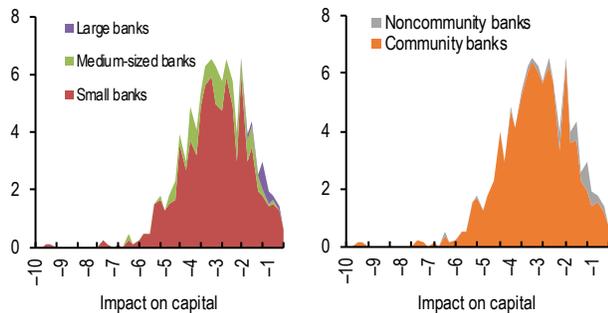


Sources: Call Reports; Federal Deposit Insurance Corporation Deposit Survey; and author calculations.

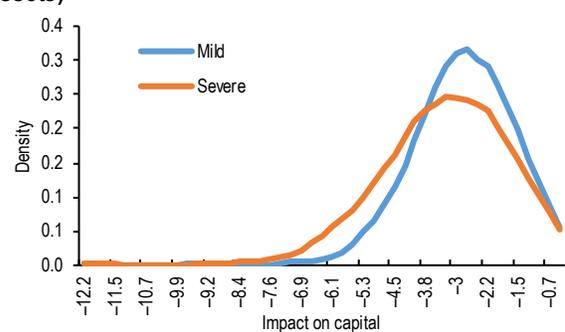
Note: Panel 1 shows CRE price forecast scenarios based on different assumptions about a permanent increase in the vacancy rate. Panel 2 shows the distribution of the eight-quarter-ahead projected capital losses due to a sustained CRE price decline as in the mild adverse scenario. The panel shows the distribution for different bank groups (depending on size or on whether the bank is a community bank). Panel 3 shows the capital loss distribution using an alternative CRE price forecast scenario that assumes a 5 percentage points permanent increase in CRE vacancy rates. CRE = commercial real estate.

Figure 6. Decline in Bank Capital Decline under Different Price Scenarios: With Macroeconomic Factors

1. Distribution of Projected Capital Losses under Mild Adverse Scenario (Percent of pre-shock risk-weighted assets)



2. Distribution of Projected Capital Losses with Permanent Shocks to Vacancy Rates (Percent of pre-shock risk-weighted assets)



Sources: Call Reports; Federal Deposit Insurance Corporation Deposit Survey; and author calculations.

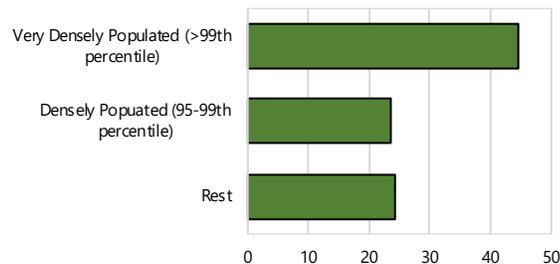
Note: Panels 1 and 2 show the distribution of 8-quarter-ahead projected capital losses similar to panels 2 and 3 in Figure 5, respectively, using an alternative specification that incorporates macroeconomic effects (by including location interacted with time fixed effects over the forecast horizon).

STRUCTURAL SHIFTS IN THE CRE SECTOR AND BANK PROVISIONING

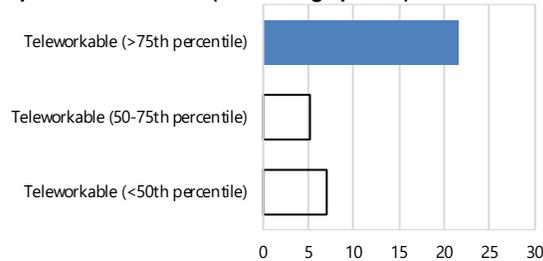
The effect of structural shifts in the CRE sector, such as those related to the rise of e-commerce and teleworking, on CRE market valuations could be stronger in areas that are more densely populated or with a higher share of less contact-intensive jobs that can be performed remotely. In turn, local banks operating in such regions could also be more adversely affected, potentially due to greater non-performing CRE loans. While a lack of publicly available disaggregated data does not permit a direct testing of this hypothesis, simple correlations of provision expenses to CRE loan exposures provide supportive evidence. Community banks in very densely populated areas or in areas with a higher share of teleworkable jobs seem to have increased their provisions more strongly during 2020 than other banks (Figure 7).

Figure 7. Sensitivity of Provisions in 2020 to Local Population Density and Teleworkability

1. Sensitivity of Total Provisions-to-PPNR Ratio to CRE Loan Exposure in 2019:Q4 (Percentage points)



2. Sensitivity of Total Provisions-to-PPNR Ratio to CRE Loan Exposure in 2019:Q4 (Percentage points)



Sources: Federal Financial Institutions Examination Council Call Reports; US Census Bureau, Dingel and Neiman (2020); and author calculations.

Note: Panel 1 shows the estimated coefficient from the regression of the ratio of total provisions during 2020:Q1-2020:Q3 to pre-provision net revenues in 2019 on the total CRE loans-to-total assets ratio in 2019:Q4. "Very Densely Populated" corresponds to community banks headquartered in zip codes with population densities above the 99th percentile. Similarly, "Densely Populated" corresponds to those above the 95th percentile and less than the 99th percentile. "Teleworkable (>75th percentile)" correspond to community banks headquartered in MSAs with a share of jobs that can be done at home greater than the 75th percentile and similarly for others. Solid bars indicate that the estimated relation is statistically significant at the 5 percent level of significance. CRE = commercial real estate; PPNR = pre-provision net revenue.

CONCLUDING REMARKS

The COVID-19 crisis has hit the commercial real estate sector hard in the US. The structural shifts in CRE demand pose considerable uncertainty around the outlook for the sector and suggest that further price declines may be possible, at least in some CRE segments. This note shows that such price declines may potentially be a source of stress for banks, especially for smaller and community banks with higher CRE loan exposures.

So far, the banking sector in the US has been largely resilient to the developments in the CRE sector during the COVID-19 crisis because of strong bank capital buffers and the unprecedented policy support and regulatory responses during the crisis.¹³ Large banks have also been more prudent in their CRE lending compared to the pre-global financial crisis period, with their exposures declining notably. Going forward, maintaining the frequency of stress tests for small/community banks, particularly for those with high levels of exposures to riskier CRE segments, would be beneficial to assess the risks to financial stability in a timely fashion.

¹³ See Fed (2021) for a summary of Federal Reserve's policy responses to the COVID-19 crisis.