



March 2018

# COMMERCIAL REAL ESTATE LENDING

## Banks Potentially Face Increased Risk; Regulators Generally Are Assessing Banks' Risk Management Practices

Accessible Version

## Why GAO Did This Study

In 2006, federal banking regulators jointly issued guidance that described their expectations for sound risk management practices for banks with CRE concentrations. The guidance includes two CRE thresholds that regulators use to identify banks that are potentially exposed to significant CRE concentration risk and could be subject to greater supervisory scrutiny. Concentrations in CRE loans at U.S. banks have been steadily increasing—raising safety and soundness concerns. In December 2015, the regulators jointly issued a public statement to remind banks of the 2006 CRE guidance.

In light of the joint 2015 statement and GAO's ongoing monitoring of regulatory efforts to identify and respond to emerging threats to the banking system, GAO examined (1) trends in the CRE lending market, including changes in risk, and (2) actions taken by regulators to help ensure that banks with CRE concentrations are effectively managing the related risks. To address these issues, GAO analyzed CRE-related data; reviewed agency policies and guidance; and reviewed a nongeneralizable sample of 54 bank examinations conducted from 2013 through 2016 based on the banks' CRE concentrations, total assets, primary regulator, and geographic location. GAO also interviewed officials from the federal banking regulators.

View [GAO-18-245](#). For more information, contact Lawrence Evans at (202) 512-8678 or [evansl@gao.gov](mailto:evansl@gao.gov).

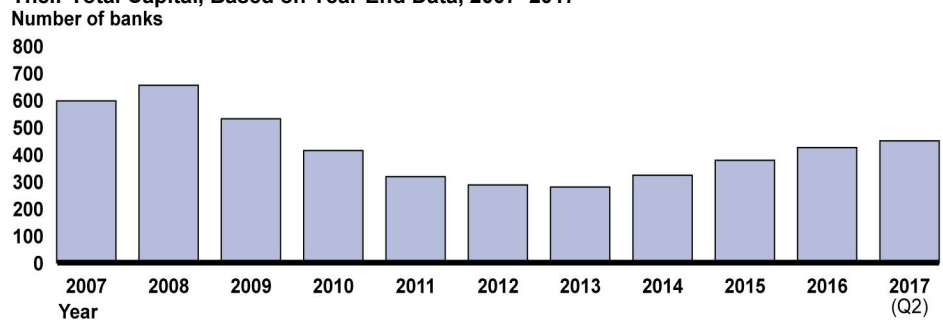
## COMMERCIAL REAL ESTATE LENDING

### Banks Potentially Face Increased Risk; Regulators Generally Are Assessing Banks' Risk Management Practices

#### What GAO Found

While the commercial real estate (CRE) sector has recovered since the 2007–2009 financial crisis, GAO's trend and econometric analyses generally indicate that risk in CRE lending by banks has increased over the past several years. Since the early 2000s, community banks have tended toward providing CRE loans more than other kinds of loans. Indicators of CRE market conditions and loan performance have been improving since 2011. At the same time, GAO's analyses of changes in CRE underwriting standards, property prices, and other data suggest that credit and concentration risks have increased in bank CRE lending. For example, the number of banks with relatively high CRE concentrations—measured by the ratio of a bank's CRE loans to its total capital—has been increasing. In addition, commercial property prices have been increasing rapidly, and property valuations also have risen in recent years. Similarly, GAO's predictive econometric models of CRE loan performance suggest that risk has increased, based largely on the simultaneous increase in bank CRE lending and CRE prices observed over the last several years, but is lower than the level associated with the 2007–2009 financial crisis.

**Number of Banks with Commercial Real Estate Loans Representing 300 Percent or More of Their Total Capital, Based on Year-End Data, 2007–2017**



Source: GAO analysis of S&P Global Market Intelligence data. | GAO-18-245

GAO found that federal banking regulators subjected banks with relatively high CRE concentrations to greater supervisory scrutiny based on its review of a nongeneralizable sample of 54 bank examinations covering 40 banks done by the Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency from 2013 through 2016. Of the 54 examinations that GAO reviewed, 41 of them covered banks with relatively high CRE concentrations. In all of these examinations, regulators examined whether the banks had adequate risk management practices and capital to manage their CRE concentration risk. In 26 of the 41 examinations, regulators did not find any risk management weaknesses. However, in 15 of the 41 examinations, regulators found the banks had weaknesses in one or more risk management areas, such as board and management oversight, management information systems, or underwriting. The regulators generally communicated their findings to the banks in the reports of examination and directed the banks to correct their risk management weaknesses.

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**Abbreviations**

Call Report	Consolidated Reports of Condition and Income
CAMELS	capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk
CLD	construction and land development
CRE	commercial real estate
FDIC	Federal Deposit Insurance Corporation
Federal Reserve	Board of Governors of the Federal Reserve System
GDP	gross domestic product
MRA	matters requiring attention
MRBA	matters requiring board attention
MRIA	matters requiring immediate attention
OCC	Office of the Comptroller of the Currency

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March 15, 2018

The Honorable Elizabeth Warren  
Ranking Member  
Subcommittee on Financial Institutions and Consumer Protection  
Committee on Banking, Housing, and Urban Affairs  
United States Senate

Dear Senator Warren,

Concentrations in commercial real estate (CRE) loans at U.S. banks have been steadily increasing, raising safety and soundness concerns because of the potential for such concentrations to make the banks more susceptible to failure.<sup>1</sup> As an asset class, CRE is prone to volatility and cyclical behavior, as illustrated by the sharp downturn in the CRE market generally following the 2007–2009 financial crisis. A bank’s CRE concentration can be measured by its ratio of CRE loans to its total capital.<sup>2</sup> Since the early 2000s, community banks have trended toward providing CRE loans more than other kinds of loans.<sup>3</sup> Following this trend, the Federal Deposit Insurance Corporation (FDIC), the Board of Governors of the Federal Reserve System (Federal Reserve), and Office of the Comptroller of the Currency (OCC) jointly issued guidance in 2006 (hereafter referred to as the 2006 CRE guidance) that described their expectations for sound risk management practices for banks with

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<sup>1</sup>A CRE loan generally is used to acquire, develop, construct, improve, or refinance real property and where the primary source of repayment is the sale of the real property or the revenues from third-party rent or lease payments. CRE loans do not include ordinary business loans and lines of credit in which real estate is taken as collateral. For information on the role of CRE lending in bank failures, see Federal Deposit Insurance Corporation, Office of the Inspector General, *Report to the Congress: Comprehensive Study on the Impact of Failure of Insured Depository Institutions*, Report No. EVAL-13-002 (Arlington, Va.: January 2013), and Keith Friend, Harry Glenos, and Joseph B. Nichols, *An Analysis of the Impact of the Commercial Real Estate Concentration Guidance* (Washington, D.C.: April 2013).

<sup>2</sup>Capital generally is defined as a bank’s long-term source of funding, contributed largely by the bank’s equity stockholders and its own returns in the form of retained earnings. One important function of capital is to absorb losses.

<sup>3</sup>Although no commonly accepted definition of a community bank exists, the term often is associated with smaller banks (e.g., under \$1 billion in total assets) that provide relationship banking services to the local community and have management and board members who reside in the local community.

concentrations in CRE loans.<sup>4</sup> In December 2015, the federal banking regulators jointly issued a public statement to remind banks of the 2006 CRE guidance.<sup>5</sup> According to the statement, the regulators observed that (1) many CRE asset and lending markets were experiencing substantial growth; and (2) certain risk management practices at some banks were causing concern, including a greater number of underwriting policy exceptions and insufficient monitoring of market conditions to assess the risks associated with these concentrations.

In our prior work, federal banking regulators told us that they have taken steps intended to improve their ability to identify and respond to emerging risks based on lessons learned from past banking crises.<sup>6</sup> Our review of failed banks also found that regulators frequently identified weak management practices at banks involved in higher-risk activities early on in each crisis and before the banks began experiencing declines in capital. However, regulators were not always effective in directing bank management to address underlying problems before bank capital began to decline, and it was often too late to avoid failure. We have incorporated these and other regulatory lessons learned into a framework for monitoring federal banking regulators' efforts to identify and respond to emerging risks to the banking system.<sup>7</sup> Through such monitoring, we identified CRE for a targeted assessment of the federal banking regulators' supervisory efforts.

We prepared this report under the authority of the Comptroller General to assist Congress with its oversight responsibilities. Given the federal banking regulators' joint 2015 statement on CRE lending and our ongoing monitoring of their efforts to identify and respond to emerging threats to the banking system, this report examines

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<sup>4</sup>Concentrations in Commercial Real Estate Lending, Sound Risk Management Practices, 71 Fed. Reg. 74580 (Dec. 12, 2006).

<sup>5</sup>Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and Office of the Comptroller of the Currency, *Statement on Prudent Risk Management for Commercial Real Estate Lending* (Washington, D.C.: December 2015). The statement also included a list of interagency regulations and guidance related to CRE lending in addition to the 2006 CRE guidance, such as 12 CFR 364, appendix A.

<sup>6</sup>See GAO, *Bank Regulation: Lessons Learned and a Framework for Monitoring Emerging Risks and Regulatory Response*, [GAO-15-365](#) (Washington, D.C.: June 25, 2015).

<sup>7</sup>See [GAO-15-365](#).

- trends in the CRE lending markets, including changes in the level of credit and concentration risk in the markets, and
- actions taken by federal banking regulators through their examinations to help ensure that banks with CRE concentrations are effectively managing the related risks.

To address our objective on trends in the CRE lending markets, we reviewed academic literature and prior GAO work, analyzed FDIC, Federal Reserve, and other data on CRE markets and lending, and interviewed officials from federal banking agencies and CRE data providers. We evaluated trends in these data and used a subset of these data to estimate several predictive models of aggregate losses on bank CRE loans. For more information on our predictive models, see appendix II.

To address our objective on actions taken by federal banking regulators, we analyzed Consolidated Reports of Condition and Income (Call Report) data from SNL Financial for the period from 2011 through 2016 to calculate banks' construction and land development (CLD) and CRE concentrations and identify banks whose concentrations exceeded, in full or in part, the 2006 CRE guidance during part or all of the period.<sup>8</sup> Using such analysis, we selected a nongeneralizable sample of 40 banks that underwent full-scope examinations from 2013 through 2016 based on their CLD and total CRE concentrations, total assets, primary regulator, and geographic location. More specifically, we selected 20 FDIC-supervised banks, 10 Federal Reserve-supervised banks, and 10 OCC-supervised banks. We requested from FDIC the reports of examination and related workpapers that covered its full-scope examinations of the 20 banks conducted in 2013 or 2014 (20 examinations). We requested from the Federal Reserve and OCC the reports of examination and related workpapers that covered their two consecutive full-scope examinations of the 20 banks conducted from 2013 through 2016 (40 examinations).<sup>9</sup> Although we requested a total of 60 bank examinations, we reviewed 54

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<sup>8</sup>SNL Financial recently became S&P Global Market Intelligence, a division of S&P Global. S&P Global Market Intelligence is a provider of financial data, news, and analytics.

<sup>9</sup>Although we requested two consecutive full-scope examinations from the Federal Reserve and OCC for our sampled banks, we did not take the same approach with FDIC. Officials from FDIC's Office of Inspector General told us that they were conducting a similar review of CRE lending and planned to review a sample of FDIC's examinations conducted in 2015 or later. To avoid duplicating this work, we limited our sample of FDIC bank examinations to those conducted in 2013 or 2014.

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because 6 were not applicable to our review.<sup>10</sup> We also interviewed officials from FDIC, Federal Reserve, and OCC regarding the CRE regulatory guidance and oversight by the federal banking regulators.

For the data that we used in our analyses under both of our objectives, we assessed the reliability of the data by, among other things, interviewing knowledgeable officials, reviewing relevant documentation, and corroborating trends across multiple data sources. We determined the data were sufficiently reliable for our reporting objectives. For more information on our scope and methodologies, see appendix I.

We conducted this performance audit from January 2017 to March 2018 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

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## Background

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### Federal Banking Supervision

The purpose of federal banking supervision is to help ensure that banks throughout the financial system are operating in a safe and sound manner and are complying with banking laws and regulations in the provision of financial services. Banks in the United States are supervised by one of the following three federal regulators:

- FDIC supervises all FDIC-insured state-chartered banks that are not members of the Federal Reserve System and insured state savings associations and insured state chartered branches of foreign banks.

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<sup>10</sup>We did not review six examinations of banks supervised by the Federal Reserve. For five of the banks, the Federal Reserve did not conduct a full-scope examination of the banks during one of the two examination cycles in our review. Under the alternate-year examination program, banks that qualify are examined in alternate examination cycles by the Reserve Bank and the state banking agency. Another bank that we selected applied to become a member of the Federal Reserve System in 2016. Thus, the Federal Reserve had not conducted a full-scope examination of the bank during the time frame of our review, but did conduct a limited-scope, pre-membership examination targeting the bank's CRE lending in 2016. We included this examination in our review.



- The Federal Reserve supervises commercial banks that are state-chartered and members of the Federal Reserve System.
- OCC supervises federally chartered national banks and savings associations (also known as federal thrifts).

FDIC, the Federal Reserve, and OCC are required to conduct a full-scope, on-site examination of each of their supervised banks at least once during each 12-month period. The regulators may extend the examination interval to 18 months, generally for banks and thrifts that have less than \$1 billion in total assets and that meet certain conditions, such as satisfactory ratings, are well capitalized, and are not being subject to a formal enforcement action.<sup>11</sup> As part of a full-scope examination, examiners review a bank's risk exposure within a number of components using the Uniform Financial Institutions Rating System, which also is referred to as the CAMELS rating system (capital adequacy, asset quality, management, earnings, liquidity, and sensitivity to market risk).<sup>12</sup> Evaluations of CAMELS components consider a bank's size and sophistication, the nature and complexity of its activities, and its risk profile.

The end result of a full-scope, on-site examination is a report of examination, which includes the CAMELS ratings and other findings and is provided to the bank's management and board of directors. A report of examination may include deficiencies or other issues that examiners found and that a bank is expected to address within specific time frames. Such issues generally are called supervisory recommendations by FDIC, supervisory findings by the Federal Reserve, and supervisory concerns by OCC. For purposes of this report, we collectively refer to such issues as supervisory concerns. Supervisory concerns may be designed to correct practices that deviate from sound risk management principles or noncompliance with laws and regulations. Supervisory concerns that involve more significant issues are brought to the attention of a bank's board of directors and senior management in the report of examination as

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<sup>11</sup> 12 U.S.C. § 1820(d)(4); Expanded Examination Cycle for Certain Small Insured Depository Institutions and U.S. Branches and Agencies of Foreign Banks, 81 Fed. Reg. 90949 (Dec. 16, 2016).

<sup>12</sup> In an examination, a bank is rated for each of the CAMELS components and given a composite rating, which generally bears a close relationship to the component ratings. However, the composite is not an average of the component ratings. The component rating and the composite ratings are scored on a scale of 1 (best) to 5 (worst). Regulatory actions typically correspond to the composite CAMELS ratings, with the actions generally increasing in severity as the ratings become worse.

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matters requiring immediate attention (MRIA) or matters requiring attention (MRA) under the Federal Reserve's policies, matters requiring board attention (MRBA) under FDIC's policies, and MRAs under OCC's policies.<sup>13</sup> If a bank were to fail to address a supervisory concern, its regulator could subject the bank to enhanced supervision, downgrade of a component or composite rating, or other supervisory actions, such as informal or formal enforcement actions.<sup>14</sup>

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## CRE Lending and Associated Risks

Under their 2006 guidance, regulators define CRE loans to include construction loans, loans to finance CRE that are not secured by CRE, loans secured by multifamily property, and loans secured by nonfarm, nonresidential property in which the primary source of repayment derives from the rental income associated with the property or the proceeds of the sale, refinancing, or permanent financing of the property. CRE loans in which the primary source of repayment is not the property itself are called owner-occupied loans and can include loans to businesses for working capital purposes that use real estate as collateral. For example, a line of credit for a business's operating expenses might be secured in part by commercial property, such as an office.

Construction and land development (CLD) loans generally are considered to be the riskiest class of CRE, due to their long development times and because they can include properties (such as housing developments or retail space in a shopping mall) that are built before having firm

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<sup>13</sup>The Federal Reserve generally defines (1) an MRBA as a matter of significant importance and urgency that a bank must address immediately and (2) an MRA as a matter that is important and that a bank is expected to address over a reasonable period of time but not immediately. FDIC generally defines an MRBA as a matter involving an issue or risk of significant importance that typically requires more effort by a bank to address than those correctable in the normal course of business. OCC generally defines an MRA as a deficient practice or a lack of a practice that could adversely affect the bank's condition.


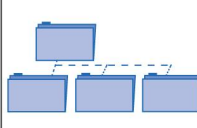





<sup>14</sup>In general, informal or formal enforcement actions are taken after the completion of an on-site bank examination, when warranted. Informal enforcement actions are used when circumstances warrant a less severe form of action than a formal enforcement action. Informal enforcement actions are not enforceable, and their violation cannot serve as a basis for assessing a civil money penalty or initiating a removal and prohibition action. Informal actions are not published or publicly available. Formal enforcement actions are authorized by statute and may be enforceable through the assessment of civil money penalties or the federal court system.

commitments from buyers or lessees.<sup>15</sup> In addition, by the time the construction phase is completed, market demand may have fallen, putting downward pressure on sales prices or rents—making this type of loan more risky.

### Regulatory Guidance on CRE Concentrations and Risk Management Practices

Based on concerns about the increase in CRE concentrations at community banks and the risks associated with such concentrations, FDIC, the Federal Reserve, and OCC jointly issued guidance in December 2006 on CRE concentrations and sound risk management practices.<sup>16</sup> The guidance described the regulators’ expectations for sound risk management practices for banks with concentrations in CRE loans. Specifically, the guidance identified seven key elements, or internal control areas, that a bank’s risk management practices should address to identify, monitor, and control its CRE concentration risk (see fig. 1).

**Figure 1: Bank Internal Control Areas for Managing Commercial Real Estate Concentration Risk Based on 2006 Guidance**

						
<p><b>Board and management oversight</b></p> <p>Example: Establishing policy guidelines and approving an overall CRE lending strategy regarding the level and nature of CRE exposures acceptable to the bank.</p>	<p><b>Portfolio management</b></p> <p>Example: Developing appropriate strategies for managing CRE concentration levels, including a contingency plan to reduce or mitigate concentrations in the event of adverse CRE market conditions.</p>	<p><b>Management information systems</b></p> <p>Example: Providing management with sufficient information to identify, measure, monitor, and manage CRE concentration risk.</p>	<p><b>Market analysis</b></p> <p>Example: Providing management and board of directors with information to assess whether the bank’s CRE lending strategy and policies continue to be appropriate in light of changes in CRE market conditions.</p>	<p><b>Credit underwriting standards</b></p> <p>Example: Establishing sound lending policies for CRE loans.</p>	<p><b>Portfolio stress testing and sensitivity analysis</b></p> <p>Example: Performing portfolio-level stress tests or sensitivity analysis to quantify the impact of changing economic conditions on asset quality, earnings, and capital.</p>	<p><b>Credit risk review function</b></p> <p>Example: Assessing credit quality and identifying problem loans.</p>

Source: GAO analysis of *Concentrations in Commercial Real Estate Lending, Sound Risk Management Practices* (December 12, 2006). | GAO-18-245

The 2006 CRE guidance also sets forth three criteria to identify banks with CRE loan concentrations that could be subject to greater supervisory

<sup>15</sup>CLD loans are also known as acquisition, development, and construction loans.

<sup>16</sup>Concentrations in Commercial Real Estate Lending, Sound Risk Management Practices, 71 Fed. Reg. 74580 (Dec. 12, 2006).

scrutiny. According to the guidance, a bank that has experienced rapid growth in CRE lending, has notable exposure to a specific type of CRE, or is approaching or exceeds the following supervisory criteria may be identified for further supervisory analysis of the level and nature of its CRE concentration risk:

- **CLD concentration threshold:** CLD loans represent 100 percent or more of a bank's total capital.<sup>17</sup>
- **Total CRE concentration threshold:** Total nonowner-occupied CRE loans (including CLD loans) represent 300 percent or more of a bank's total capital and total CRE lending increased by 50 percent or more during the previous 36 months.

According to the guidance, the CLD and CRE thresholds do not constitute limits on a bank's CRE lending activity but rather serve as high-level indicators to identify banks potentially exposed to CRE concentration risk.

In 2011, we reported on how the federal banking regulators had responded to the potential risks of growing CRE concentrations at community banks, including by jointly issuing the 2006 CRE concentration guidance.<sup>18</sup> We recommended that the regulators should enhance or supplement the 2006 CRE guidance and take steps to better ensure that such guidance is consistently applied. The regulators have taken steps to address our recommendation.

Out of the approximately 5,900 banks that had a CRE loan portfolio as of the end of June 2017, a total of 504 banks exceeded either 100 percent in CLD loans as a percentage of total risk-based capital, or 300 percent in CRE loans as a percentage of total-risk based capital and had seen 50 percent CRE portfolio growth during the previous 36 months. Of these 504 banks, a total of 69 banks exceeded both the CLD criteria and the total CRE criteria (including the growth component).

In December 2015, federal banking regulators issued a joint statement to remind banks of the 2006 regulatory guidance on prudent risk management practices for CRE lending activity through economic cycles. The regulators noted, among other trends, that many banks' CRE

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<sup>17</sup>In the 2006 guidance, total capital refers to the total risk-based capital as reported for commercial banks.

<sup>18</sup>See GAO, *Bank Regulation: Enhanced Guidance on Commercial Real Estate Risks Needed*, [GAO-11-489](#) (Washington, D.C.: May 19, 2011).

concentration levels had been rising. According to the statement, regulators would continue to pay special attention to potential risks associated with CRE lending during 2016. Specifically, the regulators stated that when conducting examinations that include a review of CRE lending activities, they would focus on banks' implementation of the prudent principles in the 2006 CRE guidance and other applicable guidance relative to identifying, measuring, monitoring, and managing concentration risk in CRE lending activities.

According to officials from FDIC, the Federal Reserve, and OCC, their agencies use a variety of formal and informal processes to monitor the condition of banks and identify risks, including CRE concentration risk. For example, The Federal Reserve has a National Risk Council and FDIC and OCC have National Risk Committees that meet routinely to identify and evaluate risks facing banks and are supported by a number of other committees or other groups. FDIC officials told us that analysis done by FDIC's Regional Risk Committees identified growth in CRE concentrations in 2015 and brought the issue to the National Risk Committee's attention. OCC began actively monitoring CRE loan growth in the middle of 2014 and began focusing on CRE concentration risk management during bank examinations in 2015. OCC officials also stated that CRE concentration risk has been a key risk issue for the agency's National Risk Committee since early 2016. Federal Reserve officials told us that the agency, including the Federal Reserve banks, began to monitor bank CRE concentrations more closely around mid-2013 after identifying an increase in CRE concentrations. According to FDIC, Federal Reserve, and OCC officials, they met together in early 2015 to discuss CRE lending growth and the rise in bank CRE loan concentrations and held subsequent meetings throughout the year, in part to discuss policy options for helping to ensure that banks were appropriately managing their CRE concentration risks. One of the outcomes of such interagency coordination was the December 2015 joint statement on CRE concentrations.

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## Credit and Other Risks Related to Bank CRE Lending Have Increased over the Past Several Years

Although the CRE sector has recovered since the 2007–2009 financial crisis, our trend and econometric analyses generally indicate that credit

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and other risks related to bank CRE lending have increased over the past several years.<sup>19</sup>

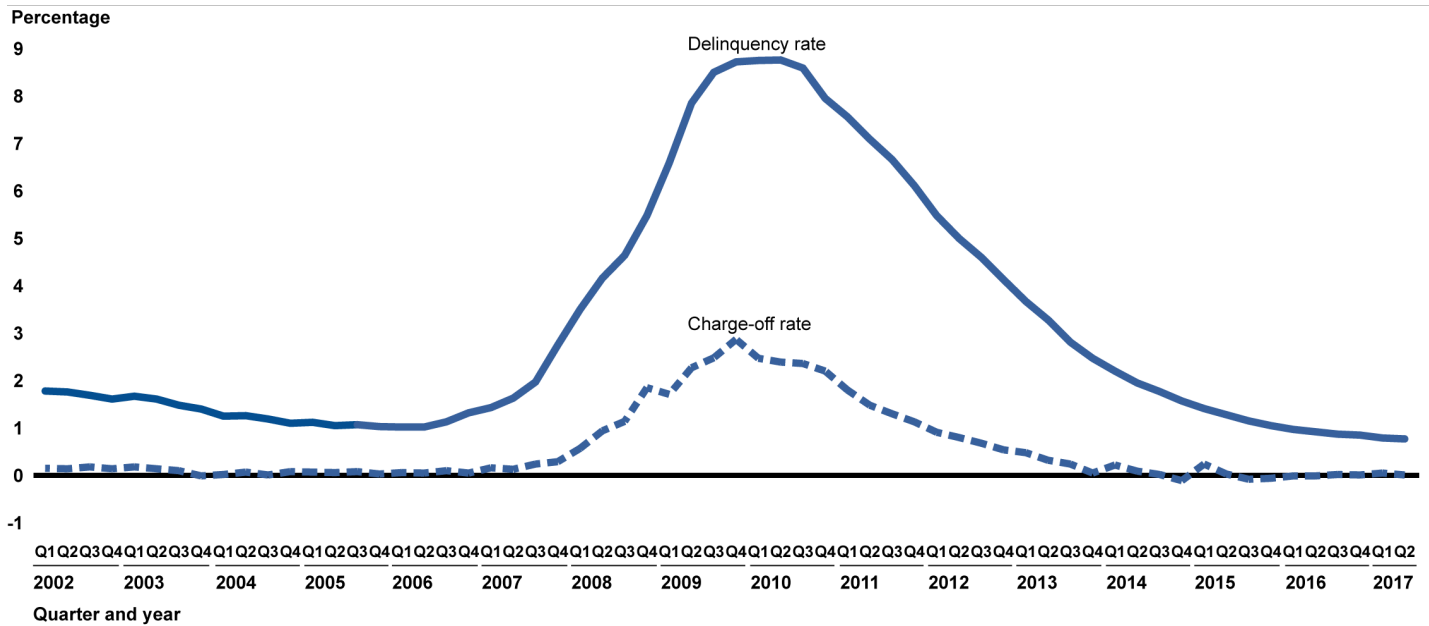
Based on indicators of CRE market conditions and loan performance, the CRE sector has recovered from the 2007–2009 financial crisis. For example, spending on CRE construction projects—a source of demand for bank financing—has rebounded. Vacancy rates for apartments, office buildings, and other CRE properties have declined. Similarly, as shown in figure 2, delinquency and charge-off rates on bank CRE loans have fallen from their post-crisis peaks and are at or below their lowest levels since 2002.<sup>20</sup> Although these rates provide information on the current performance of bank CRE loans, they provide little or no information about potential future risks faced by banks. For example, high-risk loans made to less creditworthy borrowers could perform well when property markets and the economy are doing well but may perform poorly when property markets or the economy begin to slow.

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<sup>19</sup>We discuss several types of risk in bank CRE lending, including market risk (e.g., the risk that commercial properties that serve as collateral for CRE loans could fall in value), credit risk (the risk that borrowers will fail to pay off their CRE loans), and concentration risk (e.g., an increase in the proportion of a bank's lending that is exposed to a single sector or subsector—for example the CRE sector as a whole or CLD, a subset of the CRE sector).

<sup>20</sup>Charge-offs, which are the value of loans removed from the books and charged against loss reserves, are measured net of recoveries as a percentage of average loans and annualized. Delinquent loans are those past due 30 days or more and still accruing interest as well as those in nonaccrual status.

**Figure 2: Delinquency and Charge-off Rates on Bank Commercial Real Estate Loans from 2002 through Second Quarter of 2017**



Source: GAO analysis of Federal Reserve data. | GAO-18-245

Note: Charge-offs, which are the value of loans removed from the books and charged against loss reserves, are measured net of recoveries as a percentage of average loans and annualized. Delinquent loans are those past due 30 days or more and still accruing interest as well as those in nonaccrual status.

At the same time, our analyses of other market, underwriting, and lending data and forecasts from predictive econometric models we developed suggest that banks' credit and concentration risks related to their CRE lending have increased. As shown in figure 3, according to a Federal Reserve survey, banks lowered their CRE loan underwriting standards—terms and conditions under which banks extend loans—after the financial crisis, but more banks began to tighten their underwriting standards since late 2015.<sup>21</sup> In general, tightening underwriting standards may indicate that loan officers are reevaluating the degree of risk in CRE markets served by banks. According to Federal Reserve data, a larger share of banks has tightened underwriting standards on multifamily properties, such as apartments.

<sup>21</sup>Underwriting standards include factors such as the capacity of the borrower or income from the underlying property to adequately service the debt; the market value of the underlying real estate collateral; the overall creditworthiness of the borrower; and the level of the borrower's equity invested in the property.

**Figure 3: Change in Underwriting Standards by Banks for Commercial Real Estate Properties from First Quarter of 2002 through Second Quarter of 2017**



Source: GAO analysis of Federal Reserve and Federal Deposit Insurance Corporation data. | GAO-18-245

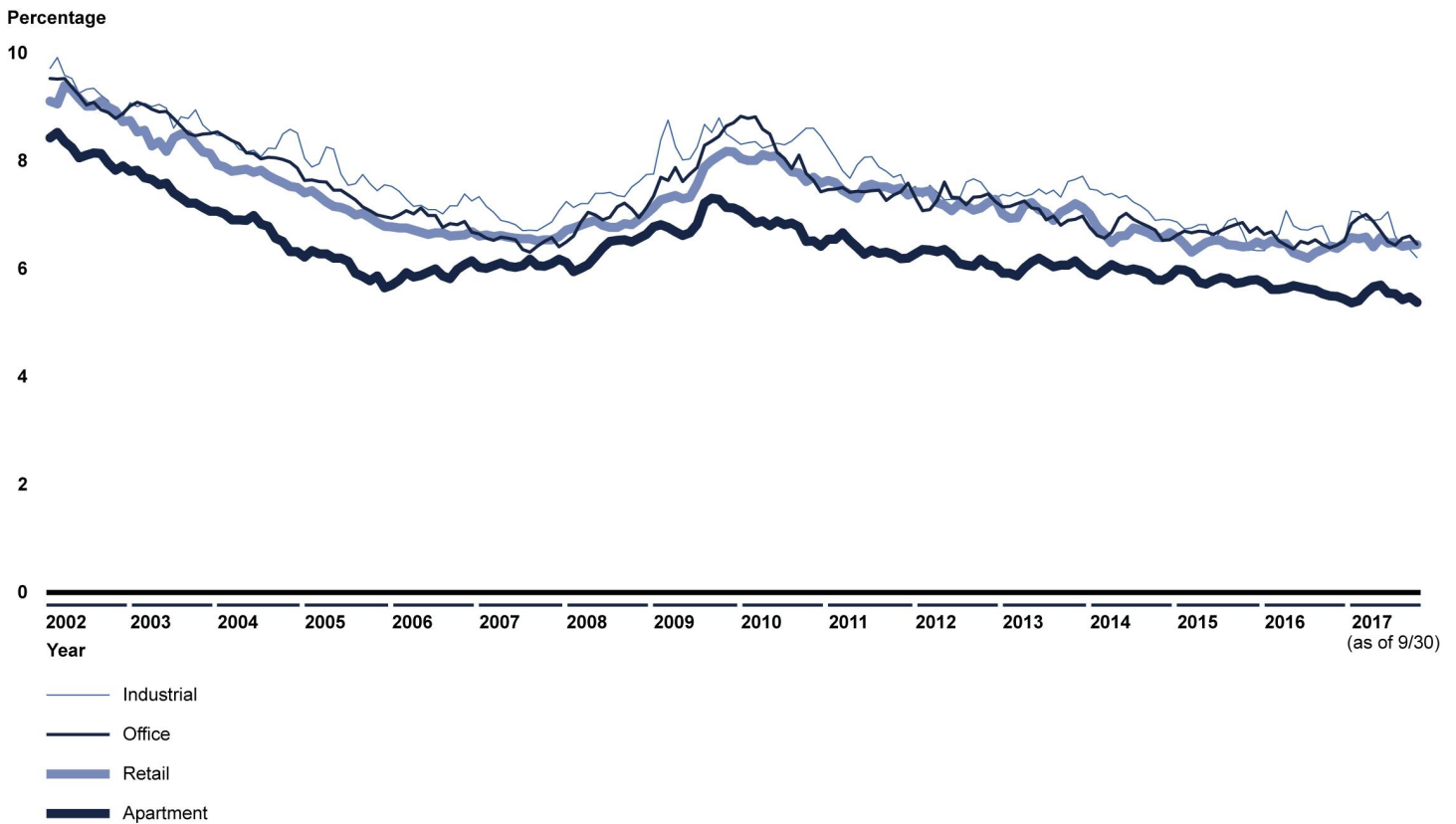
Note: We report results from the Federal Reserve’s Senior Loan Officer Opinion Survey, which summarizes changes in underwriting by the “net percentage” of banks tightening underwriting standards on various classes of loans—that is, the percentage of banks reporting that they have tightened standards minus the percentage of banks reporting that they have loosened standards. A positive number indicates that more banks are tightening than loosening standards. In the fourth quarter of 2013, the Federal Reserve updated the survey to disaggregate commercial real estate (CRE) into three balance sheet components: construction and land development, nonfarm nonresidential, and multifamily (right graph). Before the change, all CRE loans were reported in a single category. To report a consistent measure of aggregate CRE underwriting changes over a longer period of time (left graph), we constructed a weighted average of the more recent disaggregated survey results, weighting each CRE lending sector by the value of outstanding bank loans in that sector from FDIC’s Quarterly Banking Profile.

CRE property prices, particularly for multifamily properties, have increased rapidly in recent years, and CRE property valuations have similarly increased. For example, as shown in figure 4, capitalization rates (the ratio of income generated by a property to the property’s price) on CRE properties have trended downward since around 2010—indicating that borrowers (i.e., property owners) may be earning less of a return on their CRE properties. Capitalization rates can be indicative of expected future price changes—for example, low capitalization rates may reflect



expectations of future price increase, but can also be driven by investor sentiment not associated with fundamental aspects of properties.<sup>22</sup>

**Figure 4: Capitalization Rates on Commercial Real Estate Properties from January 2002 to September 2017**

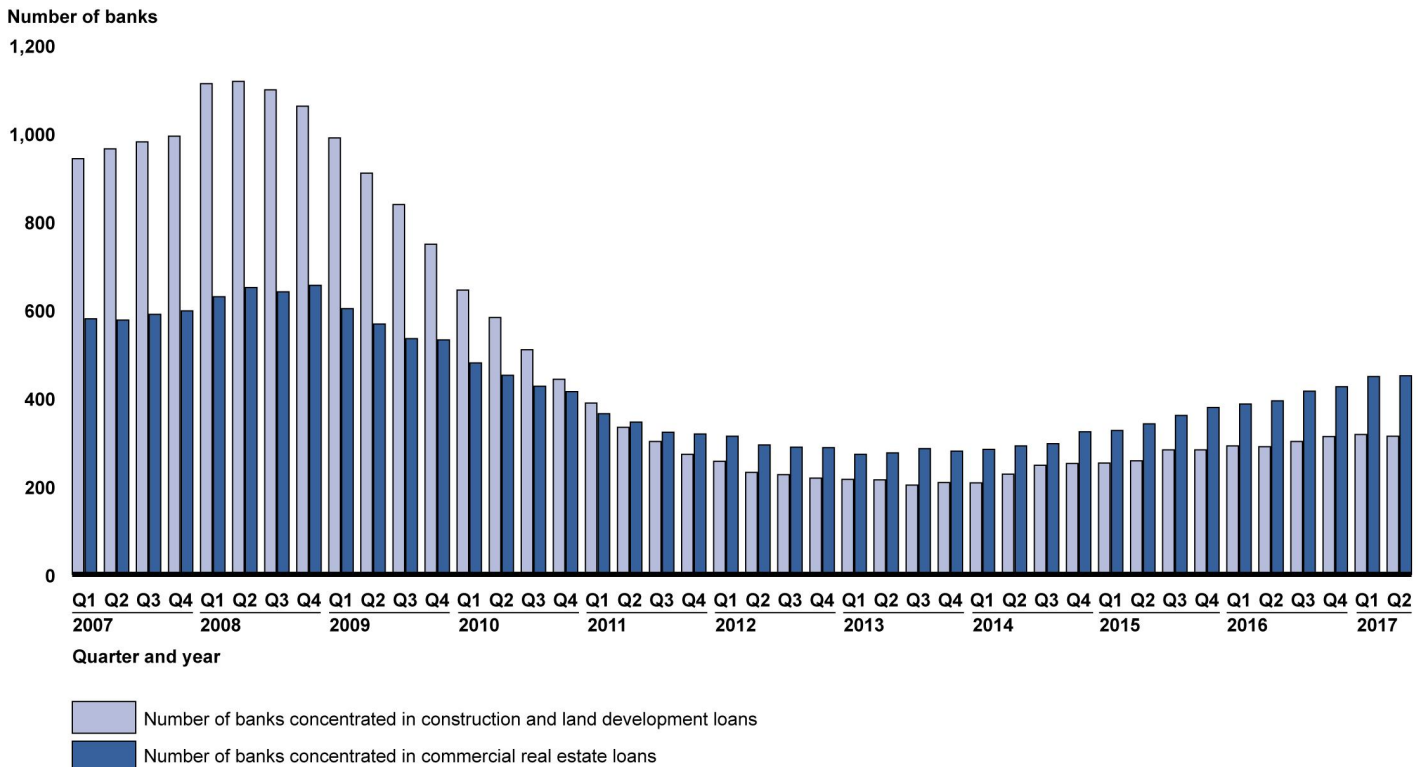


Source: GAO analysis of Real Capital Analytics data. | GAO-18-245

<sup>22</sup>See, for example, “Cap Rates and Commercial Property Prices,” *Federal Reserve Bank of San Francisco Economic Letters* (Sept. 19, 2011) and Jim Clayton, David C. Ling, and Andy Naranjo, “Commercial Real Estate Valuation: Fundamentals vs. Investor Sentiment,” *Journal of Real Estate Finance and Economics* (2009). Low capitalization rates may reflect market expectations of future increases in property income. However, market participants may be unwilling to pay for higher valuations—and will eventually bid prices down—should property income not increase as much or as soon as market participants initially expected. Consequently, falling property prices can reduce the value of collateral used to secure CRE loans and hence reduce the amount of protection banks have in the event of default. In addition, capitalization rates are expected to fluctuate with prevailing interest rates, and regulators told us that they also monitor the spread on capitalization rates over 10-year Treasury interest rates. This spread has fallen since 2013.

In addition, as shown in figure 5, the number of banks with concentrated portfolios in CLD or total CRE loans has been gradually increasing since around 2014. Greater concentrations in a particular lending sector (e.g., commercial real estate, residential real estate, or business lending) leave banks more vulnerable to a sectoral downturn, all else equal.

**Figure 5: Number of Banks with Concentrations in Construction and Land Development and Total Commercial Real Estate Loans, First Quarter of 2007 through Second Quarter of 2017**



Source: GAO analysis of S&P Global Market Intelligence data. | GAO-18-245

Note: Similar to the 2006 commercial real estate (CRE) guidance, we define CRE concentrations as construction and land development loans representing 100 percent or more of a bank's total capital or CRE loans representing 300 percent or more of a bank's total capital. Because the figure focuses on CRE concentrations, we exclude the 50 percent growth rate criterion that is part of the guidance.

To further assess risk in bank CRE lending, we developed and estimated several predictive models of aggregate losses on bank CRE loans. The models incorporate measures of CRE property prices, bank lending, and underwriting standards. The models generally found that, historically, higher future losses are predicted when CRE lending and prices are simultaneously high relative to gross domestic product, and when banks are tightening underwriting standards. Based largely on the simultaneous increase in bank CRE lending and CRE prices observed over the last

several years, these models suggest that credit risk has increased, though it remains lower than the level of risk associated with the 2007–2009 financial crisis.<sup>23</sup> As we noted earlier, high property valuations and substantial increases in lending can simultaneously weaken collateral protections and indicate lower borrower quality, both of which can raise the risk of losses should the economy or CRE sector weaken. (See app. II for additional information on our models.)

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## Regulators Examined Risk Management Practices of Banks with CRE Concentrations

We found that regulators generally subjected banks with relatively high concentrations in CRE loans to greater supervisory scrutiny in comparison to banks with relatively lower concentrations in CRE loans in our review of 54 examinations for 40 banks conducted from 2013 through 2016.<sup>24</sup> In all of these examinations, the regulators specifically assessed whether each bank had adequate risk management practices and capital for managing its CRE concentration risk and generally found that the banks had adequate risk management practices and capital. In a few examinations, regulators differed in how they addressed supervisory concerns about a bank’s CRE-related risk management practices.

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<sup>23</sup>We developed these regression models based on, among other things, the existing early warning model literature which is designed to anticipate banking crises, e.g., Claudio Borio and Mathias Drehmann, “Assessing the risk of banking crises—revisited,” *Bank for International Settlements Quarterly Review* (March 2009). As these authors noted, models of this class are based on the idea that “imbalances manifest themselves in the coexistence of unusually rapid cumulative growth in private sector credit and asset prices.” Our results were consistent with this concept and extend the aggregate early warning model literature to a sectoral model. We also performed diagnostic testing and assessed the forecasting ability of our models. The models’ in-sample and out-of-sample predictions conform to the broad pattern of CRE losses observed in recent decades but a limited data history also implies that our models and their predictions are subject to certain limitations. See appendix II for additional information on our models and associated limitations.

<sup>24</sup>We selected a judgmental, nonprobability sample of 40 banks which resulted in 54 examinations for review. For more details on how we selected our sample of banks, see appendix I.

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## Regulators Examined Whether Banks with Relatively High CRE Concentrations Had Adequate Practices and Capital to Manage Their CRE Concentration Risk

In our review of a nongeneralizable sample of 54 examinations conducted from 2013 through 2016, we found that FDIC, Federal Reserve, and OCC subjected banks with relatively high concentrations in CRE loans to greater supervisory scrutiny.<sup>25</sup> In both their 2006 CRE guidance and 2015 CRE statement, the regulators indicated that banks with relatively high CLD or total CRE concentrations should maintain risk management practices commensurate with the level and nature of their concentration risk. The 2006 CRE guidance recognized that the sophistication of a bank's CRE risk management practices depends on, among other things, the level and nature of its CRE concentrations and associated risk. As noted earlier, the guidance notes that a bank's risk management practices should address seven internal control areas: (1) board and management oversight; (2) portfolio management; (3) management information systems; (4) market analysis; (5) credit underwriting standards; (6) portfolio stress testing and sensitivity analysis; and (7) credit risk review function. Based on our analyses, we found that the 2006 CRE guidance's risk management framework is adequately designed to help ensure that banks effectively identify, measure, monitor, and control their CRE concentration risk. For example, the guidance is consistent with credit and concentration risk principles issued by international standard-setting bodies.<sup>26</sup>

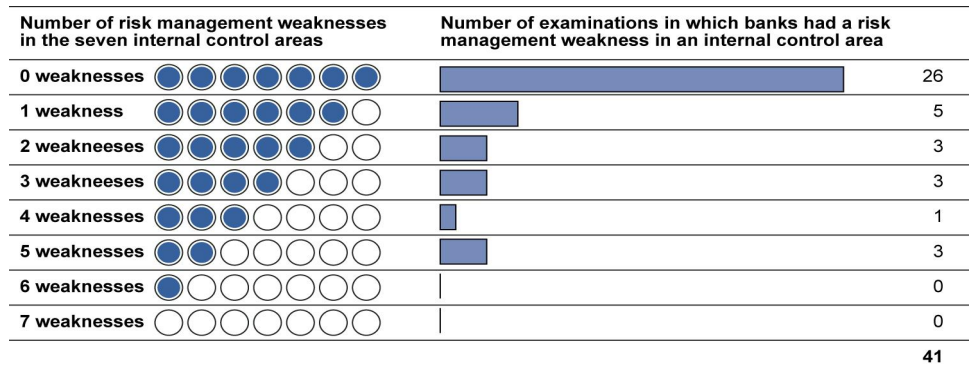
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<sup>25</sup>According to the 2006 CRE guidance, the regulators will use three criteria to identify banks with CRE loan concentrations that could be subject to greater supervisory scrutiny. One of the supervisory criteria is that (1) CLD loans represent 100 percent or more of the bank's total capital or (2) total CRE loans (generally defined as total nonowner-occupied CRE and CLD loans) represent 300 percent or more of the bank's total capital and the bank's total CRE loans have increased by 50 percent or more during the previous 36 months. Because several of the reports of examination we reviewed reported the banks' total CRE concentrations but not their CRE growth rates, for our analysis we classified banks with total CRE concentration of 300 percent or more as banks that exceeded the CRE concentration criterion regardless of their CRE growth rate. Of the banks we classified as having exceeded the total CRE concentration criterion, some of them exceeded the 50 percent growth rates, but other banks may not have.

<sup>26</sup>In addition, the regulators solicited public comments on a draft of the 2006 CRE guidance, collectively received more than 4,400 comment letters, and considered such comments in finalizing the guidance. 71 Fed. Reg. 74580, 74581 (Dec. 12, 2006).

Of the 54 reports of examination that we reviewed, 41 of them covered banks whose CLD or total CRE concentrations exceeded the CLD concentration threshold, total CRE concentration threshold, or both thresholds set forth in the 2006 guidance. In all of these examinations, we found that FDIC, Federal Reserve, and OCC examiners generally assessed whether each bank had implemented adequate risk management practices to manage their concentration risk. As shown in figure 6, in 26 of the 41 examinations, FDIC, Federal Reserve, and OCC examiners did not find any weaknesses in the banks' CRE risk management practices across the seven internal control areas, but did find weaknesses in the remaining 15 examinations.

**Figure 6: Number of Sampled Examinations in Which Federal Banking Regulators Found a Commercial Real Estate-Related Risk Management Weakness in One or More of the Internal Control Areas**



Source: GAO analysis of sampled Federal Deposit Insurance Corporation, Board of Governors of the Federal Reserve System, and Office of the Comptroller of the Currency examinations. | GAO-18-285

Note: The seven internal control areas are (1) board and management oversight; (2) portfolio management; (3) management information systems; (4) market analysis; (5) credit underwriting standards; (6) portfolio stress testing and sensitivity analysis; and (7) credit risk review function.

In 15 of the 41 examinations we reviewed, FDIC, Federal Reserve, and OCC examiners found the banks had CRE-related risk management weaknesses in at least one of the seven internal control areas. Examiners most frequently found risk management weakness in three internal control areas: board and management oversight (11 instances), management information systems (8 instances), and stress testing (7 instances). To a slightly lesser extent, examiners found weaknesses in portfolio management, credit underwriting standards, and credit risk review function. Examiners communicated their supervisory concerns to these 15 banks in their reports of examinations.

- In 12 of the examinations, examiners included MRAs, MRBAs, or MRIAs in their reports of examination that directed the banks to correct their risk management weaknesses.
- In the other three examinations, examiners included recommendations or other notes in their reports of examination that generally directed the banks to correct their risk management weaknesses.

Consistent with the 2006 CRE guidance, we found that examiners generally did not use the CLD or total CRE concentration thresholds as limits on bank CRE lending.<sup>27</sup> With two exceptions, examiners did not direct banks that exceeded the CLD or CRE threshold to reduce their concentrations but rather focused on ensuring that the banks' risk management practices were commensurate with the nature and level of their concentration risk. In the two exceptions, examiners found the banks' practices and capital inadequate for managing their CLD or CRE concentration risk and directed the banks to reduce their concentrations and improve their risk management practices.

We found that FDIC, Federal Reserve, and OCC examiners varied in the extent to which they documented—in the reports of examination and supporting workpapers—the scope of their review of banks' CRE-related risk management practices and findings. For example, we were not always able to determine whether examiners found a bank's practices adequate in one or more of the seven internal control areas based on our review of the report of examination and, if available, supporting workpapers. According to the regulators, reports of examinations are used primarily to document practices found to be inadequate and not practices found to be adequate. Moreover, the regulators told us that their examiners recently have been required to use a CRE examination

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<sup>27</sup>As noted earlier, according to the 2006 CRE guidance, the supervisory criteria for CLD and total CRE concentrations do not constitute limits on a bank's lending activity but rather serve as high-level indicators to identify banks potentially exposed to concentration risk.

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module to document their assessment and findings of banks with concentrations exceeding the CLD or CRE threshold.<sup>28</sup>

### Capital and Concentration Risk

In the 41 examinations we reviewed where banks exceed one of the concentration thresholds, FDIC, Federal Reserve, and OCC examiners assessed whether the banks generally had capital commensurate with their CRE concentration risk. In 34 of the examinations, examiners determined that the banks' capital levels were adequate for managing their CLD or total CRE concentration risk. In 7 of the examinations, examiners determined that the banks' capital levels were inadequate. For six of the seven banks, examiners directed the banks in the reports of examination to reduce or manage their CRE concentrations in light of inadequate capital. In the case of one bank, examiners required the bank to comply with a previous formal enforcement action that addressed the need for the bank to adhere to its board-approved capital plan.

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### Review of CRE-Related Risk Management Practices in Subsequent Examination Cycles

For banks with relatively high CLD or total CRE concentrations, we found that Federal Reserve and OCC examiners assessed the banks' CRE-related risk management practices in subsequent examinations.<sup>29</sup> In our review of 41 examinations of banks that exceeded the CLD or CRE threshold, 26 of them covered two examination cycles of 13 banks conducted from 2013 through 2016. We found that examiners assessed the banks' practices for managing their concentration risk in both examinations.

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<sup>28</sup>According to OCC officials, the agency created an electronic workpaper in August 2017 that its examiners use to document their review of the CRE-related risk management practices of banks exceeding the CLD or total CRE threshold. Similarly, FDIC instituted a CRE work-program on April 1, 2017, that requires its examiners to document their review of the risk management practices across the seven internal control areas for banks exceeding the CLD or total CRE threshold. While the Federal Reserve has had a CRE examination module that examiners used at their discretion, Federal Reserve officials told us that their examiners were directed to use the module when examining banks exceeding the CLD or total CRE threshold after the issuance of the joint 2015 CRE statement.

<sup>29</sup>FDIC's Office of Inspector General is conducting a similar review of CRE lending and planned to review a sample of FDIC's examinations conducted in 2015 and later. To avoid duplicating such work, we limited the scope of our work to review FDIC examinations conducted in 2013 or 2014.

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- In 14 examinations (covering 7 banks), examiners found that the banks had adequate risk management practices in both examinations.
  - In six examinations (covering three banks), examiners found aspects of the banks' risk management practices to be inadequate in their 2013 or 2014 examination and noted their supervisory concerns in the reports of examination. In the subsequent examinations, the examiners found that the banks had adequately addressed the previously identified risk management weaknesses.
  - In six examinations (covering three banks), examiners found the banks' practices for managing their CRE concentration risk to be adequate in the 2013 or 2014 examinations but inadequate in the subsequent examinations. The examiners issued the banks MRAs or MRIAs or took an informal enforcement action.

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### Regulators Generally Did Not Examine CRE-Related Risk Management Practices of Banks with Concentrations below the CLD or Total CRE Threshold

For banks with concentrations below the CLD or total CRE threshold, we found that regulators generally did not examine the banks' CRE-related risk management practices. Thirteen of the 54 examinations we reviewed covered banks that did not exceed the CLD or CRE thresholds. Although the banks did not exceed either threshold, OCC examiners assessed the banks' CRE-related risk management practices in 3 of the examinations.<sup>30</sup> In 1 examination, examiners determined that the bank's CRE-related risk management practices were adequate. The other 2 examinations covered subsequent cycle examinations of the same bank. In the first examination, examiners found that the bank had adequate practices for managing risk associated with its CRE loans but directed the bank through an MRA to incorporate stress testing of the loan portfolio into its monitoring. In the subsequent examination, the examiners found that the bank had addressed the MRA. In the other 10 examinations, FDIC, Federal Reserve, and OCC examiners did not mention in the report of

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<sup>30</sup>According to the 2006 CRE guidance, the CLD and CRE thresholds serve as a screen for identifying banks with potential CRE concentration risk but should not be viewed as a "safe harbor" if other risk indicators are present. The guidance also notes that banks experiencing recent, significant growth in CRE lending are to receive closer supervisory review than other banks that have demonstrated a successful track record of managing the risks in CRE concentrations.



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examination the banks' practices for managing the risk associated with their CRE loans.

FDIC, Federal Reserve, and OCC officials told us that examiners use their professional judgment in determining whether to review a bank's CRE-related risk management practices if the bank's concentration is below the CLD and CRE threshold. This approach is consistent with the overall risk-based supervisory process used by the regulators, which focuses examiner resources on assessing bank management's ability to identify and control risks. For example, FDIC's examination guidelines note that examiners should focus their resources on a bank's highest risk areas when assessing risk management programs, financial conditions, and internal controls.<sup>31</sup> According to the guidance, the exercise of examiner judgment to determine the scope and depth of review in each functional area is crucial to the success of the risk-focused supervisory process.

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### Regulators Differed in How They Addressed a Few Supervisory Concerns about Banks' CRE-Related Risk Management Practices

In a few examinations, we found differences across regulators in how they addressed supervisory concerns about banks' CRE-related risk management practices because of differences in the regulators' policies. In our nongeneralizable sample of 54 examinations, Federal Reserve, FDIC, and OCC examiners included CRE-related supervisory concerns, such as recommendations, MRAs, or MRBAs, in 22 of the reports of examinations.<sup>32</sup> Although the regulators have policies for identifying and communicating supervisory concerns, their policies use different criteria. For example, OCC's policies instruct examiners to use MRAs to describe practices that a bank must implement or correct to address a deficiency and not to use MRAs to require enhancements to bank practices that

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<sup>31</sup>See, for example, Federal Deposit Insurance Corporation, *RMS Manual of Examination Policies, Basic Examination Concepts and Guidelines* (February 2016).

<sup>32</sup>Specifically, we found that examiners communicated their supervisory concerns as an MRA, MRIA, or MRBA in 16 of these examinations and as recommendations in the remaining 6 examinations. In general, recommendations are less stringent than MRAs, MRIAs, and MRBAs.

meet acceptable standards.<sup>33</sup> However, the Federal Reserve's and FDIC's policies do not expressly include such criteria.<sup>34</sup> Consistent with their policies, OCC examiners included MRAs in the reports of examination that we reviewed only when they found a bank's CRE-related risk-management practices to be inadequate. In contrast, in 2 reports of examination, we found that FDIC examiners did not find the banks' CRE-related risk management practices to be inadequate but included MRBAs to direct the banks to enhance or sustain certain CRE-related risk management practices. Similarly, in 1 report of examination, Federal Reserve examiners found that the bank's risk management practices and capital were adequate for its CRE concentrations but included an MRA to require the bank to enhance its capital plan to include concentration risk considerations.

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### FDIC, Federal Reserve, and OCC Have Recently Taken Formal Enforcement Actions against Banks for Not Adequately Managing Their CRE Concentration Risk

In addition to their examinations, federal banking regulators have taken informal and formal enforcement actions against banks for not adequately managing their CRE concentration risk. In general, initial consideration and determination of whether informal or formal action is required usually results from examination findings. Unlike informal enforcement actions, formal enforcement actions are published or publicly available. From 2013 through 2016, FDIC, the Federal Reserve, and OCC took formal enforcement actions against banks for not adequately managing risks

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<sup>33</sup>According to OCC's policies, MRAs describe practices that a bank must implement or correct, ideally before those deficient practices affect the bank's condition.

<sup>34</sup>According to FDIC's policies, supervisory recommendations may be designed to correct, among other things, practices that deviate from sound governance, internal controls, or risk management principles. Supervisory recommendations also may be designed to encourage an institution to more fully take into account supervisory guidance in a manner that is commensurate with the institution's nature of business, size, and complexity for safety and soundness or consumer protection purposes. According to FDIC's policies, recommendations may be included in the report of examination and most recommendations are correctable in the normal course of business, but recommendations involving an issue or risk of significant importance that would typically require more effort to address than those correctable in the normal course of business, need to be brought to the attention of the board and senior management through comments in an MRBA. According to the Federal Reserve's policies, MRAs constitute matters that are important and that the Federal Reserve expects a bank to address over a reasonable period of time, but the timing need not be immediate.

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related to their CRE concentrations, including those outlined in the jointly issued 2006 CRE guidance.

- FDIC took 22 formal enforcement actions against banks for matters related to their CRE concentrations during this period.
- The Federal Reserve took 2 formal enforcement actions against banks for matters related to their risk management of CRE lending.
- OCC took 11 formal enforcement actions against banks for matters related to their CRE concentrations during this same period.

The majority of these formal enforcement actions discussed the 2006 CRE guidance and directed the banks to improve their practices for managing their CRE concentration risk. For example, in a number of formal enforcement actions, the regulators ordered the banks to revise their written concentration risk management programs for identifying, monitoring, and controlling risks associated with concentrations of credit, consistent with the 2006 CRE guidance.

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## Agency Comments

We provided a draft of this report to FDIC, the Federal Reserve, and OCC for review and comment. The agencies provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees and FDIC, the Federal Reserve, and OCC. This report will also be available at no charge on our website at <http://www.gao.gov>.

Should you or your staff have questions concerning this report, please contact me at (202) 512-8678 or [evansl@gao.gov](mailto:evansl@gao.gov). Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. Key contributors to this report are listed in appendix VII.



Lawrance L. Evans, Jr.  
Managing Director, Financial Markets and Community Investment

## Appendix I: Objectives, Scope, and Methodology

Our objectives in this report were to examine: (1) trends in the commercial real estate (CRE) lending markets, including changes in the level of credit and concentration risk in the markets, and (2) actions federal banking regulators took through their examinations to help ensure that banks with CRE concentrations are effectively managing the related risks.

To examine trends in the CRE lending markets, we reviewed academic literature and prior GAO work and interviewed officials from the federal banking regulators and private data providers. Specifically, we interviewed officials at the Board of Governors of the Federal Reserve System (Federal Reserve), the Federal Deposit Insurance Corporation (FDIC), and the Office of the Comptroller of the Currency (OCC) to help identify potential indicators of risk in CRE markets. To further inform our assessment of risk, we reviewed prior GAO work on the lessons learned from prior banking crises and the use of early warning models for monitoring the financial system.<sup>1</sup> We also reviewed academic research on early warning models of banking and real estate-related crises.

To report trends and assess risk, we reviewed and analyzed a range of data that we considered to be reflective of various aspects of risk in CRE lending markets. Specifically, we reviewed and analyzed commercial property vacancy data from REIS (a private commercial real estate data provider); commercial property construction data from the U.S. Census Bureau; data on delinquencies and charge-offs on bank CRE loans from the Federal Reserve; data on commercial property prices and capitalization rates from Real Capital Analytics (a private commercial real estate data provider); FDIC data on bank CRE lending; and Federal Reserve data on underwriting standards. We evaluated trends in these data and used a subset of these data to estimate several predictive

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<sup>1</sup>See GAO, *Bank Regulation: Lessons Learned and a Framework for Monitoring Emerging Risks and Regulatory Response*, [GAO-15-365](#) (Washington, D.C.: June 25, 2015) and *Financial Stability: New Council and Research Office Should Strengthen the Accountability and Transparency of Their Decisions*, [GAO-12-886](#) (Washington, D.C.: Sept. 11, 2012).

models of aggregate losses on bank CRE loans. (See app. II for more information on our predictive models.)

To examine actions taken by federal regulators to help ensure that banks with high CRE concentrations are effectively managing the related risks, we reviewed and analyzed their relevant guidance and regulations on bank CRE lending, examination policies and procedures (e.g., examination manuals and modules), studies and other publications on risks in the banking industry, and formal enforcement actions taken from 2013 through 2016 for CRE-related matters. In addition, we analyzed Consolidated Reports of Condition and Income data from SNL Financial for the period from 2011 through 2016 to calculate banks' construction and land development (CLD) and CRE concentrations during the period.<sup>2</sup> Specifically, we used the concentration formulas in the 2006 CRE concentration guidance (jointly issued by the federal banking regulators) to calculate banks' CLD and CRE concentrations and identify banks whose CRE concentrations exceeded, in full or in part, the guidance's CRE concentration thresholds during part or all of the time frame.<sup>3</sup> Based on whether the banks' CRE concentrations exceeded the thresholds and other criteria discussed below, we selected a nongeneralizable sample of 40 banks overseen by FDIC, the Federal Reserve, or OCC. For the banks in our sample, we requested from the regulators copies of the reports of examination and, if available, related workpapers prepared by the regulators based on their full-scope examinations of the banks done from 2013 through 2014, and from 2015 through 2016.

In addition to using banks' CRE concentrations as a basis to select examinations, we judgmentally selected a nonprobability sample of banks based on the following criteria:

- **Total asset size:** We considered the size of the banks based on their total assets and selected banks from each of the following three ranges: (1) banks with \$1 billion or more in total assets, (2) banks with \$100 million or more but less than \$1 billion in total assets, and (3) banks with less than \$100 million in total assets.

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<sup>2</sup>SNL Financial recently became S&P Global Market Intelligence, a division of S&P Global. S&P Global Market Intelligence is a provider of financial data, news, and analytics.

<sup>3</sup>Concentrations in Commercial Real Estate Lending, Sound Risk Management Practices, 71 Fed. Reg. 74580 (Dec. 12, 2006).

- **Primary regulator:** We considered the primary regulator of the banks and selected a sample of 40 banks that resulted in a total of 20 examinations to review from each regulator.<sup>4</sup>
- **Geographic distribution:** We selected banks to ensure that at least one bank was from each of the four regions of the U.S. Census and each of the nine divisions within those regions.

Based on the 40 banks we selected, we reviewed and analyzed 54 reports of examination and, if available, the related workpapers. We analyzed the examinations using criteria or other requirements specified in the 2006 CRE guidance jointly issued by the regulators and their examination policies and procedures. We did not review six examinations of banks supervised by the Federal Reserve.<sup>5</sup> We also interviewed officials from FDIC, Federal Reserve, and OCC, and from a national banking association about bank CRE lending and applicable CRE guidance and requirements.

For the data we analyzed under both of our objectives, we took a number of steps to assess the reliability of the data, including interviewing data providers; corroborating trends across multiple data sources; reviewing related documentation; inspecting data for missing values, outliers, or other errors; and reviewing relevant, prior GAO work. We determined that these data were sufficiently reliable for our reporting objectives.

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<sup>4</sup>We selected a total of 20 banks to review from FDIC, 10 from the Federal Reserve, and 10 from OCC. We selected 20 banks from FDIC because, during the course of work, officials from FDIC's Office of Inspector General told us that they were conducting a similar review of CRE lending and planned to review a sample of FDIC's examinations conducted in 2015 or later. As such, we requested examination reports and workpapers for examinations issued during only one of the cycles in our sample—the 2013–2014 cycle—to arrive at a total of 20 examinations to review from FDIC. We selected 10 banks each from the Federal Reserve and OCC for examinations conducted in both cycles—2013–2014 and 2015–2016—to arrive at a total of 20 examinations to review from each of these two regulators.

<sup>5</sup>For five of the banks, the Federal Reserve did not conduct a full-scope examination of the banks during one of the two examination cycles in our review. Under the alternate-year examination program, banks that qualify are examined in alternate examination cycles by the Reserve Bank and the state. Thus, a particular bank would be examined by the Reserve Bank in one examination cycle and the state in the next. If a state solely conducted the bank examination, we did not request and review the examination. Another bank that we selected applied to become a member of the Federal Reserve System in 2016. Thus, the Federal Reserve did not conduct a full-scope examination of the bank during the time frame of our review, but did conduct a limited-scope, pre-membership examination targeting the bank's CRE lending in 2016. We included this examination in our review..

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We conducted this performance audit from January 2017 to March 2018 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

## Appendix II: GAO Predictive Models of Aggregate Losses on Bank Commercial Real Estate Loans

We developed and estimated several models of aggregate losses on bank commercial real estate (CRE) loans. These models attempt to predict future aggregate charge-offs using contemporary indicators of potential risks.<sup>1</sup> We incorporated indicators of risk based on the cross-country research literature on early warning models of banking risk and prior GAO work on identifying early warning models as tools that could assist financial regulators in assessing risk.<sup>2</sup> One study summarized the overall intuition for models of this class in the following way: “imbalances manifest themselves in the coexistence of unusually rapid cumulative growth in private sector credit and asset prices.”<sup>3</sup> Our results were consistent with this concept and extend the aggregate early warning model literature to a sectoral model. As such, our models incorporate measures of CRE property prices, bank lending volumes, and bank loan underwriting standards.

The models predict charge-offs 2–3 years into the future (the dependent variable is the average charge-off rate for 8 through 11 quarters into the future), using commercial bank charge-off rates from the Board of Governors of the Federal Reserve System (Federal Reserve), first quarter 1991 to second quarter 2017. (See below for an illustrative regression equation for one of these models.)

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<sup>1</sup>Charge-offs, which are the value of loans removed from the books and charged against loss reserves, are measured net of recoveries as a percentage of average loans and annualized.

<sup>2</sup>See Claudio Borio and Mathias Drehmann, “Assessing the risk of banking crises—revisited,” *Bank for International Settlements Quarterly Review* (March 2009); Stijn Ferrari, Mara Pirovano, and Wanda Cornacchia, *Identifying early warning indicators for real estate-related banking crises*, European Systemic Risk Board Occasional Paper Series no. 8 (August 2015); and [GAO-12-886](#).

<sup>3</sup>Claudio Borio and Mathias Drehmann, “Assessing the risk of banking crises—revisited,” *Bank for International Settlements Quarterly Review* (March 2009).



We began with two model variations, one based on the levels of key variables and the other based on their growth rates, using the following independent variables, respectively:

- “Level” model: Level of CRE prices to gross domestic product (GDP), level of bank CRE lending to GDP, the interaction of the level of CRE prices and lending, and the net percentage of banks tightening underwriting standards on CRE loans.
- “Growth” model: Growth rate of CRE prices over the last year, growth rate of bank CRE lending over the last year, interaction of price and lending growth, and the net percentage of banks tightening underwriting standards on CRE loans.

All variables are based on quarterly U.S. data, including CRE price indices from Real Capital Analytics and Standard & Poor’s, bank balance sheet data from the Federal Deposit Insurance Corporation, underwriting data from the Federal Reserve’s Senior Loan Officer Opinion Survey, and gross domestic product and associated deflators from the Bureau of Economic Analysis. We estimated both models and assessed in-sample fit while reserving the last year of data for out-of-sample testing. The model based on levels had far superior in-sample fit, and we iterated from that model in additional specifications. Out-of-sample fit for the model based on levels was somewhat weaker than in-sample fit. The regression equation for this model is below:

$$\begin{aligned}
 \text{CRE charge-off rate}_{t+2 \text{ to } 3} &= \beta_0 + \beta_1 \times \text{CRE bank loans/GDP}_t + \beta_2 \\
 &\times \text{CRE prices/GDP}_t + \beta_3 \\
 &\times \text{Net percentage of banks tightening CRE underwriting}_t \\
 &+ \beta_4 \times (\text{CRE bank loans/GDP}_t \times \text{CRE prices/GDP}_t) + \varepsilon_t
 \end{aligned}$$

$$\begin{aligned}
 \text{CRE charge-off rate (t+2 to 3)} &= \beta_0 + \beta_1 \times \text{CRE bank} \\
 &\text{loans/GDP}_t + \beta_2 \times \text{CRE prices/GDP}_t + \beta_3 \times \text{Net percentage of banks} \\
 &\text{tightening CRE underwriting}_t + \beta_4 \times (\text{CRE bank loans/GDP}_t \times \text{CRE} \\
 &\text{prices/GDP}_t) + \varepsilon_t
 \end{aligned}$$

By inspection, the model based on levels also captured key aspects of the evolution of aggregate losses on bank CRE loans in recent decades—for example, low charge-offs prior to the crisis, the rapid increase during crisis, and very low charge-offs in recent years. In this model higher losses are predicted by tightening underwriting standards, and the interaction of (i.e., simultaneous increase in) the level of CRE

prices and the level of CRE lending. The bulk of the explanatory power of the model appears to come from the interaction of the level of CRE prices and the level of CRE lending—consistent with Borio and Drehmann’s view that the coexistence of rapidly increasing credit and prices is associated with greater risk.<sup>4</sup> These results are also consistent with a more general theory, for example, that periods of economic stability induce greater risk-taking over time, bidding up asset prices and loosening underwriting standards until ultimately increased valuations become unsustainable, prices fall, and borrowers begin to default.<sup>5</sup>

We estimated a number of additional models for robustness, to determine if goodness-of-fit and forecasts could be improved markedly, and to assess the degree of forecast uncertainty. For example we estimated a model with a censored dependent variable and used information criteria to select models that combined elements from our initially separate models based on growth rates and levels as well as a model that includes current charge-offs. In figure 7, we report the general trend in expected future charge-offs as well as convey forecast uncertainty based on differences in the forecasts of three of these models.

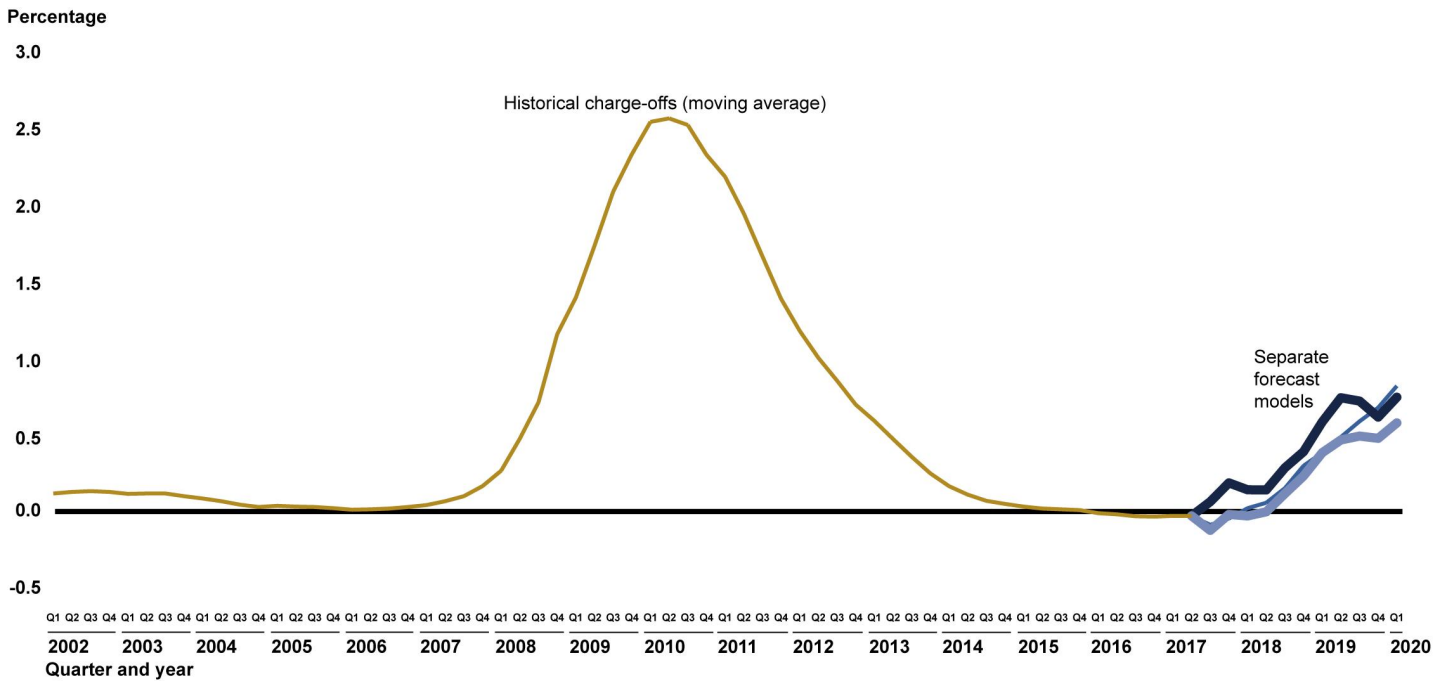
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<sup>4</sup>Claudio Borio and Mathias Drehmann, “Assessing the risk of banking crises—revisited,” *Bank for International Settlements Quarterly Review* (March 2009).

<sup>5</sup>See, e.g., Hyman Minsky, *The financial instability hypothesis*, Levy Economics Institute Working Paper no. 74 (May 1992) and Karl Case and Robert Shiller, “Is there a bubble in the housing market?” *Brookings Papers on Economic Activity*, vol. 2003, no. 2 (2003).

Appendix II: GAO Predictive Models of Aggregate Losses on Bank Commercial Real Estate Loans

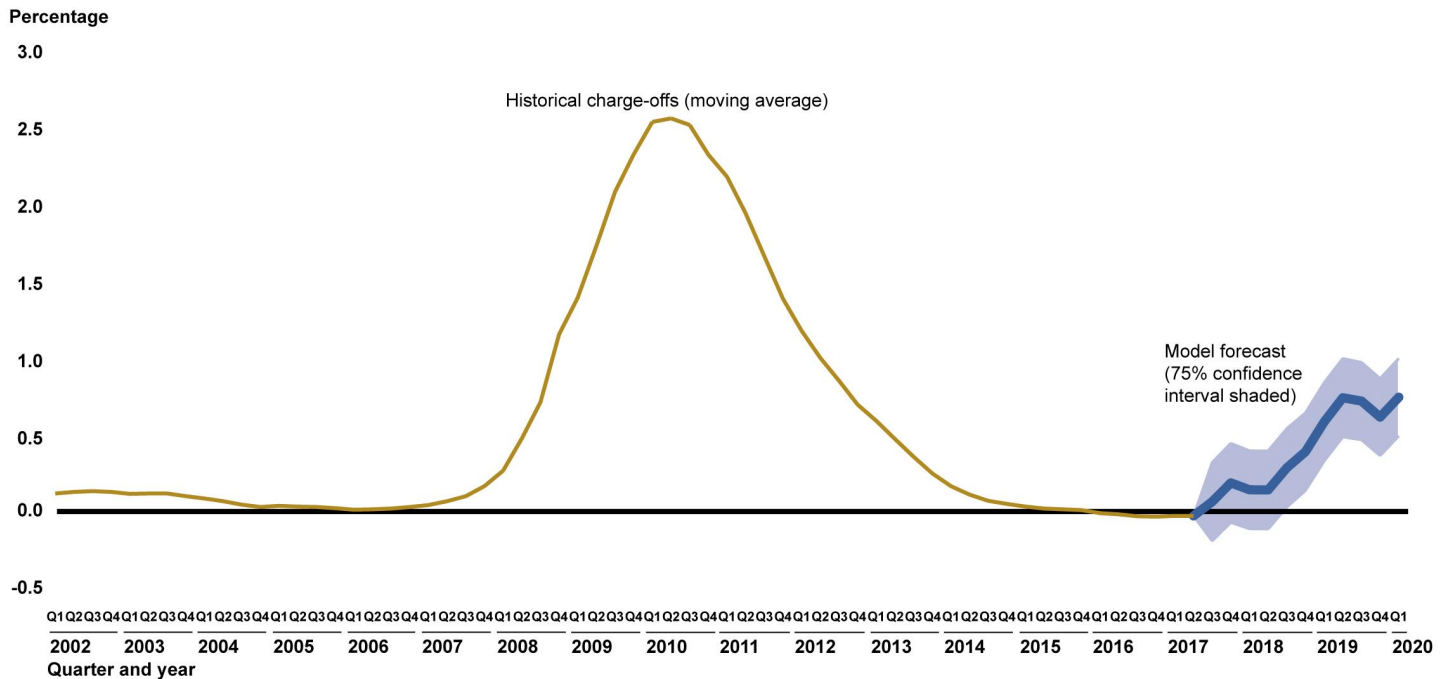
Figure 7: Historical Charge-offs from 2002–2017 (1 year moving average) with Predictive Model Forecast Comparison, 2017–2020



Source: GAO regression forecast results based on analysis of data from the Federal Reserve, Federal Deposit Insurance Corporation, Real Capital Analytics, Standard & Poor's, and Bureau of Economic Analysis. | GAO-18-245

In figure 8, we convey forecast uncertainty based on the 75 percent confidence interval for a combined model that we selected based on information criteria.

Figure 8: Historical Charge-offs from 2002–2017 (1 year moving average) with Predictive Model Forecast and Confidence Intervals, 2017–2020



Source: GAO regression forecast results based on analysis of data from the Federal Reserve, Federal Deposit Insurance Corporation, Real Capital Analytics, Standard & Poor's, and Bureau of Economic Analysis. | GAO-18-245

Implicit in this exercise is the assumption that the data-generating process is reasonably stable—as a result, structural change associated with new financial products, new risk management tools, and new legal and regulatory frameworks could reduce the stability of the data-generating process. We interpret our results and forecasts in light of these potential limitations. Specifically, we do not interpret model results as concrete, precise predictions of aggregate commercial real estate losses but rather as an additional, general indication of the degree of risk in bank CRE lending.

We mitigate risks associated with estimating this type of model with appropriate diagnostics, out-of-sample testing, and by developing the model in the context of the well-established early warning literature. That said, some inevitable limitations remain, including the potential omission of important risk factors and other approximations associated with our specification (e.g., our choice of a linear functional form). In addition, diagnostics for detecting nonstationary time series are imperfect, especially with small sample sizes, which may inflate our measures of statistical significance and traditional goodness-of-fit measures like r-

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squared. These biases may be present, however, in models that still generate useful predictions. In this “small data” context there is also risk of fitting (or over-fitting) the model to predict a particular credit event—though, again, this risk is mitigated somewhat in the context of the broad cross-country early warning literature and the use of out-of-sample testing.

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## Appendix III: GAO Contact and Staff Acknowledgments

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### GAO Contact

Lawrance Evans, 202-512-8678, or [evansl@gao.gov](mailto:evansl@gao.gov)

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### Staff Acknowledgments

In addition to the contact named above, Richard Tsuhara (Assistant Director), Tarek Mahmassani (Analyst in Charge), Abigail Brown, Tarik Carter, M'Baye Diagne, Michael Hoffman, Risto Laboski, Marc Molino, Jessica Sandler, Jennifer Schwartz, and Andrew Stavisky made significant contributions to this report.

# Appendix IV: Accessible Data

## Data Tables

**Data Table for Highlights figure Number of Banks with Commercial Real Estate Loans Representing 300 Percent or More of Their Total Capital, Based on Year-End Data, 2007–2017**

Year and Quarter	Number of Banks Exceeding CRE (300%)
2007Q4	597
2008Q4	655
2009Q4	531
2010Q4	414
2011Q4	318
2012Q4	287
2013Q4	279
2014Q4	323
2015Q4	378
2016Q4	425
2017Q2	450

**Data Table for Figure 2: Delinquency and Charge-off Rates on Bank Commercial Real Estate Loans from 2002 through Second Quarter of 2017**

Year/Quarter	Delinquency rate	Charge-off rate
2002-Q1	1.78	0.17
Q2	1.76	0.14
Q3	1.69	0.15
Q4	1.61	0.16
2003-Q1	1.67	0.12
Q2	1.61	0.15
Q3	1.48	0.15
Q4	1.40	0.09
2004-Q1	1.25	0.06
Q2	1.26	0.08
Q3	1.19	0.06
Q4	1.10	0.03
2005-Q1	1.12	0.09

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Year/Quarter	Delinquency rate	Charge-off rate
Q2	1.05	0.06
Q3	1.07	0.05
Q4	1.03	0.00
2006-Q1	1.02	0.05
Q2	1.02	0.07
Q3	1.13	0.07
Q4	1.32	0.04
2007-Q1	1.43	0.10
Q2	1.63	0.17
Q3	1.97	0.20
Q4	2.75	0.30
2008-Q1	3.50	0.50
Q2	4.16	1.00
Q3	4.64	1.14
Q4	5.48	2.06
2009-Q1	6.59	1.45
Q2	7.85	2.34
Q3	8.50	2.54
Q4	8.72	3.03
2010-Q1	8.75	2.29
Q2	8.76	2.43
Q3	8.59	2.37
Q4	7.95	2.26
2011-Q1	7.56	1.72
Q2	7.09	1.48
Q3	6.66	1.26
Q4	6.11	1.16
2012-Q1	5.48	0.89
Q2	5.00	0.78
Q3	4.60	0.67
Q4	4.13	0.54
2013-Q1	3.67	0.47
Q2	3.28	0.31
Q3	2.81	0.21
Q4	2.47	0.11
2014-Q1	2.21	0.14
Q2	1.95	0.09



Year/Quarter	Delinquency rate	Charge-off rate
Q3	1.77	0.05
Q4	1.57	0.03
2015-Q1	1.41	0.07
Q2	1.28	0.04
Q3	1.15	0.03
Q4	1.05	0.01
2016-Q1	0.97	-0.01
Q2	0.92	0.01
Q3	0.86	-0.02
Q4	0.85	0.00
2017-Q1	0.79	0.01
Q2	0.77	0.01

**Data Table for Figure 3: Change in Underwriting Standards by Banks for Commercial Real Estate Properties from First Quarter of 2002 through Second Quarter of 2017**

Year/Quarter	All commercial real estate	All commercial real estate (weighted average starting 2013 Q4)	Construction and land development	Nonfarm nonresidential	Multifamily
2002:Q1	46.3	NA	NA	NA	NA
2002:Q2	30.9	NA	NA	NA	NA
2002:Q3	25.5	NA	NA	NA	NA
2002:Q4	22.2	NA	NA	NA	NA
2003:Q1	13.6	NA	NA	NA	NA
2003:Q2	17.8	NA	NA	NA	NA
2003:Q3	13.8	NA	NA	NA	NA
2003:Q4	0	NA	NA	NA	NA
2004:Q1	-5.5	NA	NA	NA	NA
2004:Q2	-10.7	NA	NA	NA	NA
2004:Q3	-8.9	NA	NA	NA	NA
2004:Q4	-17.5	NA	NA	NA	NA
2005:Q1	-23.7	NA	NA	NA	NA
2005:Q2	-22.2	NA	NA	NA	NA
2005:Q3	-12.9	NA	NA	NA	NA
2005:Q4	-5.2	NA	NA	NA	NA
2006:Q1	1.8	NA	NA	NA	NA
2006:Q2	1.8	NA	NA	NA	NA
2006:Q3	10.7	NA	NA	NA	NA

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Year/Quarter	All commercial real estate	All commercial real estate (weighted average starting 2013 Q4)	Construction and land development	Nonfarm nonresidential	Multifamily
2006:Q4	36.3	NA	NA	NA	NA
2007:Q1	26.3	NA	NA	NA	NA
2007:Q2	30.2	NA	NA	NA	NA
2007:Q3	25	NA	NA	NA	NA
2007:Q4	50	NA	NA	NA	NA
2008:Q1	80.3	NA	NA	NA	NA
2008:Q2	78.6	NA	NA	NA	NA
2008:Q3	80.7	NA	NA	NA	NA
2008:Q4	87	NA	NA	NA	NA
2009:Q1	79.2	NA	NA	NA	NA
2009:Q2	66	NA	NA	NA	NA
2009:Q3	46.3	NA	NA	NA	NA
2009:Q4	33.9	NA	NA	NA	NA
2010:Q1	27.3	NA	NA	NA	NA
2010:Q2	12.5	NA	NA	NA	NA
2010:Q3	5.3	NA	NA	NA	NA
2010:Q4	3.6	NA	NA	NA	NA
2011:Q1	0	NA	NA	NA	NA
2011:Q2	-5.5	NA	NA	NA	NA
2011:Q3	-5.5	NA	NA	NA	NA
2011:Q4	-2	NA	NA	NA	NA
2012:Q1	-1.8	NA	NA	NA	NA
2012:Q2	-13.8	NA	NA	NA	NA
2012:Q3	-10.9	NA	NA	NA	NA
2012:Q4	-8.8	NA	NA	NA	NA
2013:Q1	-13.4	NA	NA	NA	NA
2013:Q2	-20.9	NA	NA	NA	NA
2013:Q3	-19.2	NA	NA	NA	NA
2013:Q4	NA	-7.7	-9.9	-6.8	-9.7
2014:Q1	NA	-6.9	-8.1	-6.7	-6.8
2014:Q2	NA	-7.2	-4.2	-8.2	-5.6
2014:Q3	NA	-6.6	-9.6	-8.1	1.4
2014:Q4	NA	-5.9	-10.8	-6.7	1.3
2015:Q1	NA	-1.4	-2.8	-1.4	0
2015:Q2	NA	-5.0	-2.7	-7.9	4

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Year/Quarter	All commercial real estate	All commercial real estate (weighted average starting 2013 Q4)	Construction and land development	Nonfarm nonresidential	Multifamily
2015:Q3	NA	-6.0	1.4	-8.5	-2.9
2015:Q4	NA	4.9	4.3	4.4	7.4
2016:Q1	NA	9.8	12.7	5.6	22.5
2016:Q2	NA	18.2	24.6	11.6	36.2
2016:Q3	NA	25.2	31.4	18.3	44.3
2016:Q4	NA	24.5	27.5	18.8	42
2017:Q1	NA	18.7	25	13	33.3
2017:Q2	NA	20.1	32.4	12.5	36.1

Data Table for Figure 4: Capitalization Rates on Commercial Real Estate Properties from January 2002 to September 2017

Date	OFCRANAT Index	RETRANAT Index	APRTNCAP Index	RINDANAT Index
1/31/2002	9.53	9.11	8.43	9.72
2/28/2002	9.52	9.06	8.53	9.92
3/31/2002	9.53	9.4	8.36	9.59
4/30/2002	9.37	9.32	8.25	9.53
5/31/2002	9.22	9.16	8.06	9.26
6/30/2002	9.04	9.02	8.11	9.33
7/31/2002	9.09	9.02	8.15	9.35
8/31/2002	8.95	9.11	8.14	9.22
9/30/2002	8.9	9	7.96	9.12
10/31/2002	8.79	8.93	7.83	8.82
11/30/2002	8.88	8.73	7.91	8.81
12/31/2002	9.02	8.75	7.81	9.08
1/31/2003	9.09	8.54	7.83	9.01
2/28/2003	9.04	8.57	7.69	9.07
3/31/2003	8.96	8.28	7.66	9.01
4/30/2003	8.91	8.36	7.56	9.05
5/31/2003	8.92	8.18	7.59	8.98
6/30/2003	8.79	8.43	7.41	8.61
7/31/2003	8.65	8.5	7.32	8.82
8/31/2003	8.51	8.49	7.22	8.79
9/30/2003	8.47	8.32	7.22	8.95
10/31/2003	8.5	8.17	7.14	8.67
11/30/2003	8.51	8.14	7.07	8.55
12/31/2003	8.54	7.93	7.07	8.48

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Date	OFCRANAT Index	RETRANAT Index	APRTNCAP Index	RINDANAT Index
1/31/2004	8.46	7.89	7.02	8.46
2/29/2004	8.38	7.81	6.91	8.39
3/31/2004	8.32	7.83	6.91	8.22
4/30/2004	8.15	7.85	6.9	8.17
5/31/2004	8.14	7.79	6.99	8.2
6/30/2004	8.04	7.83	6.83	8.08
7/31/2004	8.07	7.73	6.79	8.24
8/31/2004	8.06	7.66	6.57	8.23
9/30/2004	8.03	7.6	6.51	8.5
10/31/2004	7.98	7.53	6.32	8.59
11/30/2004	7.87	7.51	6.32	8.52
12/31/2004	7.64	7.41	6.22	8.05
1/31/2005	7.65	7.45	6.34	7.89
2/28/2005	7.62	7.35	6.28	7.95
3/31/2005	7.61	7.24	6.28	8.26
4/30/2005	7.46	7.16	6.2	8.22
5/31/2005	7.46	7.14	6.2	7.76
6/30/2005	7.37	7.09	6.14	7.55
7/31/2005	7.28	7	5.92	7.58
8/31/2005	7.15	7.03	5.86	7.75
9/30/2005	7.08	6.95	5.78	7.58
10/31/2005	7	6.86	5.87	7.45
11/30/2005	6.97	6.79	5.65	7.56
12/31/2005	6.94	6.78	5.7	7.53
1/31/2006	7	6.76	5.79	7.44
2/28/2006	7.08	6.76	5.93	7.29
3/31/2006	7.02	6.72	5.85	7.16
4/30/2006	7.13	6.68	5.88	7.18
5/31/2006	6.99	6.64	5.94	7.1
6/30/2006	6.99	6.67	6	7.1
7/31/2006	6.77	6.67	5.87	7.02
8/31/2006	6.84	6.61	5.82	7.17
9/30/2006	6.82	6.62	5.99	7.17
10/31/2006	6.88	6.63	6.08	7.39
11/30/2006	6.68	6.69	6.15	7.26
12/31/2006	6.65	6.61	6.03	7.34
1/31/2007	6.57	6.63	6.01	7.16

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Date	OFCRANAT Index	RETRANAT Index	APRTNCAP Index	RINDANAT Index
2/28/2007	6.53	6.6	6.06	7.05
3/31/2007	6.59	6.62	6.11	6.9
4/30/2007	6.57	6.59	6.05	6.87
5/31/2007	6.54	6.57	6.03	6.82
6/30/2007	6.36	6.56	6.06	6.71
7/31/2007	6.31	6.56	6.18	6.72
8/31/2007	6.42	6.52	6.06	6.71
9/30/2007	6.51	6.54	6.05	6.79
10/31/2007	6.58	6.54	6.1	6.87
11/30/2007	6.41	6.6	6.18	7.08
12/31/2007	6.5	6.72	6.12	7.25
1/31/2008	6.61	6.76	5.95	7.14
2/29/2008	6.87	6.81	6.01	7.21
3/31/2008	7.05	6.86	6.08	7.21
4/30/2008	7	6.9	6.23	7.4
5/31/2008	6.91	6.81	6.39	7.4
6/30/2008	6.96	6.77	6.51	7.42
7/31/2008	7.15	6.77	6.53	7.36
8/31/2008	7.22	6.84	6.54	7.34
9/30/2008	7.11	6.82	6.5	7.52
10/31/2008	6.95	6.92	6.57	7.62
11/30/2008	7.13	7.02	6.64	7.75
12/31/2008	7.35	7.14	6.78	7.76
1/31/2009	7.7	7.28	6.82	8.4
2/28/2009	7.64	7.32	6.77	8.76
3/31/2009	7.88	7.36	6.69	8.27
4/30/2009	7.62	7.3	6.62	8.02
5/31/2009	7.76	7.33	6.67	8.04
6/30/2009	7.88	7.57	6.83	8.26
7/31/2009	8.29	7.89	7.22	8.68
8/31/2009	8.37	8.01	7.31	8.53
9/30/2009	8.46	8.1	7.29	8.8
10/31/2009	8.65	8.18	7.14	8.5
11/30/2009	8.71	8.17	7.13	8.41
12/31/2009	8.83	8.05	7.07	8.31
1/31/2010	8.79	8.01	6.96	8.34
2/28/2010	8.82	8.01	6.85	8.36

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Date	OFCRANAT Index	RETRANAT Index	APRTNCAP Index	RINDANAT Index
3/31/2010	8.59	8.12	6.89	8.24
4/30/2010	8.5	8.08	6.8	8.28
5/31/2010	8.16	8.1	6.89	8.33
6/30/2010	8.05	7.94	6.82	8.3
7/31/2010	7.86	7.8	6.85	8.37
8/31/2010	8.11	7.78	6.78	8.49
9/30/2010	7.77	7.62	6.51	8.61
10/31/2010	7.64	7.7	6.52	8.61
11/30/2010	7.43	7.59	6.42	8.46
12/31/2010	7.47	7.64	6.55	8.25
1/31/2011	7.48	7.6	6.55	8.05
2/28/2011	7.51	7.46	6.67	7.82
3/31/2011	7.42	7.38	6.52	7.68
4/30/2011	7.44	7.31	6.4	7.93
5/31/2011	7.43	7.53	6.27	8.07
6/30/2011	7.45	7.57	6.35	8.08
7/31/2011	7.46	7.52	6.29	7.89
8/31/2011	7.27	7.52	6.31	7.81
9/30/2011	7.37	7.47	6.27	7.7
10/31/2011	7.43	7.5	6.19	7.77
11/30/2011	7.54	7.37	6.2	7.47
12/31/2011	7.29	7.43	6.28	7.54
1/31/2012	7.06	7.42	6.36	7.33
2/29/2012	7.1	7.45	6.35	7.55
3/31/2012	7.27	7.23	6.32	7.42
4/30/2012	7.61	7.18	6.36	7.28
5/31/2012	7.33	7.08	6.26	7.29
6/30/2012	7.32	7.2	6.1	7.28
7/31/2012	7.19	7.17	6.07	7.61
8/31/2012	7.33	7.09	6.05	7.67
9/30/2012	7.34	7.13	6.18	7.61
10/31/2012	7.39	7.23	6.07	7.43
11/30/2012	7.25	7.29	6.05	7.31
12/31/2012	7.15	7.02	5.92	7.38
1/31/2013	7.16	6.94	5.92	7.35
2/28/2013	7.21	6.95	5.87	7.42
3/31/2013	7.26	7.18	6.02	7.35

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Date	OFCRANAT Index	RETRANAT Index	APRTNCAP Index	RINDANAT Index
4/30/2013	7.13	7.23	6.13	7.38
5/31/2013	7.11	7.1	6.2	7.48
6/30/2013	6.91	7.04	6.12	7.39
7/31/2013	6.98	6.9	6.04	7.46
8/31/2013	6.81	7.05	6.07	7.33
9/30/2013	6.9	7.12	6.07	7.62
10/31/2013	6.92	7.21	6.15	7.66
11/30/2013	6.98	7.13	6.03	7.72
12/31/2013	6.77	7.01	5.92	7.48
1/31/2014	6.62	6.78	5.88	7.46
2/28/2014	6.57	6.65	5.98	7.37
3/31/2014	6.68	6.49	6.08	7.4
4/30/2014	6.94	6.61	6	7.32
5/31/2014	7.03	6.62	5.97	7.36
6/30/2014	6.92	6.76	6	7.24
7/31/2014	6.85	6.72	5.97	7.17
8/31/2014	6.79	6.67	5.91	7.07
9/30/2014	6.72	6.59	5.8	6.9
10/31/2014	6.53	6.58	5.78	6.92
11/30/2014	6.54	6.67	5.86	6.91
12/31/2014	6.63	6.59	5.99	6.87
1/31/2015	6.7	6.46	5.98	6.74
2/28/2015	6.67	6.31	5.92	6.76
3/31/2015	6.7	6.4	5.75	6.82
4/30/2015	6.69	6.49	5.72	6.82
5/31/2015	6.64	6.53	5.79	6.51
6/30/2015	6.71	6.53	5.84	6.7
7/31/2015	6.77	6.45	5.82	6.89
8/31/2015	6.82	6.44	5.73	6.94
9/30/2015	6.86	6.41	5.75	6.69
10/31/2015	6.68	6.42	5.79	6.36
11/30/2015	6.77	6.5	5.8	6.34
12/31/2015	6.64	6.44	5.74	6.34
1/31/2016	6.69	6.52	5.62	6.53
2/29/2016	6.52	6.47	5.62	6.65
3/31/2016	6.44	6.47	5.64	7.08
4/30/2016	6.37	6.3	5.69	6.8

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Date	OFCRANAT Index	RETRANAT Index	APRTNCAP Index	RINDANAT Index
5/31/2016	6.51	6.25	5.66	6.73
6/30/2016	6.47	6.2	5.63	6.72
7/31/2016	6.54	6.3	5.61	6.78
8/31/2016	6.45	6.36	5.54	6.8
9/30/2016	6.39	6.42	5.5	6.5
10/31/2016	6.44	6.38	5.48	6.47
11/30/2016	6.52	6.48	5.43	6.51
12/31/2016	6.84	6.59	5.37	7.07
1/31/2017	6.95	6.57	5.41	7.06
2/28/2017	7.01	6.59	5.56	6.91
3/31/2017	6.88	6.42	5.68	6.9
4/30/2017	6.72	6.58	5.69	6.92
5/31/2017	6.54	6.48	5.53	7.06
6/30/2017	6.47	6.48	5.52	6.61
7/31/2017	6.58	6.42	5.45	6.42
8/31/2017	6.57	6.46	5.49	6.37
9/30/2017	6.45	6.49	5.4	6.25

**Data Table for Figure 5: Number of Banks with Concentrations in Construction and Land Development and Total Commercial Real Estate Loans, First Quarter of 2007 through Second Quarter of 2017**

Year/Quarter	Number of Banks Exceeding CLD (100%)	Number of Banks Exceeding CRE (300%)
2007Q1	942	579
2007Q2	964	576
2007Q3	980	589
2007Q4	993	597
2008Q1	1112	629
2008Q2	1117	650
2008Q3	1098	640
2008Q4	1061	655
2009Q1	989	602
2009Q2	909	567
2009Q3	838	534
2009Q4	748	531
2010Q1	644	479
2010Q2	582	451
2010Q3	509	426
2010Q4	442	414



Year/Quarter	Number of Banks Exceeding CLD (100%)	Number of Banks Exceeding CRE (300%)
2011Q1	388	364
2011Q2	333	345
2011Q3	301	322
2011Q4	272	318
2012Q1	256	313
2012Q2	231	293
2012Q3	226	288
2012Q4	218	287
2013Q1	215	272
2013Q2	214	275
2013Q3	202	285
2013Q4	208	279
2014Q1	207	283
2014Q2	227	291
2014Q3	247	296
2014Q4	251	323
2015Q1	252	326
2015Q2	257	341
2015Q3	282	360
2015Q4	282	378
2016Q1	291	386
2016Q2	289	393
2016Q3	301	415
2016Q4	312	425
2017Q1	317	448
2017Q2	313	450

**Data Table Figure 6: Number of Sampled Examinations in Which Federal Banking Regulators Found a Commercial Real Estate-Related Risk Management Weakness in One or More of the Internal Control Areas**

Number of risk management weaknesses in the seven internal control areas	Number of examinations in which banks had a risk management weakness in an internal control area
Risk management weakness in none of the internal control areas	26
Risk management weakness in one of the internal control areas	5

Number of risk management weaknesses in the seven internal control areas	Number of examinations in which banks had a risk management weakness in an internal control area
Risk management weakness in two of the internal control areas	3
Risk management weakness in three of the internal control areas	3
Risk management weakness in four of the internal control areas	1
Risk management weakness in five of the internal control areas	3
Risk management weakness in six of the internal control areas	0
Risk management weakness in seven of the internal control areas	0
Total Number of Examinations	41

**Data Table for Figure 7: Historical Charge-offs from 2002–2017 (1 year moving average) with Predictive Model Forecast Comparison, 2017–2020**

Quarter / Year	historical	model 1	model 2	model 3
Q1-2002	0.145	NA	NA	NA
Q2	0.155	NA	NA	NA
Q3	0.16	NA	NA	NA
Q4	0.155	NA	NA	NA
Q1-2003	0.1425	NA	NA	NA
Q2	0.145	NA	NA	NA
Q3	0.145	NA	NA	NA
Q4	0.1275	NA	NA	NA
Q1-2004	0.1125	NA	NA	NA
Q2	0.095	NA	NA	NA
Q3	0.0725	NA	NA	NA
Q4	0.0575	NA	NA	NA
Q1-2005	0.065	NA	NA	NA
Q2	0.06	NA	NA	NA
Q3	0.0575	NA	NA	NA
Q4	0.05	NA	NA	NA
Q1-2006	0.04	NA	NA	NA
Q2	0.0425	NA	NA	NA
Q3	0.0475	NA	NA	NA
Q4	0.0575	NA	NA	NA

Appendix IV: Accessible Data

Quarter / Year	historical	model 1	model 2	model 3
Q1-2007	0.07	NA	NA	NA
Q2	0.095	NA	NA	NA
Q3	0.1275	NA	NA	NA
Q4	0.1925	NA	NA	NA
Q1-2008	0.2925	NA	NA	NA
Q2	0.5	NA	NA	NA
Q3	0.735	NA	NA	NA
Q4	1.175	NA	NA	NA
Q1-2009	1.4125	NA	NA	NA
Q2	1.7475	NA	NA	NA
Q3	2.0975	NA	NA	NA
Q4	2.34	NA	NA	NA
Q1-2010	2.55	NA	NA	NA
Q2	2.5725	NA	NA	NA
Q3	2.53	NA	NA	NA
Q4	2.3375	NA	NA	NA
Q1-2011	2.195	NA	NA	NA
Q2	1.9575	NA	NA	NA
Q3	1.68	NA	NA	NA
Q4	1.405	NA	NA	NA
Q1-2012	1.1975	NA	NA	NA
Q2	1.0225	NA	NA	NA
Q3	0.875	NA	NA	NA
Q4	0.72	NA	NA	NA
Q1-2013	0.615	NA	NA	NA
Q2	0.4975	NA	NA	NA
Q3	0.3825	NA	NA	NA
Q4	0.275	NA	NA	NA
Q1-2014	0.1925	NA	NA	NA
Q2	0.1375	NA	NA	NA
Q3	0.0975	NA	NA	NA
Q4	0.0775	NA	NA	NA
Q1-2015	0.06	NA	NA	NA
Q2	0.0475	NA	NA	NA
Q3	0.0425	NA	NA	NA
Q4	0.0375	NA	NA	NA
Q1-2016	0.0175	NA	NA	NA

Appendix IV: Accessible Data

Quarter / Year	historical	model 1	model 2	model 3
Q2	0.01	NA	NA	NA
Q3	-0.0025	NA	NA	NA
Q4	-0.005	NA	NA	NA
Q1-2017	0	NA	NA	NA
Q2	0	0	0	0
Q3	NA	-0.09365721	0.091817193	-0.058001265
Q4	NA	0.009577272	0.213648871	-0.0172424
Q1-2018	NA	-0.000320151	0.169032544	0.049714319
Q2	NA	0.026311543	0.167974353	0.084874094
Q3	NA	0.143906355	0.31089589	0.179338038
Q4	NA	0.258030236	0.415539593	0.324234396
Q1-2019	NA	0.408884287	0.608128428	0.409135908
Q2	NA	0.491262496	0.764598787	0.510029376
Q3	NA	0.51654315	0.743215978	0.611782908
Q4	NA	0.501860321	0.639336884	0.700834334
Q1-2020	NA	0.601720273	0.767963052	0.840787351

Data Table Figure 8: Historical Charge-offs from 2002–2017 (1 year moving average) with Predictive Model Forecast and Confidence Intervals, 2017–2020

Quarter/Year	Historical	Forecast	Upper bound	Lower bound
Q1-2002	0.145	NA	NA	NA
Q2	0.155	NA	NA	NA
Q3	0.16	NA	NA	NA
Q4	0.155	NA	NA	NA
Q1-2003	0.1425	NA	NA	NA
Q2	0.145	NA	NA	NA
Q3	0.145	NA	NA	NA
Q4	0.1275	NA	NA	NA
Q1-2004	0.1125	NA	NA	NA
Q2	0.095	NA	NA	NA
Q3	0.0725	NA	NA	NA
Q4	0.0575	NA	NA	NA
Q1-2005	0.065	NA	NA	NA
Q2	0.06	NA	NA	NA
Q3	0.0575	NA	NA	NA
Q4	0.05	NA	NA	NA
Q1-2006	0.04	NA	NA	NA

Appendix IV: Accessible Data

Quarter/Year	Historical	Forecast	Upper bound	Lower bound
Q2	0.0425	NA	NA	NA
Q3	0.0475	NA	NA	NA
Q4	0.0575	NA	NA	NA
Q1-2007	0.07	NA	NA	NA
Q2	0.095	NA	NA	NA
Q3	0.1275	NA	NA	NA
Q4	0.1925	NA	NA	NA
Q1-2008	0.2925	NA	NA	NA
Q2	0.5	NA	NA	NA
Q3	0.735	NA	NA	NA
Q4	1.175	NA	NA	NA
Q1-2009	1.4125	NA	NA	NA
Q2	1.7475	NA	NA	NA
Q3	2.0975	NA	NA	NA
Q4	2.34	NA	NA	NA
Q1-2010	2.55	NA	NA	NA
Q2	2.5725	NA	NA	NA
Q3	2.53	NA	NA	NA
Q4	2.3375	NA	NA	NA
Q1-2011	2.195	NA	NA	NA
Q2	1.9575	NA	NA	NA
Q3	1.68	NA	NA	NA
Q4	1.405	NA	NA	NA
Q1-2012	1.1975	NA	NA	NA
Q2	1.0225	NA	NA	NA
Q3	0.875	NA	NA	NA
Q4	0.72	NA	NA	NA
Q1-2013	0.615	NA	NA	NA
Q2	0.4975	NA	NA	NA
Q3	0.3825	NA	NA	NA
Q4	0.275	NA	NA	NA
Q1-2014	0.1925	NA	NA	NA
Q2	0.1375	NA	NA	NA
Q3	0.0975	NA	NA	NA
Q4	0.0775	NA	NA	NA
Q1-2015	0.06	NA	NA	NA
Q2	0.0475	NA	NA	NA

Appendix IV: Accessible Data

Quarter/Year	Historical	Forecast	Upper bound	Lower bound
Q3	0.0425	NA	NA	NA
Q4	0.0375	NA	NA	NA
Q1-2016	0.0175	NA	NA	NA
Q2	0.01	NA	NA	NA
Q3	-0.0025	NA	NA	NA
Q4	-0.005	NA	NA	NA
Q1-2017	0	NA	NA	NA
Q2	0	0	0	0
Q3	NA	0.091817193	0.346114695	-0.162480295
Q4	NA	0.213648871	0.470113248	-0.042815521
Q1-2018	NA	0.169032544	0.421797097	-0.083732016
Q2	NA	0.167974353	0.421201736	-0.08525303
Q3	NA	0.31089589	0.565025151	0.056766607
Q4	NA	0.415539593	0.667286813	0.163792402
Q1-2019	NA	0.608128428	0.862155318	0.354101509
Q2	NA	0.764598787	1.019034147	0.510163486
Q3	NA	0.743215978	0.994069397	0.492362559
Q4	NA	0.639336884	0.88925159	0.389422148
Q1-2020	NA	0.767963052	1.019014835	0.516911209

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