

ANNUAL REPORT



Dear Shareholders,
2018 was a record
year for BOK Financial
in many ways.

KEY STATISTICS

Assets: **\$38 billion**

Loans: **\$22 billion**

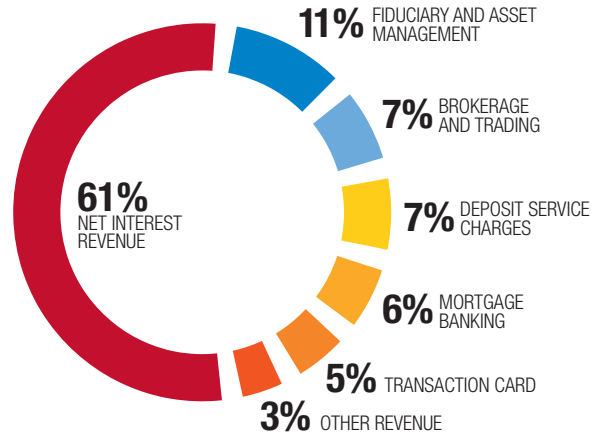
Deposits: **\$25 billion**

Fiduciary Assets: **\$45 billion**

Assets Under Management and/or Administration: **\$76 billion**

At December 31, 2018

DIVERSIFIED REVENUE



CREDIT RATINGS

BOK Financial Corporation
Long-term Issuer

BOKF, NA
Long-term Issuer

S&P	Moody's	Fitch Ratings
BBB+ (ON)	A3 (OS)	A (OS)
A- (ON)	A3 (OS)	A (OS)

2018 HIGHLIGHTS FOR A RECORD REVENUE YEAR



28th consecutive year of profitability



33% year-over-year increase in net income to \$446 million



14th consecutive year of dividend increases for stockholders



Largest acquisition in company history with the addition of CoBiz Financial



Robust loan production bringing total loan portfolio to over \$21 billion for the first time in company history



Named 'Best Places To Work' by both Glassdoor and Forbes

Record earnings, near record loan production, and the largest acquisition in company history were the defining characteristics of the year, and these landmarks could not have been reached without the hard work and dedication of every single one of our employees. They work tirelessly to ensure that BOK Financial stands apart in an increasingly competitive environment with our customers, prospects, and communities.

For the year, pre-tax earnings was a record \$565.5 million; net income attributable to BOK Financial shareholders was \$445.6 million, up 33.2 percent compared to 2017; and we reported diluted earnings per share of \$6.63, the highest level in our company's history. I think this is a testament to the philosophy upon which we've built our bank: managing for long-term value rather than short-term results.

COBIZ: EXPANDING OUR WESTERN PRESENCE

We decided to invest our excess capital and the benefit from corporate tax reduction to make a long-term investment in our company with an almost \$1 billion purchase of CoBiz Financial. This acquisition vaulted BOK Financial to a top-ten deposit share bank in Colorado, and more than doubled our market share in Denver and Phoenix—both important growth markets for BOK Financial.

We have taken a very detailed and thoughtful approach to integrating the two companies and expect 2019 results to positively reflect the acquisition and the efforts of so many across the company. By adding CoBiz, an organization that like us has proven the ability to grow organically over time, we feel that BOK Financial is now the premier commercial banking franchise in Colorado and Arizona. We are very excited about the future of the combined organization, and we are pleased to welcome our new teammates from CoBiz.

LOAN GROWTH: A RECORD YEAR

Our revenue diversity remains a large component of our strategy, and this showed its value again in 2018 as we saw substantial loan growth across most businesses and markets as rising interest rates impacted our fee-based businesses. More on the fee businesses later in my letter.

Economic and employment growth helped drive us to near record loan growth in 2018, ultimately resulting in an increase in loan balances of more than nine percent for the year.

With such broad growth across our loan portfolio, there is plenty to be optimistic about. Our energy lending business has grown substantially this year, and we would expect this to continue into 2019. One of our core philosophies is that we are not casual in our business segments, and we stay fully committed to our customers even when cycles impact

certain business segments. That has never been more clear than in our approach to the energy sector, and our continued growth is a byproduct of that long-term commitment. Commercial real estate has also been an area of growth, although we remain cautious given the length of the economic recovery. Our commercial and industrial business continues to drive regionally-diverse growth, which portends well for continued stability. Our healthcare portfolio continues to expand, and demographic trends indicate that this business has plenty of potential for strong ongoing growth.

We remain optimistic about core loan growth as we head into 2019 as long as the broader economy continues to show strength. We believe our geographic footprint and quality of our banking teams will allow us to outperform the national economy, especially as we integrate CoBiz portfolios into our lines of business.

RISING INTEREST RATES: A DOUBLE-EDGED SWORD

Rising interest rates helped create margin expansion, greatly benefiting our traditional banking units in 2018. While increasing deposit betas will impact BOK Financial, we continue to track favorable to the industry, primarily due to our enviable mix of high commercial demand deposits. Even so, holding deposit costs at competitive levels while still growing balances will be a challenging objective for all of us in the banking industry.

Rising rates, while excellent for margin, also provided a headwind for our mortgage and mortgage-backed security trading business. As a result, run rate expense save measures have been undertaken in these businesses to right-size for the current environment. Many of you will recall 2012 when these businesses carried our earnings growth as loan balances and spreads declined. Bottom line, our business diversification makes us a more stable and predictable company—for shareholders, employees, and customers.

WEALTH MANAGEMENT

Our wealth management capabilities are still the envy of the industry, and we continue to innovate to address the changing market landscape.

The team undertook initiatives to expand and enhance their delivery channels to include virtual advisors and call center support for our consumer branch delivery channel. This initiative, financed through a reallocation of current resources, will undoubtedly pay dividends in the future as clients expect to have instant access to advice and results no matter which area of wealth management is providing their services. We expect to remain competitive and continue to grow by taking share from larger, less client focused national competitors.

The team also successfully added two new mutual funds in response to regulatory changes. By being able to quickly address the changes in the regulatory environment to serve our clients better, we demonstrate our agility in meeting constantly changing client needs.

While the expansion of trading activities in the MBS market proved difficult in 2018 due to the aforementioned interest rate environment, our MBS trading activities were down only 6 percent year over year. When compared to the overall mortgage origination activity in the U.S. being off by nearly 11 percent, we consider this a win and fully intend to stay committed to this business going forward.

EXPENSE MANAGEMENT

Another primary driver of our strong 2018 financial performance was expense discipline. One of our core goals is to drive earnings leverage by holding expense growth to no more than half of revenue growth, with the goal of a 60 percent efficiency ratio. We made great strides in this regard, as expenses were down from the prior year despite the significant increase in revenue, and moved our efficiency ratio from 66 percent at the beginning of 2018 to 63 percent at the end of the year, even before full run rate efficiencies were realized from the CoBiz acquisition. We are clearly moving the needle and quicker than was previously anticipated with our three-year timeframe.

RISK MANAGEMENT, COMPLIANCE, AND TECHNOLOGY

We had a banner year within our operations and technology group. The collaboration with our business lines is producing faster and more competitive customer product and delivery enhancements. In fact, we saw a significant upgrade to our deposit system go off without a hitch—a monumental accomplishment.

We are excited to see what 2019 and beyond hold for our organization, as we seek ways to generate accuracy and efficiency by introducing robotics and machine learning within our operational environment. We are on the cusp of technology being a competitive advantage for our company—a significant component in today's ever-changing economy.

Our risk management group, in collaboration with operations and technology, made significant strides in addressing risks identified with the natural disasters that occurred in August of 2017. We feel that we stand even more ready to address risk than ever before, but we continue to push ourselves to improve. Initiatives like cyber awareness and security have been a strong emphasis and will continue as top priorities into next year.

COMMUNITY, DIVERSITY, AND INCLUSION

While a record fiscal year is something to be proud of, I think I am most proud of the organization's success this year in our communities. BOK Financial has always put our commitment to our communities, our customers, and each other above all. The philanthropic priorities of our chairman, George Kaiser, have imprinted themselves onto the organization. Our employees learn early in their careers that community involvement is who we are and that the leaders in our company have embraced this commitment.

And each year is better than the last. In 2018, BOK Financial employees volunteered nearly 19,000 hours to local non-profit entities, and more than 350 of them serve in 650 leadership roles with nearly 500 non-profits and set the tone, direction, and strategy for these organizations. Employees donated \$2.23 million to our various United Way campaigns in 2018. Their charitable spirit is matched by the company, which granted more than \$5.3 million to philanthropic causes through the BOKF Foundation.

In 2018, we celebrated the opening of Gathering Place in Tulsa, a spectacular new public park built as a communal site for the entire city. Gathering Place was a vision of the George Kaiser Family Foundation, which raised nearly \$500 million to make it a reality. It's a tremendous example of the philanthropic nature of our Chairman and our company—and we should all be proud to play a continuing role in its funding.

This philanthropic approach in our communities is echoed by our employees in our workplace culture. In fact, BOK Financial was recently named one of the best places to work by both Glassdoor and Forbes. This is a testament to the efforts we've put forth in talent attraction and retention, and these designations will only serve to make the organization even more competitive in recruiting new and mid-career professionals.

We also challenged several top talent workgroups to help us develop a more intentional approach to creating greater diversity and inclusion across the company. We are working to form a council within the bank that I will chair—to advise my team and me on strategies we can employ to make sure our company reflects the values and perspective of our markets and customers. To that end, we were pleased to add two new and diverse members to our Executive Leadership Team this year in Kelley Weil (EVP-Chief Human Resource Officer) and Derek Martin (EVP-Consumer Banking Services), both of whom will broaden our perspective as we set ongoing strategy for the company.

LOOKING FORWARD

We are incredibly proud of our results in 2018 and are equally enthusiastic about what 2019 has in store. As we noted in our investor communications throughout 2018, we expect to see great things from the CoBiz acquisition and look forward to completing the integration process soon.

Although there are some market headwinds that many will point to as potential roadblocks for the financial industry, I have full faith in our diversified approach to driving shareholder value. And it's that approach that will leave us well-positioned for strong earnings growth in the coming years.

Best regards,



Steven G. Bradshaw
President and Chief Executive Officer



**UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549**

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the quarterly period ended December 31, 2018

OR

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____

Commission File No. 0-19341

BOK FINANCIAL CORPORATION
(Exact name of registrant as specified in its charter)

Oklahoma
(State or other jurisdiction
of Incorporation or Organization)

73-1373454
(IRS Employer
Identification No.)

Bank of Oklahoma Tower
Boston Avenue at Second Street
Tulsa, Oklahoma
(Address of Principal Executive Offices)

74172
(Zip Code)

(918) 588-6000
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12 (b) of the Act: None

Securities registered pursuant to Section 12 (g) of the Act:

Common stock, \$0.00006 par value

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15 (d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Website, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files) Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer or a smaller reporting company. See definitions of "larger accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes No

The aggregate market value of the registrant's common stock ("Common Stock") held by non-affiliates is approximately \$2.4 billion (based on the June 30, 2018 closing price of Common Stock of \$94.01 per share). As of January 31, 2019, there were 72,251,266 shares of Common Stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Part III incorporates certain information by reference from the Registrant's Proxy Statement for the 2019 Annual Meeting of Shareholders.

BOK Financial Corporation
Form 10-K
Year Ended December 31, 2018

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PART I

ITEM 1. BUSINESS

General

Developments relating to individual aspects of the business of BOK Financial Corporation ("BOK Financial" or "the Company") are described below. Additional discussion of the Company's activities during the current year appears within Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations."

Description of Business

BOK Financial is a financial holding company incorporated in the state of Oklahoma in 1990 whose activities are governed by the Bank Holding Company Act of 1956 ("BHCA"), as amended by the Financial Services Modernization Act or Gramm-Leach-Bliley Act and the Dodd-Frank Wall Street Reform and Consumer Protection Act (the "Dodd-Frank Act"). BOK Financial offers full service banking in Oklahoma, Texas, New Mexico, Northwest Arkansas, Colorado, Arizona, and Kansas/Missouri. At December 31, 2018, the Company reported total consolidated assets of \$38 billion.

BOKF, NA is a wholly owned subsidiary bank of BOK Financial. BOKF, NA operates TransFund, Cavanal Hill Investment Management, BOK Financial Asset Management, Inc. and seven banking divisions: Bank of Albuquerque, Bank of Arizona, Bank of Arkansas, Mobank, Bank of Oklahoma, Bank of Texas and Colorado State Bank and Trust. On October 1, 2018, BOK Financial acquired CoBiz Bank as a wholly owned subsidiary, greatly enhancing our market presence in the Colorado and Arizona markets. CoBiz Bank will be merged into BOKF, NA in first quarter of 2019. BOKF, NA and CoBiz Bank are collectively referred to as "the subsidiary banks" in the discussion following. Other wholly owned subsidiaries of BOK Financial include BOK Financial Securities, Inc., a broker/dealer that primarily engages in retail and institutional securities sales and municipal bond underwriting and The Milestone Group, Inc., an investment adviser to high net worth clients. Other non-bank subsidiary operations do not have a significant effect on the Company's financial statements.

Our overall strategic objective is to emphasize growth in long-term value by building on our leadership position in Oklahoma through expansion into other high-growth markets in contiguous states. We operate primarily in the metropolitan areas of Tulsa and Oklahoma City, Oklahoma; Dallas, Fort Worth and Houston, Texas; Albuquerque, New Mexico; Denver, Colorado; Phoenix, Arizona, and Kansas City, Kansas/Missouri. Our acquisition strategy targets fairly priced quality organizations with demonstrated solid growth that would supplement our principal lines of business. We provide additional growth opportunities by hiring talent to enhance competitiveness, adding locations and broadening product offerings. Our operating philosophy embraces local decision-making in each of our geographic markets while adhering to common Company standards.

Our primary focus is to provide a comprehensive range of nationally competitive financial products and services in a personalized and responsive manner. Products and services include loans and deposits, cash management services, fiduciary services, mortgage banking and brokerage and trading services to middle-market businesses, financial institutions and consumers. Commercial banking represents a significant part of our business. Our credit culture emphasizes building relationships by making high quality loans and providing a full range of financial products and services to our customers. We offer derivative products that enable mortgage banking customers to manage their production risks and our energy financing expertise enables us to offer commodity derivatives for customers to use in their risk management. Our diversified base of revenue sources is designed to generate returns in a range of economic situations. Historically, fees and commissions provide 40% to 48% of our total revenue. Approximately 40% of our revenue came from fees and commissions in 2018.

BOK Financial's corporate headquarters is located at Bank of Oklahoma Tower, Boston Avenue at Second Street, Tulsa, Oklahoma 74172.

The Company's Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to those reports are available on the Company's website at www.bokf.com as soon as reasonably practicable after the Company electronically files such material with or furnishes it to the Securities and Exchange Commission.

Operating Segments

BOK Financial operates three principal lines of business: Commercial Banking, Consumer Banking and Wealth Management. Commercial Banking includes lending, treasury and cash management services and customer risk management products for small businesses, middle market and larger commercial customers. Commercial Banking also includes the TransFund electronic funds network. Consumer Banking includes retail lending and deposit services, lending and deposit services to small business customers served through the retail branch network and all mortgage banking activities. Wealth Management provides fiduciary services, private bank services and investment advisory services in all markets. Wealth Management also underwrites state and municipal securities and engages in brokerage and trading activities. Discussion of these principal lines of business appears within the Lines of Business section of "Management's Discussion and Analysis of Financial Condition and Results of Operations".

Competition

BOK Financial and its operating segments face competition from other banks, thrifts, credit unions and other non-bank financial institutions, such as investment banking firms, investment advisory firms, brokerage firms, investment companies, financial technology firms, government agencies, mortgage brokers and insurance companies. The Company competes largely on the basis of customer services, interest rates on loans and deposits, lending limits and customer convenience. Some operating segments face competition from institutions that are not as closely regulated as banks, and therefore are not limited by the same capital requirements and other restrictions. All market share information presented below is based upon share of deposits in specified areas according to the Federal Deposit Insurance Corporation ("FDIC") as of June 30, 2018.

We are the largest financial institution in the state of Oklahoma with 13% of the state's total deposits. We have 32% and 10% of the market share in the Tulsa and Oklahoma City areas, respectively. We compete with two banks that have operations nationwide and have greater access to funds at lower costs, higher lending limits, and greater access to technology resources. We also compete with regional and locally-owned banks in both the Tulsa and Oklahoma City areas, as well as in every other community in which we do business throughout the state.

We compete against numerous financial institutions in the state of Texas, including some of the largest in the United States, and have a market share of approximately 2% in the Dallas, Fort Worth area and less than 1% in the Houston area. We have an 11% market share in the Albuquerque area and compete with four large national banks, some regional banks and several locally-owned smaller community banks. Our market share is approximately 4% in the Denver area. We serve Benton and Washington counties in Arkansas with a market share of approximately 2%. Our market share is approximately 2% in the Kansas City, Missouri/Kansas area. We operate as a community bank with locations in Phoenix, Mesa and Scottsdale with approximately 1% market share. The Company's ability to expand into additional states remains subject to various federal and state laws.

Employees

As of December 31, 2018, BOK Financial and its subsidiaries employed 5,313 full-time equivalent employees. None of the Company's employees are represented by collective bargaining agreements. Management considers its employee relations to be good.

Supervision and Regulation

BOK Financial and its subsidiaries are subject to extensive regulations under federal and state laws. Both the scope of the laws and regulations and the intensity of the supervision to which our business is subject have increased in recent years. Regulatory enforcement and fines have also increased across the banking and financial services sector. Many of these changes have occurred as a result of the Dodd-Frank Act and its implementing regulations, most of which are now in place. These regulations and others are designed to promote safety and soundness, protect consumers and ensure the stability of the banking system as a whole. The purpose of these regulations is not necessarily to protect shareholders and creditors. As detailed below, these regulations require the Company and its subsidiaries to maintain certain capital balances and require the Company to provide financial support to its subsidiaries. These regulations may restrict the Company's ability to diversify, to acquire other institutions and to pay dividends on its capital stock. These regulations also include requirements on certain programs and services offered to our customers, including restrictions on fees charged for certain services. President Trump has issued an executive order that sets forth principles for reform of the federal financial regulatory framework; however, the recent change to a Democrat controlled House may limit the opportunity for further regulatory reform. The Company expects that its business will remain subject to extensive regulation and supervision.

The following information summarizes certain existing laws and regulations that affect the Company's operations. It does not summarize all provisions of these laws and regulations and does not include all laws and regulations that affect the Company presently or in the future.

General

As a financial holding company, BOK Financial is regulated under the BHCA and is subject to regular inspection, examination and supervision by the Board of Governors of the Federal Reserve System (the "Federal Reserve Board"). Under the BHCA, BOK Financial files quarterly reports and other information with the Federal Reserve Board.

BOKF, NA is organized as a national banking association under the National Banking Act, and is subject to regulation, supervision and examination by the Office of the Comptroller of the Currency (the "OCC"), the FDIC, the Federal Reserve Board, the Consumer Financial Protection Bureau ("CFPB") and other federal and state regulatory agencies. The OCC has primary supervisory responsibility for national banks and must approve certain corporate or structural changes, including changes in capitalization, payment of dividends, change of place of business, and establishment of a branch or operating subsidiary. The OCC performs examinations concerning safety and soundness, the quality of management and directors, information technology and compliance with applicable regulations. The National Banking Act authorizes the OCC to examine every national bank as often as necessary.

A financial holding company, and the companies under its control, are permitted to engage in activities considered "financial in nature" as defined by the BHCA, Gramm-Leach-Bliley Act and Federal Reserve Board interpretations. Activities that are "financial in nature" include securities underwriting and dealing, insurance underwriting, merchant banking, operating a mortgage company, performing certain data processing operations, servicing loans and other extensions of credit, providing investment and financial advice, owning and operating savings and loan associations, and leasing personal property on a full pay-out, non-operating basis. A financial holding company is required to notify the Federal Reserve Board within thirty days of engaging in new activities determined to be "financial in nature." BOK Financial is engaged in some of these activities and has notified the Federal Reserve Board.

In order for a financial holding company to commence any new activity permitted by the BHCA, each insured depository institution subsidiary of the financial holding company must be "well capitalized" and "well managed" and have received a rating of at least "satisfactory" in its most recent examination under the Community Reinvestment Act. A financial holding company and its depository institution subsidiaries are considered to be "well capitalized" if they meet the requirements discussed in the section captioned "Capital Adequacy and Prompt Corrective Action" which follows. A financial holding company and its depository institution subsidiaries are considered to be "well managed" if they receive a composite rating and management rating of at least "satisfactory" in their most recent examinations. If a financial holding company fails to meet these requirements, the Federal Reserve Board may impose limitations or conditions on the conduct of its activities and the company may not commence any new financial activities without prior approval.

The BHCA requires the Federal Reserve Board's prior approval for the direct or indirect acquisition of more than five percent of any class of voting stock of any non-affiliated bank. Under the Federal Bank Merger Act, the prior approval of the OCC is required for a national bank to merge with another bank or purchase the assets or assume the deposits of another bank. In reviewing applications seeking approval of merger and acquisition transactions, the bank regulatory authorities consider, among other things, the competitive effect and public benefits of the transactions, the capital position of the combined organization, the applicant's performance record under the Community Reinvestment Act and fair housing laws and the effectiveness of the subject organizations in combating money laundering activities.

A financial holding company and its subsidiaries are prohibited under the BHCA from engaging in certain tie-in arrangements in connection with the provision of any credit, property or services. Thus, a subsidiary of a financial holding company may not extend credit, lease or sell property, furnish any services or fix or vary the consideration for these activities on the condition that (1) the customer obtain or provide additional credit, property or services from or to the financial holding company or any subsidiary thereof, or (2) the customer may not obtain some other credit, property or services from a competitor, except to the extent reasonable conditions are imposed to insure the soundness of credit extended.

The Company and other non-bank subsidiaries are also subject to other federal and state laws and regulations. For example, BOK Financial Securities, Inc. is regulated by the Securities and Exchange Commission ("SEC"), the Financial Industry Regulatory Authority ("FINRA"), the Federal Reserve Board, and state securities regulators. Such regulations generally include licensing of certain personnel, customer interactions, and trading operations.

Volcker and Swap Rules

Title VI of the Dodd-Frank Act, commonly known as the Volcker Rule, prohibits the Company from (1) engaging in short-term proprietary trading for our own account, and (2) having certain ownership interests in or relationships with private equity or hedge funds. The fundamental prohibitions of the Volcker Rule apply to banking entities of any size, including the Company and its bank subsidiary. The Company has implemented a compliance program required by the Volcker Rule. Trading activity remains largely unaffected by the Volcker Rule as most of our trading activity is exempted or excluded from the proprietary trading prohibitions.

Title VII of the Dodd-Frank Act, commonly known as the Swap Rule, subjects nearly all derivative transactions to the regulations of the Commodity Futures Trading Commission ("CFTC") or SEC. This includes registration, recordkeeping, reporting, capital, margin and business conduct requirements on swap dealers and major swap participants. Under CFTC and SEC rules, entities transacting in less than \$8 billion in notional value of swaps over any 12 month period are exempt from the definition of and registration as a "swap dealer." The Company currently estimates that the nature and volume of its swaps activity will not require it to register as a swap dealer.

Enhanced Prudential Standards

The Dodd-Frank Act directed the Federal Reserve Board to monitor emerging risks to financial institutions and enacted enhanced supervision and prudential standards applicable to bank holding companies with consolidated assets of \$50 billion or more and non-bank covered companies designated as systemically important to the Financial Stability Oversight Council (often referred to as systemically important financial institutions). The Dodd-Frank Act mandated that certain regulatory requirements applicable to systemically important financial institutions be more stringent than those applicable to other financial institutions.

In February 2014, the Federal Reserve Board adopted rules to implement certain of these enhanced prudential standards. Beginning in 2015, the rules required publicly traded bank holding companies with \$10 billion or more in total consolidated assets to establish risk committees and required bank holding companies with \$50 billion or more in total consolidated assets to comply with enhanced capital, liquidity and overall risk management standards. In May 2018, the Economic Growth, Regulatory Relief and Consumer Protection Act ("Regulatory Relief Act") raised the threshold for systemically important financial institutions from \$50 billion to \$250 billion while providing the Federal Reserve with authority to establish incremental prudential standards for banks between \$100 billion and \$250 billion. The regulations to implement this change have not been finalized.

Consumer Financial Protection

We are subject to a number of federal and state consumer protection laws that extensively govern our relationship with our customers. These laws include the Equal Credit Opportunity Act, the Fair Credit Reporting Act, the Truth in Lending Act, the Truth in Savings Act, the Electronic Fund Transfer Act, the Expedited Funds Availability Act, the Home Mortgage Disclosure Act, the Fair Housing Act, the Real Estate Settlement Procedures Act, the Fair Debt Collection Practices Act, the Service Members Civil Relief Act and these laws' respective state-law counterparts, as well as state usury laws and laws regarding unfair and deceptive acts and practices. These and other federal laws, among other things, require disclosures of the cost of credit and terms of deposit accounts, provide substantive consumer rights, prohibit discrimination in credit transactions, regulate the use of credit report information, provide financial privacy protections, prohibit unfair, deceptive and abusive practices, restrict our ability to raise interest rates and subject us to substantial regulatory oversight. Violations of applicable consumer protection laws can result in significant potential liability from litigation brought by customers, including actual damages, restitution and attorneys' fees. Federal bank regulators, state attorneys general and state and local consumer protection agencies may also seek to enforce consumer protection requirements and obtain these and other remedies, including regulatory sanctions, customer rescission rights, action by the state and local attorneys general in each jurisdiction in which we operate and civil money penalties. Failure to comply with consumer protection requirements may also damage our reputation and result in our failure to obtain any required bank regulatory approval for merger or acquisition transactions we may wish to pursue or our prohibition from engaging in such transactions even if approval is not required.

The CFPB has broad rulemaking authority for a wide range of consumer financial laws that apply to all banks, including, among other things, the authority to prohibit "unfair, deceptive or abusive" acts and practices. Abusive acts or practices are defined as those that materially interfere with a consumer's ability to understand a term or condition of a consumer financial product or service or take unreasonable advantage of a consumer's (i) lack of financial savvy, (ii) inability to protect himself in the selection or use of consumer financial products or services, or (iii) reasonable reliance on a covered entity to act in the consumer's interests.

The CFPB can issue cease-and-desist orders against banks and other entities that violate consumer financial laws. The CFPB may also institute a civil action against an entity in violation of federal consumer financial law in order to impose a civil penalty or injunction.

Community Reinvestment Act

The Community Reinvestment Act of 1977 ("CRA") requires depository institutions to assist in meeting the credit needs of their market areas consistent with safe and sound banking practice. Under the CRA, each depository institution is required to help meet the credit needs of its market areas by, among other things, providing credit to low- and moderate-income individuals and communities. Depository institutions are periodically examined for compliance with the CRA and are assigned ratings. In order for a financial holding company to commence any new activity permitted by the BHCA, or to acquire any company engaged in any new activity permitted by the BHCA, each insured depository institution subsidiary of the financial holding company must have received a rating of at least "satisfactory" in its most recent examination under the CRA. Furthermore, banking regulators take into account CRA ratings when considering a request for an approval of a proposed transaction. BOKF, NA received a rating of "outstanding" in its most recent CRA examination, which is above "satisfactory."

Financial Privacy

The federal banking regulators adopted rules that limit the ability of banks and other financial institutions to disclose non-public information about consumers to non-affiliated third parties. These limitations require disclosure of privacy policies to consumers and, in some circumstances, allow consumers to prevent disclosure of certain personal information to a non-affiliated third party. These regulations affect how consumer information is transmitted through diversified financial companies and is conveyed to outside parties.

Capital Adequacy and Prompt Corrective Action

The Federal Reserve Board, the OCC and the FDIC have issued substantially similar risk-based and leverage capital guidelines applicable to United States banking organizations to ensure capital adequacy based upon the risk levels of assets and off-balance sheet financial instruments. In addition, these regulatory agencies may from time to time require that a banking organization maintain capital above the minimum levels, whether because of its financial condition or actual or anticipated growth. Capital adequacy guidelines and prompt corrective action regulations involve quantitative measures of assets, liabilities, and certain off-balance sheet items calculated under regulatory accounting practices. Capital amounts and classifications are also subject to qualitative judgments by regulators regarding components, risk weighting and other factors.

Federal Reserve Board risk-based guidelines define a four-tier capital framework based on three categories of regulatory capital. Common equity Tier 1 capital ("CET1") includes common shareholders' equity, less goodwill, most intangible assets and other adjustments. Tier 1 capital consists of CET1 capital plus certain additional capital instruments and related surplus. Supplementary capital ("Tier 2") consists of preferred stock not qualifying as Tier 1 capital, qualifying mandatory convertible debt securities, limited amounts of subordinated debt, other qualifying term debt and allowances for credit losses, subject to limitations. Assets and off-balance sheet exposures are assigned to categories of risk-weights, based primarily upon relative credit risk. Risk-based capital ratios are calculated by dividing CET1, Tier 1 and total capital by risk-weighted assets.

Additional capital rules were effective for banks and bank holding companies, including BOK Financial, on January 1, 2015 as part of a package of regulatory reforms developed by the Basel Committee on Banking Supervision ("BCBS") to strengthen the regulation, supervision and risk management of the banking sector, commonly referred to as the Basel III framework. Implementation of certain components of these rules continues to be deferred.

The leverage ratio is determined by dividing Tier 1 capital by adjusted average total assets. A bank which falls below acceptable levels, including the capital conservation buffer, would be subject to regulatory restrictions on capital distributions (including but not limited to dividends and share repurchases) and executive bonus payments.

The Federal Deposit Insurance Corporation Improvement Act of 1991 (the "FDICIA"), among other things, identifies five capital categories for insured depository institutions from well capitalized to critically under-capitalized and requires the respective federal regulatory agencies to implement systems for prompt corrective action for institutions failing to meet minimum capital requirements within such categories. FDICIA imposes progressively more restrictive covenants on operations, management and capital distributions, depending upon the category in which an institution is classified. The various regulatory agencies have adopted substantially similar regulations that define the five capital categories identified by FDICIA, using the total risk-based capital, Tier 1 risk-based capital and leverage capital ratios as the relevant capital measures. Such regulations establish various degrees of corrective action to be taken when an institution is considered under-capitalized.

Stress Testing

The Regulatory Relief Act eliminated the requirement for periodic company run capital stress tests known as the Dodd-Frank Act Stress Test for banks with assets less than \$250 billion. Although the mandate has been lifted, the Company still continues to perform capital stress testing on a regular basis.

Executive and Incentive Compensation

Guidelines adopted by federal banking agencies prohibit excessive compensation as an unsafe and unsound practice and describe compensation as excessive when the amounts paid are unreasonable or disproportionate to the services performed by an executive officer, employee, director or principal shareholder. The Federal Reserve Board has issued comprehensive guidance on incentive compensation intended to ensure that the incentive compensation policies do not undermine safety and soundness by encouraging excessive risk taking. This guidance covers all employees that have the ability to materially affect the risk profile of an organization, either individually or as part of a group, based on key principles that (i) incentives do not encourage risk-taking beyond the organization's ability to identify and manage risk, (ii) compensation arrangements are compatible with effective internal controls and risk management, and (iii) compensation arrangements are supported by strong corporate governance, including active and effective board oversight. Deficiencies in compensation practices may affect supervisory ratings and enforcement actions may be taken if incentive compensation arrangements pose a risk to safety and soundness.

Deposit Insurance

Substantially all of the deposits held by the subsidiary banks are insured up to applicable limits by the Deposit Insurance Fund ("DIF") of the FDIC and are subject to deposit insurance assessments to maintain the DIF. In 2011, the FDIC released a final rule to implement provisions of the Dodd-Frank Act that affect deposit insurance assessments. Among other things, the Dodd-Frank Act raised the minimum designated reserve ratio from 1.15% to 1.35% of estimated insured deposits, removed the upper limit of the designated reserve ratio, required that the designated reserve ratio reach 1.35% by September 30, 2020, and required that the FDIC offset the effect of increasing the minimum designated reserve ratio on depository institutions with total assets of less than \$10 billion. The Dodd-Frank Act provided the FDIC flexibility in implementation of the increase in the designated reserve ratio, but it will ultimately result in increased deposit insurance costs to the Company. The Dodd-Frank Act also required that the FDIC redefine the assessment base to average consolidated assets minus average tangible equity.

On June 30, 2016, the DIF rose above the 1.15%, resulting in a reduction of the initial assessment rate for all banks and implementing a 4.5% surcharge on insured depository institutions with total consolidated assets of \$10 billion or more. The assessment base for the surcharge was the regular assessment base reduced by \$10 billion. On September 30, 2018 the DIF rose above 1.35%. Accordingly, the surcharge for depository institutions with assets of greater than \$10 million will cease. Base assessment rates will remain unchanged, but are scheduled to decrease when the reserve ratio exceeds 2%.

Dividends

A key source of liquidity for BOK Financial is dividends from BOKF, NA, which is limited by various banking regulations to net profits, as defined, for the year plus retained profits for the preceding two years. Dividends are further restricted by minimum capital requirements and the Company's internal capital policy. BOKF, NA's dividend limitations are discussed under the heading "Liquidity and Capital" within "Management's Discussion and Analysis of Financial Condition and Results of Operations."

Source of Strength Doctrine

According to Federal Reserve Board policy, a bank holding company is expected to act as a source of financial strength to each subsidiary bank and to commit resources to support each such subsidiary. This support may be required at times when a bank holding company may not be able to provide such support.

Transactions with Affiliates

The Federal Reserve Board regulates transactions between the Company and its subsidiaries. Generally, the Federal Reserve Act and Regulation W, as amended by the Dodd-Frank Act, limit the Company's banking subsidiary and its subsidiaries, to lending and other "covered transactions" with affiliates. The aggregate amount of covered transactions a banking subsidiary or its subsidiaries may enter into with an affiliate may not exceed 10% of the capital stock and surplus of the banking subsidiary. The aggregate amount of covered transactions with all affiliates may not exceed 20% of the capital stock and surplus of the banking subsidiary.

Covered transactions with affiliates are also subject to collateral requirements and must be conducted on arm's length terms. Covered transactions include (a) a loan or extension of credit by the banking subsidiary, including derivative contracts, (b) a purchase of securities issued to a banking subsidiary, (c) a purchase of assets by the banking subsidiary unless otherwise exempted by the Federal Reserve, (d) acceptance of securities issued by an affiliate to the banking subsidiary as collateral for a loan, and (e) the issuance of a guarantee, acceptance or letter of credit by the banking subsidiary on behalf of an affiliate.

Bank Secrecy Act and USA PATRIOT Act

The Bank Secrecy Act ("BSA") and The USA PATRIOT Act of 2001 ("PATRIOT Act") impose many requirements on financial institutions in the interest of national security and law enforcement. BSA requires banks to maintain records and file suspicious activity reports that are of use to law enforcement and regulators in combating money laundering and other financial crimes. The PATRIOT Act is intended to deny terrorists and criminals the ability to access the U.S. financial services system and places significantly greater requirements on financial institutions. Financial institutions, such as the Company and its subsidiaries, must have a designated BSA Officer, internal controls, independent testing and training programs commensurate with their size and risk profile. As part of its internal control program, a financial institution is expected to have effective customer due diligence and enhanced due diligence requirements for high-risk customers, as well as processes to prohibit transactions with entities subject to Office of Foreign Asset Control sanctions. Documentation and recordkeeping requirements, as well as system requirements, aimed at identifying and reporting suspicious activity reporting, must increase with the institution's size and complexity. Failure to implement or maintain adequate programs and controls to combat terrorist financing and money laundering may have serious legal, financial, and reputational consequences.

Governmental Policies and Economic Factors

The operations of BOK Financial and its subsidiaries are affected by legislative changes and by the policies of various regulatory authorities and, in particular, the policies of the Federal Reserve Board. The Federal Reserve Board has statutory objectives to maximize employment and maintain price stability. Among the instruments of monetary policy used by the Federal Reserve Board to implement these objectives are: open-market operations in U.S. Government securities, changes in the discount rate and federal funds rate on bank borrowings, and changes in reserve requirements on bank deposits. The effect of future changes in such policies on the business and earnings of BOK Financial and its subsidiaries is uncertain.

In response to the significant recession in business activity which began in 2007, the Federal Reserve took aggressive actions to reduce interest rates and provide liquidity. While many of the crisis-related programs have expired or been closed, government legislation and policies continue to be accommodative, including increases in government spending, reduction of certain taxes and promotion of affordable home programs.

The Federal Reserve completed its bond purchase program designed to reduce longer-term rates in October of 2014. Beginning in October of 2017, the Federal Reserve initiated a balance sheet normalization program that will gradually reduce the reinvestment of principal payments from its securities holdings though the pace and extent of the reduction remains uncertain.

As a result of signs of an improving economy, the Federal Reserve increased its target rate by 25 basis points four times during 2018. We expect the Federal Reserve will slow the frequency of rate increases in 2019 when compared to 2018. Real gross domestic product is forecasted to slow to about 2 percent in 2019 after being around 3 percent in 2018. The inflation rate increased 2 percent in 2018 and is expected to remain close to that pace in 2019. The short-term effectiveness and long-term impact of these programs on the economy in general and on BOK Financial in particular are uncertain.

The Tax Cuts and Jobs Act ("the Tax Reform Act"), signed into law on December 22, 2017, has had a broad impact on the Company and our customers. We believe that the overall impact of lower income tax rates and other provisions of the Tax Reform Act will be beneficial to future economic growth.

Foreign Operations

BOK Financial does not engage in operations in foreign countries, nor does it lend to foreign governments.

ITEM 1A. RISK FACTORS

BOK Financial Corporation and its subsidiaries could be adversely affected by risks and uncertainties that could have a material impact on its financial condition and results of operations, as well as on its common stock and other financial instruments. Risk factors which are significant to the Company include, but are not limited to:

General and Regulatory Risk Factors

Adverse factors could impact BOK Financial's ability to implement its operating strategy.

Although BOK Financial has developed an operating strategy, which it expects to result in continuing improved financial performance, BOK Financial cannot ensure that it will be successful in fulfilling this strategy or that this operating strategy will be successful. Achieving success is dependent upon a number of factors, many of which are beyond BOK Financial's direct control. Factors that may adversely affect BOK Financial's ability to implement its operating strategy include:

- deterioration of BOK Financial's asset quality;
- deterioration in general economic conditions, especially in BOK Financial's core markets;
- inability to control BOK Financial's non-interest expenses;
- inability to increase non-interest income;
- inability to access capital;
- decreases in net interest margins;
- increases in competition; and
- adverse regulatory developments.

Substantial competition could adversely affect BOK Financial.

Banking is a competitive business. BOK Financial competes actively for loan, deposit and other financial services business in the southwest region of the United States. BOK Financial's competitors include a large number of small and large local and national banks, savings and loan associations, credit unions, trust companies, broker-dealers and underwriters, as well as many financial and non-financial firms that offer services similar to those of BOK Financial. Large national financial institutions have substantial capital, technology and marketing resources. Such large financial institutions may have greater access to capital at a lower cost than BOK Financial does, which may adversely affect BOK Financial's ability to compete effectively.

BOK Financial has expanded into markets outside of Oklahoma, where it competes with a large number of financial institutions that have an established customer base and greater market share than BOK Financial. With respect to some of its services, BOK Financial competes with non-bank companies that are not subject to regulation. The absence of regulatory requirements may give non-banks a competitive advantage.

The increasingly competitive environment is in part a result of changes in regulation, changes in technology and product delivery systems and the accelerating pace of consolidation among financial service providers. Our success depends on our ability to respond to the threats and opportunities of financial technology innovations. Developments in "fintech" and cryptocurrencies have the potential to disrupt the financial industry and change the way banks do business. Investment in new technology to stay competitive could result in significant costs and increased cybersecurity risk. Our success depends on our ability to adapt to the pace of the rapidly changing technological environment which is important to retention and acquisitions of customers.

Government regulations could adversely affect BOK Financial.

BOK Financial and BOKF, NA are subject to banking laws and regulations that limit the type of acquisitions and investments that we may make. In addition, certain permitted acquisitions and investments are subject to prior review and approval by banking regulators, including the Federal Reserve, OCC and FDIC. Banking regulators have broad discretion on whether to approve proposed acquisitions and investments. In deciding whether to approve a proposed acquisition, federal banking regulators will consider, among other things, the effect of the acquisition on competition; the convenience and needs of the communities to be served, including our record of compliance under the Community Reinvestment Act; and our effectiveness in combating money laundering. They will also consider our financial condition and our future prospects, including projected capital ratios and levels; the competence, experience, and integrity of our management; and our record of compliance with laws and regulations.

The last several years have seen an increase in regulatory costs borne by the banking industry. Laws, regulations or policies currently affecting BOK Financial and its subsidiaries may change. The implementation of the Dodd-Frank Act has and will continue to affect BOK Financial's businesses, including interchange revenue, mortgage banking, derivative and trading activities on behalf of customers, consumer products and funds management.

Regulatory authorities may change their interpretation of these statutes and regulations, including the OCC, our primary regulator, and the CFPB, our regulator for certain designated consumer laws and regulations. Violations of laws and regulations could limit the growth potential of BOK Financial's businesses. We have made extensive investments in human and technological resources to address enhanced regulatory expectations, including investments in the areas of risk management, compliance, and capital planning. Political developments, including the change in administration in the United States and more recent change in leadership in the House of Representatives, have added additional uncertainty to the implementation, scope and timing of changes in the regulatory environment for the banking industry and for the broader economy.

Political environment could negatively impact BOK Financial's business.

As a result of the financial crisis and related government intervention to stabilize the banking system, there have been a series of laws and related regulations proposed or enacted in an attempt to ensure the crisis is not repeated. Many of the new regulations have been far-reaching. The intervention by the government also impacted populist sentiment with a negative view of financial institutions. High profile mistakes by the very largest banks in the country have continued to fuel negative sentiment towards the banking industry. This sentiment may increase litigation risk to the Company or have an adverse impact on BOK Financial's future operations. The passage of recent legislative proposals have eased some of the regulatory burden for BOK Financial; however, legislative outcomes and their durability are inherently uncertain.

Credit Risk Factors

Adverse regional economic developments could negatively affect BOK Financial's business.

At December 31, 2018, loans to businesses and individuals with collateral primarily located in Texas represented approximately 30% of the total loan portfolio, loans to businesses and individuals with collateral primarily located in Oklahoma represented approximately 16% of our total loan portfolio and loans to businesses and individuals with collateral primarily located in Colorado represented approximately 15% of our total loan portfolio. These geographic concentrations subject the loan portfolio to the general economic conditions within these areas. Poor economic conditions in Texas, Oklahoma, Colorado or other markets in the southwest region may cause BOK Financial to incur losses associated with higher default rates and decreased collateral values in BOK Financial's loan portfolio. A regional economic downturn could also adversely affect revenue from brokerage and trading activities, mortgage loan originations and other sources of fee-based revenue.

Extended oil and gas commodity price downturns could negatively affect BOK Financial customers.

At December 31, 2018, 17% of BOK Financial's total loan portfolio is comprised of loans to borrowers in the energy industry. The energy industry is historically cyclical and prolonged periods of low oil and gas commodity prices could negatively impact borrowers' ability to pay. In addition, the Company does business in several major oil and natural gas producing states including Oklahoma, Texas and Colorado. The economies of these states could be negatively impacted by prolonged periods of low oil and gas commodity prices resulting in increased credit migration to classified and nonaccruing categories, higher loan loss provisions and risk of credit losses from both energy borrowers and businesses and individuals in those regional economies.

Other adverse economic factors affecting particular industries could have a negative effect on BOK Financial customers and their ability to make payments to BOK Financial.

Certain industry-specific economic factors also affect BOK Financial. For example, BOK Financial's loan portfolio includes commercial real estate loans. A downturn in the real estate industry in general or in certain segments of the commercial real estate industry in the southwest region could also have an adverse effect on BOK Financial's operations. Regulatory changes in healthcare may negatively affect our customers. Legislation affecting reimbursement rates along with the continued transition to managed care in place of fee for service payments could affect their ability to pay.

Adverse global economic factors could have a negative effect on BOK Financial customers and counterparties.

Economic conditions globally could impact BOK Financial's customers and counterparties with which we do business. The United Kingdom has not yet found an agreement regarding BREXIT, trade related issues remain between the United States and China, and the turmoil in Venezuela, who holds the world's largest oil reserve, continues without an obvious agreement. We have no direct exposure to European sovereign debt and limited exposure to European and Chinese financial institutions. We have not identified any significant customer exposures to European sovereign debt, European financial institutions or Chinese financial institutions.

Liquidity and Interest Rate Risk Factors

Fluctuations in interest rates could adversely affect BOK Financial's business.

BOK Financial's business is highly sensitive to:

- the monetary policies implemented by the Federal Reserve Board, including the discount rate on bank borrowings and changes in reserve requirements, which affect BOK Financial's ability to make loans and the interest rates we may charge;
- changes in prevailing interest rates, due to the dependency of the subsidiary banks on interest income;
- open market operations in U.S. Government securities.

A significant increase in market interest rates, or the perception that an increase may occur, could adversely affect both BOK Financial's ability to originate new loans and BOK Financial's ability to grow. Conversely, a decrease in interest rates could result in acceleration in the payment of loans, including loans underlying BOK Financial's holdings of residential mortgage-backed securities and termination of BOK Financial's mortgage servicing rights. In addition, changes in market interest rates, changes in the relationships between short-term and long-term market interest rates or changes in the relationships between different interest rate indices, could affect the interest rates charged on interest-earning assets differently than the interest rates paid on interest-bearing liabilities. This difference could result in an increase in interest expense relative to interest income, which would reduce the Company's net interest revenue. In a rising interest rate environment, the composition of the deposit portfolio could shift resulting in a mix that is more sensitive to changes in interest rates than is the current mix. An increase in market interest rates also could adversely affect the ability of BOK Financial's floating-rate borrowers to meet their higher payment obligations. If this occurred, it could cause an increase in nonperforming assets and net charge-offs, which could adversely affect BOK Financial's business.

We have a significant number of loans, derivative contracts, borrowings and other financial instruments with attributes that are either directly or indirectly dependent on LIBOR. In 2017, the U.K. Financial Conduct Authority announced that it would no longer persuade or compel banks to submit to LIBOR after 2021. U.S. regulatory authorities have voiced similar support for phasing out LIBOR. The Federal Reserve Bank of New York's Alternative Reference Rate Committee has recommended the Secured Overnight Financing Rate ("SOFR") as an alternative to LIBOR. However, for two key reasons, SOFR is a secured rate while LIBOR is an unsecured rate and SOFR is an overnight rate while LIBOR is published for different maturities, SOFR is not the economic equivalent of LIBOR. The impact of SOFR or other alternatives to LIBOR on the valuations, pricing and operation of our financial instruments is not yet known.

Changes in mortgage interest rates could adversely affect mortgage banking operations along with mortgage servicing rights as well as BOK Financial's substantial holdings of residential mortgage-backed securities, and brokerage and trading revenue.

BOK Financial derives a substantial amount of revenue from mortgage banking activities, the production and sale of mortgage loans and the servicing of mortgage loans. In addition, as part of BOK Financial's mortgage banking business, BOK Financial has substantial holdings of mortgage servicing rights. Revenue generated from the production and sale of mortgage loans is affected by mortgage interest rates and government policies related to economic stimulus and home ownership. Falling interest rates tend to increase mortgage lending activities and related revenue while rising interest rates have an opposite effect.

Mortgage servicing revenue is a fee earned over the life of the related loan. However, mortgage servicing rights are assets that are carried at fair value which are very sensitive to numerous factors with the primary factor being changes in market interest rates. Falling interest rates tend to increase loan prepayments, which may lead to a decrease in the value of related servicing rights. We attempt to manage this risk by maintaining an active hedging program. The primary objective of the Company's hedging program is to provide an offset to changes in the fair value of these rights due to hedgeable risks, primarily changes in market interest rates. Due to numerous unhedgeable factors, hedging strategies may not offset all changes in the fair value of the asset. Such unhedgeable factors include, but are not limited to, changes in customer prepayment or delinquency behavior that is inconsistent with historical actual performance in a similar market environment; changes in the long-term or short-term primary/secondary mortgage spreads; and changes in survey-driven assumptions such as the cost of servicing and discount rates.

We also hold a substantial portfolio of residential mortgage-backed securities issued by U.S. government agencies. The fair value of residential mortgage-backed securities is highly sensitive to changes in interest rates. A significant decrease in interest rates may lead mortgage holders to refinance the mortgages constituting the pool backing the securities, subjecting BOK Financial to a risk of prepayment and decreased return on investment due to subsequent reinvestment at lower interest rates. A significant decrease in interest rates may also accelerate premium amortization. Conversely, a significant increase in interest rates may cause mortgage holders to extend the term over which they repay their loans, which delays the Company's opportunity to reinvest funds at higher rates. We mitigate this risk somewhat by investing principally in shorter duration mortgage products, which are less sensitive to changes in interest rates.

In addition, the Company actively engages in trading activities that provide U.S. government agency residential mortgage-backed securities and related derivative instruments to our customers. Trading activities generate net interest revenue, trading revenue and customer hedging revenue. Trading revenue and customer hedging revenue varies in response to customer demand. The value of trading securities will increase in response to decreases in interest rates or decrease in response to increases in interest rates. We mitigate the market risk of holding trading securities through appropriate economic hedging techniques.

Market disruptions could impact BOK Financial's funding sources.

BOK Financial's subsidiary bank may rely on other financial institutions and the Federal Home Loan Bank of Topeka as a significant source of funds. Our ability to fund loans, manage our interest rate risk and meet other obligations depends on funds borrowed from these sources. The inability to borrow funds at market interest rates could have a material adverse effect on our operations.

Operating Risk Factors

Dependence on technology increases cybersecurity risk.

As a financial institution, we process a significant number of customer transactions and possess a significant amount of sensitive customer information. As technology advances, the ability to initiate transactions and access data has become more widely distributed among mobile phones, personal computers, automated teller machines, remote deposit capture sites and similar access points. These technological advances increase cybersecurity risk. While the Company maintains programs intended to prevent or limit the effects of cybersecurity risk, there is no assurance that unauthorized transactions or unauthorized access to customer information will not occur. The financial, reputational and regulatory impact of unauthorized transactions or unauthorized access to customer information could be significant.

We depend on third parties for critical components of our infrastructure.

We outsource a significant portion of our information systems, communications, data management and transaction processing to third parties. These third parties are sources of risk associated with operational errors, system interruptions or breaches, unauthorized disclosure of confidential information and misuse of intellectual property. If the service providers encounter any of these issues, we could be exposed to disruption of service, reputation damages, and litigation risk that could be material to our business.

Integration of BOK Financial and CoBiz may be more difficult, costly or time consuming than expected and the anticipated benefits and cost savings of the merger may not be realized.

The success of the merger will depend on a number of factors including:

- Successful integration of the acquired business into current operations;

- Retention of acquired deposits and earning assets;
- Control over incremental non-interest expense;
- Retention of certain key employees; and
- Continued performance of the CoBiz credit portfolio.

The acquisition of CoBiz which represents BOK Financial's largest transaction to date, includes anticipated benefits and cost savings, that depend, in part, on our ability to successfully combine and integrate the businesses in a manner that permits growth opportunities and does not materially disrupt existing customer relations nor result in decreased revenues due to loss of customers. Business disruptions may cause customers to remove their accounts to competing financial institutions. Disruption of ongoing businesses or inconsistencies in standards, controls, procedures and policies may adversely affect our ability to maintain relationships with clients, customers, depositors and employees or to achieve the anticipated benefits and cost savings of the merger. In addition, the loss of key employees could adversely affect our ability to successfully conduct its business. We may also encounter unexpected difficulties or costs during the integration. Integration efforts may also divert management attention and resources.

Risks Related to an Investment in Our Stock

Although publicly traded, BOK Financial's common stock has substantially less liquidity than the average trading market for a stock quoted on the NASDAQ National Market System.

A relatively small fraction of BOK Financial's outstanding common stock is actively traded. The risks of low liquidity include increased volatility of the price of BOK Financial's common stock. Low liquidity may also limit holders of BOK Financial's common stock in their ability to sell or transfer BOK Financial's shares at the price, time and quantity desired.

BOK Financial's principal shareholder controls a majority of BOK Financial's common stock.

Mr. George B. Kaiser owns approximately 53% of the outstanding shares of BOK Financial's common stock at December 31, 2018. Mr. Kaiser is able to elect all of BOK Financial's directors and effectively control the vote on all matters submitted to a vote of BOK Financial's common shareholders. Mr. Kaiser's ability to prevent an unsolicited bid for BOK Financial or any other change in control could have an adverse effect on the market price for BOK Financial's common stock. A substantial majority of BOK Financial's directors are not officers or employees of BOK Financial or any of its affiliates. However, because of Mr. Kaiser's control over the election of BOK Financial's directors, he could change the composition of BOK Financial's Board of Directors so that it would not have a majority of outside directors.

Possible future sales of shares by BOK Financial's principal shareholder could adversely affect the market price of BOK Financial's common stock.

Mr. Kaiser has the right to sell shares of BOK Financial's common stock in compliance with the federal securities laws at any time, or from time to time. The federal securities laws will be the only restrictions on Mr. Kaiser's ability to sell. Because of his current control of BOK Financial, Mr. Kaiser could sell large amounts of his shares of BOK Financial's common stock by causing BOK Financial to file a registration statement that would allow him to sell shares more easily. In addition, Mr. Kaiser could sell his shares of BOK Financial's common stock without registration under Rule 144 of the Securities Act. Although BOK Financial can make no predictions as to the effect, if any, that such sales would have on the market price of BOK Financial's common stock, sales of substantial amounts of BOK Financial's common stock, or the perception that such sales could occur, could adversely affect market prices. If Mr. Kaiser sells or transfers his shares of BOK Financial's common stock as a block, another person or entity could become BOK Financial's controlling shareholder.

Statutory restrictions on subsidiary dividends and other distributions and debts of BOK Financial's subsidiaries could limit amounts BOK Financial's subsidiaries may pay to BOK Financial.

A substantial portion of BOK Financial's cash flow typically comes from dividends paid by BOKF, NA. Statutory provisions and regulations restrict the amount of dividends BOKF, NA may pay to BOK Financial without regulatory approval. Management also developed, and the BOK Financial board of directors approved, an internal capital policy that is more restrictive than the regulatory capital standards. In the event of liquidation, creditors of the subsidiary banks and other non-bank subsidiaries of BOK Financial are entitled to receive distributions from the assets of that subsidiary before BOK Financial, as holder of an equity interest in the subsidiaries, is entitled to receive any distributions.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

BOK Financial and its subsidiaries own and lease improved real estate that is carried at \$196 million, net of depreciation and amortization. The Company's principal offices are located in leased premises in the Bank of Oklahoma Tower in Tulsa, Oklahoma. Banking offices are primarily located in Tulsa and Oklahoma City, Oklahoma; Dallas, Fort Worth and Houston, Texas; Albuquerque, New Mexico; Denver, Colorado; Phoenix, Arizona; and Kansas City, Kansas/Missouri. Primary operations facilities are located in Tulsa and Oklahoma City, Oklahoma; Dallas, Texas and Albuquerque, New Mexico. The Company's facilities are suitable for their respective uses and present needs.

The information set forth in Notes 5 and 14 of the Company's Notes to Consolidated Financial Statements, which appear elsewhere herein, provides further discussion related to properties.

ITEM 3. LEGAL PROCEEDINGS

The information set forth in Note 14 of the Company's Notes to Consolidated Financial Statements, which appear elsewhere herein, provides discussion related to legal proceedings.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

BOK Financial's \$0.00006 par value common stock is traded on the NASDAQ Stock Market under the symbol BOKF. As of January 31, 2019, common shareholders of record numbered 755 with 72,251,266 shares outstanding.

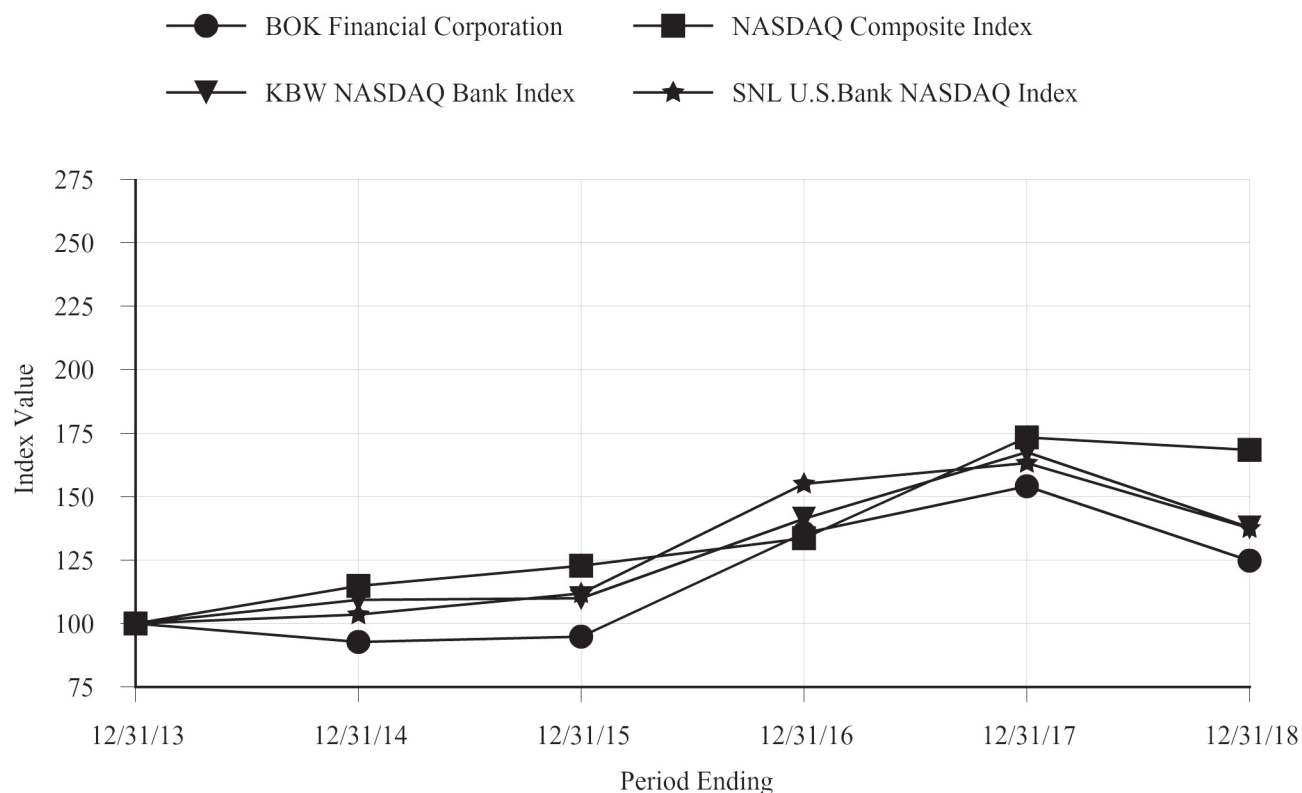
The highest and lowest quarterly closing bid price for shares and cash dividends declared per share of BOK Financial common stock follows:

	First	Second	Third	Fourth
2018:				
Low	\$ 90.62	\$ 93.00	\$ 93.33	\$ 70.61
High	100.98	105.24	104.74	96.91
Cash dividends declared	0.45	0.45	0.50	0.50
2017:				
Low	\$ 75.15	\$ 74.34	\$ 77.30	\$ 82.30
High	84.81	85.83	89.08	93.50
Cash dividends declared	0.44	0.44	0.44	0.45

Shareholder Return Performance Graph

Set forth below is a line graph comparing the change in cumulative shareholder return of the NASDAQ Composite Index, the KBW NASDAQ Bank Index and the SNL U.S. Bank NASDAQ Index for the period commencing December 31, 2013 and ending December 31, 2018.*

Total Return Performance



<i>Index</i>	<i>Period Ending December 31,</i>					
	2013	2014	2015	2016	2017	2018
BOK Financial Corporation	100.00	92.79	94.85	135.55	154.01	124.75
NASDAQ Composite	100.00	114.75	122.74	133.62	173.22	168.30
SNL U.S. Bank NASDAQ	100.00	103.57	111.80	155.02	163.20	137.56
KBW NASDAQ Bank Index	100.00	109.37	109.91	141.24	167.50	137.83

* Graph assumes value of an investment in the Company's Common Stock for each index was \$100 on December 31, 2013. Cash dividends on Common Stock are assumed to have been reinvested in BOK Financial Common Stock.

The following table provides information with respect to purchases made by or on behalf of the Company or any “affiliated purchaser” (as defined in Rule 10b-18(a)(3) under the Securities Exchange Act of 1934), of the Company’s common stock during the three months ended December 31, 2018.

Period	Total Number of Shares Purchased ²	Average Price Paid per Share	Total Number of Shares Purchased as Part of Publicly Announced Plans or Programs ¹	Maximum Number of Shares that May Yet Be Purchased Under the Plans
October 1, 2018 to October 31, 2018	200,000	\$ 85.08	200,000	1,749,917
November 1, 2018 to November 30, 2018	235,000	\$ 88.68	235,000	1,514,917
December 1, 2018 to December 31, 2018	90,000	\$ 80.02	90,000	1,424,917
Total	525,000		525,000	

¹ On October 1, 2015, the Company's board of directors authorized the Company to repurchase up to five million shares of the Company's common stock. As of December 31, 2018, the Company had repurchased 3,575,083 shares under this plan. Future repurchases of the Company's common stock will vary based on market conditions, regulatory limitations and other factors.

² The Company may repurchase shares from employees to cover the exercise price and taxes in connection with employee shared-based compensation.

ITEM 6. SELECTED FINANCIAL DATA

The selected financial data is set forth within Table 1 of Item 7, “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

ITEM 7. Management’s Discussion and Analysis of Financial Condition and Results of Operations

Table 1 – Consolidated Selected Financial Data

(Dollars in thousands, except per share data)

	December 31,				
	2018	2017	2016	2015	2014
Selected Financial Data					
For the year:					
Interest revenue	\$ 1,228,426	\$ 972,751	\$ 829,117	\$ 766,828	\$ 732,239
Interest expense	243,559	131,050	81,889	63,474	67,045
Net interest revenue	984,867	841,701	747,228	703,354	665,194
Provision for credit losses	8,000	(7,000)	65,000	34,000	—
Fees and commissions revenue ⁵	643,642	642,390	647,726	614,960	588,012
Net income attributable to BOK Financial Corporation shareholders	445,646	334,644	232,668	288,565	292,435
Period-end:					
Loans	21,656,730	17,153,424	16,989,660	15,941,154	14,208,037
Assets	38,020,504	32,272,160	32,772,281	31,476,128	29,089,698
Deposits	25,263,763	22,061,305	22,748,095	21,088,158	21,140,859
Shareholders’ equity	4,432,109	3,495,367	3,274,854	3,230,556	3,302,179
Nonperforming assets ¹	267,162	290,305	356,641	251,908	256,617
Profitability Statistics					
Earnings per share (based on average equivalent shares):					
Basic	\$ 6.63	\$ 5.11	\$ 3.53	\$ 4.22	\$ 4.23
Diluted	6.63	5.11	3.53	4.21	4.22
Percentages (based on daily averages):					
Return on average assets	1.28%	1.02%	0.72%	0.94%	1.04%
Return on average shareholders’ equity	11.98%	9.82%	7.02%	8.65%	9.21%
Average total equity to average assets	10.70%	10.43%	10.38%	11.03%	11.47%
Common Stock Performance					
Per Share:					
Book value per common share	\$ 61.45	\$ 53.45	\$ 50.12	\$ 49.03	\$ 47.78
Market price: December 31 close	73.33	92.32	83.04	59.79	60.04
Market range – High close bid price	105.24	93.50	84.13	72.44	70.18
Market range – Low close bid price	70.61	74.34	44.72	53.37	57.87
Cash dividends declared	1.90	1.77	1.73	1.69	1.62
Dividend payout ratio	28.55%	34.45%	48.81%	40.03%	38.35%

Table 1 – Consolidated Selected Financial Data

(Dollars in thousands, except per share data)

	December 31,				
	2018	2017	2016	2015	2014
Selected Financial Data					
Selected Balance Sheet Statistics					
Period-end:					
Common equity Tier 1 ratio ²	10.92%	12.05%	11.21%	12.13%	N/A
Tier 1 capital ratio ²	10.92%	12.05%	11.21%	12.13%	13.33%
Total capital ratio ²	12.50%	13.54%	12.81%	13.30%	14.66%
Leverage ratio ²	8.96%	9.31%	8.72%	9.25%	9.96%
Allowance for loan losses to nonaccruing loans ⁴	132.89%	129.09%	112.33%	180.09%	245.34%
Allowance for loan losses to loans	0.96%	1.34%	1.45%	1.41%	1.33%
Combined allowances for credit losses to loans ³	0.97%	1.37%	1.52%	1.43%	1.34%
Miscellaneous (at December 31)					
Number of employees (full-time equivalent)	5,313	4,930	4,884	4,789	4,743
Number of TransFund locations	2,426	2,223	2,021	1,972	2,080
Fiduciary assets	\$ 44,841,339	\$48,761,477	\$42,378,053	\$38,333,638	\$ 35,997,877
Mortgage loans serviced for others	21,658,335	22,046,632	21,997,568	19,678,226	16,162,887

¹ Includes nonaccruing loans, renegotiated loans and assets acquired in satisfaction of loans. Excludes loans past due 90 days or more and still accruing.

² Risk-based capital ratios for 2018, 2017, 2016 and 2015 calculated under revised regulatory capital rules issued July 2013 and effective for the Company on January 1, 2015. Previous risk-based ratios presented are calculated in accordance with then current regulatory capital rules.

³ Includes allowance for loan losses and accrual for off-balance sheet credit risk.

⁴ Excludes residential mortgage loans guaranteed by agencies of the U.S. government.

⁵ Non-GAAP measure to net interchange charges from prior years between transaction card revenue and data processing and communications expense as a result of the recent revenue recognition standard. This measure has no effect on net income or earnings per share.

Management's Assessment of Operations and Financial Condition

Overview

The following discussion is management's analysis to assist in the understanding and evaluation of the financial condition and results of operations of BOK Financial Corporation ("BOK Financial" or "the Company"). This discussion should be read in conjunction with the Consolidated Financial Statements and footnotes and selected financial data presented elsewhere in this report.

For 2018, the U.S. economy continued to grow, supported by declining unemployment, continued payroll growth and modest inflation. GDP increased 3.5% through the third quarter of 2018 and is expected to remain in the range of 2 to 3 percent in 2019. The national unemployment rate fell to 3.1% at December of 2018 from 4.1% in December of 2017. Inflation also remained low around 2% for 2018. The minutes of the Federal Open Market Committee ("FOMC") of the Federal Reserve for December indicated continued strengthening of labor market conditions and unchanged longer-run inflation expectations.

The Federal Reserve increased the target range for the federal funds rate by 25 basis points four times during 2018. The 10-year U.S. Treasury note finished the year yielding 2.69% versus 2.40% at December 31, 2017. We expect rates to continue to rise in 2019. Global quantitative easing and lack of inflation, combined with continued gradual federal funds rate increases by the Federal Reserve are contributing to a flattening of the yield curve; however, a yield curve inversion is not expected. Higher long-term interest rates are likely in 2019.

Performance Summary

Net income for the year ended December 31, 2018 totaled \$445.6 million or \$6.63 per diluted share compared with net income of \$334.6 million or \$5.11 per diluted share for the year ended December 31, 2017.

On October 1, 2018, the Company acquired CoBiz Financial, Inc. ("CoBiz"). CoBiz is headquartered in Denver with a presence in Colorado and Arizona. The Company paid total consideration of \$944 million, which included \$243 million in cash along with the issuance of 7.2 million shares of BOK Financial stock valued at \$701 million, in exchange for all outstanding shares of CoBiz stock. We anticipate a full bank consolidation in the first quarter of 2019.

We incurred \$16.6 million of closing and integration costs, which resulted in an \$0.18 per share reduction in 2018. A fee earned through the sale of client assets of \$15.4 million was recognized in 2018 accounting for a \$0.17 per share addition. The fluctuation discussion in the highlights below exclude the impact of these items.

Highlights of 2018 included:

- Net interest revenue totaled \$984.9 million for 2018, up from \$841.7 million for 2017. CoBiz added \$43.1 million to net interest revenue. The remaining increase was driven by both widening spreads and growth in average assets. Net interest margin was 3.20% for 2018 compared to 2.92% for 2017. Average earning assets were \$31.0 billion for 2018, up \$1.4 billion over 2017 with \$950 million due to CoBiz.
- Fees and commissions revenue was \$643.6 million for 2018, a decrease of \$14.1 million compared to 2017. Brokerage and trading revenue decreased \$23.3 million primarily due to the cost of financial instruments used to hedge our trading portfolio. Mortgage banking revenue decreased \$6.9 million affected by the impact of rising interest rates on mortgage loan origination volumes. Fiduciary and asset management revenue increased \$6.4 million.
- The change in the fair value of mortgage servicing rights, net of economic hedges, decreased other operating revenue by \$20.4 million in 2018, compared to \$1.9 million in 2017. This increase is due to the combination of unhedgeable factors and significant mortgage rate volatility. This amount does not include hedge-related net interest revenue of \$4.8 million.
- Other operating expense totaled \$1.0 billion, a \$24.9 million increase compared to 2017, including \$29.7 million of costs related to CoBiz operations in the fourth quarter of 2018. Excluding CoBiz operating costs, personnel expense decreased \$15.2 million. Annual merit increases were offset by a decrease in incentive compensation expense. Non-personnel expense increased \$10.4 million. Increases in occupancy and equipment, data processing and communications, and net losses and expenses on repossessed assets were partially offset by a decrease in mortgage banking costs.
- The Company recorded an \$8.0 million provision for credit losses in 2018, compared to a \$7.0 million negative provision for credit losses in 2017. The 2018 provision reflected loan growth partially offset by continued improvement in credit metrics. Nonaccruing loans not guaranteed by U.S. government agencies decreased \$23 million compared to December 31, 2017. Potential problem loans decreased \$26 million while other loans especially mentioned increased \$64 million. Net charge-offs were \$33 million or 0.18% of average loans for 2018, compared to net charge-offs of \$16 million or 0.09% of average loans for 2017. The combined allowance for credit losses totaled \$209 million or 0.97% of outstanding loans and 1.12%, excluding loans from CoBiz, at December 31, 2018.
- Period-end outstanding loan balances were \$21.7 billion at December 31, 2018, a \$4.5 billion increase over the prior year. CoBiz added \$2.9 billion of loans during 2018. Excluding acquired loans, commercial loan balances grew by \$1.1 billion or 10% and commercial real estate loans grew by \$447 million or 13%.
- Period-end deposits totaled \$25.3 billion at December 31, 2018, a \$3.2 billion increase compared to December 31, 2017. Excluding \$3.3 billion of acquired deposits, interest-bearing transaction deposits increased \$244 million, while demand deposit balances decreased \$330 million.
- Common equity Tier 1 capital ratio was 10.92% at December 31, 2018. In addition, the Tier 1 capital ratio was 10.92%, total capital ratio was 12.50% and leverage ratio was 8.96% at December 31, 2018. At December 31, 2017, the Tier 1 capital ratio was 12.05%, the total capital ratio was 13.54% and the leverage ratio was 9.31%.
- The Company repurchased 615,840 shares at an average price of \$86.82 per share during 2018 and 80,000 shares at an average price of \$92.54 during 2017.
- The Company paid cash dividends of \$1.90 per common share during 2018 and \$1.77 per common share in 2017.

Net income for the fourth quarter of 2018 totaled \$108 million or \$1.50 per diluted share, up from \$72.5 million or \$1.11 per diluted share for the fourth quarter of 2017. The fourth quarter earnings per share included a \$0.15 per share reduction as a result of CoBiz closing and integration costs of \$14.5 million. The highlights below exclude this amount.

Income tax expense was \$20.1 million or 15.7% of net income before taxes for the fourth quarter of 2018 and \$54.3 million or 42.9% of net income before taxes for the fourth quarter of 2017. The Tax Reform Act enacted in 2017 added \$11.7 million of expense to the fourth quarter of 2017 largely due to the revaluation of net deferred taxes. The 2017 tax returns were finalized in the fourth quarter of 2018. This resolved several uncertainties caused by last year's Tax Cuts and Jobs Act. Resolution of these uncertainties and other routine adjustments reduced tax expense for the quarter by \$8.6 million.

Highlights of the fourth quarter of 2018 included:

- Net interest revenue totaled \$285.7 million for the fourth quarter of 2018, up \$68.8 million over the fourth quarter of 2017. CoBiz added \$43.1 million to net interest revenue in the fourth quarter of 2018. Net interest margin was 3.40% for the fourth quarter of 2018, up from 2.97% for the fourth quarter of 2017. Net interest revenue increased primarily due to four 25 basis point increases in the federal funds rate by the Federal Reserve during 2018 and growth in average loan balances.
- Fees and commissions revenue totaled \$160.1 million, up \$2.2 million over the fourth quarter of 2017. Increases in trust fees and commissions, service charges, and other revenue were partially offset by decreases in brokerage and trading and mortgage banking revenue. This amount does not include hedge-related net interest revenue of \$695 thousand.
- The loss in the fair value of mortgage servicing rights, net of economic hedges, was \$12.4 million in the fourth quarter of 2018 compared to \$1.4 million in the fourth quarter of 2017. This increase is due primarily to the combination of unhedgeable factors and significant mortgage volatility in the fourth quarter of 2018.
- Operating expenses in the fourth quarter totaled \$270.1 million, a \$15.6 million increase compared to the prior year, including \$29.7 million related to CoBiz operations. Excluding these costs, personnel expense decreased \$9.6 million primarily due to changes in vesting assumptions related to share-based compensation. Non-personnel expenses decreased \$4.5 million. An increase in occupancy and equipment and net losses and expenses of repossessed assets was offset by a decrease in mortgage banking costs and professional fees and services.

Critical Accounting Policies & Estimates

The Consolidated Financial Statements and accompanying notes are prepared in accordance with generally accepted accounting principles in the United States of America (“GAAP”). The Company’s accounting policies are more fully described in Note 1 of the Consolidated Financial Statements. Management makes significant assumptions and estimates in the preparation of the Consolidated Financial Statements and accompanying notes in conformity with GAAP that may be highly subjective, complex and subject to variability. Actual results could differ significantly from these assumptions and estimates. The following discussion addresses the most critical areas where these assumptions and estimates could affect the financial condition, results of operations and cash flows of the Company. These critical accounting policies and estimates have been discussed with the appropriate committees of the Board of Directors.

Allowance for Loan Losses and Accrual for Off-Balance Sheet Credit Risk

The appropriateness of the allowance for loan losses and accrual for off-balance sheet credit risk is assessed quarterly by management based on an ongoing evaluation of the probable estimated losses inherent in the loan portfolio and probable estimated losses on unused commitments to provide financing. A consistent, well-documented methodology has been developed and is applied by an independent Credit Administration department to ensure consistency across the Company. The allowance for loan losses consists of specific allowances attributed to certain impaired loans that have not yet been charged down to amounts we expect to recover, general allowances for unimpaired loans that are based on estimated loss rates by loan class and nonspecific allowances for risks beyond factors specific to a particular portfolio segment or loan class. There have been no material changes in the approach or techniques utilized in developing the allowance for loan losses and accrual for off-balance sheet credit risk during 2018.

Loans are considered impaired when it is probable that we will not collect all amounts due according to the contractual terms of the loan agreements, including loans modified in a troubled debt restructuring. Internally risk graded loans are evaluated individually for impairment. Substantially all commercial and commercial real estate loans and certain residential mortgage and personal loans are risk graded through a quarterly evaluation of the borrower’s ability to repay.

Specific allowances for impaired loans that have not yet been charged down to amounts we expect to recover are measured by an evaluation of estimated future cash flows discounted at the loan’s initial effective interest rate or the fair value of collateral for certain collateral dependent loans. Collateral value of real property is generally based on third party appraisals that conform to Uniform Standards of Professional Appraisal Practice, less estimated selling costs. Appraised values are on an “as-is” basis and generally are not adjusted by the Company. Updated appraisals are obtained at least annually or more frequently if market conditions indicate collateral values may have declined. Collateral value of mineral rights is determined by our internal staff of engineers based on projected cash flows under current market conditions. The value of other collateral is generally determined by our special assets staff based on liquidation cash flows under current market conditions. Collateral values and available cash resources that support impaired loans are evaluated quarterly. Historical statistics may be used as a practical way to estimate impairment in limited situations, such as when a collateral dependent loan is identified as impaired near the end of a reporting period until an updated appraisal of collateral value is received or a full assessment of future cash flows is completed. Estimates of future cash flows and collateral values require significant judgments and may be volatile.

General allowances for unimpaired loans are based on estimated loss rates by loan class. The appropriate historical gross loss rate for each loan class is determined by the greater of the current loss rate based on the most recent twelve months or a ten-year average gross loss rate. Recoveries are not directly considered in the estimation of historical loss rates. Recoveries generally do not follow predictable patterns and are not received until well-after the charge-off date as a result of protracted legal proceedings. For risk graded loans, historical loss rates are adjusted for changes in risk rating. For each loan class, the weighted average current risk grade is compared to the weighted average long-term risk grade. This comparison determines whether the risk in each loan class is increasing or decreasing. Historical loss rates are adjusted upward or downward in proportion to changes in weighted average risk grading. General allowances for unimpaired loans also consider inherent risks identified for a given loan class. Inherent risks include consideration of the loss rates that most appropriately represent the current credit cycle and other factors attributable to a specific loan class which have not yet been represented in the historical gross loss rates or risk grading. Examples of these factors include changes in commodity prices or engineering imprecision, which may affect the value of reserves that secure our energy loan portfolio, construction risk that may affect commercial real estate loans, changes in regulations and public policy that may disproportionately impact health care loans and changes in loan product types.

Nonspecific allowances are maintained for risks beyond factors specific to a particular portfolio segment or loan class. These factors include trends in the economy in our primary lending areas, concentrations in loans with large balances and other relevant factors.

Fair Value Measurement

Certain assets and liabilities are recorded at fair value in the Consolidated Financial Statements. Fair value is defined by applicable accounting guidance as the price to sell an asset or transfer a liability in an orderly transaction between market participants in the principal markets for the given asset or liability at the measurement date based on market conditions at that date. An orderly transaction assumes exposure to the market for a customary period for marketing activities prior to the measurement date and not a forced liquidation or distressed sale.

A hierarchy for fair value has been established that prioritizes the inputs of valuation techniques used to measure fair value into three broad categories: unadjusted quoted prices in active markets for identical assets or liabilities (Level 1), other observable inputs that can be observed either directly or indirectly (Level 2) and unobservable inputs for assets or liabilities (Level 3). Fair value may be recorded for certain assets and liabilities every reporting period on a recurring basis or under certain circumstances on a non-recurring basis. Fair value adjustments of significant assets or liabilities that are based on unobservable inputs (Level 3) are considered Critical Accounting Policies and Estimates. Additional discussion of fair value measurement and disclosure is included in Notes 7 and 19 of the Consolidated Financial Statements.

Mortgage Servicing Rights

We have a significant investment in mortgage servicing rights. Our mortgage servicing rights are primarily retained from sales in the secondary market of residential mortgage loans we have originated or purchased from correspondent lenders. Occasionally, mortgage servicing rights may be purchased from other lenders. Both originated and purchased mortgage servicing rights are initially recognized at fair value. We carry all mortgage servicing rights at fair value. Changes in fair value are recognized in earnings as they occur.

Mortgage servicing rights are not traded in active markets. The fair value of mortgage servicing rights is determined by discounting the projected cash flows. Certain significant assumptions and estimates used in valuing mortgage servicing rights are based on current market sources including projected prepayment speeds, assumed servicing costs, earnings on escrow deposits, ancillary income and discount rates. Assumptions used to value our mortgage servicing rights are considered significant unobservable inputs and represent our best estimate of assumptions that market participants would use to value this asset. A separate third party model is used to estimate prepayment speeds based on interest rates, housing turnover rates, estimated loan curtailment, anticipated defaults and other relevant factors. The prepayment model is updated periodically for changes in market conditions and adjusted to better correlate with actual performance of our servicing portfolio. The discount rate is based on benchmark rates for mortgage loans plus a market spread expected by investors in servicing rights. Significant assumptions used to determine the fair value of our mortgage servicing rights are presented in Note 7 to the Consolidated Financial Statements. At least annually, we request estimates of fair value from outside sources to corroborate the results of the valuation model.

The assumptions used in this model are primarily based on mortgage interest rates. Evaluation of the effect of a change in one assumption without considering the effect of that change on other assumptions is not meaningful. Considering all related assumptions, we expect a 50 basis point increase in primary mortgage interest rates to increase the fair value of our servicing rights by \$19 million. We expect a \$27 million decrease in the fair value of our mortgage servicing rights from a 50 basis point decrease in primary mortgage interest rates.

Valuation of Impaired Loans and Real Estate and Other Repossessed Assets

The fair value of collateral for certain impaired loans and real estate and other repossessed assets is measured on a non-recurring basis. The fair value of real estate is generally based on unadjusted third-party appraisals derived principally from or corroborated by observable market data. Fair value measurements based on these appraisals are considered to be based on Level 2 inputs. Fair value measurements based on appraisals that are not based on observable inputs or that require significant adjustments by us or fair value measurements that are not based on third-party appraisals are considered to be based on Level 3 inputs. Significant unobservable inputs include listing prices for comparable assets, uncorroborated expert opinions or management's knowledge of the collateral or industry.

The fair value of mineral rights is generally determined by our internal staff of engineers based on projected cash flows from proven oil and gas reserves under existing economic and operating conditions. Proven oil and gas reserves are estimated quantities that geological and engineering data demonstrate, with reasonable certainty, to be recoverable in future years from known reservoirs using existing prices and costs. Projected cash flows incorporate assumptions related to a number of factors including production, sales prices, operating expenses, severance, ad valorem taxes, capital costs and appropriate discount rate. Fair values determined through this process are considered to be based on Level 3 inputs.

Income Taxes

Determination of income tax expense and related assets and liabilities is complex and requires estimates and judgments when applying tax laws, rules, regulations and interpretations. It also requires judgments as to future earnings and the timing of future events. Accrued income taxes represent an estimate of net amounts due to or from taxing jurisdictions based upon these estimates, interpretations and judgments.

Management evaluates the Company's current tax expense or benefit based upon estimates of taxable income, tax credits and statutory tax rates. Annually, we file tax returns with each jurisdiction where we conduct business and adjust recognized income tax expense or benefit to filed tax returns.

We recognize deferred tax assets and liabilities based upon the differences between the values of assets and liabilities as recognized in the financial statements and their related tax basis using enacted tax rates in effect for the year in which the differences are expected to be recovered or settled. A valuation allowance is provided when it is more likely than not that some portion of the entire deferred tax asset may not be realized.

We also recognize the benefit of uncertain tax positions when based upon all relevant evidence, it is more-likely-than-not that our position would prevail upon examination, including resolution of related appeals or litigation, based upon the technical merits of the position. Unrecognized tax benefits, including estimated interest and penalties, are part of our current accrued income tax liability. Estimated penalties and interest are recognized in income tax expense. Income tax expense in future periods may decrease if an uncertain tax position is favorably resolved, generally upon completion of an examination by the taxing authorities, expiration of a statute of limitations, or changes in facts and circumstances.

Results of Operations

Net Interest Revenue and Net Interest Margin

Net interest revenue is the interest earned on debt securities, loans and other interest-earning assets less interest paid for interest-bearing deposits and other borrowings. The net interest margin is calculated by dividing tax-equivalent net interest revenue by average interest-earning assets. Net interest spread is the difference between the average rate earned on interest-earning assets and the average rate paid on interest-bearing liabilities. Net interest margin is typically greater than net interest spread due to interest income earned on assets funded by non-interest bearing liabilities such as demand deposits and equity.

Tax-equivalent net interest revenue totaled \$993.8 million for 2018, up from \$858.9 million for 2017. Tax-equivalent net interest revenue increased \$134.9 million over the prior year. The acquisition of CoBiz in the fourth quarter of 2018 added \$43.1 million to net interest revenue, including \$6.4 million of net purchase accounting discount accretion. Net interest revenue increased \$55.5 million due to rates and \$79.4 million from growth in earning assets. The benefit of an increase in short-term interest rates on floating-rate earning assets was partially offset by higher borrowing costs. Table 2 shows the effects on net interest revenue due to changes in average balances and interest rates for the various types of earning assets and interest-bearing liabilities. In addition, see the Annual and Quarterly Financial Summary of consolidated daily average balances, yields and rates following the Consolidated Financial Statements.

Net interest margin was 3.20% for 2018 and 2.92% for 2017. The tax-equivalent yield on earning assets was 3.98% for 2018, up from 3.36% in 2017, primarily due to increases in short-term interest rates resulting from four 25 basis point increases in the federal funds rate by the Federal Reserve during the year. Loan yields increased 67 basis points to 4.80%. The available for sale securities portfolio yield increased 22 basis points to 2.35%. The yield on interest-bearing cash and cash equivalents increased 70 basis points to 1.80%. Funding costs increased 52 basis points over 2017. The cost of interest-bearing deposits increased 30 basis points. The cost of other borrowed funds increased 86 basis points. The benefit to net interest margin from earning assets funded by non-interest bearing liabilities was 41 basis points for 2018, up from 23 basis points for 2017.

Average earning assets for 2018 increased \$1.4 billion or 5% over 2017 with \$950 million due to CoBiz. Average loans, net of allowance for loan losses, increased \$1.6 billion led by growth in average commercial and commercial real estate loans. Average trading securities balances increased \$1.0 billion primarily related to expanded U.S. mortgage-backed securities trading activity. Average interest-bearing cash and cash equivalents decreased \$768 million as we reduced our balances held at the Federal Reserve, including cash used in our purchase of CoBiz. The average balance of available for sale securities, which consists largely of residential and commercial mortgage-backed securities guaranteed by U.S. government agencies, decreased \$144 million. We purchase securities to supplement earnings and to manage interest rate risk. We have reduced the size of our bond portfolio during the past four years through normal monthly runoff to better position the balance sheet for an environment of rising longer-term rates.

Total average deposits grew by \$624 million over the prior year, including \$859 million from the CoBiz acquisition. Excluding acquired deposits, average demand deposit balances decreased \$131 million, average interest-bearing transaction account balances decreased \$62 million and average time deposit balances decreased \$81 million. Average borrowed funds increased \$709 million over the prior year. Borrowings from the Federal Home Loan Banks increased \$325 million and average funds purchased and repurchase agreement balances increased \$392 million over the prior year.

Our overall objective is to manage the Company's balance sheet to be relatively neutral to changes in interest rates as is further described in the Market Risk section of this report. As shown in Table 21, approximately 79% of our commercial and commercial real estate loan portfolios are either variable rate loans or fixed rate loans that will re-price within one year. These loans are funded primarily by deposit accounts that are either non-interest bearing, or that re-price more slowly than the loans. The result is a balance sheet that would be asset sensitive, which means that assets generally re-price more quickly than liabilities. Among the strategies that we use to manage toward a relatively rate-neutral position, we purchase fixed rate residential mortgage-backed securities issued primarily by U.S. government agencies and fund them with market rate sensitive liabilities. The liability-sensitive nature of this strategy provides an offset to the asset-sensitive characteristics of our loan portfolio. We also may use derivative instruments to manage our interest rate risk.

The effectiveness of these strategies is reflected in the overall change in net interest revenue due to changes in interest rates as shown in Table 2 and in the interest rate sensitivity projections as shown in the Market Risk section of this report.

Fourth Quarter 2018 Net Interest Revenue

Tax-equivalent net interest revenue totaled \$288.8 million for the fourth quarter of 2018, an increase of \$67.8 million over the fourth quarter of 2017. CoBiz added \$43.1 million to net interest revenue, including \$6.4 million of net purchase accounting discount accretion. Net interest revenue increased \$18.3 million primarily due to four 25 basis point increases in the federal funds rate by the Federal Reserve during 2018 and \$49.4 million primarily due to the growth in average loan balances.

Net interest margin was 3.40% for the fourth quarter of 2018 compared to 2.97% for the fourth quarter of 2017. The tax-equivalent yield on earning assets was 4.33% for the fourth quarter of 2018, up 84 basis points over the fourth quarter of 2017. Loan yields increased 80 basis points to 5.09%, including 12 basis points from net purchase accounting discount accretion. The remaining increase is due mainly to short-term market interest rates related to the Federal Reserve's four 25 basis point increases in 2018. The available for sale securities portfolio yield increased 30 basis points to 2.51%. The yield on interest-bearing cash and cash equivalents increased 96 basis points to 2.23%. Yield on trading securities increased 72 basis points to 4.10%. Funding costs were up 63 basis points over the fourth quarter of 2017. The cost of interest-bearing deposits increased 39 basis points over the fourth quarter of 2017. The cost of other borrowed funds increased 105 basis points. The benefit to net interest margin from earning assets funded by non-interest bearing liabilities was 49 basis points in the fourth quarter of 2018, up from 27 basis points in the fourth quarter of 2017.

Average earning assets for the fourth quarter of 2018 increased \$4.0 billion over the fourth quarter of 2017. Average loans, net of allowance for loan losses, increased \$4.4 billion, including acquired loans. The legacy BOKF loan portfolio grew \$1.3 billion. Commercial and commercial real estate loan balances were the primary drivers.

Average deposits increased \$2.9 billion over the fourth quarter of 2017, including \$3.4 billion related to Cobiz. Excluding acquired deposits, average demand deposit balances decreased \$387 million, average interest-bearing transaction accounts decreased \$48 million and average time deposits decreased \$72 million. Average borrowed funds increased \$868 million.

2017 Net Interest Revenue

Tax-equivalent net interest revenue for 2017 was \$858.9 million, up from \$764.8 million for 2016. Tax-equivalent net interest revenue increased \$94.1 million over the prior year. Net interest revenue increased \$61.2 million due to rates and \$32.9 million from growth in earning assets. The benefit of an increase in short-term interest rates during 2017 on the loan portfolio and interest-bearing cash and cash equivalents yields was offset by higher borrowing costs.

Net interest margin was 2.92% for 2017 compared to 2.66% for 2016. The tax-equivalent yield on average earning assets increased 41 basis points over 2016. Loan yields increased 50 basis points primarily due to an increase in short-term interest rates. The yield on interest-bearing cash and cash equivalents increased 57 basis points. The available for sale securities portfolio yield increased 10 basis points. The cost of interest-bearing liabilities increased 25 basis points. The cost of interest-bearing deposits increased 9 basis points due to a lack of market pricing pressure. The cost of other borrowed funds increased 55 basis points, primarily due to increases in federal funds rates by the Federal Reserve. The cost of subordinated debentures increased 275 basis points due to the full year impact of higher fixed rate debt issued in the second quarter of 2016. The benefit to net interest margin from earning assets funded by non-interest bearing liabilities was 23 basis points for 2017, compared to 13 basis points for 2016.

Average earning assets increased \$646 million or 2% during 2017. Average loans, net of allowance for loan losses, increased \$812 million. Growth in average commercial, residential and personal loans was partially offset by a decrease in average commercial real estate loan balances. The average balance of available for sale securities, which consists largely of residential and commercial mortgage-backed securities guaranteed by U.S. government agencies, decreased \$414 million. We reduced the size of our bond portfolio through normal monthly runoff to better position the balance sheet for an environment of rising longer-term rates. Growth in average assets was funded by growth in demand and interest-bearing deposits, partially offset by decreased repurchase agreements and borrowings from the Federal Home Loan Banks. Average demand deposit account balances grew by \$839 million and average interest-bearing transaction deposits increased \$475 million. Average borrowed funds balances decreased \$275 million compared to 2016. Funds purchased and repurchase agreements decreased \$176 million compared to 2016.

Table 2 – Volume/Rate Analysis

(In thousands)

	Year Ended December 31, 2018 / 2017			Year Ended December 31, 2017 / 2016		
	Change Due To ¹			Change Due To ¹		
	Change	Volume	Yield / Rate	Change	Volume	Yield / Rate
Tax-equivalent interest revenue:						
Interest-bearing cash and cash equivalents	\$ 205	\$ (11,155)	\$ 11,360	\$ 11,402	\$ (252)	\$ 11,654
Trading securities	40,311	37,008	3,303	8,424	8,122	302
Investment securities	(2,944)	(2,504)	(440)	(1,043)	(1,763)	720
Available for sale securities	19,404	581	18,823	1,443	(7,895)	9,338
Fair value option securities	(1,550)	(3,541)	1,991	10,032	5,886	4,146
Restricted equity securities	3,065	1,880	1,185	1,252	(257)	1,509
Residential mortgage loans held for sale	(583)	(1,645)	1,062	(3,952)	(4,389)	437
Loans	189,518	68,882	120,636	115,678	29,407	86,271
Total tax-equivalent interest revenue	247,426	89,506	157,920	143,236	28,859	114,377
Interest expense:						
Transaction deposits	37,232	1,748	35,484	14,721	851	13,870
Savings deposits	80	35	45	(27)	27	(54)
Time deposits	4,402	(769)	5,171	(1,385)	(728)	(657)
Funds purchased and repurchase agreements	8,351	2,369	5,982	422	(213)	635
Other borrowings	60,856	5,023	55,833	33,270	(1,001)	34,271
Subordinated debentures	1,588	1,665	(77)	2,160	(2,892)	5,052
Total interest expense	112,509	10,071	102,438	49,161	(3,956)	53,117
Tax-equivalent net interest revenue	134,917	79,435	55,482	94,075	32,815	61,260
Change in tax-equivalent adjustment	(8,249)			(398)		
Net interest revenue	\$ 143,166			\$ 94,473		

¹ Changes attributable to both volume and yield/rate are allocated to both volume and yield/rate on an equal basis.

Table 2 – Volume/Rate Analysis (continued)
(In thousands)

	Three Months Ended December 31, 2018 / 2017		
	Change	Change Due To ¹	
		Volume	Yield / Rate
Tax-equivalent interest revenue:			
Interest-bearing cash and cash equivalents	\$ (3,141)	\$ (6,234)	\$ 3,093
Trading securities	15,007	12,843	2,164
Investment securities	(719)	(760)	41
Available for sale securities	9,462	2,391	7,071
Fair value option securities	(3,192)	(4,103)	911
Restricted equity securities	842	438	404
Residential mortgage loans held for sale	(594)	(751)	157
Loans	91,097	52,006	39,091
Total tax-equivalent interest revenue	108,762	55,830	52,932
Interest expense:			
Transaction deposits	14,429	2,310	12,119
Savings deposits	61	12	49
Time deposits	2,013	29	1,984
Funds purchased and repurchase agreements	3,795	1,486	2,309
Other borrowings	18,978	748	18,230
Subordinated debentures	1,727	1,816	(89)
Total interest expense	41,003	6,401	34,602
Tax-equivalent net interest revenue	67,759	49,429	18,330
Change in tax-equivalent adjustment	(1,064)		
Net interest revenue	\$ 68,823		

¹ Changes attributable to both volume and yield/rate are allocated to both volume and yield/rate on an equal basis.

Other Operating Revenue

Other operating revenue was \$616.8 million for 2018, a decrease of \$39.5 million or 6% compared 2017. The change in the fair value of mortgage servicing rights, net of economic hedges, decreased other operating revenue by \$20.4 million in 2018 and \$1.9 million in 2017. This increase is primarily as a result of mortgage rate volatility.

A \$15.4 million fee earned through the sale of client assets was recognized as fiduciary and asset management revenue in 2018. This fee is excluded from the fluctuation discussion below.

Table 3 – Other Operating Revenue

(In thousands)

	Year Ended December 31,				
	2018	2017	2016	2015	2014
Brokerage and trading revenue	\$ 108,323	\$ 131,601	\$ 138,377	\$ 129,556	\$ 134,437
Transaction card revenue ¹	84,025	81,143	78,347	73,650	71,671
Fiduciary and asset management revenue	184,703	162,889	135,387	126,034	115,529
Deposit service charges and fees	112,153	112,079	111,589	109,592	109,783
Mortgage banking revenue	97,787	104,719	133,914	126,002	109,093
Other revenue	56,651	49,959	50,112	50,126	47,499
Total fees and commissions revenue	643,642	642,390	647,726	614,960	588,012
Other gains (losses), net	(2,731)	11,213	4,947	5,459	2,991
Gain (loss) on derivatives, net	(422)	779	(15,685)	430	2,776
Gain (loss) on fair value option securities, net	(25,572)	(2,733)	(10,555)	(3,684)	10,189
Change in fair value of mortgage servicing rights	4,668	172	(2,193)	(4,853)	(16,445)
Gain (loss) on available for sale securities, net	(2,801)	4,428	11,675	12,058	1,539
Total other-than-temporary impairment	—	—	—	(2,443)	(373)
Portion of loss recognized in (reclassified from) other comprehensive income	—	—	—	624	—
Net impairment losses recognized in earnings	—	—	—	(1,819)	(373)
Total other operating revenue	\$ 616,784	\$ 656,249	\$ 635,915	\$ 622,551	\$ 588,689
Non-GAAP Reconciliation:¹					
Transaction card revenue on income statement	84,025	119,988	116,452	109,579	104,940
Netting adjustment	—	(38,845)	(38,105)	(35,929)	(33,269)
Transaction card revenue after netting adjustment	84,025	81,143	78,347	73,650	71,671

¹ Non-GAAP measure to net interchange charges from prior years between transaction card revenue and data processing and communications expense as a result of the recent revenue recognition standard. This measure has no effect on net income or earnings per share.

Fees and commissions revenue

Diversified sources of fees and commissions revenue are a significant part of our business strategy and represented 40% of total revenue for 2018, excluding provision for credit losses and gains and losses on asset sales, securities and derivatives and the change in the fair value of mortgage servicing rights. We believe that a variety of fee revenue sources provides an offset to changes in interest rates, values in the equity markets, commodity prices and consumer spending, all of which can be volatile. As an example of this strength, many of the economic factors such as rising interest rates resulting in growth in net interest revenue or fiduciary and asset management revenue, may also decrease mortgage banking production volumes. We expect growth in other operating revenue to come through offering new products and services and by further development of our presence in other markets. However, current and future economic conditions, regulatory constraints, increased competition and saturation in our existing markets could affect the rate of future increases.

Brokerage and trading revenue, which includes revenues from trading, customer hedging, retail broker and investment banking, decreased \$23.3 million or 18% compared to the prior year.

Trading revenue includes net realized and unrealized gains and losses primarily related to sales of U.S. government securities, residential mortgage-backed securities guaranteed by U.S. government agencies and municipal securities to institutional customers and related derivative instruments. Trading revenue also includes gains and losses on instruments we hold as economic hedges of changes in the fair value of trading securities. During 2018, we significantly expanded our U.S. government residential mortgage-backed securities trading activities. Average trading securities increased \$1.0 billion over the previous year. Net interest revenue earned on our trading portfolio grew \$37.0 million. However, trading revenue decreased \$15.5 million to \$28.1 million in 2018 primarily due to an \$18.3 million increase in hedging costs.

Customer hedging revenue is based primarily on realized and unrealized changes in the fair value of derivative contracts held for customer risk management programs. As more fully discussed under Customer Derivative Programs in Note 3 of the Consolidated Financial Statements, we offer commodity, interest rate, foreign exchange and equity derivatives to our customers. Derivative contracts executed with customers are offset with contracts between selected counterparties and exchanges to minimize market risk from changes in commodity prices, interest rates or foreign exchange rates. Customer hedging revenue totaled \$38.8 million for 2018, a decrease of \$5.3 million or 12% compared to 2017. The volume of derivative contracts sold to our mortgage banking customers used to hedge their pipelines of mortgage loan originations decreased as average mortgage rates rose during 2018.

Revenue earned from retail brokerage transactions totaled \$22.2 million for 2018, a decrease of \$766 thousand or 3% compared to the prior year. Retail brokerage revenue is primarily based on fees and commissions earned on sales of fixed income securities, annuities, mutual funds and other financial instruments to retail customers. Revenue is primarily based on the volume of customer transactions and applicable commission rate for each type of product. We expect retail brokerage revenue to continue to decline as more relationships are transitioned to managed accounts, which are included in fiduciary and asset management revenue.

Investment banking, which includes fees earned upon completion of underwriting, financial advisory services and loan syndication fees, totaled \$19.3 million for 2018, a decrease of \$1.7 million or 8% compared to 2017, related to the timing and volume of completed transactions.

Transaction card revenue depends largely on the volume and amount of transactions processed, the number of TransFund automated teller machine ("ATM") locations and the number of merchants served. Transaction card revenue totaled \$84.0 million for 2018, a \$2.9 million or 4% increase over 2017. Revenues from the processing of transactions on behalf of the members of our TransFund electronic funds transfer ("EFT") network totaled \$76.2 million, up \$2.7 million or 4% over 2017. The number of TransFund ATM locations totaled 2,426 at December 31, 2018 compared to 2,223 at December 31, 2017. Merchant services fees paid by customers for account management and electronic processing of card transactions totaled \$7.8 million, relatively consistent with the prior year.

Fiduciary and asset management revenue is earned through managing or holding of assets for customers and executing transactions or providing related services. Approximately 80% of fiduciary and asset management revenue is primarily based on the fair value of assets. Rates applied to those asset values vary based on the nature of the relationship. Fiduciary and managed asset relationships generally have a higher fee rate than non-fiduciary and/or managed relationships.

Fiduciary and asset management revenue grew \$6.4 million or 4% over 2017 primarily due to growth in managed fiduciary assets.

A distribution of assets under management or administration and related fiduciary and asset management revenue follows:

Table 4 -- Assets Under Management or Administration

	Year Ended December 31,					
	2018			2017		
	Balance	Revenue ¹	Margin ²	Balance	Revenue ¹	Margin ²
Managed fiduciary assets:						
Personal	\$ 8,115,503	\$ 92,633	1.14%	\$ 7,801,968	\$ 85,328	1.09%
Institutional	13,119,497	22,488	0.17%	13,192,969	21,630	0.16%
Total managed fiduciary assets	21,235,000	115,121	0.54%	20,994,937	106,958	0.51%
Non-managed assets:						
Fiduciary	23,606,339	67,460	0.22% ³	27,766,540	53,511	0.19%
Non-fiduciary	15,964,854	2,122	0.01%	16,969,222	2,420	0.01%
Safekeeping and brokerage assets under administration	15,473,584	—	—%	16,097,098	—	—%
Total non-managed assets	55,044,777	69,582	0.10%	60,832,860	55,931	0.09%
Total assets under management or administration	\$76,279,777	\$ 184,703	0.22% ³	\$81,827,797	\$ 162,889	0.20%

¹ Fiduciary and asset management revenue includes asset-based and other fees associated with the assets.

² Revenue divided by period-end balance.

³ Excludes \$15.4 million fee earned through client asset management.

A summary of changes in assets under management or administration for the year ended December 31, 2018 and 2017 follows:

Table 5 -- Changes in Assets Under Management or Administration

	Year Ended December 31,	
	2018	2017
Beginning balance	\$ 81,827,797	\$ 75,407,863
Net inflows (outflows)	(6,812,199)	(406,469)
Change in assets from acquisitions	998,705	—
Net change in fair value	265,474	6,826,403
Ending balance	\$ 76,279,777	\$ 81,827,797

The Tax Cuts and Jobs Act eliminated the ability for bond issuers to use tax-exempt bonds to advance refund their outstanding debt; thus putting downward pressure on our Corporate Trust asset balance through most of the year. This, combined with larger than expected departures in our retirement plan space, led to higher asset outflows in 2018.

Mortgage banking revenue totaled \$97.8 million for 2018, a \$6.9 million or 7% decrease compared to 2017. Production volume is down \$666 million as primary interest rates increased 56 basis points compared to 2017. While increased market competition has negatively impacted our gain on sale margins, this was more than offset by improved hedging performance and better pricing discipline. Mortgage servicing revenue was \$66.1 million, consistent with the prior year. The outstanding principal balance of mortgage loans serviced for others totaled \$21.7 billion at December 31, 2018, a \$388 million decrease compared to December 31, 2017.

Table 6 – Mortgage Banking Revenue

(In thousands)

	Year Ended December 31,				
	2018	2017	2016	2015	2014
Mortgage production revenue	\$ 31,690	\$ 38,498	\$ 69,628	\$ 69,587	\$ 61,061
Mortgage loans funded for sale	\$ 2,587,297	\$ 3,286,873	\$ 6,117,417	\$ 6,372,956	\$ 4,484,394
Add: Current year end outstanding commitments	160,848	222,919	318,359	601,147	627,505
Less: Prior year end outstanding commitments	222,919	318,359	601,147	627,505	258,873
Total mortgage production volume	2,525,226	3,191,433	5,834,629	6,346,598	4,853,026
Gain on sale margin	1.25%	1.21%	1.19%	1.10%	1.26%
Mortgage loan refinances to mortgage loans funded for sale	28%	40%	51%	42%	30%
Primary mortgage interest rates:					
Average	4.54%	3.99%	3.65%	3.85%	4.17%
Period end	4.55%	3.99%	4.32%	3.96%	3.83%
Mortgage servicing revenue	\$ 66,097	\$ 66,221	\$ 64,286	\$ 56,415	\$ 48,032
Average outstanding principal balance of mortgage loans serviced for others	21,891,749	22,055,002	20,837,897	17,920,557	14,940,915
Average mortgage servicing fee rates	0.30%	0.30%	0.31%	0.31%	0.32%

Primary rates disclosed in Table 6 above represent rates generally available to borrowers on 30 year conforming mortgage loans.

Net gains on securities, derivatives and other assets

As discussed in the Market Risk section following, the fair value of our mortgage servicing rights ("MSRs") changes in response to changes in primary mortgage loan rates and other assumptions. We attempt to mitigate the earnings volatility caused by changes in the fair value of MSRs by designating certain financial instruments as an economic hedge. Changes in the fair value of these instruments are generally expected to partially offset changes in the fair value of MSRs.

The net economic cost of the changes in fair value of mortgage servicing rights and related economic hedges was \$15.6 million in 2018, including a \$4.7 million increase in the fair value of mortgage servicing rights, offset by a \$25.0 million decrease in the fair value of securities and derivative contracts held as an economic hedge and \$4.8 million of related net interest revenue. This increase is due to the combination of unhedgeable factors and significant mortgage rate volatility during the year, particularly in the fourth quarter.

The net economic cost of changes in the fair value of mortgage servicing rights and related economic hedges was \$6.6 million for 2017. The fair value of mortgage servicing rights increased \$172 thousand. The fair value of securities and interest rate derivative contracts held as an economic hedge decreased \$2.1 million. Net interest earned on securities held as an economic hedge was \$8.4 million.

Table 7 – Gain (Loss) on Mortgage Servicing Rights, Net of Economic Hedge
(In thousands)

	Year Ended December 31,				
	2018	2017	2016	2015	2014
Gain (loss) on mortgage hedge derivative contracts, net	\$ 551	\$ 681	\$ (15,696)	\$ 634	\$ 2,776
Gain (loss) on fair value option securities, net	(25,572)	(2,733)	(10,555)	(3,684)	10,003
Gain (loss) on economic hedge of mortgage servicing rights	(25,021)	(2,052)	(26,251)	(3,050)	12,779
Gain (loss) on change in fair value of mortgage servicing rights	4,668	172	(2,193)	(4,853)	(16,445)
Gain (loss) on changes in fair value of mortgage servicing rights, net of economic hedges included in other operating revenue	(20,353)	(1,880)	(28,444)	(7,903)	(3,666)
Net interest revenue on fair value option securities ¹	4,798	8,435	4,356	8,001	3,253
Total economic benefit (cost) of changes in the fair value of mortgage servicing rights, net of economic hedges	\$ (15,555)	\$ 6,555	\$ (24,088)	\$ 98	\$ (413)

¹ Actual interest earned on fair value option securities less internal transfer-priced cost of funds.

Fourth Quarter 2018 Other Operating Revenue

Other operating revenue was \$136.5 million for the fourth quarter of 2018, a decrease of \$20.9 million compared to the fourth quarter of 2017. CoBiz added \$5.8 million to other operating revenue in the fourth quarter of 2018. Excluding CoBiz, other operating revenue decreased \$29.4 million. The fourth quarter of 2018 included a \$12.4 million decrease in the fair value of mortgage servicing rights, net of economic hedges, while the fourth quarter of 2017 included a \$1.4 million decrease. Other gains and losses, net, decreased \$9.6 million primarily due to changes in the fair value of assets related to the deferred compensation plan and equity securities not held for trading purposes.

Brokerage and trading revenue was \$28.1 million for the fourth quarter of 2018, a decrease of \$8.4 million, excluding CoBiz. Trading revenue decreased \$4.1 million largely due to increased cost of hedging a larger trading portfolio. Net interest revenue on the trading portfolio increased \$12.0 million over the same period of 2017. Investment banking revenue decreased \$3.4 million primarily related to the timing and volume of completed transactions.

Mortgage banking revenue was \$21.9 million for the fourth quarter of 2018, a decrease of \$2.5 million compared to the fourth quarter of 2017 due primarily to a decrease in mortgage loan production volume as a result of higher interest rates and increased market competition. Mortgage loan production volumes were \$460 million for the fourth quarter of 2018, compared to \$729 million in the fourth quarter of 2017.

2017 Other Operating Revenue

Other operating revenue totaled \$656.2 million for 2017, up \$20.3 million or 3% over 2016. The change in the fair value of mortgage servicing rights, net of economic hedges, decreased operating revenue in 2017 by \$1.9 million and decreased operating revenue by \$28.4 million in 2016.

Transaction card revenue grew by \$2.8 million over 2016 primarily due to growth in transaction volumes. Fiduciary and asset management fees increased \$27.5 million primarily due to growth in assets under management, improved pricing discipline and decreased fee waivers.

Mortgage banking revenue decreased by \$29.2 million compared 2016 mainly due to a decrease in production volume. This was largely related to the Company's strategic decision to exit the correspondent lending channel during 2016.

Brokerage and trading revenue for 2017 decreased \$6.8 million compared to 2016. Excluding a \$5.0 million decrease in the value of trading securities due to the unexpected increase in interest rates in 2016, brokerage and trading revenue decreased \$11.8 million or 9%. The revenue decrease generally resulted from customer reaction to rising interest rates along with changes in regulations.

Other gains, net totaled \$11.2 million for 2017 mainly due to the sale of certain merchant banking investments during the year.

Other Operating Expense

Other operating expense for 2018 totaled \$1.0 billion, a \$41.5 million or 4% increase over the prior year. CoBiz added \$16.6 million in closing and integration costs during 2018, primarily affecting professional fees and services and personnel expenses. Operations related to CoBiz added \$29.7 million to other operating expense. Excluding those costs, operating expense decreased \$4.8 million, largely consistent with 2017. The fluctuation discussion below excludes closing and integration costs.

Table 8 – Other Operating Expense
(In thousands)

	Year Ended December 31,				
	2018	2017	2016	2015	2014
Regular compensation	\$ 358,280	\$ 333,226	\$ 332,740	\$ 313,403	\$ 298,420
Incentive compensation:					
Cash-based compensation	132,593	127,964	128,077	114,305	111,748
Share-based compensation	3,572	23,602	10,464	12,358	10,875
Deferred compensation	(419)	4,091	1,687	361	(13,692)
Total incentive compensation	135,746	155,657	140,228	127,024	108,931
Employee benefits	89,105	84,525	80,151	74,871	69,580
Total personnel expense	583,131	573,408	553,119	515,298	476,931
Business promotion	30,523	28,877	26,582	27,851	26,649
Charitable contributions to BOKF Foundation	2,846	2,000	2,000	796	4,267
Professional fees and services	59,099	51,067	56,783	40,123	44,440
Net occupancy and equipment	97,981	86,477	80,024	76,016	77,232
Insurance	23,318	19,653	32,489	20,375	18,578
Data processing & communications ¹	114,796	108,125	93,736	86,454	81,956
Printing, postage and supplies	17,169	15,689	15,584	13,498	13,518
Net losses & operating expenses of repossessed assets	17,052	9,687	3,359	1,446	6,019
Amortization of intangible assets	9,620	6,779	6,862	4,359	3,965
Mortgage banking costs	46,298	52,856	61,387	38,813	31,705
Other expense	26,333	32,054	47,560	35,233	28,993
Total other operating expense	\$ 1,028,166	\$ 986,672	\$ 979,485	\$ 860,262	\$ 814,253
Average number of employees (full-time equivalent)	4,993	4,900	4,872	4,797	4,679
Non-GAAP Reconciliation:¹					
Data processing and communications expense on income statement	114,796	146,970	131,841	122,383	115,225
Netting adjustment	—	(38,845)	(38,105)	(35,929)	(33,269)
Data processing and communications expense after netting adjustment	114,796	108,125	93,736	86,454	81,956

¹ Non-GAAP measure to net interchange charges from prior quarters between transaction card revenue and data processing and communications expense as a result of the recent revenue recognition standard. This measure has no effect on net income or earnings per share.

Personnel expense

Personnel expense increased \$4.0 million in 2018. An increase in regular compensation expense largely as a result of the addition of CoBiz employees in the fourth quarter was partially offset by a decrease in incentive compensation due to changes in vesting assumptions.

Regular compensation expense, which consists of salaries and wages, overtime pay and temporary personnel costs, increased \$24.9 million or 7% over 2017, which included \$13.5 million related to the addition of CoBiz employees. The remaining increase is primarily due to standard annual merit increases, which were effective for the majority of our staff on March 1. The average number of employees increased with the addition of CoBiz employees in the fourth quarter of 2018.

Incentive compensation decreased \$24.6 million or 16% compared to 2017. Cash-based incentive compensation plans, which are either intended to provide current rewards to employees who generate long-term business opportunities for the Company based on growth in loans, deposits, customer relationships and other measurable metrics or intended to compensate employees with commissions on completed transactions, remained consistent compared to 2017.

Share-based compensation expense represents expense for equity awards based on the grant-date fair value. Non-vested shares generally cliff vest in 3 years and are subject to a two year holding period after vesting. The number of shares that will ultimately vest is determined by BOKF's change in earnings per share relative to a defined group of peer banks. In addition, compensation costs related to certain shares is variable based on changes in the fair value of BOK Financial common shares. Share-based compensation expense for equity awards decreased \$20.0 million or 85% compared to 2017, primarily due to a decrease in the vesting probability of certain performance-based share awards.

The Company currently offers a deferred compensation plan for certain executive and senior officers. Deferred compensation expense decreased \$4.5 million compared to the prior year. Deferred compensation expense is largely offset by changes in the fair value of assets held in rabbi trusts for the benefit of participants, which is included other gains (losses), net in the Consolidated Statements of Earnings.

Non-personnel operating expense

Non-personnel expense increased \$20.9 million or 5% over the prior year.

Occupancy and equipment expense increased \$11.4 million or 13%, including \$3.2 million related to CoBiz operations. The remaining increase is largely due to our new Oklahoma City headquarters. Data processing and communications expense increased \$6.3 million or 6% primarily due to technology project costs.

Insurance expense increased \$3.7 million or 19%. The Company received \$5.1 million in credits during 2017 related to the revision of certain inputs to the assessment calculation filed for years 2013 through 2016. This was partially offset by the elimination of a large bank deposit insurance surcharge assessed by the FDIC in the fourth quarter of 2018.

Mortgage banking expense decreased \$6.6 million or 12%, primarily due to a decrease in accruals related to default servicing and loss mitigation costs on loans serviced for others.

Net losses and operating expenses of repossessed assets increased \$7.4 million over the prior year mainly due to write-downs on a set of oil and gas properties and a healthcare property in 2018.

Other expense decreased \$5.7 million compared to the prior year primarily due to reductions in litigation expenses and expenses related to merchant banking investments that were sold in 2017.

Fourth Quarter 2018 Operating Expenses

Other operating expense for the fourth quarter of 2018 totaled \$284.6 million, an increase of \$30.2 million compared to the fourth quarter of 2017. The fourth quarter of 2018 included \$14.5 million of CoBiz closing and acquisition costs. The discussion following excludes these costs.

Personnel expense increased \$9.7 million over the fourth quarter of 2017. Regular compensation expense increased \$17.8 million compared to the fourth quarter of 2017. The addition of CoBiz employees added \$13.5 million. The remaining increase is due primarily to annual merit increases. Incentive compensation decreased \$13.4 million. Share-based compensation expense decreased \$8.1 million mainly due to changes in vesting assumptions related to the Company's earnings per share growth relative to a defined peer group. Deferred compensation expense decreased \$4.8 million, which is largely offset by changes in the fair value of assets held in rabbi trusts for the benefit of participants.

Non-personnel expense increased \$5.9 million compared to the fourth quarter of 2017. Occupancy and equipment costs increased \$5.3 million due primarily to our new Oklahoma City headquarters. Net losses and operating expenses of repossessed assets increased \$2.2 million mainly due to gains in the fourth quarter of 2017. Intangible amortization increased \$3.9 million primarily related to fourth quarter 2018 amortization of the CoBiz identifiable intangible assets. Professional fees and services decreased \$3.0 million largely as a result of one-time technology assessments and a large project that was implemented in the fourth quarter of 2017. Mortgage banking costs decreased \$2.8 million primarily due to a decrease in accruals related to default servicing and loss mitigation costs on loans serviced for others. Insurance expense decreased \$2.3 million primarily due to the elimination of a large bank deposit insurance surcharge assessed by the FDIC.

2017 Operating Expenses

Other operating expense totaled \$986.7 million for 2017, a \$7.2 million or 1% increase over 2016.

Personnel expense increased \$20.3 million or 4%. Incentive compensation expense increased \$15.4 million or 11%, mainly due to the increase in the vesting probability of certain performance-based share awards and increase in the fair value of BOK Financial common shares. Employee benefit expense increased \$4.4 million primarily due to employee medical costs.

Non-personnel expense decreased \$13.1 million or 3% compared to 2016. Insurance expense decreased \$12.8 million due to a credit received in 2017 related to the revision of certain inputs to the assessment calculation along with the benefit from decreased criticized and classified asset levels. Mortgage banking expense decreased \$8.5 million primarily related to actual mortgage loan prepayments. Professional fees and services expense decreased \$5.7 million due to Mobank integration costs incurred in 2016. Other expense decreased \$15.5 million due primarily to higher litigation and settlement expenses in 2016.

Data processing and communications expense increased \$14.4 million and net occupancy and equipment expense increased \$6.5 million primarily related to continued upgrades of our information technology infrastructure and cybersecurity. Net losses and operation expenses of repossessed assets increased \$6.3 million mainly due to a write-down of a set of oil and gas properties.

Income Taxes

Income tax expense was \$119.1 million or 21.1% of net income before taxes for 2018, \$182.6 million or 35.2% of net income before taxes for 2017 and \$106.4 million or 31.4% of net income before taxes for 2016. Tax Reform enacted in 2017 added \$11.7 million of expense in 2017 largely due to the revaluation of net deferred tax assets. Excluding the effect of adjustments for tax reform, the 2017 income tax expense would have been 33.0% of net income before taxes.

In 2018, we completed our accounting for uncertainties that resulted from the Tax Reform Act. Resolution of these uncertainties and revaluation of deferred taxes decreased 2018 tax expense by \$1.7 million. Excluding these adjustments, the 2018 effective tax rate would have been 21.4%.

Net deferred tax assets totaled \$35 million at December 31, 2018 compared to net deferred tax assets of \$15 million at December 31, 2017. We have evaluated the recoverability of our deferred tax assets based on the generation of future taxable income during the periods in which those temporary differences become deductible and determined that no valuation allowance was required in 2018 and 2017.

Unrecognized tax benefits totaled \$19 million at December 31, 2018 compared to \$18 million at December 31, 2017. BOK Financial operates in numerous jurisdictions, which requires judgment regarding the allocation of income, expense, and earnings under various laws and regulations of each of these taxing jurisdictions. Each jurisdiction may audit our tax returns and may take different positions with respect to these allocations.

Income tax expense was \$20.1 million or 15.7% of net income before taxes for the fourth quarter of 2018 compared to \$54.3 million or 42.9% of net income before taxes for the fourth quarter of 2017. The 2017 tax returns were finalized in the fourth quarter resolving uncertainties caused by last year's Tax Cuts and Jobs Act. Resolution of these uncertainties and other routine adjustments reduced tax expense for the quarter by \$8.6 million.

Table 9 – Selected Quarterly Financial Data (Unaudited)

(In thousands, except per share data)

	2018			
	First	Second	Third	Fourth
Interest revenue	\$ 265,407	\$ 294,180	\$ 303,247	\$ 365,592
Interest expense	45,671	55,618	62,364	79,906
Net interest revenue	219,736	238,562	240,883	285,686
Provision for credit losses	(5,000)	—	4,000	9,000
Net interest revenue after provision for credit losses	224,736	238,562	236,883	276,686
Fees and commissions revenue	159,913	157,331	166,265	160,133
Gain (loss) on financial instruments and other assets, net	(25,130)	(2,655)	(4,296)	555
Change in fair value of mortgage servicing rights	21,206	1,723	5,972	(24,233)
Other operating revenue	155,989	156,399	167,941	136,455
Personnel expense	139,947	138,947	143,531	160,706
Other non-personnel expense	104,483	107,529	109,086	123,937
Total other operating expense	244,430	246,476	252,617	284,643
Net income before taxes	136,295	148,485	152,207	128,498
Federal and state income taxes	30,948	33,330	34,662	20,121
Net income	105,347	115,155	117,545	108,377
Net income (loss) attributable to non-controlling interests	(215)	783	289	(79)
Net income attributable to shareholders of BOK Financial Corp. shareholders	\$ 105,562	\$ 114,372	\$ 117,256	\$ 108,456
Earnings per share:				
Basic	\$ 1.61	\$ 1.75	\$ 1.79	\$ 1.50
Diluted	\$ 1.61	\$ 1.75	\$ 1.79	\$ 1.50
Average shares:				
Basic	64,847,334	64,901,975	64,901,095	71,808,029
Diluted	64,888,033	64,937,226	64,934,351	71,833,334

Table 9 – Selected Quarterly Financial Data (Unaudited) (continued)

(In thousands, except per share data)

	2017			
	First	Second	Third	Fourth
Interest revenue	\$ 226,390	\$ 235,181	\$ 255,413	\$ 255,767
Interest expense	25,208	29,977	36,961	38,904
Net interest revenue	201,182	205,204	218,452	216,863
Provision for credit losses	—	—	—	(7,000)
Net interest revenue after provision for credit losses	201,182	205,204	218,452	223,863
Fees and commissions revenue ¹	154,712	166,617	163,163	157,900
Gain (loss) on financial instruments and other assets, net	4,525	12,359	3,271	(6,470)
Change in fair value of mortgage servicing rights	1,856	(6,943)	(639)	5,898
Other operating revenue	161,093	172,033	165,795	157,328
Personnel expense	136,425	143,744	147,910	145,329
Other non-personnel expense ¹	99,083	96,922	108,109	109,150
Total other operating expense	235,508	240,666	256,019	254,479
Net income before taxes	126,767	136,571	128,228	126,712
Federal and state income taxes	38,103	47,705	42,438	54,347
Net income	\$ 88,664	\$ 88,866	\$ 85,790	\$ 72,365
Net income (loss) attributable to non-controlling interests	308	719	141	(127)
Net income attributable to shareholders of BOK Financial Corp. shareholders	\$ 88,356	\$ 88,147	85,649	72,492
Earnings per share:				
Basic	\$ 1.35	\$ 1.35	\$ 1.31	\$ 1.11
Diluted	\$ 1.35	\$ 1.35	\$ 1.31	\$ 1.11
Average shares:				
Basic	64,715,964	64,729,752	64,742,822	64,793,005
Diluted	64,783,737	64,793,134	64,805,172	64,843,179

¹ Non-GAAP measure to net interchange charges from prior years between transaction card revenue and data processing and communications expense as a result of the recent revenue recognition standard. This measure has no effect on net income or earnings per share.

Lines of Business

We operate three principal lines of business: Commercial Banking, Consumer Banking and Wealth Management. Commercial Banking includes lending, treasury and cash management services and customer risk management products for small businesses, middle market and larger commercial customers. Commercial Banking also includes the TransFund EFT network. Consumer Banking includes retail lending and deposit services, lending and deposit services to small businesses served through our consumer branch network and all mortgage banking activities. Wealth Management provides fiduciary services, private bank services and investment advisory services in all markets. Wealth Management also underwrites state and municipal securities and engages in brokerage and trading activities.

In addition to our lines of business, we have a Funds Management unit. The primary purpose of this unit is to manage our overall liquidity needs and interest rate risk. Each line of business borrows funds from and provides funds to the Funds Management unit as needed to support their operations. Operating results for Funds Management and other include the effect of interest rate risk positions and risk management activities, securities gains and losses including impairment charges, the provision for credit losses in excess of net loans charged off, tax planning strategies and certain executive compensation costs that are not attributed to the lines of business. The Funds Management unit also initially recognizes accruals for loss contingencies when losses become probable. Actual losses are recognized by the lines of business if the accruals are settled.

We allocate resources and evaluate the performance of our lines of business using the net direct contribution which includes the allocation of funds, actual net credit losses and capital costs. In addition, we measure the performance of our business lines after allocations of certain direct expenses and taxes based on statutory rates.

The cost of funds borrowed from the Funds Management unit by the operating lines of business is transfer priced at rates that approximate market rates for funds with similar interest rate and liquidity risk characteristics. Market rates are generally based on the applicable LIBOR or interest rate swap rates, adjusted for prepayment risk. This method of transfer-pricing funds that support assets of the operating lines of business tends to insulate them from interest rate risk.

The value of funds provided by the operating lines of business to the Funds Management unit is also based on rates which approximate wholesale market rates for funds with similar duration and re-pricing characteristics. Market rates are generally based on LIBOR or interest rate swap rates. The funds credit formula applied to deposit products with indeterminate maturities is established based on their re-pricing characteristics reflected in a combination of the short-term LIBOR rate and a moving average of an intermediate term swap rate, with an appropriate spread applied to both. Shorter duration products are weighted towards the short term LIBOR rate and longer duration products are weighted towards the intermediate swap rates. The expected duration ranges from 30 days for certain rate-sensitive deposits to five years.

Economic capital is assigned to the business units by a capital allocation model that reflects management's assessment of risk. This model assigns capital based upon credit, operating, interest rate and market risk inherent in our business lines and recognizes the diversification benefits among the units. The level of assigned economic capital is a combination of the risk taken by each business line, based on its actual exposures and calibrated to its own loss history where possible. Average invested capital includes economic capital and amounts we have invested in the lines of business.

As shown in Table 10 following, net income attributable to our lines of business increased \$102.3 million or 29% over the prior year. Net interest revenue grew by \$89.5 million over the prior year. Other operating revenue decreased \$57.5 million and other operating expenses decreased \$44.5 million. Net charge-offs were up \$17.2 million over the prior year.

The operations of CoBiz, acquired on October 1, 2018, were not yet allocated to the operating segments at December 31, 2018. Accordingly, the operations, assets and liabilities of CoBiz were included in Funds Management and other for 2018.

Table 10 – Net Income by Line of Business
(In thousands)

	Year Ended December 31,		
	2018	2017	2016
Commercial Banking	\$ 336,376	\$ 270,504	\$ 204,140
Consumer Banking	26,581	16,886	(5,323)
Wealth Management	86,544	59,849	31,681
Subtotal	449,501	347,239	230,498
Funds Management and other	(3,855)	(12,595)	2,170
Total	\$ 445,646	\$ 334,644	\$ 232,668

Commercial Banking

Commercial Banking contributed \$336.4 million to consolidated net income in 2018, up \$65.9 million or 24% over the prior year, primarily due to the positive impact of the Tax Cuts and Jobs Act. Income before taxes was unchanged from the previous year. Growth in net interest revenue from improved loan yields and growth in average balances of loans attributed to Commercial Banking was offset by increased credit costs and higher corporate expense allocations.

Table 11 – Commercial Banking
(Dollars in thousands)

	Year Ended December 31,		
	2018	2017	2016
Net interest revenue from external sources	\$ 726,856	\$ 618,325	\$ 501,042
Net interest expense from internal sources	(156,254)	(89,106)	(62,655)
Total net interest revenue	570,602	529,219	438,387
Net loans charged off	30,358	13,877	32,961
Net interest revenue after net loans charged off	540,244	515,342	405,426
Fees and commissions revenue ¹	161,949	163,107	158,664
Other gains, net	752	7,192	1,393
Other operating revenue	162,701	170,299	160,057
Personnel expense	121,686	116,684	113,192
Non-personnel expense ¹	71,125	73,330	65,956
Other operating expense	192,811	190,014	179,148
Net direct contribution	510,134	495,627	386,335
Gain on financial instruments, net	26	52	10
Gain (loss) on repossessed assets, net	(6,532)	(2,681)	669
Corporate expense allocations	45,818	34,253	36,134
Income before taxes	457,810	458,745	350,880
Federal and state income taxes	121,434	188,241	146,740
Net income	\$ 336,376	\$ 270,504	\$ 204,140
Average assets	\$ 18,431,411	\$ 17,730,654	\$ 17,175,325
Average loans	15,073,484	14,373,830	13,757,245
Average deposits	8,517,137	8,725,920	8,477,829
Average invested capital	1,525,077	1,312,438	1,256,211

¹ Fees and commission revenue for 2017 and 2016 has been adjusted on a comparable basis with 2018 (Non-GAAP measure) to net interchange fees paid to issuing banks on card transactions processed by our TransFund merchant processing services for the twelve months ended December 31, 2017 and December 31, 2016 as a result of the recent revenue recognition standard. The discussion following is based on this comparable basis.

Net interest revenue increased \$41 million or 8% over 2017. Growth in net interest revenue was due to improved yields and a \$700 million increase in average loan balances as discussed further in the Loans section of Management's Discussion and Analysis of Financial Condition. Commercial and commercial real estate loans are primarily attributed to the Commercial Banking segment.

Average deposits attributed to Commercial Banking were \$8.5 billion for 2018, a decrease of \$209 million or 2% compared to 2017. See additional discussion concerning changes in Commercial Banking deposits in the Liquidity and Capital section of Management's Discussion and Analysis following.

Fees and commissions revenue were relatively unchanged compared to 2017. Transaction card revenue generated by the TransFund EFT network increased \$2.3 million or 3% largely due to a \$2.7 million increase in revenues from the processing of transactions on behalf of the members of our TransFund EFT network as well as a 9% increase in TransFund ATM locations. Other revenue decreased \$3.8 million or 14% as a result of a sale of a merchant banking investment in 2017.

Operating expense increased \$2.8 million or 1% compared to 2017. Personnel costs increased \$5.0 million or 4% primarily due to an increase in incentive compensation expense. Non-personnel expense decreased \$2.2 million or 3% compared to the prior year. Decreases in miscellaneous expenses and intangible asset amortization were partially offset by an increase in net repossession expense.

Corporate expense allocations increased \$11.6 million compared to the prior year primarily due to enhancements of activity based costing drivers to better reflect services being utilized by the Commercial Banking line of business.

Consumer Banking

Consumer Banking services are provided through four primary distribution channels: traditional branches, the 24-hour ExpressBank call center, Internet banking and mobile banking. Consumer Banking also conducts mortgage banking activities through offices located outside of our consumer banking markets and through HomeDirect Mortgage, an online origination channel.

Net income attributed to Consumer Banking totaled \$26.6 million for 2018, compared to \$16.9 million in the prior year. Increased net income was largely due to net interest revenue partially offset by changes in the fair value of our mortgage servicing rights, net of economic hedges.

Table 12 – Consumer Banking

(Dollars in thousands)

	Year Ended December 31,		
	2018	2017	2016
Net interest revenue from external sources	\$ 83,231	\$ 84,286	\$ 77,283
Net interest revenue from internal sources	73,448	53,916	43,156
Total net interest revenue	156,679	138,202	120,439
Net loans charged off	5,143	4,786	4,925
Net interest revenue after net loans charged off	151,536	133,416	115,514
Fees and commissions revenue	178,174	185,030	216,324
Other losses, net	(51)	(152)	(39)
Other operating revenue	178,123	184,878	216,285
Personnel expense	95,427	99,889	101,295
Other non-personnel expense	114,760	121,790	146,183
Total other operating expense	210,187	221,679	247,478
Net direct contribution	119,472	96,615	84,321
Loss on financial instruments, net	(25,021)	(2,054)	(26,252)
Change in fair value of mortgage servicing rights	4,668	172	(2,193)
Gain on repossessed assets, net	247	223	979
Corporate expense allocations	63,700	67,320	65,567
Net income before taxes	35,666	27,636	(8,712)
Federal and state income taxes	9,085	10,750	(3,389)
Net income	\$ 26,581	\$ 16,886	\$ (5,323)
Average assets	\$ 8,303,262	\$ 8,544,117	\$ 8,254,666
Average loans	1,731,894	1,734,836	1,736,260
Average deposits	6,560,145	6,610,134	6,607,816
Average invested capital	285,521	298,243	351,750

Net interest revenue from Consumer Banking activities grew by \$18.5 million or 13% over 2017, primarily related to increased yields on deposit balances sold to the Funds Management unit. Average loans were largely unchanged while average deposits decreased \$50 million.

Fees and commissions revenue decreased \$6.9 million or 4% compared to the prior year. Mortgage banking revenue decreased \$6.8 million or 6% compared the prior year due to rising mortgage rates that have slowed production. Mortgage loan production volumes decreased \$666 million compared to 2017.

Operating expense decreased \$11.5 million or 5% compared to 2017. Personnel expense was down \$4.5 million or 4%, primarily due to incentive compensation expense and efforts to right size the business as mortgage production volume is down. Non-personnel expense decreased \$7.0 million or 6%. Mortgage banking costs were down \$6.6 million compared to the prior year.

Corporate expense allocations decreased \$3.6 million compared to 2017.

Changes in the fair value of our mortgage servicing rights, net of economic hedges as more fully presented in Table 7, resulted in a \$20.4 million decrease to pre-tax net income for 2018 compared to a \$1.9 million decrease to pre-tax net income in 2017.

Wealth Management

Wealth Management contributed \$86.5 million to consolidated net income in 2018, up \$26.7 million or 45% over the prior year, including a \$15.4 million fee on the sale of client assets in 2018. The fluctuation discussion below excludes this fee. The remaining increase was primarily due to growth in net interest revenue and favorable impact of the Tax Cut and Jobs Act.

Table 13 – Wealth Management
(Dollars in thousands)

	Year Ended December 31,		
	2018	2017	2016
Net interest revenue from external sources	\$ 81,527	\$ 45,024	\$ 33,006
Net interest revenue from internal sources	31,505	38,344	29,043
Total net interest revenue	113,032	83,368	62,049
Net loans charged off (recovered)	(288)	(696)	(801)
Net interest revenue after net loans charged off (recovered)	113,320	84,064	62,850
Fees and commissions revenue	296,465	301,485	282,710
Other gains (losses), net	(96)	(51)	512
Other operating revenue	296,369	301,434	283,222
Personnel expense	184,144	183,727	190,756
Other non-personnel expense	64,815	62,899	60,239
Other operating expense	248,959	246,626	250,995
Net direct contribution	160,730	138,872	95,077
Loss on financial instruments, net	7	—	(42)
Gain (loss) on repossessed assets, net	—	387	—
Corporate expense allocations	44,190	40,562	42,378
Net income before taxes	116,547	98,697	52,657
Federal and state income tax	30,003	38,848	20,976
Net income	\$ 86,544	\$ 59,849	\$ 31,681
Average assets	\$ 8,446,006	\$ 7,072,622	\$ 7,373,080
Average loans	1,423,126	1,314,441	1,352,694
Average deposits	5,617,325	5,516,214	5,457,566
Average invested capital	252,961	236,815	351,750

Net interest revenue increased \$30 million or 36% over the prior year driven by growth in trading securities and loans along with net interest margin expansion. Average trading securities increased \$1.0 billion over 2017. Average loan balances were up \$109 million or 8% over the prior year and average deposit balances increased \$101 million or 2%.

Fees and commissions revenue decreased \$20.4 million or 7% compared to the prior year. Fiduciary and asset management revenue increased \$4.8 million compared to 2017. Brokerage and trading revenue decreased \$29.7 million compared to the prior year due to an increase in the cost of hedging the larger trading portfolio.

Operating expenses increased \$2.3 million or 1% compared to the prior year. Personnel expense was relatively consistent with 2017 and non-personnel expense was well controlled, up \$1.9 million or 3% over 2017.

Corporate expense allocations increased \$3.6 million or 9% over the prior year due to enhancements of activity based costing drivers to better reflect services being utilized by the Wealth Management line of business.

Financial Condition

Securities

We maintain a securities portfolio to enhance profitability, manage interest rate risk, provide liquidity and comply with regulatory requirements. Securities are classified as trading, held for investment, or available for sale.

Table 14 – Securities
(In thousands)

	December 31,					
	2018		2017		2016	
	Amortized Cost	Fair Value	Amortized Cost	Fair Value	Amortized Cost	Fair Value
Trading:						
U.S. government agency debentures	\$ 63,511	\$ 63,765	\$ 21,188	\$ 21,196	\$ 6,238	\$ 6,234
U.S. government agency residential mortgage-backed securities	1,781,618	1,791,584	393,190	392,673	309,432	310,067
Municipal and other tax-exempt securities	34,508	34,507	13,476	13,559	14,377	14,427
Asset-backed securities	41,971	42,656	23,911	23,885	—	—
Other trading securities	24,346	24,411	11,359	11,363	6,843	6,900
Total trading securities	\$ 1,945,954	\$ 1,956,923	\$ 463,124	\$ 462,676	\$ 336,890	\$ 337,628
Investment:						
Municipal and other tax-exempt securities	\$ 137,296	\$ 138,562	\$ 228,186	230,349	\$ 320,364	\$ 321,225
U.S. government agency residential mortgage-backed securities	12,612	12,770	15,891	16,242	20,777	21,473
Other debt securities	205,279	215,966	217,716	233,444	205,004	222,795
Total investment securities	\$ 355,187	\$ 367,298	\$ 461,793	\$ 480,035	\$ 546,145	\$ 565,493
Available for sale:						
U.S. Treasury securities	\$ 496	\$ 493	\$ 1,000	\$ 1,000	\$ 1,000	\$ 999
Municipal and other tax-exempt securities	2,782	2,864	27,182	27,080	41,050	40,993
Residential mortgage-backed securities:						
U.S. government agencies	5,886,323	5,804,708	5,355,148	5,309,152	5,475,351	5,460,386
Private issue	40,948	59,736	74,311	93,221	101,192	115,535
Total residential mortgage-backed securities	5,927,271	5,864,444	5,429,459	5,402,373	5,576,543	5,575,921
Commercial mortgage-backed securities guaranteed by U.S. government agencies	2,986,297	2,953,889	2,858,885	2,834,961	3,035,750	3,017,933
Other debt securities	35,545	35,430	25,500	25,481	4,400	4,152
Perpetual preferred stock ¹	—	—	12,562	15,767	15,561	18,474
Equity securities and mutual funds ¹	—	—	14,487	14,916	17,424	18,357
Total available for sale securities	\$ 8,952,391	\$ 8,857,120	\$ 8,369,075	\$ 8,321,578	\$ 8,691,728	\$ 8,676,829
Fair value option securities:						
U.S. government agency residential mortgage-backed securities	\$ 280,469	\$ 283,235	\$ 756,931	\$ 755,054	\$ 78,823	\$ 77,046

¹ As a result of the recent measurement accounting standard effective January 1, 2018, equity securities are no longer considered part of the available for sale portfolio and have been moved to other assets.

We maintain an inventory of trading securities in support of sales to a variety of customers, including banks, corporations, insurance companies, money managers and others. As discussed in the Market Risk section of this report, trading activities involve risk of loss from adverse price movement. We mitigate this risk within board-approved limits through the use of derivative contracts, short-sales and other techniques. These limits remain unchanged from levels set before our expanded trading activities.

Investment securities consist primarily of intermediate and long-term, fixed rate Oklahoma and Texas municipal bonds and taxable Texas school construction bonds. The investment security portfolio is diversified among issuers.

Available for sale securities, which may be sold prior to maturity, are carried at fair value. Unrealized gains or losses, net of deferred taxes, are recorded as accumulated other comprehensive income in shareholders' equity. The amortized cost of available for sale securities totaled \$9.0 billion at December 31, 2018, an increase of \$583 million compared to December 31, 2017. Available for sale securities consist primarily of U.S. government agency residential mortgage-backed securities and U.S. government agency commercial mortgage-backed securities. Both residential and commercial mortgage-backed securities have credit risk from delinquency or default of the underlying loans. We mitigate this risk by primarily investing in securities issued by U.S. government agencies. Principal and interest payments on the underlying loans are fully guaranteed. Commercial mortgage-backed securities have prepayment penalties similar to commercial loans. At December 31, 2018, residential mortgage-backed securities represented 66% of total available for sale securities.

A primary risk of holding residential mortgage-backed securities comes from extension during periods of rising interest rates or prepayment during periods of falling interest rates. We evaluate this risk through extensive modeling of risk both before making an investment and throughout the life of the security. Our best estimate of the effective duration of the combined residential mortgage-backed securities portfolio held in investment and available for sale securities portfolios at December 31, 2018 is 3.2 years. Management estimates the combined portfolios' duration extends to 3.8 years assuming an immediate 200 basis point upward shock. The estimated duration contracts to 2.6 years assuming a 100 basis point decline in the current low rate environment.

The aggregate gross amount of unrealized losses on available for sale securities totaled \$138 million at December 31, 2018, a \$49 million increase compared to December 31, 2017. On a quarterly basis, we perform an evaluation on debt securities to determine if the unrealized losses are temporary as more fully described in Note 2 of the Consolidated Financial Statements. No other-than-temporary impairment charges were recognized in earnings in 2018.

Certain residential mortgage-backed securities issued by U.S. government agencies and included in Fair value option securities on the Consolidated Balance Sheets, have been segregated and designated as economic hedges of changes in the fair value of our mortgage servicing rights. We have elected to carry these securities at fair value with changes in fair value recognized in current period income. These securities are held with the intent that gains or losses will offset changes in the fair value of mortgage servicing rights and related derivative contracts.

Bank-Owned Life Insurance

We have approximately \$382 million of bank-owned life insurance at December 31, 2018. This investment is expected to provide a long-term source of earnings to support existing employee benefit programs. Approximately \$295 million is held in separate accounts. Our separate account holdings are invested in diversified portfolios of investment-grade fixed income securities and cash equivalents, including U.S. Treasury and Agency securities, residential mortgage-backed securities, corporate debt, asset-backed and commercial mortgage-backed securities. The portfolios are managed by unaffiliated professional managers within parameters established in the portfolio's investment guidelines. The cash surrender value of certain life insurance policies is further supported by a stable value wrap, which protects against changes in the fair value of the investments. At December 31, 2018, the fair value of investments held in separate accounts was approximately \$294 million. As the underlying fair value of the investments held in a separate account at December 31, 2018 was less than the aggregate book value of the investments, approximately \$813 thousand cash surrender value was supported by the stable value wrap. The stable value wrap is provided by a domestic financial institution. The remaining cash surrender value of \$87 million primarily represents the cash surrender value of policies held in general accounts and other amounts due from various insurance companies.

Loans

The aggregate loan portfolio before allowance for loan losses totaled \$21.7 billion at December 31, 2018, an increase of \$4.5 billion over December 31, 2017. Excluding \$2.9 billion of loans, net of fair value adjustments, added by the CoBiz acquisition, loans grew by \$1.6 billion or 9%, primarily due to commercial and commercial real estate loans. CoBiz added \$1.8 billion to our commercial loan portfolio, primarily in the services and public finance loan classes, and \$838 million to our commercial real estate portfolio. Substantially all CoBiz loans are attributed to Colorado and Arizona.

Table 15 – Loans

(In thousands)

	December 31,				
	2018	2017	2016	2015	2014
Commercial:					
Energy	\$ 3,590,333	\$ 2,930,156	\$ 2,497,868	\$ 3,097,328	\$ 2,860,428
Services	3,252,146	2,522,025	2,632,036	2,480,361	2,033,082
Healthcare	2,733,537	2,243,487	2,120,722	1,867,172	1,397,912
Wholesale/retail	1,621,158	1,471,256	1,576,818	1,418,024	1,435,650
Public finance	876,336	541,775	568,214	324,922	428,302
Manufacturing	730,521	496,774	514,975	556,729	532,594
Other commercial and industrial	832,047	528,502	480,191	507,995	407,702
Total commercial	13,636,078	10,733,975	10,390,824	10,252,531	9,095,670
Commercial real estate:					
Multifamily	1,288,065	980,017	903,272	751,085	704,298
Office	1,072,920	831,770	798,888	637,707	415,544
Retail	919,082	691,532	761,888	796,499	666,889
Industrial	778,106	573,014	871,749	563,169	428,817
Residential construction and land development	148,584	117,245	135,533	160,426	143,591
Other commercial real estate	558,056	286,409	337,716	350,147	369,011
Total commercial real estate	4,764,813	3,479,987	3,809,046	3,259,033	2,728,150
Residential mortgage:					
Permanent mortgage	1,320,165	1,043,435	1,006,820	945,336	969,951
Permanent mortgages guaranteed by U.S. government agencies	190,866	197,506	199,387	196,937	205,950
Home equity	719,002	732,745	743,625	734,620	773,611
Total residential mortgage	2,230,033	1,973,686	1,949,832	1,876,893	1,949,512
Personal	1,025,806	965,776	839,958	552,697	434,705
Total	\$ 21,656,730	\$ 17,153,424	\$ 16,989,660	\$ 15,941,154	\$ 14,208,037

Commercial

Commercial loans represent loans for working capital, facilities acquisition or expansion, purchases of equipment and other needs of commercial customers primarily located within our geographical footprint. Commercial loans are underwritten individually and represent ongoing relationships based on a thorough knowledge of the customer, the customer's industry and market. While commercial loans are generally secured by the customer's assets including real property, inventory, accounts receivable, operating equipment, interests in mineral rights and other property and may also include personal guarantees of the owners and related parties, the primary source of repayment of the loans is the on-going cash flow from operations of the customer's business. Inherent lending risks are centrally monitored on a continuous basis from underwriting throughout the life of the loan for compliance with commercial lending policies.

Commercial loans totaled \$13.6 billion or 63% of the loan portfolio at December 31, 2018, growing \$1.1 billion or 10% over December 31, 2017, excluding the impact of acquired loans. This growth was led by a \$640 million or 22% increase in energy sector loans. Healthcare sector loans were up \$174 million or 8%. Service sector loans increased \$126 million or 5% and other commercial and industrial loans increased \$107 million or 20%.

Table 16 presents our commercial loan portfolio distributed primarily by collateral location. Loans for which the collateral location is less relevant, such as unsecured loans and reserve-based energy loans, are distributed by the borrower's primary operating location.

Table 16 – Commercial Loans by Collateral Location
(In thousands)

	Oklahoma	Texas	New Mexico	Arkansas	Colorado	Arizona	Kansas/Missouri	Other	Total
Energy	\$ 803,550	\$1,935,449	\$ 35,021	\$ 2,615	\$ 368,819	\$ 6,517	\$ 82,914	\$ 355,448	\$ 3,590,333
Services	637,835	695,096	167,297	14,281	656,504	405,450	282,613	393,070	3,252,146
Healthcare	221,520	362,984	123,372	80,046	331,458	217,383	202,688	1,194,086	2,733,537
Wholesale/retail	204,660	615,880	36,299	30,711	179,976	113,878	70,220	369,534	1,621,158
Public finance	98,705	185,817	42,908	—	165,320	113,427	55,207	214,952	876,336
Manufacturing	95,539	166,072	189	5,115	187,979	126,634	71,362	77,631	730,521
Other commercial and industrial	94,259	184,290	3,585	67,413	142,692	54,483	62,265	223,060	832,047
Total commercial loans	\$2,156,068	\$4,145,588	\$408,671	\$ 200,181	\$2,032,748	\$1,037,772	\$ 827,269	\$2,827,781	\$13,636,078

The majority of our commercial portfolio is located within our geographic footprint. At December 31, 2018, the Other category is composed primarily of California totaling \$524 million or 4% of the commercial portfolio, Florida totaling \$302 million or 2% of the commercial portfolio, Pennsylvania totaling \$153 million or 1% of the commercial portfolio, Ohio totaling \$150 million or 1% of the commercial portfolio and Louisiana totaling \$142 million or 1%. All other states individually represent less than one percent of the total commercial loan portfolio.

Supporting the energy industry with loans to producers and other energy-related entities has been a hallmark of the Company since its founding and represents a large portion of our commercial loan portfolio. In addition, energy production and related industries have a significant impact on the economy in our primary markets. Loans collateralized by oil and gas properties are subject to a semi-annual engineering review by our internal staff of petroleum engineers. This review is utilized as the basis for developing the expected cash flows supporting the loan amount. The projected cash flows are discounted according to risk characteristics of the underlying oil and gas properties. Loans are evaluated to demonstrate with reasonable certainty that crude oil, natural gas and natural gas liquids can be recovered from known oil and gas reservoirs under existing economic and operating conditions at current pricing levels and with existing conventional equipment and operating methods and costs. As part of our evaluation of credit quality, we analyze rigorous stress tests over a range of commodity prices and take proactive steps to mitigate risk when appropriate.

Outstanding energy loans totaled \$3.6 billion or 17% of total loans at December 31, 2018. Unfunded energy loan commitments increased by \$335 million during the year to \$3.2 billion at December 31, 2018. Approximately \$2.9 billion or 82% of energy loans were to oil and gas producers, a \$454 million increase over December 31, 2017. The majority of this portfolio is first lien, senior secured, reserve-based lending, which we believe is the lowest risk form of energy lending. Approximately 57% of the committed production loans are secured by properties primarily producing oil and 43% of the committed production loans are secured by properties primarily producing natural gas. Loans to borrowers in the midstream sector of the industry totaled \$420 million or 12% of energy loans, an increase of \$159 million over the prior year. Loans to borrowers that provide services to the energy industry totaled \$176 million or 5% of energy loans, an increase of \$46 million during 2018. Loans to other energy borrowers, including those engaged in wholesale or retail energy sales totaled \$62 million or 2% of energy loans, an increase of \$987 thousand compared to the prior year.

The services sector of the loan portfolio totaled \$3.3 billion or 15% of total loans and consists of a large number of loans to a variety of businesses, including commercial services, Native American tribal governments, financial services, entertainment and recreation and education. Approximately \$2.3 billion of the services category is made up of loans with individual balances of less than \$10 million. Service sector loans are generally secured by the assets of the borrower with repayment coming from the cash flows of ongoing operations of the customer's business.

The healthcare sector of the loan portfolio totaled \$2.7 billion or 13% of total loans and consists primarily of loans for the development and operation of senior housing and care facilities, including independent living, assisted living and skilled nursing. Healthcare also includes loans to hospitals and other medical service providers.

We participate in shared national credits when appropriate to obtain or maintain business relationships with local customers. Shared national credits are defined by banking regulators as credits of more than \$100 million and with three or more non-affiliated banks as participants. At December 31, 2018, the outstanding principal balance of these loans totaled \$4.1 billion. Approximately 86% of these loans are to borrowers with local market relationships. We serve as the agent lender in approximately 17% of our shared national credits, based on dollars committed. We hold shared credits to the same standard of analysis and perform the same level of review as internally originated credits. Our lending policies generally avoid loans in which we do not have the opportunity to maintain or achieve other business relationships with the customer. In addition to management's quarterly assessment of credit risk, banking regulators annually review a sample of shared national credits for proper risk grading.

Commercial Real Estate

Commercial real estate represents loans for the construction of buildings or other improvements to real estate and property held by borrowers for investment purposes. The majority of commercial real estate loans are secured by properties within our geographic footprint, with the larger concentrations in Texas and Colorado, which represent 26% and 16% of the total commercial real estate portfolio at December 31, 2018, respectively. We require collateral values in excess of the loan amounts, demonstrated cash flows in excess of expected debt service requirements, equity investment in the project and a portion of the project already sold, leased or permanent financing already secured. The expected cash flows from all significant new or renewed income producing property commitments are stress tested to reflect the risks in varying interest rates, vacancy rates and rental rates. As with commercial loans, inherent lending risks are centrally monitored on a continuous basis from underwriting throughout the life of the loan for compliance with applicable lending policies.

Commercial real estate loans totaled \$4.8 billion or 22% of the loan portfolio at December 31, 2018. The outstanding balance of commercial real estate loans increased \$447 million over 2017, excluding the impact of acquired loans. Loans secured by multifamily residential properties were up \$180 million or 18%. Loans secured by industrial facilities increased \$126 million or 22%. Loans secured by retail facilities and office buildings also grew over the prior year. The commercial real estate loan balance as a percentage of our total loan portfolio has ranged from 19% to 22% over the past five years. The commercial real estate segment of our loan portfolio distributed by collateral location follows in Table 17.

Table 17 – Commercial Real Estate Loans by Collateral Location

(In thousands)

	Oklahoma	Texas	New Mexico	Arkansas	Colorado	Arizona	Kansas/ Missouri	Other	Total
Multifamily	\$ 138,803	\$ 491,322	\$ 30,288	\$ 57,008	\$ 134,394	\$121,218	\$ 166,680	\$ 148,352	\$ 1,288,065
Office	107,725	278,001	86,370	15,000	153,545	91,913	55,395	284,971	1,072,920
Retail	56,863	258,957	133,155	5,524	146,038	80,349	14,560	223,636	919,082
Industrial	81,096	168,792	21,048	97	79,733	33,830	40,027	353,483	778,106
Residential construction and land development	8,592	17,449	14,974	555	63,818	11,564	12,152	19,480	148,584
Other commercial real estate	47,992	36,574	11,722	1,484	180,151	106,195	26,282	147,656	558,056
Total commercial real estate loans	\$ 441,071	\$1,251,095	\$297,557	\$ 79,668	\$ 757,679	\$445,069	\$ 315,096	\$1,177,578	\$ 4,764,813

The Other category includes California with \$291 million or 6% of total commercial real estate loans, Utah with \$109 million or 2% of total commercial real estate loans, Florida with \$98 million or 2% of total commercial real estate loans and Nevada with \$92 million or 2% of total commercial real estate loans. All other states individually represent less than 2% of the total commercial real estate loan population.

While recent changes nationally in consumer purchasing trends from brick-and-mortar stores to online has created concern with regards to retail lending, our credit quality remains very good. The portfolio is highly diversified with no material exposure to a single borrower or tenant.

Residential Mortgage and Personal

Residential mortgage loans provide funds for our customers to purchase or refinance their primary residence or to borrow against the equity in their home. Residential mortgage loans are secured by a first or second-mortgage on the customer's primary residence. Personal loans consist primarily of loans to Wealth Management clients secured by the cash surrender value of insurance policies and marketable securities. It also includes direct loans secured by and for the purchase of automobiles, recreational and marine equipment as well as unsecured loans. Residential mortgage and personal loans are made in accordance with underwriting policies we believe to be conservative and are fully documented. Credit scoring is assessed based on significant credit characteristics including credit history, residential and employment stability.

Residential mortgage loans totaled \$2.2 billion, a \$33 million or 2% increase over December 31, 2017, excluding the impact of purchased loans. In general, we sell the majority of our fixed rate loan originations that conform to U.S. government agency standards in the secondary market and retain the majority of our non-conforming and adjustable-rate mortgage loans. We have no concentration in sub-prime residential mortgage loans. Our mortgage loan portfolio does not include payment option adjustable rate mortgage loans or adjustable rate mortgage loans with initial rates that are below market. Collateral for 95% of our residential mortgage portfolio is located within our geographic footprint.

The majority of our permanent mortgage loan portfolio is primarily composed of various non-conforming mortgage programs to support customer relationships including jumbo mortgage loans, non-builder construction loans and special loan programs for high net worth individuals or certain professionals. Jumbo loans may be fixed or variable rate and are fully amortizing. The size of jumbo loans exceed maximums set under government sponsored entity standards, but otherwise generally conform to those standards. These loans generally require a minimum FICO score of 720 and a maximum debt-to-income ratio ("DTI") of 38%. Loan-to-value ratios ("LTV") are tiered from 60% to 100%, depending on the market. Special mortgage programs include fixed and variable rate fully amortizing loans tailored to the needs of certain healthcare professionals. Variable rate loans are fully indexed at origination and may have fixed rates for three to ten years, then adjust annually thereafter.

At December 31, 2018, \$191 million of permanent residential mortgage loans are guaranteed by U.S. government agencies. We have minimal credit exposure on loans guaranteed by the agencies. This amount includes residential mortgage loans previously sold into GNMA mortgage pools that are eligible to be repurchased. We may repurchase these loans when certain defined delinquency criteria are met. Because of this repurchase right, the Company is deemed to have regained effective control over these loans and must include them in the Consolidated Balance Sheets. Permanent residential mortgage loans guaranteed by U.S. government agencies decreased \$6.6 million or 3% compared to December 31, 2017.

Home equity loans totaled \$719 million at December 31, 2018, a \$40 million or 5% decrease compared to December 31, 2017, excluding \$26 million of loans added by CoBiz. Our home equity portfolio is primarily composed of first-lien, fully amortizing home equity loans. Home equity loans generally require a minimum FICO score of 700 and a maximum DTI of 50%. The maximum loan amount available for our home equity loan products is generally \$400 thousand. Revolving loans have a 10 year revolving period followed by 15 year term of amortizing repayments. Interest-only home equity loans have a 5 year revolving period followed by a 15 year term of amortizing repayments and may not be extended for any additional revolving time. All other home equity loans may be extended at management's discretion for an additional 5 year revolving term subject to an update of certain credit information.

A summary of our home equity loan portfolio at December 31, 2018 by lien position and amortizing status follows in Table 18.

Table 18 – Home Equity Loans

(In thousands)

	Revolving	Amortizing	Total
First lien	\$ 87,866	\$ 337,234	\$ 425,100
Junior lien	175,728	118,174	293,902
Total home equity	\$ 263,594	\$ 455,408	\$ 719,002

Personal loans totaled \$1.0 billion, growing by \$38 million or 4% over the prior year, excluding the impact of acquired loans. This growth is primarily due to loans to Wealth Management customers for investment in businesses that will be repaid from personal income.

The distribution of residential mortgage and personal loans at December 31, 2018 is presented in Table 19. Residential mortgage loans are distributed by collateral location. Personal loans are generally distributed by borrower location.

Table 19 – Residential Mortgage and Personal Loans by Collateral Location

(In thousands)

	Oklahoma	Texas	New Mexico	Arkansas	Colorado	Arizona	Kansas/ Missouri	Other	Total
Residential mortgage:									
Permanent mortgage	\$ 173,991	\$448,594	\$ 60,396	\$ 13,565	\$ 353,510	\$146,173	\$ 67,010	\$ 56,926	\$ 1,320,165
Permanent mortgages guaranteed by U.S. government agencies	47,810	30,524	33,534	9,350	4,924	1,233	15,355	48,136	190,866
Home equity	364,838	135,486	81,985	6,430	63,692	14,478	49,308	2,785	719,002
Total residential mortgage	\$ 586,639	\$614,604	\$ 175,915	\$ 29,345	\$ 422,126	\$161,884	\$ 131,673	\$107,847	\$ 2,230,033
Personal	\$ 313,077	\$418,214	\$ 11,844	\$ 12,360	\$ 79,475	\$ 61,840	\$ 62,064	\$ 66,932	\$ 1,025,806

The Company secondarily evaluates loan portfolio performance based on the primary geographical market managing the loan. Loans attributed to a geographical market may not represent the location of the borrower or the collateral. All permanent mortgage loans serviced by our mortgage banking unit and held for investment by BOKF, NA are centrally managed by the Bank of Oklahoma division.

Table 20 – Loans Managed by Primary Geographical Market

(In thousands)

	December 31,				
	2018	2017	2016	2015	2014
Oklahoma:					
Commercial	\$ 3,491,117	\$ 3,238,720	\$ 3,370,259	\$ 3,782,687	\$ 3,142,689
Commercial real estate	700,756	682,037	684,381	739,829	603,610
Residential mortgage	1,440,566	1,435,432	1,407,197	1,409,114	1,467,096
Personal	375,543	342,212	303,823	255,387	206,115
Total Oklahoma	6,007,982	5,698,401	5,765,660	6,187,017	5,419,510
Texas:					
Commercial	5,438,133	4,520,401	4,022,455	3,908,425	3,549,128
Commercial real estate	1,341,783	1,261,864	1,415,011	1,204,202	1,027,817
Residential mortgage	266,805	233,675	233,981	219,126	235,948
Personal	394,743	375,084	306,748	203,496	154,363
Total Texas	7,441,464	6,391,024	5,978,195	5,535,249	4,967,256
New Mexico:					
Commercial	340,489	343,296	399,256	375,839	383,439
Commercial real estate	383,670	341,282	284,603	313,422	296,358
Residential mortgage	87,346	98,018	108,058	120,507	127,999
Personal	10,662	11,721	11,483	11,557	10,899
Total New Mexico	822,167	794,317	803,400	821,325	818,695
Arkansas:					
Commercial	111,338	95,644	86,577	92,359	95,510
Commercial real estate	141,898	87,393	73,616	69,320	88,301
Residential mortgage	7,537	6,596	7,015	8,169	7,261
Personal	11,955	9,992	6,524	819	5,169
Total Arkansas	272,728	199,625	173,732	170,667	196,241
Colorado:					
Commercial	2,275,069	1,130,714	1,018,208	987,076	977,961
Commercial real estate	963,575	174,201	265,264	223,946	194,553
Residential mortgage	251,849	63,350	59,631	53,782	57,119
Personal	72,916	63,115	50,372	23,384	27,918
Total Colorado	3,563,409	1,431,380	1,393,475	1,288,188	1,257,551
Arizona:					
Commercial	1,320,139	687,792	686,253	606,733	547,524
Commercial real estate	889,903	660,094	747,409	507,523	355,140
Residential mortgage	97,959	41,771	36,265	44,047	35,872
Personal	68,546	57,140	52,553	31,060	12,883
Total Arizona	2,376,547	1,446,797	1,522,480	1,189,363	951,419
Kansas/Missouri:					
Commercial	659,793	717,408	807,816	499,412	399,419
Commercial real estate	343,228	273,116	338,762	200,791	162,371
Residential mortgage	77,971	94,844	97,685	22,148	18,217
Personal	91,441	106,512	108,455	26,994	17,358
Total Kansas/Missouri	1,172,433	1,191,880	1,352,718	749,345	597,365
Total BOK Financial loans	\$ 21,656,730	\$ 17,153,424	\$ 16,989,660	\$ 15,941,154	\$ 14,208,037

Table 21 – Loan Maturity and Interest Rate Sensitivity at December 31, 2018

(In thousands)

	Remaining Maturities of Selected Loans			
	Total	Within 1 Year	1-5 Years	After 5 Years
Loan maturity:				
Commercial	\$ 13,636,078	\$ 1,094,732	\$ 7,760,989	\$ 4,780,357
Commercial real estate	4,764,813	639,755	2,956,080	1,168,978
Total	\$ 18,400,891	\$ 1,734,487	\$ 10,717,069	\$ 5,949,335
Interest rate sensitivity for selected loans with:				
Predetermined interest rates	\$ 3,929,368	\$ 156,147	\$ 1,186,339	\$ 2,586,882
Floating or adjustable interest rates	14,471,523	1,578,340	9,530,730	3,362,453
Total	\$ 18,400,891	\$ 1,734,487	\$ 10,717,069	\$ 5,949,335

Loan Commitments

We enter into certain off-balance sheet arrangements in the normal course of business as shown in Table 22. Loan commitments may be unconditional obligations to provide financing or conditional obligations that depend on the borrower's financial condition, collateral value or other factors. Standby letters of credit are unconditional commitments to guarantee the performance of our customer to a third party. Since some of these commitments are expected to expire before being drawn upon, the total commitment amounts do not necessarily represent future cash requirements. None of the outstanding standby letters of credit were issued on behalf of customers whose loans are nonperforming at December 31, 2018.

Table 22 – Off-Balance Sheet Credit Commitments

(In thousands)

	December 31,				
	2018	2017	2016	2015	2014
Loan commitments	\$ 11,944,525	\$ 9,958,080	\$ 9,404,665	\$ 8,455,037	\$ 8,328,416
Standby letters of credit	582,196	647,653	585,472	507,988	447,599
Mortgage loans sold with recourse	98,623	125,127	139,486	155,489	179,822

We have off-balance sheet commitments related to certain residential mortgage loans originated under community development loan programs that were sold to a U.S. government agency with full recourse. These mortgage loans were underwritten to standards approved by the agencies, including full documentation and originated under programs available only for owner-occupied properties. We no longer sell residential mortgage loans with recourse other than obligations under standard representations and warranties. We are obligated to repurchase these loans for the life of these loans in the event of foreclosure for the unpaid principal and interest at the time of foreclosure. Substantially all of these loans are to borrowers in our primary markets including \$61 million to borrowers in Oklahoma and \$11 million to borrowers in Arkansas. At December 31, 2018, approximately 2% of these loans were nonperforming and 7% were past due 30 to 89 days. A separate accrual for credit risk of \$2.9 million is available to absorb losses on these loans.

We also have an off-balance sheet obligation to repurchase residential mortgage loans sold to government sponsored entities through our mortgage banking activities due to standard representations and warranties made under contractual agreements and to service loans in accordance with investor guidelines. The Company has established accruals for losses related to these obligations that are included in Other liabilities in the Consolidated Balance Sheets and in Mortgage banking costs in the Consolidated Statements of Earnings.

In 2018, the Company repurchased 7 loans from the agencies for \$1.9 million and paid indemnification for 5 loans. Losses on both repurchases and indemnifications were insignificant. For the period from 2010 through 2018, approximately 21% of repurchase requests have currently resulted in actual repurchases or indemnification by the Company.

A summary of unresolved deficiency requests from U.S. government agencies follows (in thousands, except for number of unresolved deficiency requests):

Table 23 - Summary of Unresolved Deficiency Requests
(In thousands, except number of unresolved deficiency requests)

	December 31,	
	2018	2017
Number of unresolved deficiency requests	169	191
Aggregate outstanding principal balance subject to unresolved deficiency requests	\$ 5,896	\$ 9,737
Unpaid principal balance subject to indemnification by the Company	6,916	4,519

The accrual for credit losses related to potential loan repurchases under representations and warranties totaled \$1.6 million at December 31, 2018 and \$1.4 million at December 31, 2017.

Customer Derivative Programs

We offer programs that permit our customers to hedge various risks, including fluctuations in energy, cattle and other agricultural product prices, interest rates and foreign exchange rates. Each of these programs work essentially the same way. Derivative contracts are executed between the customers and the Company. Offsetting contracts are executed between the Company and selected counterparties or exchanges to minimize market risk to us from changes in commodity prices, interest rates or foreign exchange rates. The counterparty contracts are identical to the customer contracts, except for a fixed pricing spread or a fee paid to us as compensation for administrative costs, credit risk and profit.

The customer derivative programs create credit risk for potential amounts due to the Company from our customers and from the counterparties. Customer credit risk is monitored through existing credit policies and procedures. The effects of changes in commodity prices, interest rates or foreign exchange rates are evaluated across a range of possible options to determine the maximum exposure we are willing to have individually to any customer. Customers may also be required to provide cash margin or other collateral in conjunction with our credit agreements to further limit our credit risk.

Counterparty credit risk is evaluated through existing policies and procedures. This evaluation considers the total relationship between BOK Financial and each of the counterparties. Individual limits are established by management, approved by Credit Administration and reviewed by the Asset/Liability Committee. Margin collateral is required if the exposure between the Company and any counterparty exceeds established limits. Based on declines in the counterparties' credit ratings, these limits may be reduced and additional margin collateral may be required.

A deterioration of the credit standing of one or more of the customers or counter-parties to these contracts may result in BOK Financial recognizing a loss as the fair value of the affected contracts may no longer move in tandem with the offsetting contracts. This occurs if the credit standing of the customer or counterparty deteriorated such that either the fair value of underlying collateral no longer supports the contract or the customer or counterparty's ability to provide margin collateral was impaired. Credit losses on customer derivatives reduce brokerage and trading revenue in the Consolidated Statements of Earnings.

Derivative contracts are carried at fair value. At December 31, 2018, the net fair values of derivative contracts, before consideration of cash margin, reported as assets under these programs totaled \$427 million compared to \$225 million at December 31, 2017. Derivative contracts carried as assets include foreign exchange contracts with fair values of \$184 million, energy contracts with fair values of \$145 million, to-be-announced residential mortgage-backed securities with fair values of \$65 million and interest rate swaps primarily sold to loan customers with fair values of \$29 million. Before consideration of cash margin paid to counterparties, the aggregate net fair values of derivative contracts held under these programs reported as liabilities totaled \$413 million.

At December 31, 2018, total derivative assets were reduced by \$115 million of cash collateral received from counterparties and total derivative liabilities were reduced by \$69 million of cash collateral paid to counterparties related to instruments executed with the same counterparty under a master netting agreement.

A table showing the notional and fair value of derivative assets and liabilities on both a gross and net basis is presented in Note 3 to the Consolidated Financial Statements.

The fair value of derivative contracts reported as assets under these programs, net of cash margin held by the Company, by category of debtor at December 31, 2018 follows in Table 24.

Table 24 – Fair Value of Derivative Contracts

(In thousands)

Customers	\$ 140,973
Banks and other financial institutions	128,526
Exchanges and clearing organizations	41,891
Fair value of customer hedge asset derivative contracts, net	\$ 311,390

The largest exposure to a single counterparty was to an exchange organization for energy swaps which totaled \$36 million at December 31, 2018.

Our customer derivative program also introduces liquidity and capital risk. We are required to provide cash margin to certain counterparties when the net negative fair value of the contracts exceeds established limits. Also, changes in commodity prices affect the amount of regulatory capital we are required to hold as support for the fair value of our derivative assets. These risks are modeled as part of the management of these programs. Based on current prices, the fair value of derivative assets would not be materially impacted by either a decrease in market prices equivalent to \$20.88 per barrel of oil nor an increase in prices equivalent to \$55.34 per barrel of oil as the Company generally is in a derivative asset position with counterparties fully offset by cash margin received from those counterparties. Liquidity requirements of this program are also affected by our credit rating. A decrease in credit rating to below investment grade would increase our obligation to post cash margin on existing contracts by approximately \$10 million. The fair value of our to-be-announced residential mortgage-backed securities and interest rate swap derivative contracts is affected by changes in interest rates. Based on our assessment as of December 31, 2018, changes in interest rates would not materially impact regulatory capital or liquidity needed to support this portion of our customer derivative program.

Summary of Loan Loss Experience

We maintain an allowance for loan losses and an accrual for off-balance sheet credit risk. At December 31, 2018, the combined allowance for loan losses and accrual for off-balance sheet credit risk totaled \$209 million or 0.97% of outstanding loans and 134.03% of nonaccruing loans, excluding loans guaranteed by U.S. government agencies. Excluding acquired loans measured at acquisition date fair value, the combined allowance for loan losses was 1.12% of outstanding loans and 145.66% of nonaccruing loans. The allowance for loan losses was \$207 million and the accrual for off-balance sheet credit risk was \$1.8 million. At December 31, 2017, the combined allowance for credit losses was \$234 million or 1.37% of outstanding loans and 131% of nonaccruing loans, excluding loans guaranteed by U.S. government agencies. The allowance for loan losses was \$231 million and the accrual for off-balance sheet credit risk was \$3.7 million.

The provision for credit losses is the amount necessary to maintain the allowance for loan losses and an accrual for off-balance sheet credit risk at an amount determined by management to be appropriate based on its evaluation. The provision includes the combined charge or credit to expense for both the allowance for loan losses and the accrual for off-balance sheet credit risk. All losses incurred from lending activities will ultimately be reflected in charge-offs against the allowance for loan losses following funds advanced against outstanding commitments. Based on an evaluation of all credit factors, including sustained improvement in nonaccruing and potential problem loans during the year, net charge-offs and growth in the loan portfolio during the year, the Company determined that an \$8.0 million provision for credit losses was appropriate for 2018. The Company recorded a \$7.0 million negative provision for loan losses for 2017.

Table 25 – Summary of Loan Loss Experience
(In thousands)

	Year Ended December 31,				
	2018	2017	2016	2015	2014
Allowance for loan losses:					
Beginning balance	\$ 230,682	\$ 246,159	\$ 225,524	\$ 189,056	\$ 185,396
Loans charged off:					
Commercial	(37,880)	(19,810)	(35,828)	(6,734)	(3,569)
Commercial real estate	—	(76)	—	(944)	(2,047)
Residential mortgage	(378)	(649)	(1,312)	(2,205)	(4,448)
Personal	(5,325)	(5,064)	(5,448)	(5,288)	(6,168)
Total	(43,583)	(25,599)	(42,588)	(15,171)	(16,232)
Recoveries of loans previously charged off:					
Commercial	3,316	4,461	1,727	2,729	5,703
Commercial real estate	3,552	1,940	1,283	11,079	7,003
Residential mortgage	1,047	760	1,999	1,260	2,000
Personal	2,499	2,451	2,747	3,052	4,328
Total	10,414	9,612	7,756	18,120	19,034
Net loans recovered (charged off)	(33,169)	(15,987)	(34,832)	2,949	2,802
Provision for loan losses	9,944	510	55,467	33,519	858
Ending balance	\$ 207,457	\$ 230,682	\$ 246,159	\$ 225,524	\$ 189,056
Accrual for off-balance sheet credit risk:					
Beginning balance	\$ 3,734	\$ 11,244	\$ 1,711	\$ 1,230	\$ 2,088
Provision for off-balance sheet credit risk	(1,944)	(7,510)	9,533	481	(858)
Ending balance	\$ 1,790	\$ 3,734	\$ 11,244	\$ 1,711	\$ 1,230
Total combined provision for credit losses	\$ 8,000	\$ (7,000)	\$ 65,000	\$ 34,000	\$ —
Allowance for loan losses to loans outstanding at period end	0.96%	1.34 %	1.45%	1.41 %	1.33 %
Net charge-offs (recoveries) to average loans	0.18%	0.09 %	0.21%	(0.02)%	(0.02)%
Total provision for credit losses to average loans	0.04%	(0.04)%	0.40%	0.23 %	— %
Recoveries to gross charge-offs	23.89%	37.55 %	18.21%	119.44 %	117.26 %
Allowance for loan losses as a multiple of net charge-offs	6.25x	14.43x	7.07x	(76.47)x	(67.47)x
Accrual for off-balance sheet credit risk to off-balance sheet credit commitments	0.01%	0.04 %	0.11%	0.02 %	0.01 %
Combined allowance for credit losses to loans outstanding at period-end	0.97%	1.37 %	1.52%	1.43 %	1.34 %

Allowance for Loan Losses

The appropriateness of the allowance for loan losses is assessed by management based on an ongoing quarterly evaluation of the probable estimated losses inherent in the portfolio. The allowance consists of specific allowances attributed to certain impaired loans, general allowances based on estimated loss rates by loan class and non-specific allowances based on general economic conditions, concentration in loans with large balances and other relevant factors.

Loans are considered to be impaired when it is probable that we will not collect all amounts due according to the original contractual terms of the loan agreements. This includes all nonaccruing loans, all loans modified in trouble debt restructurings and all government guaranteed loans repurchased from GNMA pools. A specific allowance is required when the outstanding principal balance of the loan is not supported by either the discounted cash flows expected to be received from the borrower or the fair value of collateral for collateral dependent loans. At December 31, 2018, impaired loans totaled \$347 million, including \$35 million with specific allowances of \$8.7 million and \$312 million with no specific allowances because the loan balances represent the amounts we expect to recover. At December 31, 2017, impaired loans totaled \$376 million, including \$51 million of impaired loans with specific allowances of \$8.8 million and \$325 million with no specific allowances.

General allowances for unimpaired loans are based on an estimated loss rate by loan class. Estimated loss rates for risk-graded loans are either increased or decreased based on changes in risk grading for each loan class. Estimated loss rates for both risk-graded and non-risk graded loans may be further adjusted for inherent risks identified for the given loan class which have not yet been captured in the loss rate.

The aggregate amount of general allowances for all unimpaired loans totaled \$181 million at December 31, 2018, compared to \$200 million at December 31, 2017. The decrease was primarily due to improved risk grading and inherent risk factors related to energy loans.

Nonspecific allowances are maintained for risks beyond factors specific to a particular portfolio segment or loan class. These factors include trends in the economy in our primary lending areas, concentrations in loans with large balances and other relevant factors. Nonspecific allowances totaled \$18 million at December 31, 2018, down from \$22 million at December 31, 2017.

An allocation of the allowance for loan losses by loan category follows in Table 26.

Table 26 – Allowance for Loan Losses Allocation
(Dollars in thousands)

Loan category:	December 31,									
	2018		2017		2016		2015		2014	
	Allowance	% of Loans ¹	Allowance	% of Loans ¹	Allowance	% of Loans ¹	Allowance	% of Loans ¹	Allowance	% of Loans ¹
Commercial	\$ 102,226	62.96%	\$ 124,269	62.58%	\$ 140,213	61.16%	\$ 130,334	64.32%	\$ 90,875	64.02%
Commercial real estate	60,026	22.00%	56,621	20.29%	50,749	22.42%	41,391	20.44%	42,445	19.20%
Residential mortgage	17,964	10.30%	18,451	11.50%	18,224	11.48%	19,509	11.77%	23,458	13.72%
Personal	9,473	4.74%	9,124	5.63%	8,773	4.94%	4,164	3.47%	4,233	3.06%
Nonspecific allowance	17,768		22,217		28,200		30,126		28,045	
Total	\$ 207,457	100.00%	\$ 230,682	100.00%	\$ 246,159	100.00%	\$ 225,524	100.00%	\$ 189,056	100.00%

¹ Represents ratio of loan category balance to total loans.

Our loan monitoring process also identified certain accruing substandard loans, based on regulatory guidelines, that possess more than the normal amount of risk due to deterioration in the financial condition of the borrower or the value of the collateral. Because the borrowers are still performing in accordance with the original terms of the loan agreements, and no loss of principal or interest is anticipated, these loans were not included in nonperforming assets. Known information does, however, cause management concern as to the borrowers' continued ability to comply with current repayment terms. These potential problem loans totaled \$215 million at December 31, 2018 composed primarily of \$87 million or 2% of energy loans, \$38 million or 1% of healthcare loans, \$33 million or 1% of services loans and \$22 million or 3% of manufacturing loans. Potential problem loans totaled \$241 million at December 31, 2017.

Based on regulatory guidelines, other loans especially mentioned are in compliance with the original terms of the agreement, but may have a weakness that deserves management's close attention. Other loans especially mentioned totaled \$182 million at December 31, 2018 and were composed primarily of \$50 million or 2% of service sector loans, \$42 million or 1% of energy loans, \$31 million or 4% of manufacturing sector loans, \$19 million or 1% of wholesale/retail sector loans and \$15 million or 1% of healthcare sector loans. Other loans especially mentioned totaled \$118 million at December 31, 2017.

Net Loans Charged Off

Loans are charged off against the allowance for loan losses when the loan balance or a portion of the loan balance is no longer covered by the paying capacity of the borrower based on an evaluation of available cash resources and collateral value. Internally risk graded loans are evaluated quarterly and charge-offs are taken in the quarter in which the loss is identified. Non-risk graded loans are generally charged off when payments are between 60 days and 180 days past due, depending on loan class. In addition, non-risk graded loans are generally charged-down to collateral value within 60 days of being notified of a borrower's bankruptcy filing, regardless of payment status.

BOK Financial had net loans charged off of \$33 million or 0.18% of average loans for 2018, compared to net loans charged off of \$16 million or 0.09% of average loans in 2017.

Net commercial loans charged off totaled \$35 million, primarily from \$16 million of net charge-offs from energy loans, \$12 million from wholesale sector loans and \$6.6 million of net charge-offs from healthcare loans. Net commercial real estate loan recoveries totaled \$3.6 million. Net recoveries of residential mortgage loans totaled \$669 thousand for the year and net charge-offs of personal loans were \$2.8 million.

Table 27 - Nonperforming Assets
(Dollars in Thousands)

	December 31,				
	2018	2017	2016	2015	2014
Nonaccruing loans:					
Commercial	\$ 99,841	\$ 137,303	\$ 178,953	\$ 76,424	\$ 13,527
Commercial real estate	21,621	2,855	5,521	9,001	18,557
Residential mortgage	41,555	47,447	46,220	61,240	48,121
Personal	230	269	290	463	566
Total nonaccruing loans	163,247	187,874	230,984	147,128	80,771
Accruing renegotiated loans guaranteed by U.S. government agencies	86,428	73,994	81,370	74,049	73,985
Real estate and other repossessed assets:					
Guaranteed by U.S. government agencies ¹	—	—	—	—	49,898
Other	17,487	28,437	44,287	30,731	51,963
Real estate and other repossessed assets	17,487	28,437	44,287	30,731	101,861
Total nonperforming assets	\$ 267,162	\$ 290,305	\$ 356,641	\$ 251,908	\$ 256,617
Total nonperforming assets excluding those guaranteed by U.S. government agencies	\$ 173,602	\$ 207,132	\$ 263,425	\$ 155,959	\$ 129,022
Nonaccruing loans by loan class:					
Commercial:					
Energy	\$ 47,494	\$ 92,284	\$ 132,499	\$ 61,189	\$ 1,416
Healthcare	16,538	14,765	825	1,072	1,380
Manufacturing	8,919	5,962	4,931	331	450
Services	8,567	2,620	8,173	10,290	5,201
Wholesale/retail	1,316	2,574	11,407	2,919	4,149
Public finance	—	—	—	—	—
Other commercial and industrial	17,007	19,098	21,118	623	931
Total commercial	99,841	137,303	178,953	76,424	13,527
Commercial real estate:					
Retail	20,279	276	326	1,319	3,926
Residential construction and land development	350	1,832	3,433	4,409	5,299
Multifamily	301	—	38	274	—
Office	—	275	426	651	3,420
Industrial	—	—	76	76	—
Other commercial real estate	691	472	1,222	2,272	5,912
Total commercial real estate	21,621	2,855	5,521	9,001	18,557
Residential mortgage:					
Permanent mortgage	23,951	25,193	22,855	28,984	34,845
Permanent mortgages guaranteed by U.S. government agencies	7,132	9,179	11,846	21,900	3,712
Home equity	10,472	13,075	11,519	10,356	9,564
Total residential mortgage	41,555	47,447	46,220	61,240	48,121
Personal	230	269	290	463	566
Total nonaccruing loans	\$ 163,247	\$ 187,874	\$ 230,984	\$ 147,128	\$ 80,771

	December 31,				
	2018	2017	2016	2015	2014
Allowance for loan losses to nonaccruing loans ²	132.89%	129.09%	112.33%	180.09%	245.34%
Accruing loans 90 days or more past due ²	\$ 1,338	\$ 633	\$ 5	\$ 1,207	\$ 125
Foregone interest on nonaccruing loans ³	15,502	16,496	15,990	7,432	8,170

¹ Approximately \$50 million was reclassified from Real estate and other repossessed assets to Receivables on the balance sheet on January 1, 2015 with the adoption of Financial Accounting Standards Board Update No. 2014-14, *Classification of Certain Government-Guaranteed Mortgage Loans Upon Foreclosure* ("ASU 2014-14"). With the implementation of ASU 2014-14, upon foreclosure of loans for which the loan balance is expected to be recovered from the guarantor by a U.S. government agency, the loan balance is directly reclassified to other receivables without including such foreclosed assets in real estate and other repossessed assets.

² Excludes residential mortgages guaranteed by agencies of the U.S. government.

³ Interest collected and recognized on nonaccruing loans was not significant in 2018 and previous years.

Nonperforming assets totaled \$267 million or 1.23% of outstanding loans and repossessed assets at December 31, 2018, a \$23 million decrease compared to the prior year. Nonaccruing loans totaled \$163 million, accruing renegotiated residential mortgage loans totaled \$86 million and real estate and other repossessed assets totaled \$17 million. All accruing renegotiated residential mortgage loans and \$7.1 million of nonaccruing loans are guaranteed by U.S. government agencies. Excluding assets guaranteed by U.S. government agencies, nonperforming assets decreased \$34 million to \$174 million or 0.81% of outstanding non-guaranteed loans and repossessed assets. The acquisition of CoBiz Financial in 2018 added \$18 million to nonperforming assets, net of fair value adjustments. The remaining decrease was primarily due to nonaccruing energy loans and real estate and other repossessed assets, partially offset by an increase in nonaccruing commercial real estate loans secured by retail facilities. The Company generally retains nonperforming assets to maximize potential recovery, which may cause future nonperforming assets to decrease more slowly.

Loans are generally classified as nonaccruing when it becomes probable that we will not collect the full contractual principal and interest. As more fully discussed in Note 4 to the Consolidated Financial Statements, we may modify loans in a troubled debt restructuring. Modifications may include extension of payment terms and rate concessions. We generally do not forgive principal or accrued but unpaid interest. All loans modified in troubled debt restructurings, except residential mortgage loans guaranteed by U.S. government agencies, are classified as nonaccruing. We may renew matured nonaccruing loans. All nonaccruing loans, including those renewed or modified in troubled debt restructurings, are charged off when the loan balance is no longer covered by the paying capacity of the borrower based on a quarterly evaluation of available cash resources and collateral value. Nonaccruing loans generally remain on nonaccruing status until full collection of principal and interest in accordance with the original terms, including principal previously charged off, is probable. We generally do not voluntarily modify personal loans to troubled borrowers. Personal loans modified at the direction of bankruptcy court orders are identified as troubled debt restructurings and classified as nonaccruing.

As of December 31, 2018, renegotiated loans consist solely of accruing residential mortgage loans guaranteed by U.S. government agencies that have been modified in troubled debt restructurings. Generally, we modify residential mortgage loans primarily by reducing interest rates and extending the number of payments in accordance with U.S. government agency guidelines. No unpaid principal or interest is forgiven. Interest continues to accrue based on the modified terms of the loan. Modified loans guaranteed by U.S. government agencies under residential mortgage loan programs may be sold once they become eligible according to U.S. government agency guidelines.

A rollforward of nonperforming assets for the year ended December 31, 2018 follows in Table 28.

Table 28 – Rollforward of Nonperforming Assets
(In thousands)

	Year Ended December 31, 2018			
	Nonaccruing Loans	Renegotiated Loans	Real Estate and Other Reposessed Assets	Total Nonperforming Assets
Balance, December 31, 2017	\$ 187,874	\$ 73,994	\$ 28,437	\$ 290,305
Additions	116,372	55,521	—	171,893
Payments	(94,755)	(3,055)	—	(97,810)
Charge-offs	(43,583)	—	—	(43,583)
Net losses and write-downs	—	—	(6,009)	(6,009)
Foreclosure of nonaccruing loans	(9,880)	—	9,880	—
Foreclosure of loans guaranteed by U.S. government agencies	(5,403)	(8,684)	—	(14,087)
Proceeds from sales	—	(31,075)	(20,676)	(51,751)
Acquisitions	12,687	—	5,155	17,842
Net transfers to nonaccruing loans	1,793	(1,793)	—	—
Return to accrual status	(1,858)	—	—	(1,858)
Other, net	—	1,520	700	2,220
Balance, December 31, 2018	\$ 163,247	\$ 86,428	\$ 17,487	\$ 267,162

We foreclose on loans guaranteed by U.S. government agencies in accordance with agency guidelines. Generally these loans are not eligible for modification programs or have failed to comply with modified loan terms. Principal is guaranteed by agencies of the U.S. government, subject to limitations and credit risk is minimal. At foreclosure, these amounts are transferred to claims receivable accounts. These properties will be conveyed to the agencies and receivables collected once applicable criteria have been met.

Nonaccruing loans totaled \$163 million or 0.75% of outstanding loans at December 31, 2018, compared to \$188 million or 1.10% of outstanding loans at December 31, 2017. Nonaccruing loans decreased \$25 million compared to December 31, 2017. Newly identified nonaccruing loans totaled \$116 million and the acquisition of CoBiz Financial added \$13 million of nonaccruing loans in 2018. This was offset by \$95 million of payments, \$44 million of charge-offs and \$10 million of foreclosures during the year.

Commercial

Nonaccruing commercial loans totaled \$100 million or 0.73% of total commercial loans at December 31, 2018, down from \$137 million or 1.28% of total commercial loans at December 31, 2017. Newly identified nonaccruing commercial loans totaled \$76 million and acquired nonaccruing commercial loans totaled \$13 million, offset by \$81 million in payments, \$38 million of charge-offs and \$5.3 million of reposessions.

Nonaccruing commercial loans at December 31, 2018 were primarily composed of \$47 million or 1.32% of total energy loans, \$17 million or 2.04% of other commercial and industrial loans and \$17 million or 0.61% of healthcare sector loans.

Commercial Real Estate

Nonaccruing commercial real estate loans were \$22 million or 0.45% of outstanding commercial real estate loans at December 31, 2018, compared to \$2.9 million or 0.08% of outstanding commercial real estate loans at December 31, 2017. The \$19 million increase was primarily due to \$22 million of newly identified commercial real estate loans during the year, partially offset by \$3.6 million of cash payments received.

Nonaccruing commercial real estate loans were primarily composed of \$20 million or 2.21% of commercial real estate loans secured by retail facilities.

Residential Mortgage and Personal

Nonaccruing residential mortgage loans totaled \$42 million or 1.86% of outstanding residential mortgage loans at December 31, 2018, compared to \$47 million or 2.40% of outstanding residential mortgage loans at December 31, 2017. Newly identified nonaccruing residential mortgage loans of \$13 million were offset by \$10 million of cash payments, \$4.5 million of foreclosures and \$378 thousand of loans charged off during the year. Nonaccruing residential mortgage loans primarily consisted of \$24 million or 1.81% of non-guaranteed permanent residential mortgage loans and \$10 million or 1.46% of total home equity loans.

Payments on accruing residential mortgage loans and personal loans may be delinquent. The composition of residential mortgage loans and personal loans past due but still accruing is included in the following Table 29. Substantially all non-guaranteed residential loans past due 90 days or more are nonaccruing. At December 31, 2018, residential mortgage loans 30 to 59 days past due was \$4.3 million, down \$1.3 million compared to the prior year. Residential mortgage loans 60 to 89 days past due increased \$59 thousand from December 31, 2017. Personal loans 30 to 59 days past due decreased \$202 thousand and personal loans 60 to 89 days past due increased \$605 thousand compared to December 31, 2017. Personal loans 90 days or more past due decreased \$258 thousand.

Table 29 – Residential Mortgage and Personal Loans Past Due
(In thousands)

	December 31, 2018			December 31, 2017		
	90 Days or More	60 to 89 Days	30 to 59 Days	90 Days or More	60 to 89 Days	30 to 59 Days
Residential mortgage:						
Permanent mortgage ¹	\$ —	\$ 366	\$ 3,196	\$ —	\$ 219	\$ 3,435
Home equity	59	352	1,102	17	440	2,206
Total residential mortgage	\$ 59	\$ 718	\$ 4,298	\$ 17	\$ 659	\$ 5,641
Personal	\$ 3	\$ 796	\$ 479	\$ 261	\$ 191	\$ 681

¹ Excludes past due residential mortgage loans guaranteed by agencies of the U.S. government.

Real Estate and Other Repossessed Assets

Real estate and other repossessed assets are assets acquired in partial or total forgiveness of loans. The assets are carried at the lower of cost as determined by fair value at date of foreclosure or current fair value, less estimated selling costs.

Real estate and other repossessed assets totaled \$17 million at December 31, 2018, composed primarily \$6.1 million of oil and gas properties, \$4.4 million of 1-4 family residential properties, \$3.5 million of developed commercial real estate and \$3.4 million of undeveloped land primarily zoned for commercial development. The residential properties and undeveloped land are widely disbursed across our geographical footprint. Real estate and other repossessed assets decreased \$11 million compared to December 31, 2017.

Liquidity and Capital

Based on the average balances for 2018, approximately 65% of our funding was provided by deposit accounts, 20% from borrowed funds, less than 1% from long-term subordinated debt and 11% from equity. Our funding sources, which primarily include deposits and borrowings from the Federal Home Loan Banks, provide adequate liquidity to meet our operating needs.

Subsidiary Banks

Deposits and borrowed funds are the primary sources of liquidity for the subsidiary banks. Deposit accounts represent our largest funding source. We compete for retail and commercial deposits by offering a broad range of products and services and focusing on customer convenience. Retail deposit growth is supported through personal and small business checking, online bill paying services, mobile banking services, an extensive network of branch locations and ATMs and our ExpressBank call center. Commercial deposit growth is supported by offering treasury management and lockbox services. We also acquire brokered deposits when the cost of funds is advantageous to other funding sources.

Table 30 - Average Deposits by Line of Business

(In thousands)

	Year Ended December 31,	
	2018	2017
Commercial Banking	\$ 8,517,137	\$ 8,725,920
Consumer Banking	6,560,145	6,610,134
Wealth Management	5,617,325	5,516,214
Subtotal	20,694,607	20,852,268
Funds Management and other	2,114,604	1,332,513
Total	\$ 22,809,211	\$ 22,184,781

Average deposits for 2018 totaled \$22.8 billion and represented approximately 65% of total liabilities and capital compared with \$22.2 billion and 67% of total liabilities and capital for 2017. Average deposits increased \$624 million over the prior year, including \$859 million related to the fourth quarter impact of the CoBiz acquisition. CoBiz deposits are currently located in Funds Management and other. These will be allocated to the reporting segments in 2019. Demand deposits grew by \$277 million, including \$408 million of acquired deposits. Interest-bearing transaction deposit account balances increased by \$362 million, including \$423 million of acquired deposits. This growth was partially offset by a \$60 million decrease in time deposits.

Average deposits attributed to Commercial Banking were \$8.5 billion for 2018, a \$209 million or 2% decrease compared to 2017. Demand deposit balances decreased \$110 million or 2% and interest-bearing transaction account balances decreased \$98 million or 4%. Despite the series of federal funds rate increases from the Federal Reserve, as well as a modest increase in our earnings credit, Commercial Banking continues to retain large cash reserves primarily due to a combination of factors including uncertainty about the economic environment and potential for growth, lack of preferable liquid alternatives and a desire to minimize deposit charges through the earnings credit. The earnings credit is a non-cash method that enables commercial customers to offset deposit service charges based on account balances. Commercial deposit balances may continue to decrease as the economic outlook continues to improve and if short-term rates continue to move higher, enhancing their investment alternatives. As short-term rates move higher, related increases to the earnings credit rate may be appropriate, which will reduce the amount of deposits required to offset service charges.

Average Consumer Banking deposit balances were largely unchanged compared to the prior year. Average demand deposit balances grew by \$113 million or 6% while average interest-bearing transaction accounts decreased \$163 million or 3%. Higher costing time deposit balances decreased \$106 million or 10%.

Average Wealth Management deposit balances grew by \$101 million or 2% over the prior year. Interest-bearing transaction balances increased \$170 million or 5%. Non-interest-bearing demand deposits decreased \$107 million or 8%, and time deposit balances were up \$37 million or 5%.

Table 31 - Maturity of Domestic CDs and Public Funds in Amounts of \$100,000 or More
(In thousands)

	December 31,	
	2018	2017
Months to maturity:		
3 or less	\$ 380,315	\$ 368,584
Over 3 through 6	298,692	278,607
Over 6 through 12	299,346	253,277
Over 12	618,413	661,074
Total	\$ 1,596,766	\$ 1,561,542

Brokered deposits included in time deposits averaged \$251 million for 2018, compared to \$588 million for 2017. Brokered deposits included in time deposits totaled \$247 million at December 31, 2018 and \$573 million at December 31, 2017.

Average interest-bearing transaction accounts for 2018 included \$821 million of brokered deposits compared to \$1.4 billion for 2017. Brokered deposits included in interest-bearing transaction accounts totaled \$832 million at December 31, 2018 and \$1.5 billion at December 31, 2017.

The decrease in average brokered deposits balances was largely driven by a change in the regulatory definition of brokered deposits in the second quarter of 2018.

The distribution of our period end deposit account balances among principal markets follows in Table 32.

Table 32 - Period End Deposits by Principal Market Area
(In thousands)

	December 31,				
	2018	2017	2016	2015	2014
Oklahoma:					
Demand	\$ 3,610,593	\$ 3,885,008	\$ 3,993,170	\$ 4,133,520	\$ 3,828,819
Interest-bearing:					
Transaction	6,445,831	5,901,293	6,345,536	5,971,819	6,117,886
Savings	288,210	265,870	241,696	226,733	206,357
Time	1,118,643	1,092,133	1,118,355	1,202,274	1,301,194
Total interest-bearing	7,852,684	7,259,296	7,705,587	7,400,826	7,625,437
Total Oklahoma	11,463,277	11,144,304	11,698,757	11,534,346	11,454,256
Texas:					
Demand	3,289,659	3,239,098	3,137,009	2,627,764	2,639,732
Interest-bearing:					
Transaction	2,294,740	2,397,071	2,388,812	2,132,099	2,065,723
Savings	99,624	93,620	83,101	77,902	72,037
Time	423,880	502,879	535,642	549,740	547,316
Total interest-bearing	2,818,244	2,993,570	3,007,555	2,759,741	2,685,076
Total Texas	6,107,903	6,232,668	6,144,564	5,387,505	5,324,808
New Mexico:					
Demand	691,692	663,353	627,979	487,286	487,819
Interest-bearing:					
Transaction	571,347	552,393	590,571	563,723	519,544
Savings	58,194	55,647	49,963	43,672	37,471
Time	224,515	216,743	238,408	267,821	295,798
Total interest-bearing	854,056	824,783	878,942	875,216	852,813
Total New Mexico	1,545,748	1,488,136	1,506,921	1,362,502	1,340,632
Arkansas:					
Demand	36,800	30,384	26,389	27,252	35,996
Interest-bearing:					
Transaction	91,593	85,095	105,232	202,857	158,115
Savings	1,632	1,881	2,192	1,747	1,936
Time	8,726	14,045	16,696	24,983	28,520
Total interest-bearing	101,951	101,021	124,120	229,587	188,571
Total Arkansas	138,751	131,405	150,509	256,839	224,567

	December 31,				
	2018	2017	2016	2015	2014
Colorado:					
Demand	1,658,473	633,714	576,000	497,318	445,755
Interest-bearing:					
Transaction	1,899,203	657,629	616,679	616,697	631,874
Savings	57,289	35,223	32,866	31,927	29,811
Time	274,877	224,962	242,782	296,224	353,998
Total interest-bearing	2,231,369	917,814	892,327	944,848	1,015,683
Total Colorado	3,889,842	1,551,528	1,468,327	1,442,166	1,461,438
Arizona:					
Demand	709,176	334,701	366,755	326,324	369,115
Interest-bearing:					
Transaction	575,996	274,846	305,099	358,556	347,214
Savings	10,545	3,343	2,973	2,893	2,545
Time	43,051	20,394	27,765	29,498	36,680
Total interest-bearing	629,592	298,583	335,837	390,947	386,439
Total Arizona	1,338,768	633,284	702,592	717,271	755,554
Kansas/Missouri:					
Demand	418,199	457,080	508,418	197,424	259,121
Interest-bearing:					
Transaction	327,866	382,066	513,176	153,203	273,999
Savings	13,721	13,574	12,679	1,378	1,274
Time	19,688	27,260	42,152	35,524	45,210
Total interest-bearing	361,275	422,900	568,007	190,105	320,483
Total Kansas/Missouri	779,474	879,980	1,076,425	387,529	579,604
Total BOK Financial deposits	\$ 25,263,763	\$ 22,061,305	\$ 22,748,095	\$ 21,088,158	\$ 21,140,859

See Note 9 to the Consolidated Financial Statements for a summary of other borrowings.

In addition to deposits, liquidity for the subsidiary banks is provided primarily by federal funds purchased, securities repurchase agreements and Federal Home Loan Bank borrowings. Federal funds purchased consist primarily of unsecured, overnight funds acquired from other financial institutions. Funds are primarily purchased from bankers' banks and Federal Home Loan Banks from across the country. The largest source of wholesale federal funds purchased totaled \$300 million at December 31, 2018. There were no wholesale federal funds purchased outstanding at December 31, 2017. Securities repurchase agreements generally mature within 90 days and are secured by certain available for sale securities. Federal Home Loan Bank borrowings are generally short term and are secured by a blanket pledge of eligible collateral (generally unencumbered U.S. Treasury and mortgage-backed securities, 1-4 family residential mortgage loans, multifamily and other qualifying commercial real estate loans). Amounts borrowed from the Federal Home Loan Bank of Topeka averaged \$6.2 billion during 2018 and \$5.9 billion during 2017.

At December 31, 2018, the estimated unused credit available to BOKF, NA from collateralized sources was approximately \$7.1 billion.

BOKF, NA also has a liability related to the repurchase of certain delinquent residential mortgage loans previously sold in GNMA mortgage pools. Interest is payable monthly at rates contractually due to investors.

Parent Company and Other Non-Bank Subsidiaries

The primary sources of liquidity for BOK Financial are cash on hand and dividends from the subsidiary banks. Cash and cash equivalents totaled \$167 million at December 31, 2018. Dividends from the subsidiary banks are limited by various banking regulations to net profits, as defined, for the year plus retained profits for the two preceding years. Dividends are further restricted by minimum capital requirements. At December 31, 2018, based on the most restrictive limitations as well as management's internal capital policy, BOKF, NA could declare up to \$71 million of dividends without regulatory approval. Dividend constraints may be alleviated through increases in retained earnings, capital issuances or changes in risk weighted assets. Future losses or increases in required regulatory capital could also affect its ability to pay dividends to the parent company.

On June 27, 2016, the parent company issued \$150 million of subordinated debt that will mature on June 30, 2056. This debt bears interest at the rate of 5.375%, payable quarterly. On June 30, 2021, we will have the option to redeem the debt at the principal amount plus accrued interest, subject to regulatory approval.

As a result of the acquisition of CoBiz Financial, we obtained \$60 million of subordinated debt issued in June 2015 that will mature on June 25, 2030. This debt bears interest at the rate of 5.625% through June 25, 2025 and thereafter, the notes will bear an annual floating rate equal to 3-month LIBOR plus 317 basis points. We also acquired \$72 million of junior subordinated debentures. Interest is based on spreads over 3 month LIBOR ranging from 145 basis points to 295 basis points and mature September 17, 2033 through September 30, 2035. The junior subordinated debentures are subject to early redemption prior to maturity.

Shareholders' equity at December 31, 2018 was \$4.4 billion, an increase of \$937 million over December 31, 2017. The Company issued 7.2 million shares in conjunction with the acquisition of CoBiz Financial. Net income less cash dividends paid increased equity \$318 million during 2018. Changes in interest rates resulted in an increase in the accumulated other comprehensive loss to \$73 million at December 31, 2018, compared to \$36 million at December 31, 2017. Capital is managed to maximize long-term value to the shareholders. Factors considered in managing capital include projections of future earnings including expected benefits from lower federal income tax rates, asset growth and acquisition strategies, and regulatory and debt covenant requirements. Capital management may include subordinated debt issuance, share repurchase and stock and cash dividends.

On October 27, 2015, the Board of Directors authorized the Company to purchase up to five million common shares, subject to market conditions, securities laws and other regulatory compliance limitations. As of December 31, 2018, a cumulative total of 3,575,083 shares have been repurchased under this authorization. The Company repurchased 615,840 shares during 2018 at an average price of \$86.82 per share.

BOK Financial and the subsidiary banks are subject to various capital requirements administered by federal agencies. Failure to meet minimum capital requirements, including capital conservation buffer, can result in certain mandatory and additional discretionary actions by regulators that could have a material impact on operations including restrictions on capital distributions from dividends and share repurchases and executive bonus payments. These capital requirements include quantitative measures of assets, liabilities and off-balance sheet items. The capital standards are also subject to qualitative judgments by the regulators.

A summary of minimum capital requirements, including capital conservation buffer, follows for BOK Financial on a consolidated basis in Table 33.

Table 33 – Capital Ratios

	Minimum Capital Requirement	Capital Conservation Buffer	Minimum Capital Requirement Including Capital Conservation Buffer	December 31,	
				2018	2017
Risk-based capital:					
Common equity Tier 1	4.50%	2.50%	7.00%	10.92%	12.05%
Tier 1 capital	6.00%	2.50%	8.50%	10.92%	12.05%
Total capital	8.00%	2.50%	10.50%	12.50%	13.54%
Tier 1 Leverage	4.00%	N/A	4.00%	8.96%	9.31%
Average total equity to average assets					
				10.70%	10.43%
Tangible common equity ratio					
				8.82%	9.50%

At March 31, 2018, the Company exceeded the \$1 billion regulatory capital rules threshold for trading assets plus liabilities. This subjected the Company to the market risk rule, which imposed additional modeling, systems, oversight and reporting requirements effective beginning the second quarter of 2018 and resulted in an increase in risk weighted assets associated with trading.

Capital resources of financial institutions are also regularly measured by the tangible common shareholders' equity ratio. Tangible common shareholders' equity is shareholders' equity as defined by generally accepted accounting principles in the United States of America ("GAAP"), including unrealized gains and losses on available for sale securities, less intangible assets and equity which does not benefit common shareholders. Equity that does not benefit common shareholders includes preferred equity. This non-GAAP measure is a valuable indicator of a financial institution's capital strength since it eliminates intangible assets from shareholders' equity and retains the effect of unrealized losses on securities and other components of accumulated other comprehensive income in shareholders' equity.

Table 34 following provides a reconciliation of the non-GAAP measures with financial measures defined by GAAP.

Table 34 – Non-GAAP Measures
(Dollars in thousands)

	December 31,	
	2018	2017
Tangible common equity ratio:		
Total shareholders' equity	\$ 4,432,109	\$ 3,495,367
Less: Goodwill and intangible assets, net	1,184,112	476,088
Tangible common equity	3,247,997	3,019,279
Total assets	38,020,504	32,272,160
Less: Goodwill and intangible assets, net	1,184,112	476,088
Tangible assets	\$ 36,836,392	\$ 31,796,072
Tangible common equity ratio	8.82%	9.50%

Off-Balance Sheet Arrangements

See Note 14 to the Consolidated Financial Statements for a discussion of the Company's significant off-balance sheet commitments.

Aggregate Contractual Obligations

BOK Financial has numerous contractual obligations in the normal course of business. These obligations include time deposits and other borrowed funds, premises used under various operating leases, commitments to extend credit to borrowers and to purchase securities, derivative contracts and contracts for services such as data processing that are integral to our operations. Table 35 following summarizes payments due on contractual obligations with initial terms in excess of one year.

Table 35 – Contractual Obligations as of December 31, 2018

(In thousands)

	Less Than 1 Year	1 to 3 Years	4 to 5 Years	More Than 5 Years	Total
Time deposits	\$ 980,971	\$ 367,887	\$ 257,811	\$ 258,112	\$ 1,864,781
Other borrowings	575	1,150	1,200	7,557	10,482
Subordinated debentures	15,068	30,136	30,136	581,255	656,595
Lease obligations	25,794	46,121	28,147	78,598	178,660
Derivative contracts	132,147	35,837	6,563	6,511	181,058
Data processing services	15,561	21,128	16,941	21,224	74,854
Total	\$ 1,170,116	\$ 502,259	\$ 340,798	\$ 953,257	\$ 2,966,430
Loan commitments				\$	11,944,525
Standby letters of credit					582,196
Mortgage loans sold with recourse					98,623
Alternative investment commitments					73,885

Payments on time deposits, other borrowed funds and subordinated debentures include interest which has been calculated from rates at December 31, 2018. These obligations may have variable interest rates and actual payments will differ from the amounts shown on this table.

Payments on time deposits are based on contractual maturity dates. These funds may be withdrawn prior to maturity. We may charge the customer a penalty for early withdrawal.

Lease commitments generally represent real property we rent for branch offices, corporate offices and operations facilities. Payments presented represent the minimum lease payments and exclude related costs such as utilities and property taxes.

Obligations under derivative contracts are used in customer hedging programs. As previously discussed, we have entered into derivative contracts which are expected to substantially offset the cash payments due on these obligations.

Data processing and communications contracts represent the minimum obligations under the contracts. Additional payments that are based on the volume of transactions processed are excluded.

Loan commitments represent legally binding obligations to provide financing to our customers. Some of these commitments are expected to expire before being drawn upon and the total commitment amounts do not necessarily represent future cash requirements. Approximately \$2.3 billion of the loan commitments expire within one year.

The Company has funded \$253 million and has commitments to fund an additional \$74 million for various alternative investments. Alternative investments primarily consist of limited partnership interests in entities that invest in low income housing projects. Legally binding commitments to fund alternative investments are recognized as liabilities in the Consolidated Financial Statements.

Recently Issued Accounting Standards

See Note 1 of the Consolidated Financial Statements for disclosure of newly adopted and pending accounting standards.

Forward-Looking Statements

This 10-K contains forward-looking statements that are based on management's beliefs, assumptions, current expectations, estimates and projections about BOK Financial, the financial services industry and the economy generally. Words such as “anticipates,” “believes,” “estimates,” “expects,” “forecasts,” “plans,” “projects,” “will,” “intends,” variations of such words and similar expressions are intended to identify such forward-looking statements. Management judgments relating to and discussion of the provision and allowance for credit losses, allowance for uncertain tax positions, accruals for loss contingencies and valuation of mortgage servicing rights involve judgments as to expected events and are inherently forward-looking statements. Assessments that BOK Financial's acquisitions, including its latest acquisition of CoBiz Financial, Inc., and other growth endeavors will be profitable are necessary statements of belief as to the outcome of future events based in part on information provided by others which BOK Financial has not independently verified. These statements are not guarantees of future performance and involve certain risks, uncertainties, and assumptions which are difficult to predict with regard to timing, extent, likelihood and degree of occurrence. Therefore, actual results and outcomes may materially differ from what is expected, implied or forecasted in such forward-looking statements. Internal and external factors that might cause such a difference include, but are not limited to changes in commodity prices, interest rates and interest rate relationships, inflation, demand for products and services, the degree of competition by traditional and nontraditional competitors, changes in banking regulations, tax laws, prices, levies and assessments, the impact of technological advances, and trends in customer behavior as well as their ability to repay loans. There may also be difficulties and delays in integrating CoBiz Financial Inc.'s business or fully realizing cost savings and other benefits including, but not limited to, business disruption and customer acceptance of BOK Financial Corporation's products and services. BOK Financial and its affiliates undertake no obligation to update, amend or clarify forward-looking statements, whether as a result of new information, future events, or otherwise.

Legal Notice

As used in this report, the term “BOK Financial” and such terms as “the Company,” “the Corporation,” “our,” “we” and “us” may refer to one or more of the consolidated subsidiaries or all of them taken as a whole. All these terms are used for convenience only and are not intended as a precise description of any of the separate companies, each of which manages its own affairs.

ITEM 7A. QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Market Risk

Market risk is a broad term for the risk of economic loss due to adverse changes in the fair value of a financial instrument. These changes may be the result of various factors, including interest rates, foreign exchange rates, commodity prices or equity prices. Financial instruments that are subject to market risk can be classified either as held for trading or held for purposes other than trading. Market risk excludes changes in fair value due to credit of the individual issuers of financial instruments.

BOK Financial is subject to market risk primarily through the effect of changes in interest rates on both its assets held for purposes other than trading and trading assets. The effects of other changes, such as foreign exchange rates, commodity prices or equity prices do not pose significant market risk to BOK Financial. BOK Financial has no material investments in assets that are affected by changes in foreign exchange rates or equity prices. Energy and agricultural product derivative contracts, which are affected by changes in commodity prices, are matched against offsetting contracts as previously discussed.

The Asset/Liability Committee is responsible for managing market risk in accordance with policy limits established by the Board of Directors. The Committee monitors projected variation in net interest revenue, net income and economic value of equity due to specified changes in interest rates. These limits also set maximum levels for short-term borrowings, short-term assets, public funds and brokered deposits and establish minimum levels for un-pledged assets, among other things. Further, the Board approved market risk limits for fixed income trading, mortgage pipeline and mortgage servicing assets inclusive of economic hedge benefits. Exposure is measured daily and compliance is reviewed monthly. Deviations from the Board approved limits, which periodically occur throughout the reporting period, may require management to develop and execute plans to reduce exposure. These plans are subject to escalation to and approval by the Board.

The simulations used to manage market risk are based on numerous assumptions regarding the effects of changes in interest rates on the timing and extent of repricing characteristics, future cash flows and customer behavior. These assumptions are inherently uncertain and, as a result, models cannot precisely estimate or precisely predict the impact of higher or lower interest rates. Actual results will differ from simulated results due to timing, magnitude and frequency of interest rate changes, market conditions and management strategies, among other factors.

Interest Rate Risk – Other than Trading

As previously noted in the Net Interest Revenue section of this report, management has implemented strategies to manage the Company's balance sheet to have relatively limited exposure to changes in interest rates over a twelve-month period. The effectiveness of these strategies in managing the overall interest rate risk is evaluated through the use of an asset/liability model. BOK Financial performs a sensitivity analysis to identify more dynamic interest rate risk exposures, including embedded option positions, on net interest revenue. A simulation model is used to estimate the effect of changes in interest rates on our performance across multiple interest rate scenarios. Our current internal policy limit for net interest revenue variation due to a 200 basis point parallel change in market interest rates over twelve months is a maximum decline of 5%. The results of a 200 basis point decrease in interest rates in the current low-rate environment are not meaningful. Until such time as it becomes meaningful, we will instead report the effect of a 100 basis point decrease in interest rates.

The Company's primary interest rate exposures include the Federal Funds rate, which affects short-term borrowings, and the prime lending rate and LIBOR, which are the basis for much of the variable rate loan pricing. Additionally, residential mortgage rates directly affect the prepayment speeds for residential mortgage-backed securities and mortgage servicing rights. Derivative financial instruments and other financial instruments used for purposes other than trading are included in this simulation. In addition, the impact on the level and composition of demand deposit accounts and other core deposit balances resulting from a significant increase in short-term market interest rates and the overall interest rate environment is likely to be material. The simulation incorporates assumptions regarding the effects of such changes based on a combination of historical analysis and expected behavior. The impact of planned growth and new business activities is factored into the simulation model.

Table 36 – Interest Rate Sensitivity

(Dollar in thousands)

	200 bp Increase		100 bp Decrease	
	2018	2017	2018	2017
Anticipated impact over the next twelve months on net interest revenue	\$ (4,248)	\$ (2,692)	\$ (42,483)	\$ (37,072)
	(0.36)%	(0.30)%	(3.57)%	(4.16)%

BOK Financial is also subjected to market risk through changes in the fair value of mortgage servicing rights. Changes in the fair value of mortgage servicing rights are highly dependent on changes in primary mortgage rates offered to borrowers, intermediate-term interest rates that affect the value of custodial funds, and assumptions about servicing revenues, servicing costs and discount rates. As primary mortgage rates increase, prepayment speeds slow and the value of our mortgage servicing rights increases. As primary mortgage rates fall, prepayment speeds increase and the value of our mortgage servicing rights decreases.

We maintain a portfolio of financial instruments, which may include debt securities issued by the U.S. government or its agencies and interest rate derivative contracts held as an economic hedge of the changes in the fair value of our mortgage servicing rights. Composition of this portfolio will change based on our assessment of market risk. Changes in the fair value of residential mortgage-backed securities are highly dependent on changes in secondary mortgage rates required by investors, and interest rate derivative contracts are highly dependent on changes in other market interest rates. While primary and secondary mortgage rates generally move in the same direction, the spread between them may widen and narrow due to market conditions and government intervention. Changes in the forward-looking spread between the primary and secondary rates can cause significant earnings volatility.

Management performs a stress test to measure market risk due to changes in interest rates inherent in its MSR portfolio and hedges. The stress test shocks applicable interest rates up and down 50 basis points and calculates an estimated change in fair value, net of economic hedging activity, that may result. The Board has approved a \$20 million market risk limit for mortgage servicing rights, net of economic hedges.

Table 37 - MSR Asset and Hedge Sensitivity Analysis

(In thousands)

	December 31,			
	2018		2017	
	Up 50 bp	Down 50 bp	Up 50 bp	Down 50 bp
MSR Asset	\$ 18,619	\$ (27,154)	\$ 25,818	\$ (32,856)
MSR Hedge	(21,838)	21,922	(29,501)	25,021
Net Exposure	(3,219)	(5,232)	(3,683)	(7,835)

Trading Activities

The Company bears market risk by originating residential mortgages held for sale ("RMHFS"). RMHFS are generally outstanding for 60 to 90 days, which represents the typical period from commitment to originate a loan to sale of the closed loan to an investor. Primary mortgage interest rate changes during this period affect the value of RMHFS commitments and loans. We use forward sale contracts to mitigate market risk on all closed mortgage loans held for sale and on an estimate of mortgage loan commitments that are expected to result in closed loans.

A variety of methods are used to monitor market risk of mortgage origination activities. These methods include daily marking of all positions to market value, independent verification of inventory pricing, and revenue sensitivity limits.

Management performs a stress test to measure market risk due to changes in interest rates inherent in the mortgage production pipeline. The stress test shocks applicable interest rates up and down 50 basis points and calculates an estimated change in fair value, net of economic hedging activity that may result. The Board has approved a \$7 million market risk limit for the mortgage production pipeline, net of forward sale contracts.

Table 38 - Mortgage Pipeline Sensitivity Analysis

(In thousands)

	Year Ended December 31,			
	2018		2017	
	Up 50 bp	Down 50 bp	Up 50 bp	Down 50 bp
Average ¹	\$ 223	\$ (697)	\$ 23	\$ (1,040)
Low ²	2,077	699	1,314	789
High ³	(1,015)	(2,447)	(1,979)	(2,377)
Period End	(16)	(420)	(263)	(114)

¹ Average represents the simple average of each daily value observed during the reporting period.

² Low represents least risk of loss in fair value measured as the smallest negative value or the largest positive value observed daily during the reporting period.

³ High represents the greatest risk of loss in fair value measured as the largest negative value or the smallest positive value observed daily during the reporting period.

BOK Financial enters into trading activities both as an intermediary for customers and for its own account. As an intermediary, we take positions in securities, generally residential mortgage-backed securities, government agency securities and municipal bonds. These securities are purchased for resale to customers, which include individuals, corporations, foundations and financial institutions. On a limited basis, we may also take trading positions in U.S. Treasury securities, residential mortgage-backed securities, and municipal bonds to enhance returns on securities portfolios. Both of these activities involve interest rate, liquidity and price risk. BOK Financial has an insignificant exposure to foreign exchange risk and does not take positions in commodity derivatives.

A variety of methods are used to monitor the interest rate risk of trading activities. These methods include daily marking of all positions to market value, independent verification of inventory pricing, and position limits for each trading activity. Economic hedges in either the futures or cash markets may be used to reduce the risk associated with some trading programs.

Management performs a stress test to measure market risk from changes in interest rates on its trading portfolio. The stress test shocks applicable interest rates up and down 50 basis points and calculates an estimated change in fair value, net of economic hedging activity that may result. The Board has approved an \$8 million market risk limit for the trading portfolio, net of economic hedges.

Table 39 –Trading Securities Sensitivity Analysis

(In thousands)

	Year Ended December 31,			
	2018		2017	
	Up 50 bp	Down 50 bp	Up 50 bp	Down 50 bp
Average ¹	\$ (1,133)	\$ 649	\$ (1,702)	\$ 1,799
Low ²	2,041	4,423	668	5,210
High ³	(4,534)	(3,463)	(4,386)	(1,046)
Period End	1,470	(1,081)	(488)	539

¹ Average represents the simple average of each daily value observed during the reporting period.

² Low represents least risk of loss in fair value measured as the smallest negative value or the largest positive value observed daily during the reporting period.

³ High represents the greatest risk of loss in fair value measured as the largest negative value or the smallest positive value observed daily during the reporting period.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

Report of Management on Internal Control over Financial Reporting

Management of BOK Financial Corporation is responsible for establishing and maintaining adequate internal control over financial reporting and for assessing the effectiveness of internal control over financial reporting, as such term is defined in Exchange Act Rules 13a-15(f) and 15d-15(f), as amended. Management has assessed the effectiveness of the Company's internal control over financial reporting based on the criteria established in "Internal Control – Integrated Framework," issued by the Committee of Sponsoring Organizations ("COSO") of the Treadway Commission in 2013. Based on that assessment and criteria, management has determined that the Company maintained effective internal control over financial reporting as of December 31, 2018.

As permitted, management excluded from its assessment the operations of CoBiz Financial, which was acquired on October 1, 2018. As described in Note 6 to the Consolidated Financial Statements, assets acquired and excluded from management's assessment of internal control over financial reporting comprised approximately 12% and 20% of consolidated total and net assets, respectively, at December 31, 2018. Operations of CoBiz Financial comprised approximately 3% and 3% of revenues and net income, respectively, for the year ended December 31, 2018.

Ernst & Young LLP, the independent registered public accounting firm that audited the Consolidated Financial Statements of the Company included in this annual report has issued an audit report on the effectiveness of the Company's internal control over financial reporting as of December 31, 2018. Their report, which expresses unqualified opinion on the effectiveness of the Company's internal control over financial reporting as of December 31, 2018, is included in this annual report.

Report of Independent Registered Public Accounting Firm

To the Shareholders and Board of Directors of BOK Financial Corporation

Opinion on Internal Control over Financial Reporting

We have audited BOK Financial Corporation's internal control over financial reporting as of December 31, 2018, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, BOK Financial Corporation (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on the COSO criteria.

As indicated in the accompanying Report of Management on Internal Control over Financial Reporting, management's assessment of and conclusion on the effectiveness of internal control over financial reporting did not include the internal controls of CoBiz Financial, which is included in the 2018 consolidated financial statements of the Company and constituted 12% and 20% of total and net assets, respectively, as of December 31, 2018 and 3% and 3% of revenues and net income, respectively, for the year then ended. Our audit of internal control over financial reporting of the Company also did not include an evaluation of the internal control over financial reporting of CoBiz Financial.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the consolidated balance sheets of BOK Financial Corporation as of December 31, 2018 and 2017, and the related consolidated statements of earnings, comprehensive income, changes in equity, and cash flows for each of the three years in the period ended December 31, 2018, and the related notes and our report dated March 1, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Report of Management on Internal Control over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ Ernst & Young LLP

Tulsa, Oklahoma

March 1, 2019

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of BOK Financial Corporation

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of BOK Financial Corporation (the Company) as of December 31, 2018 and 2017, and the related consolidated statements of earnings, comprehensive income, changes in equity, and cash flows for each of the three years in the period ended December 31, 2018, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2018, based on the criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework), and our report dated March 1, 2019 expressed an unqualified opinion thereon.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We have served as the Company's auditor since 1990.

Tulsa, Oklahoma

March 1, 2019

Consolidated Statements of Earnings

(In thousands, except share and per share data)

	Year Ended December 31,		
	2018	2017	2016
Interest and dividend revenue			
Loans	\$ 891,587	\$ 696,479	\$ 581,030
Residential mortgage loans held for sale	8,123	8,706	12,658
Trading securities	57,531	17,002	8,527
Investment securities	14,775	16,121	16,894
Available for sale securities	197,317	177,070	175,321
Fair value option securities	15,205	16,755	6,723
Restricted equity securities	21,555	18,490	17,238
Interest-bearing cash and cash equivalents	22,333	22,128	10,726
Total interest and dividend revenue	1,228,426	972,751	829,117
Interest expense			
Deposits	95,517	53,803	40,494
Borrowed funds	138,215	69,124	35,099
Subordinated debentures	9,827	8,123	6,296
Total interest expense	243,559	131,050	81,889
Net interest and dividend revenue	984,867	841,701	747,228
Provision for credit losses	8,000	(7,000)	65,000
Net interest and dividend revenue after provision for credit losses	976,867	848,701	682,228
Other operating revenue			
Brokerage and trading revenue	108,323	131,601	138,377
Transaction card revenue	84,025	119,988	116,452
Fiduciary and asset management revenue	184,703	162,889	135,387
Deposit service charges and fees	112,153	112,079	111,589
Mortgage banking revenue	97,787	104,719	133,914
Other revenue	56,651	49,959	50,112
Total fees and commissions	643,642	681,235	685,831
Other gains (losses), net	(2,731)	11,213	4,947
Gain (loss) on derivatives, net	(422)	779	(15,685)
Loss on fair value option securities, net	(25,572)	(2,733)	(10,555)
Change in fair value of mortgage servicing rights	4,668	172	(2,193)
Gain (loss) on available for sale securities, net	(2,801)	4,428	11,675
Total other operating revenue	616,784	695,094	674,020
Other operating expense			
Personnel	583,131	573,408	553,119
Business promotion	30,523	28,877	26,582
Charitable contributions to BOKF Foundation	2,846	2,000	2,000
Professional fees and services	59,099	51,067	56,783
Net occupancy and equipment	97,981	86,477	80,024
Insurance	23,318	19,653	32,489
Data processing and communications	114,796	146,970	131,841
Printing, postage and supplies	17,169	15,689	15,584
Net losses and operating expenses of repossessed assets	17,052	9,687	3,359
Amortization of intangible assets	9,620	6,779	6,862
Mortgage banking costs	46,298	52,856	61,387
Other expense	26,333	32,054	47,560
Total other operating expense	1,028,166	1,025,517	1,017,590
Net income before taxes	565,485	518,278	338,658
Federal and state income taxes	119,061	182,593	106,377
Net income	446,424	335,685	232,281
Net income (loss) attributable to non-controlling interests	778	1,041	(387)
Net income attributable to BOK Financial Corporation shareholders	\$ 445,646	\$ 334,644	\$ 232,668
Earnings per share:			
Basic	\$ 6.63	\$ 5.11	\$ 3.53
Diluted	\$ 6.63	\$ 5.11	\$ 3.53
Average shares used in computation:			
Basic	66,628,640	64,745,364	65,085,627
Diluted	66,662,273	64,806,284	65,143,898
Dividends declared per share	\$ 1.90	\$ 1.77	\$ 1.73

See accompanying notes to Consolidated Financial Statements.

Consolidated Statements of Comprehensive Income

(In thousands)

	Year Ended December 31,		
	2018	2017	2016
Net income	\$ 446,424	\$ 335,685	\$ 232,281
Other comprehensive loss before income taxes:			
Net change in unrealized gain (loss)	(48,010)	(26,152)	(41,521)
Reclassification adjustments included in earnings:			
Interest revenue, Investment securities, Taxable securities	—	—	(112)
Loss (gain) on available for sale securities, net	2,801	(4,428)	(11,675)
Other comprehensive loss, before income taxes	(45,209)	(30,580)	(53,308)
Federal and state income taxes	(11,507)	(11,923)	(20,754)
Other comprehensive loss, net of income taxes	(33,702)	(18,657)	(32,554)
Comprehensive income	412,722	317,028	199,727
Comprehensive income (loss) attributable to non-controlling interests	778	1,041	(387)
Comprehensive income attributable to BOK Financial Corp. shareholders	\$ 411,944	\$ 315,987	\$ 200,114

See accompanying notes to Consolidated Financial Statements.

Consolidated Balance Sheets

(In thousands, except share data)

	December 31,	
	2018	2017
Assets		
Cash and due from banks	\$ 741,749	\$ 602,510
Interest-bearing cash and cash equivalents	401,675	1,714,544
Trading securities	1,956,923	462,676
Investment securities (fair value: 2018 – \$367,298 ; 2017 – \$480,035)	355,187	461,793
Available for sale securities	8,857,120	8,321,578
Fair value option securities	283,235	755,054
Restricted equity securities	344,447	320,189
Residential mortgage loans held for sale	149,221	221,378
Loans	21,656,730	17,153,424
Allowance for loan losses	(207,457)	(230,682)
Loans, net of allowance	21,449,273	16,922,742
Premises and equipment, net	330,033	317,335
Receivables	204,960	178,800
Goodwill	1,049,263	447,430
Intangible assets, net	134,849	28,658
Mortgage servicing rights	259,254	252,867
Real estate and other repossessed assets, net of allowance (2018 – \$13,665 ; 2017 – \$12,648)	17,487	28,437
Derivative contracts	320,929	220,502
Cash surrender value of bank-owned life insurance	381,608	316,498
Receivable on unsettled securities sales	336,400	340,077
Other assets	446,891	359,092
Total assets	\$ 38,020,504	\$ 32,272,160
Liabilities and Equity		
Liabilities:		
Noninterest-bearing demand deposits	\$ 10,414,592	\$ 9,243,338
Interest-bearing deposits:		
Transaction	12,206,576	10,250,393
Savings	529,215	469,158
Time	2,113,380	2,098,416
Total deposits	25,263,763	22,061,305
Funds purchased and repurchase agreements	1,018,411	574,963
Other borrowings	6,124,390	5,134,897
Subordinated debentures	275,913	144,677
Accrued interest, taxes and expense	192,826	164,895
Derivative contracts	362,306	171,963
Due on unsettled securities purchases	156,370	338,745
Other liabilities	183,480	162,381
Total liabilities	33,577,459	28,753,826
Shareholders' equity:		
Common stock (\$.00006 par value; 2,500,000,000 shares authorized; shares issued and outstanding: 2018 – 75,711,492 ; 2017 – 75,147,686)	5	4
Capital surplus	1,334,030	1,035,895
Retained earnings	3,369,654	3,048,487
Treasury stock (shares at cost: 2018 – 3,588,560 ; 2017 – 9,752,749)	(198,995)	(552,845)
Accumulated other comprehensive loss	(72,585)	(36,174)
Total shareholders' equity	4,432,109	3,495,367
Non-controlling interests	10,936	22,967
Total equity	4,443,045	3,518,334
Total liabilities and equity	\$ 38,020,504	\$ 32,272,160

See accompanying notes to Consolidated Financial Statements.

Consolidated Statements of Changes in Equity

(In thousands)

	Common Stock		Capital Surplus	Retained Earnings	Treasury Stock		Accumulated Other Comprehensive Income (Loss)	Total Shareholders' Equity	Non-Controlling Interests	Total Equity
	Shares	Amount			Shares	Amount				
Balance, December 31, 2015	74,530	\$ 4	\$ 982,009	\$2,704,121	8,636	\$ (477,165)	\$ 21,587	\$ 3,230,556	\$ 37,083	\$3,267,639
Net income	—	—	—	232,668	—	—	—	232,668	(387)	232,281
Other comprehensive loss	—	—	—	—	—	—	(32,554)	(32,554)	—	(32,554)
Repurchase of common stock	—	—	—	—	1,005	(66,792)	—	(66,792)	—	(66,792)
Share-based compensation plans:										
Stock options exercised	214	—	12,465	—	—	—	—	12,465	—	12,465
Non-vested shares awarded, net	249	—	1,590	—	—	—	—	1,590	—	1,590
Vesting of non-vested shares	—	—	—	—	15	(95)	—	(95)	—	(95)
Share-based compensation	—	—	10,471	—	—	—	—	10,471	—	10,471
Cash dividends on common stock	—	—	—	(113,455)	—	—	—	(113,455)	—	(113,455)
Capital calls and distributions, net	—	—	—	—	—	—	—	—	(5,193)	(5,193)
Balance, December 31, 2016	74,993	4	1,006,535	2,823,334	9,656	(544,052)	(10,967)	3,274,854	31,503	3,306,357
Net income	—	—	—	334,644	—	—	—	334,644	1,041	335,685
Other comprehensive loss	—	—	—	—	—	—	(18,657)	(18,657)	—	(18,657)
Repurchase of common stock	—	—	—	—	80	(7,403)	—	(7,403)	—	(7,403)
Share-based compensation plans:										
Stock options exercised	100	—	5,758	—	—	—	—	5,758	—	5,758
Non-vested shares awarded, net	55	—	—	—	—	—	—	—	—	—
Vesting of non-vested shares	—	—	—	—	17	(1,390)	—	(1,390)	—	(1,390)
Share-based compensation	—	—	23,602	—	—	—	—	23,602	—	23,602
Cash dividends on common stock	—	—	—	(116,041)	—	—	—	(116,041)	—	(116,041)
Capital calls and distributions, net	—	—	—	—	—	—	—	—	(9,577)	(9,577)
Reclassification of stranded accumulated other comprehensive loss related to tax reform	—	—	—	6,550	—	—	(6,550)	—	—	—
Balance, December 31, 2017	75,148	\$ 4	\$1,035,895	\$3,048,487	9,753	\$ (552,845)	\$ (36,174)	\$ 3,495,367	\$ 22,967	\$3,518,334

Consolidated Statements of Changes in Equity

(In thousands)

	Common Stock		Capital Surplus	Retained Earnings	Treasury Stock		Accumulated Other Comprehensive Income (Loss)	Total Shareholders' Equity	Non-Controlling Interests	Total Equity
	Shares	Amount			Shares	Amount				
Balance, December 31, 2017	75,148	\$ 4	\$1,035,895	\$3,048,487	9,753	\$(552,845)	\$ (36,174)	\$ 3,495,367	\$ 22,967	\$3,518,334
Transition adjustment of net unrealized gains on equity securities	—	—	—	2,709	—	—	(2,709)	—	—	—
Balance, December 31, 2017, Adjusted	75,148	4	1,035,895	3,051,196	9,753	(552,845)	(38,883)	3,495,367	22,967	3,518,334
Net income	—	—	—	445,646	—	—	—	445,646	778	446,424
Other comprehensive loss	—	—	—	—	—	—	(33,702)	(33,702)	—	(33,702)
Repurchase of common stock	—	—	—	—	616	(53,465)	—	(53,465)	—	(53,465)
Share-based compensation plans:										
Stock options exercised	54	—	2,781	—	—	—	—	2,781	—	2,781
Non-vested shares awarded, net	109	—	—	—	—	—	—	—	—	—
Vesting of non-vested shares	—	—	—	—	31	(2,870)	—	(2,870)	—	(2,870)
Share-based compensation	—	—	4,229	—	—	—	—	4,229	—	4,229
Cash dividends on common stock	—	—	—	(127,188)	—	—	—	(127,188)	—	(127,188)
Issuance of shares for CoBiz acquisition	400	1	291,125	—	(6,811)	410,185	—	701,311	—	701,311
Capital calls and distributions, net	—	—	—	—	—	—	—	—	(12,809)	(12,809)
Balance, December 31, 2018	75,711	\$ 5	\$1,334,030	\$3,369,654	3,589	\$(198,995)	\$ (72,585)	\$ 4,432,109	\$ 10,936	\$4,443,045

See accompanying notes to Consolidated Financial Statements.

Consolidated Statements of Cash Flows

(In thousands)

	Year Ended		
	2018	2017	2016
Cash Flows From Operating Activities:			
Net income	\$ 446,424	\$ 335,685	\$ 232,281
Adjustments to reconcile net income to net cash provided by (used in) operating activities:			
Provision for credit losses	8,000	(7,000)	65,000
Change in fair value of mortgage servicing rights due to market changes	(4,668)	(172)	2,193
Change in fair value of mortgage servicing rights due to principal payments	33,528	33,527	40,744
Net unrealized losses from derivative contracts	4,686	3,704	11,234
Share-based compensation	4,229	23,602	10,471
Depreciation and amortization	60,843	54,466	47,016
Net amortization of securities discounts and premiums	30,945	28,693	41,643
Net losses (gains) on financial instruments and other losses(gains), net	9,585	(2,828)	(13,011)
Net gain on mortgage loans held for sale	(35,705)	(47,159)	(63,636)
Mortgage loans originated for sale	(2,587,297)	(3,286,873)	(6,117,417)
Proceeds from sale of mortgage loans held for sale	2,691,144	3,405,890	6,193,587
Capitalized mortgage servicing rights	(35,247)	(39,149)	(71,405)
Change in trading and fair value option securities	(1,023,097)	(804,204)	149,921
Change in receivables	(38,346)	321,880	(603,861)
Change in other assets	27,507	(5,506)	(49,565)
Change in accrued interest, taxes and expense	(5,191)	18,191	44,269
Change in other liabilities	(139,346)	182,184	(11,413)
Net cash provided by (used in) operating activities	(552,006)	214,931	(91,949)
Cash Flows From Investing Activities:			
Proceeds from maturities or redemptions of investment securities	124,864	112,022	86,847
Proceeds from maturities or redemptions of available for sale securities	1,122,680	1,841,217	1,740,226
Purchases of investment securities	(4,468)	(32,972)	(41,590)
Purchases of available for sale securities	(1,955,172)	(2,845,557)	(2,333,740)
Proceeds from sales of available for sale securities	745,643	1,309,215	899,381
Change in amount receivable on unsettled available for sale securities transactions	38,347	(68,792)	33,005
Loans originated, net of principal collected	(1,553,033)	(78,232)	(621,605)
Net payments on derivative asset contracts	(114,417)	479,409	(103,668)
Acquisitions, net of cash acquired	(175,755)	—	56,017
Proceeds from disposition of assets	308,762	274,029	198,922
Purchases of assets	(345,082)	(250,783)	(199,802)
Net cash provided by (used in) investing activities	(1,807,631)	739,556	(286,007)
Cash Flows From Financing Activities:			
Net change in demand deposits, transaction deposits and savings accounts	(13,870)	(563,406)	1,277,285
Net change in time deposits	(73,089)	(123,384)	(216,084)
Net change in other borrowed funds	1,295,484	(10,909)	(606,476)
Repayment of subordinated debentures	—	—	(226,550)
Issuance of subordinated debentures, net of issuance costs	—	—	144,615
Change in amount due on unsettled security purchases	(41,319)	144,690	(10,389)
Issuance of common and treasury stock, net	(88)	4,368	12,455
Net change in derivative margin accounts	85,466	(17,726)	(28,806)
Net payments or proceeds on derivative liability contracts	114,076	(485,119)	106,051
Repurchase of common stock	(53,465)	(7,403)	(66,792)
Dividends paid	(127,188)	(116,041)	(113,455)
Net cash provided by (used in) financing activities	1,186,007	(1,174,930)	271,854
Net increase (decrease) in cash and cash equivalents	(1,173,630)	(220,443)	(106,102)
Cash and cash equivalents at beginning of period	2,317,054	2,537,497	2,643,599
Cash and cash equivalents at end of period	\$ 1,143,424	\$ 2,317,054	\$ 2,537,497
Supplemental Cash Flow Information:			
Cash paid for interest	\$ 243,121	\$ 127,513	\$ 82,876
Cash paid for taxes	\$ 92,291	\$ 121,697	\$ 79,883
Net loans and bank premises transferred to repossessed real estate and other assets	\$ 9,880	\$ 7,367	\$ 36,391
Increase in U.S. government guaranteed loans eligible for repurchase	\$ 100,238	\$ 148,107	\$ 120,406
Increase in receivables from conveyance of GNMA OREO	\$ 38,216	\$ 40,528	\$ 68,873

See accompanying notes to Consolidated Financial Statements.

Notes to Consolidated Financial Statements

(1) Significant Accounting Policies

Basis of Presentation

The Consolidated Financial Statements of BOK Financial Corporation (“BOK Financial” or “the Company”) have been prepared in conformity with accounting principles generally accepted in the United States (“U.S. GAAP”), including interpretations of U.S. GAAP issued by federal banking regulators and general practices of the banking industry. The Consolidated Financial Statements include the accounts of BOK Financial and its subsidiaries, principally BOKF, NA, CoBiz Bank, BOK Financial Securities, Inc., The Milestone Group, Inc. and Cavanal Hill Distributors, Inc. All significant intercompany transactions are eliminated in consolidation.

The Consolidated Financial Statements include the assets, liabilities, non-controlling interests and results of operations of variable interest entities (“VIEs”) when BOK Financial is determined to be the primary beneficiary. Variable interest entities are generally defined as entities that either do not have sufficient equity to finance their activities without support from other parties or whose equity investors lack a controlling financial interest. Determination that the Company is the primary beneficiary considers the power to direct the activities that most significantly impact the variable interest's economic performance and the obligation to absorb losses of the variable interest or the right to receive benefits of the variable interest that could be significant to the variable interest.

Certain prior year amounts have been reclassified to conform to current year presentation.

Nature of Operations

BOK Financial, through its subsidiaries, provides a wide range of financial services to commercial and industrial customers, other financial institutions, municipalities, and consumers. These services include depository and cash management; lending and lease financing; mortgage banking; securities brokerage, trading and underwriting; and personal and corporate trust.

BOKF, NA operates as Bank of Oklahoma primarily in the Tulsa and Oklahoma City metropolitan areas of the state of Oklahoma and Bank of Texas primarily in the Dallas, Fort Worth and Houston metropolitan areas of the state of Texas. In addition, BOKF, NA does business as Bank of Albuquerque in Albuquerque, New Mexico; Colorado State Bank and Trust in Denver, Colorado; Bank of Arizona in Phoenix, Arizona; Mobank in Kansas City, Missouri/Kansas and Bank of Arkansas in Northwest Arkansas. BOKF, NA also operates the TransFund electronic funds network, Cavanal Hill Investment Management, and BOK Financial Asset Management, Inc.

On October 1, 2018, BOK Financial acquired CoBiz Financial, Inc. and CoBiz Bank, its wholly owned subsidiary. CoBiz Financial has been merged into BOK Financial. CoBiz Bank will be merged into BOKF, NA in the first quarter of 2019.

Use of Estimates

Preparation of BOK Financial's Consolidated Financial Statements requires management to make estimates of future economic activities, including loan collectability, prepayments and cash flows from customer accounts. These estimates are based upon current conditions and information available to management. Actual results may differ significantly from these estimates.

Acquisitions

Assets and liabilities acquired, including identifiable intangible assets, are recorded at fair value on the acquisition date. The purchase price includes consideration paid at closing and the estimated fair value of contingent consideration that will be paid in the future, subject to achieving defined performance criteria. Premiums and discounts assigned to interest-earning assets and interest-bearing liabilities are amortized over the lives of the acquired assets and liabilities on either an individual instrument or pool basis. Provision for credit losses is recognized for changes in credit quality after the acquisition date. Goodwill is recognized as the excess of the purchase price over the net fair value of assets acquired and liabilities assumed. The Consolidated Statements of Earnings include the results of operations from the acquisition date.

Goodwill and Intangible Assets

Goodwill and intangible assets generally result from business combinations and are evaluated for each of BOK Financial's reporting units for impairment annually or more frequently if conditions indicate impairment. The evaluation of possible impairment of goodwill and intangible assets involves significant judgment based upon short-term and long-term projections of future performance.

Reporting units are defined by the Company as significant lines of business within each operating segment. This definition is consistent with the manner in which the chief operating decision maker assesses the performance of the Company and makes decisions concerning the allocation of resources. The Company qualitatively assesses whether it is more likely than not that the fair value of the reporting units are less than their carrying value, including goodwill. Reporting unit carrying value includes sufficient capital to exceed regulatory requirements. This assessment includes consideration of relevant events and circumstances including but not limited to macroeconomic conditions, industry and market conditions, the financial and stock performance of the Company and other relevant factors.

If the Company concludes based on the qualitative assessment that goodwill may be impaired, a quantitative one-step impairment test will be applied to goodwill at all reporting units. The quantitative analysis compares the fair value of the reporting unit with its carrying value, including goodwill. The fair value of each reporting unit is estimated by the discounted future earnings method. Goodwill is considered impaired if the fair value of the reporting unit is less than the carrying value of the reporting unit, including goodwill.

Intangible assets are generally composed of customer relationships, naming rights, non-compete agreements and core deposit premiums. They are amortized using accelerated or straight-line methods, as appropriate, over the estimated benefit periods. These periods range from 3 years to 20 years. The net book values of identifiable intangible assets are evaluated for impairment when economic conditions indicate impairment may exist.

Cash Equivalents

Due from banks, funds sold (generally federal funds sold for one day), resell agreements (which generally mature within one day to 30 days) and investments in money market funds are considered cash equivalents.

Securities

Securities are identified as trading, investment (held to maturity) or available for sale at the time of purchase based upon the intent of management, liquidity and capital requirements, regulatory limitations and other relevant factors. Trading securities, which are acquired for profit through resale, are carried at fair value with unrealized gains and losses included in current period earnings. Investment securities are carried at amortized cost. Amortization is computed by methods that approximate level yield and is adjusted for changes in prepayment estimates. Securities identified as available for sale are carried at fair value. Unrealized gains and losses are recorded, net of deferred income taxes, as accumulated other comprehensive income in shareholders' equity. Available for sale securities are separately identified as pledged to creditors if the creditor has the right to sell or re-pledge the collateral.

The purchase or sale of securities is recognized on a trade date basis. Realized gains and losses on sales of securities are based upon specific identification of the security sold. A receivable or payable is recognized for subsequent transaction settlement. Securities meeting certain criteria may also be transferred from the available for sale classification to the investment securities portfolio at fair value on the date of transfer. The unrealized gain or loss at the date of transfer is retained in accumulated other comprehensive income and in the carrying value of the investment securities portfolio. Such amounts are amortized over the estimated remaining life of the security as an adjustment to yield, offsetting the related amortization of the premium or accretion of the discount on the transferred securities.

On a quarterly basis, the Company performs separate evaluations of impaired debt investment and available for sale securities to determine if the decline in fair value below the amortized cost is other-than-temporary.

Management determines whether it intends to sell or if it is more likely than not that it will be required to sell impaired securities. This determination considers current and forecasted liquidity requirements and securities portfolio management. If the Company intends to sell or it is more likely than not that it will be required to sell the impaired debt security, a charge is recognized against earnings for the entire unrealized loss. For all impaired debt securities for which there is no intent or expected requirement to sell, the evaluation considers all available evidence to assess whether it is more likely than not that all amounts due would not be collected according to the security's contractual terms. Impairment of debt securities rated investment grade by nationally-recognized rating agencies is considered temporary unless specific contrary information is identified. Impairment of debt securities rated below investment grade by at least one of the nationally recognized rating agencies is evaluated based on projections of estimated cash flows. Any expected credit loss due to the inability to collect all amounts due according to the security's contractual terms is recognized as a charge against earnings. Any remaining unrealized loss related to other factors would be recognized in other comprehensive income, net of taxes.

BOK Financial may elect to carry certain securities at fair value with changes in fair value recognized in current period income. These securities are held with the intent that gains or losses will offset changes in the fair value of mortgage servicing rights or certain derivative instruments.

Restricted equity securities represent equity interests the Company is required to hold in the Federal Reserve Banks and Federal Home Loan Banks. Restricted equity securities are carried at cost as these securities do not have a readily determined fair value because ownership of these shares is restricted and they lack a market.

The fair value of our securities portfolio is generally based on a single price for each financial instrument provided to us by a third-party pricing service determined by one or more of the following:

- Quoted prices for similar, but not identical, assets or liabilities in active markets;
- Quoted prices for identical or similar assets or liabilities in inactive markets;
- Inputs other than quoted prices that are observable, such as interest rate and yield curves, volatilities, prepayment speeds, loss severities, credit risks and default rates; and
- Other inputs derived from or corroborated by observable market inputs.

The underlying methods used by the third-party pricing services are considered in determining the primary inputs used to determine fair values. We evaluate the methodologies employed by the third-party pricing services by comparing the price provided by the pricing service with other sources, including brokers' quotes, sales or purchases of similar instruments and discounted cash flows to establish a basis for reliance on the pricing service values. Significant differences between the pricing service provided value and other sources are discussed with the pricing service to understand the basis for their values. Based on all observable inputs, management may adjust prices obtained from third-party pricing services to more appropriately reflect the prices that would be received to sell assets or paid to transfer liabilities in orderly transactions in the current market.

Derivative Instruments

Derivative instruments may be used by the Company as part of its internal risk management programs or may be offered to customers. All derivative instruments are carried at fair value and changes in fair value are generally reported in income as they occur. The determination of fair value of derivative instruments considers changes in interest rates, commodity prices and foreign exchange rates. Fair values for exchange-traded contracts are based on quoted prices in an active market for identical instruments. Fair values for over-the-counter contracts are generated internally using third-party valuation models. Inputs used in third-party valuation models to determine fair values are considered significant other observable inputs. Credit risk is also considered in determining fair value. Deterioration in the credit rating of customers or other counterparties reduces the fair value of asset contracts. Deterioration of our credit rating could decrease the fair value of our derivative liabilities.

When bilateral netting agreements or similar agreements exist between the Company and its counterparties that create a single legal claim or obligation to pay or receive the net amount in settlement of the individual derivative contracts, the Company reports derivative assets and liabilities on a net by derivative contract by counterparty basis.

Derivative contracts may also require the Company to provide or receive cash margin as collateral for derivative assets and liabilities. Derivative assets and liabilities are reported net of cash margin when certain conditions are met. In addition, derivative contracts executed with customers under Customer Risk Management Programs may be secured by non-cash collateral in conjunction with a credit agreement with that customer. Access to collateral in the event of default is reasonably assured.

Derivative instruments may be designated as cash flow hedges of variable rate assets or liabilities, or of anticipated transactions. Changes in the fair value of derivative instruments designated as cash flow hedges are recorded in accumulated other comprehensive income to the extent they are effective. The amount recorded in other comprehensive income is reclassified to earnings in the same periods as the hedged cash flows impact earnings. The ineffective portion of changes in fair value is reported in current earnings.

BOK Financial may use derivative instruments in managing its interest rate sensitivity, as part of its economic hedge of the changes in the fair value of mortgage servicing rights and to mitigate the market risk of holding trading securities. Changes in the fair value of derivative instruments used in managing interest rate sensitivity and as part of its economic hedge of changes in the fair value of mortgage servicing rights are included in Other Operating Revenue - Gain (loss) on derivatives, net in the Consolidated Statements of Earnings. Changes in the fair value of derivative instruments used to mitigate the market risk of holding trading securities are included in Operating Revenue - Brokerage and trading revenue.

BOK Financial also enters into mortgage loan commitments that are considered derivative contracts. Forward sales contracts that have not been designated as hedging instruments are used to economically hedge these mortgage loan commitments as well as mortgage loans held for sale. Mortgage loan commitments are carried at fair value based upon quoted prices. Changes in the fair value of mortgage loan commitments, mortgage loans held for sale and forward sales contracts are reported in Other Operating Revenue - Mortgage banking revenue.

BOK Financial offers programs that permit its customers to manage various risks, including fluctuations in energy, cattle and other agricultural products, interest rates and foreign exchange rates with derivative contracts. Customers may also manage interest rate risk through interest rate swaps used by the borrower to modify interest rate terms of their loans or to-be-announced securities used by our mortgage banking customers to hedge their loan production. Derivative contracts are executed between the customers and BOK Financial. Offsetting contracts are executed between BOK Financial and other selected counterparties to minimize market risk from changes in commodity prices, interest rates or foreign exchange rates. The counterparty contracts are identical to customer contracts, except for a fixed pricing spread or fee paid to BOK Financial as profit and compensation for administrative costs and credit risk which is recognized over the life of the contracts and included in other Operating Revenue - Brokerage and trading revenue in the Consolidated Statements of Earnings.

Loans

Loans are either secured or unsecured based on the type of loan and the financial condition of the borrower. Repayment is generally expected from cash flow or proceeds from the sale of selected assets of the borrower. BOK Financial is exposed to risk of loss on loans due to the borrower's financial difficulties, which may arise from any number of factors, including problems within the respective industry or local economic conditions. Access to collateral, in the event of borrower default, is reasonably assured through adherence to applicable lending laws and through sound lending standards and credit review procedures. Accounting policies for all loans, excluding residential loans guaranteed by U.S. government agencies, are as follows.

Interest is accrued at the applicable interest rate on the outstanding principal amount. Loans are placed on nonaccruing status when, in the opinion of management, full collection of principal or interest is uncertain. Internally risk graded loans are individually evaluated for nonaccruing status quarterly. Non-risk graded loans are generally placed on nonaccruing status when 90 days or more past due or within 60 days of being notified of the borrower's bankruptcy filing. Interest previously accrued but not collected is charged against interest income when the loan is placed on nonaccruing status. Payments received on nonaccruing loans are applied to principal or recognized as interest income, according to management's judgment as to the collectability of principal. Loans may be returned to accruing status when, in the opinion of management, full collection of principal and interest, including principal previously charged off, is probable based on improvements in the borrower's financial condition or a sustained period of performance.

For loans acquired with no evidence of credit deterioration, discounts are accreted on either an individual basis for loans with unique characteristics or on a pool basis for groups of homogeneous loans. Accretion is discontinued when a loan with an individually attributed discount is placed on nonaccruing status.

Loans to borrowers experiencing financial difficulties may be modified in troubled debt restructurings ("TDRs"). All TDRs are generally classified as nonaccruing, excluding loans guaranteed by U.S. government agencies. Modifications generally consist of extension of payment terms or interest rate concessions and may result either voluntarily through negotiations with the borrower or involuntarily through court order. Generally, principal and accrued but unpaid interest is not voluntarily forgiven.

Performing loans may be renewed under the current collateral, debt service ratio and other underwriting standards. Nonaccruing loans may also be renewed and will remain classified as nonaccruing.

Occasionally, loans, other than residential mortgage loans, may be held for sale in order to manage credit concentration. These loans are carried at the lower of cost or fair value with gains or losses recognized in gain (loss) on assets.

All loans are charged-off when the loan balance or a portion of the loan balance is no longer supported by the paying capacity of the borrower or when the required cash flow is reduced in a TDR. The charge-off amount is determined through an evaluation of available cash resources and collateral value. Internally risk graded loans are evaluated quarterly and charge-offs are taken in the quarter in which the loss is identified. Non-risk graded loans that are past due between 60 days and 180 days, based on the loan product type, are charged off. Loans to borrowers whose personal obligation has been discharged through Chapter 7 bankruptcy proceedings are charged off within 60 days of notice of the bankruptcy filing, regardless of payment status.

Loan origination and commitment fees and direct loan acquisition and origination costs are deferred and amortized as an adjustment to yield over the life of the loan or over the commitment period, as applicable. Amortization does not anticipate loan prepayments. Net unamortized fees are recognized in full at time of payoff.

Qualifying residential mortgage loans guaranteed by U.S. government agencies have been sold into GNMA pools. Under certain performance conditions specified in government programs, the Company has the right, but not the obligation to repurchase loans from GNMA pools. These loans no longer qualify for sale accounting and are recognized in the Consolidated Balance Sheets. Guaranteed loans are considered to be impaired because we do not expect to receive all principal and interest based on the loan's contractual terms. The principal balance continues to be guaranteed, however, interest accrues at a curtailed rate as specified in the programs. The carrying value of these loans is reduced based on an estimate of expected cash flows discounted at the original note rate plus a liquidity spread. Guaranteed loans may be modified in TDRs in accordance with U.S. government agency guidelines. Interest continues to accrue at the modified rate. Guaranteed loans may either be resold into GNMA pools after a performance period specified by the programs or foreclosed and conveyed to the guarantors.

Loans are disaggregated into portfolio segments and further disaggregated into classes. The portfolio segment is the level at which the Company develops and documents a systematic method for determining its Allowance for Credit Losses. Classes are based on the risk characteristics of the loans and the Company's method for monitoring and assessing credit risk.

Allowance for Loan Losses and Accrual for Off-Balance Sheet Credit Risk

The appropriateness of the allowance for loan losses and accrual for off-balance sheet credit risk (collectively "Allowance for Credit Losses") is assessed by management based on an ongoing quarterly evaluation of the probable estimated losses inherent in the portfolio, including probable losses on both outstanding loans and unused commitments to provide financing. A consistent well-documented methodology has been developed and is applied by an independent Credit Administration department to assure consistency across the Company.

The allowance for loan losses consists of specific allowances attributed to impaired loans that have not yet been charged down to amounts we expect to recover, general allowances based on estimated loss rates by loan class and nonspecific allowances based on factors that affect more than one portfolio segment. There were no changes to the methodology for estimating general allowances during 2018 or 2017.

Loans are considered to be impaired when it becomes probable that BOK Financial will be unable to collect all amounts due according to the contractual terms of the loan agreements. Internally risk graded loans are evaluated individually for impairment. Substantially all commercial and commercial real estate loans and certain residential mortgage and personal loans are risk graded based on a quarterly evaluation of the borrowers' ability to repay. Certain commercial loans and most residential mortgage and personal loans are small balance, homogeneous pools of loans that are not risk graded. Non-risk graded loans are identified as impaired based on performance status. Generally, non-risk graded loans 90 days or more past due, modified in a troubled debt restructuring or in bankruptcy are considered to be impaired.

Specific allowances for impaired loans are measured by an evaluation of estimated future cash flows discounted at the loan's initial effective interest rate or the fair value of collateral for certain collateral dependent loans. The fair value of real property held as collateral is generally based on third party appraisals that conform to Uniform Standards of Professional Appraisal Practice, less estimated selling costs. Appraised values are on an "as-is" basis and generally are not adjusted by the Company. Updated appraisals are obtained at least annually or more frequently if market conditions indicate collateral values may have declined. Collateral value of mineral rights is generally determined by our internal staff of engineers based on projected cash flows from proven oil and gas reserves under existing economic and operating conditions. The value of other collateral is generally determined by our special assets staff based on projected liquidation cash flows under current market conditions. Collateral values and available cash resources that support impaired loans are evaluated quarterly. Historical statistics may be used as a practical way to estimate impairment in limited situations, such as when a collateral dependent loan is identified as impaired at the end of a reporting period until an appraisal of collateral value is received or a full assessment of future cash flows is completed. Estimates of future cash flows and collateral values require significant judgments and may be volatile.

General allowances for unimpaired loans are based on an estimated loss rate by loan class. The appropriate historical gross loss rate for each loan class is determined by the greater of the current loss rate based on the most recent twelve months or a ten-year average gross loss rate. Recoveries are not directly considered in the estimation of historical loss rates. Recoveries generally do not follow predictable patterns and are not received until well-after the charge-off date as a result of protracted legal actions. For risk graded loans, historical gross loss rates are adjusted for changes in risk grading. For each loan class, the current weighted average risk grade is compared to the long-term weighted average risk grade. This comparison determines whether credit risk in each loan class is increasing or decreasing. Historical loss rates are adjusted upward or downward in proportion to changes in average risk grading. General allowances for unimpaired loans also consider inherent risks identified for each loan class. Inherent risks consider loss rates that most appropriately represent the current credit cycle and other factors attributable to a specific loan class which have not yet been represented in the historical gross loss rates or risk grading. These factors include changes in commodity prices or engineering imprecision which may affect the value of reserves that secure our energy loan portfolio, construction risk that may affect commercial real estate loans, changes in regulations and public policy that may disproportionately impact health care loans and changes in loan products.

Nonspecific allowances are maintained for risks beyond factors specific to a particular portfolio segment or loan class. These factors include trends in the economy in our primary lending areas, concentration in large-balance loans and other relevant factors.

An accrual for off-balance sheet credit risk is included in Other liabilities in the Consolidated Balance Sheets. The appropriateness of the accrual is determined in the same manner as the allowance for loan losses.

A provision for credit losses is charged against or credited to earnings in amounts necessary to maintain an appropriate Allowance for Credit Losses. Recoveries of loans previously charged off are added to the allowance when received.

Real Estate and Other Repossessed Assets

Real estate and other repossessed assets are acquired in partial or total forgiveness of loans. These assets are initially recognized at cost, which is determined by fair value at date of foreclosure less estimated disposal costs. They are subsequently carried at the lower of cost or current fair value less estimated disposal costs. Decreases in fair value below cost are recognized as asset-specific valuation allowances which may be reversed when supported by future increases in fair value. Subsequent increases in fair value may be used to reduce the allowance but not below zero.

Fair values of real estate are based on "as is" appraisals which are updated at least annually or more frequently for certain asset types or assets located in certain distressed markets. Fair values based on appraisals are generally considered to be based on significant other observable inputs. The Company also considers decreases in listing price and other relevant information in quarterly evaluations and reduces the carrying value of real estate and other repossessed assets when necessary. Fair values based on list prices and other relevant information are generally considered to be based on significant unobservable inputs. Additional costs incurred to complete real estate and other repossessed assets may increase the carrying value, up to current fair value based on "as completed" appraisals. The fair value of mineral rights included in repossessed assets are generally determined by our internal staff of engineers based on projected cash flows from proven oil and gas reserves under existing economic and operating conditions. The value of other repossessed assets is generally determined by our special assets staff based on projected liquidation cash flows under current market conditions.

Income generated by these assets is recognized as received. Operating expenses are recognized as incurred. Gains or losses on sales of real estate and other repossessed assets are based on the cash proceeds received less the cost basis of the asset, net of any valuation allowances. The estimated disposal costs of real estate and other repossessed assets are evaluated by the Company on an annual basis based on actual results.

Transfers of Financial Assets

BOK Financial regularly transfers financial assets as part of its mortgage banking activities and periodically may transfer other financial assets. Transfers are recorded as sales when the criteria for surrender of control are met.

The Company has elected to carry certain residential mortgage loans held for sale at fair value under the fair value option. Changes in fair value are recognized in net income as they occur. These loans are reported separately in the Consolidated Balance Sheets and changes in fair value are recorded in Other Operating Revenue - Mortgage banking revenue in the Consolidated Statements of Earnings.

Fair value of conforming residential mortgage loans that will be sold to U.S. government agencies is based on sales commitments or market quotes considered Level 2 inputs. Fair value of mortgage loans that are unable to be sold to U.S. government agencies is based on Level 3 inputs using quoted prices of loans that are sold in securitization transactions with a liquidity discount applied. The fair value is corroborated with an independent third party on at least an annual basis. BOK Financial retains a repurchase obligation under underwriting representations and warranties related to residential mortgage loans transferred and generally retains the right to service the loans. The Company may incur a recourse obligation in limited circumstances. Separate accruals are recognized in Other liabilities in the Consolidated Balance Sheets for repurchase and recourse obligations. These reserves reflect the estimated amount of probable loss the Company will incur as a result of repurchasing a loan, indemnifications, and other settlement resolutions.

Repurchases of loans with an origination defect that are also credit impaired are considered collateral dependent and are initially recognized at net realizable value (appraised value less the cost to sell). The difference between unpaid principal balance and net realizable value is not accreted. Repurchases of loans with an origination defect that are not credit impaired are carried at fair value as of the repurchase date. Interest income continues to accrue on these loans and the discount is accreted over the estimated life of the loan.

The Company may also choose to purchase GNMA loans once certain mandated delinquency criteria are met. The loans that are eligible and are chosen to be repurchased are initially recognized at fair value based on expected cash flow discounted using the average agency guaranteed debenture rates, average actual principal loss rates and liquidity premium.

Mortgage Servicing Rights

Mortgage servicing rights may be purchased or may be recognized when mortgage loans are originated and sold with servicing rights retained. All mortgage servicing rights are carried at fair value. Changes in the fair value are recognized in earnings as they occur.

Mortgage servicing rights are not traded in active markets. A cash flow model is used to determine fair value. Key assumptions and estimates, including projected prepayment speeds and assumed servicing costs, earnings on escrow deposits, ancillary income and discount rates, used by this model are based on current market sources. Assumptions used to value mortgage servicing rights are considered significant unobservable inputs. A separate third-party model is used to estimate prepayment speeds based on interest rates, housing turnover rates, estimated loan curtailment, anticipated defaults and other relevant factors. The prepayment model is updated daily for changes in market conditions and adjusted to better correlate with actual performance of BOK Financial's servicing portfolio. Fair value estimates from outside sources are received at least annually to corroborate the results of the valuation model.

Premises and Equipment

Premises and equipment are carried at cost, including capitalized interest when appropriate, less accumulated depreciation and amortization. Depreciation and amortization are computed on a straight-line basis over the estimated useful lives of the assets or, for leasehold improvements, over the shorter of the estimated useful lives or remaining lease terms. Useful lives range from 5 years to 40 years for buildings and improvements, 3 years to 10 years for software and related implementation costs, and 3 years to 10 years for furniture and equipment. Construction in progress represents facilities construction and data processing systems projects underway that have not yet been placed into service. Depreciation and amortization begin once the assets are placed into service.

Repair and maintenance costs, including software maintenance and enhancement costs, are charged to expense as incurred. Software licensing costs are generally charged to expense as incurred. Software licensing costs are capitalized if the contractual right to take possession of the software exists and it is feasible to take possession without significant penalty. Capitalized costs are amortized over the shorter of the estimated useful life of the software or remaining contractual life of the license.

Premises no longer used by the Company are transferred to real estate and other repossessed assets. The transferred amount is the lower of cost less accumulated depreciation or fair value less estimated disposal costs as of the transfer date.

Rent expense for leased premises is recognized as incurred over the lease term. The effects of rent holidays, significant rent escalations and other adjustments to rent payments are recognized on a straight-line basis over the lease term.

Ongoing technology projects of significant size or length are reviewed at least annually for impairment. Accumulated costs are reviewed for projects or components of projects that do not support the value of the asset being developed. Findings of obsolescence, duplicate effort or other conditions that do not support the recorded value are impaired, with the cost of the impaired components being charged to current-year earnings.

Federal and State Income Taxes

BOK Financial and its subsidiaries file consolidated tax returns. The subsidiaries provide for income taxes on a separate return basis and remit to BOK Financial amounts determined to be currently payable. BOK Financial is agent for its subsidiaries under the Company's tax sharing agreements and has no ownership rights to any refunds received for the benefit of its subsidiaries.

Current income tax expense or benefit is based on an evaluation that considers estimated taxable income, tax credits, and statutory federal and state income tax rates. The amount of current income tax expense or benefit recognized in any period may differ from amounts reported to taxing authorities. Annually, tax returns are filed with each jurisdiction where the Company conducts business and recognized current income tax expense or benefit is adjusted to the filed tax returns.

Deferred tax assets and liabilities are based upon the temporary differences between the values of assets and liabilities as recognized in the financial statements and their related tax basis using enacted tax rates in effect for the year in which the differences are expected to be recovered or settled. The effect of changes in statutory tax rates on the measurement of deferred tax assets and liabilities is recognized through income tax expense in the period the change is enacted. A valuation allowance is provided when it is more likely than not that some portion of the entire deferred tax asset may not be realized.

BOK Financial has unrecognized tax benefits, which are included in accrued current income taxes payable, for the uncertain portion of recorded tax benefits and related interest. These uncertainties result from the application of complex tax laws, rules, regulations and interpretations, primarily in state taxing jurisdictions. Unrecognized tax benefits are assessed quarterly and may be adjusted through current income tax expense in future periods based on changing facts and circumstances, completion of examinations by taxing authorities or expiration of a statute of limitations. Estimated penalties and interest on uncertain tax positions are recognized in income tax expense.

Employee Benefit Plans

BOK Financial sponsors a defined contribution plan (“Thrift Plan”) and a defined benefit cash balance pension plan (“Pension Plan”). Employer contributions to the Thrift Plan, which matches employee contributions subject to percentage and years of service limits, are expensed when incurred. Pension Plan costs, which are based upon actuarial computations of current costs, are expensed annually. Pension Plan benefits were curtailed as of April 1, 2006. No participants may be added to the Pension Plan and no additional service benefits will be accrued. BOK Financial recognizes the funded status of its employee benefit plans. Adjustments required to recognize the Pension Plan's net funded status are made through accumulated other comprehensive income, net of deferred income taxes.

Share-Based Compensation Plans

BOK Financial awards stock options and non-vested common shares as compensation to certain officers. Compensation cost is generally fixed based on the grant date fair value of the award. The grant date fair value of stock options is based on the Black-Scholes option pricing model. Stock options generally have graded vesting over 7 years. Each tranche is considered a separate award for valuation and compensation cost recognition. Grant date fair value of non-vested shares is based on the then-current market value of BOK Financial common stock. Non-vested shares generally cliff vest in 3 years and are subject to a holding period after vesting of 2 years. Compensation cost of non-vested shares granted under the Executive Incentive Plan varies based on changes in the fair value of BOKF common shares.

Compensation cost is recognized as expense over the service period, which is generally the vesting period. Expense is reduced for estimated forfeitures over the vesting period and adjusted for actual forfeitures as they occur. Stock-based compensation awarded to certain officers has performance conditions that affect the number of awards granted. Compensation cost is adjusted based on the probable outcome of the performance conditions.

Tax effects of share-based payments are recognized through tax expense. Dividends on non-vested shares that are not subject to forfeiture are charged to retained earnings.

Other Operating Revenue

Fees and commissions revenue is generated through the sales of products, consisting primarily of financial instruments, and the performance of services for customers under contractual obligations. Revenue from providing services for customers is recognized at the time services are provided in an amount that reflects the consideration we expect to be entitled to for those services. Revenue is recognized based on the application of five steps:

- Identify the contract with a customer
- Identify the performance obligations in the contract
- Determine the transaction price
- Allocate the transaction price to the performance obligations in the contract
- Recognize revenue when (or as) the Company satisfies a performance obligation

For contracts with multiple performance obligations, individual performance obligations are accounted for separately if the customer can benefit from the good or service on its own or with other resources readily available to the customer and the promise to transfer goods and services to the customer is separately identifiable in the contract. The transaction price is allocated to the performance obligations based on relative standalone selling prices.

Revenue is recognized on a gross basis whenever we have primary responsibility and risk in providing the services or products to our customers and have discretion in establishing the price for the services or products. Revenue is recognized on a net basis whenever we act as an agent for products or services of others.

Brokerage and trading revenue includes revenues from trading, customer hedging, retail brokerage and investment banking. Trading revenue includes net realized and unrealized gains primarily related to sales of securities to institutional customers and related derivative contracts. Customer hedging revenue includes realized and unrealized changes in the fair value of derivative contracts held for customer risk management programs including credit valuation adjustments, as necessary. We offer commodity, interest rate, foreign exchange and equity derivatives to our customers. These customer contracts are offset with contracts with selected counterparties and exchanges to minimize changes in market risk from changes in commodity prices, interest rates or foreign exchange rates. Retail brokerage revenue represents fees and commissions earned on sales of fixed income securities, annuities, mutual funds and other financial instruments to retail customers. Investment banking revenue includes fees earned upon completion of underwriting and financial advisory services. Investment banking revenue also includes fees earned in conjunction with loan syndications.

Transaction card revenue includes merchant discount fees and electronic funds transfer network fees, net of interchange fees paid to card issuers and assessments paid to card networks. Merchant discount fees represent fees paid by customers for account management and electronic processing of card transactions. Merchant discount fees are recognized at the time the customer's transactions are processed or other services are performed. The Company also maintains the TransFund electronic funds transfer network for the benefit of its members, which includes the BOKF, NA. Electronic funds transfer fees are recognized as electronic transactions processed on behalf of its members.

Fiduciary and asset management revenue includes fees from asset management, custody, recordkeeping, investment advisory and administration services. Revenue is recognized on an accrual basis at the time the services are performed and may be based on either the fair value of the account or the service provided.

Deposit service charges and fees include commercial account service charges, overdraft fees, check card fee revenue and automated service charge and other deposit service fees. Fees are recognized at least quarterly in accordance with published deposit account agreements and disclosure statements for retail accounts or contractual agreements for commercial accounts. Item charges for overdraft or non-sufficient funds items are recognized as items are presented for payment. Account balance charges and activity fees are accrued monthly and collected in arrears. Commercial account activity fees may be offset by an earnings credit based on account balances. Check card fees represent interchange fees paid by a merchant bank for transactions processed from cards issued by the Company. Check card fees are recognized when transactions are processed.

Mortgage banking revenue includes revenues recognized in conjunction with the origination, marketing and servicing of conventional and government-sponsored residential mortgage loans. Mortgage production revenue includes net realized gains (losses) on sales of residential mortgage loans in the secondary market and the net change in unrealized gains (losses) on residential mortgage loans held for sale. Mortgage production revenue also includes changes in the fair value of derivative contracts not designated as hedging instruments related to residential mortgage loan commitments and forward sales contracts. Mortgage servicing revenue includes servicing fee income and late charges on loans serviced for others.

Newly Adopted and Pending Accounting Pronouncements

The following is a summary of newly adopted and pending accounting pronouncements that may have a more than insignificant effect on the Company's financial statements.

Financial Accounting Standards Board ("FASB")

FASB Accounting Standards Update No. 2014-09, *Revenue from Contracts with Customers* ("ASU 2014-09")

On May 28, 2014, the FASB issued ASU 2014-09 to clarify the principles for recognizing revenue by providing a more robust framework that will give greater consistency and comparability in revenue recognition practices. In the new framework, an entity recognizes revenue in an amount that reflects the consideration to which the entity expects to be entitled in exchange for goods or services. The new model requires the identification of performance obligations included in contracts with customers, a determination of the transaction price and an allocation of the price to those performance obligations. The entity recognizes revenue when performance obligations are satisfied. Revenue from financial assets and liabilities is explicitly excluded from the scope of ASU 2014-09. Management adopted the standard in the first quarter of 2018 using the modified retrospective transition method. There were no significant cumulative effect adjustments as a result of implementation as of January 1, 2018 as our current revenue recognition policies generally conformed with the principals in ASU 2014-09.

FASB Accounting Standards Update No. 2016-08, *Revenue from Contracts with Customers (Topic 606): Principal versus Agent Considerations (Reporting Revenue Gross versus Net)* ("ASU 2016-08")

On March 17, 2016, the FASB Issued ASU 2016-08 to amend the principal versus agent implementation guidance in ASU 2014-09. The ASU clarifies that an entity should evaluate whether it is the principal or the agent for each specified good or service promised in a contract with a customer. Management adopted the standard in the first quarter of 2018. Interchange fees paid to issuing banks for card transactions processed related to its merchant processing services previously included in data processing and communication expense are now netted against the amounts charged to the merchant in transaction card processing revenue.

FASB Accounting Standards Update No. 2016-01, *Financial Instruments - Overall (Subtopic 825-10): Recognition and Measurement of Financial Assets and Financial Liabilities* ("ASU 2016-01")

On January 5, 2016, the FASB issued ASU 2016-01 over the recognition and measurement of financial assets and liabilities. The update requires equity investments, in general, to be measured at fair value with changes in fair value recognized in earnings. It also eliminates the requirement to disclose the methods and significant assumptions used to estimate the fair value for financial instruments measured at amortized cost, requires entities to use the exit price notion when measuring fair value, requires an entity to present separately in other comprehensive income the portion of the total change in fair value of a liability resulting from a change in the instrument-specific credit risk when the fair value option has been elected, requires separate presentation of financial assets and liabilities by measurement category and form on the balance sheet or accompanying notes, clarifies that an entity should evaluate the need for a valuation allowance on a deferred tax asset related to available-for-sale securities in combination with the entity's other deferred tax assets, and simplifies the impairment assessment of equity investments without readily determinable fair values. Management adopted the standard in the first quarter of 2018. Upon adoption, net unrealized gains of \$2.7 million from equity securities were reclassified from other comprehensive income to retained earnings.

FASB Accounting Standards Update No. 2016-02, *Leases (Topic 842)* ("ASU 2016-02")

On February 25, 2016, the FASB issued ASU 2016-02 to increase transparency and comparability by recognizing lease assets and liabilities on the balance sheet and disclosing key information about leasing arrangements. Lessees will be required to recognize an obligation for future lease payments measured on a discounted basis and a right-of-use asset. The ASU is effective for the Company for interim and annual periods beginning after December 15, 2018. As originally issued, ASU 2016-02 required implementation through the modified transition method applied as of the earliest period presented in the financial statements. In 2018 an additional and optional transition method that allows entities to apply the standard as of the adoption date was approved. BOKF elected this optional transition method. BOKF elected all practical expedients other than the lessee's practical expedient to combine lease and non-lease components which would further gross up the lease liability and related right of use asset. The implementation of ASU 2016-02 increased the reported right of use assets and liabilities by approximately \$137 million. The effect on retained earnings was immaterial.

FASB Accounting Standards Update No. 2016-13, *Financial Instruments - Credit Losses (Topic 326): Assets Measured at Amortized Cost* ("ASU 2016-13")

On June 16, 2016, the FASB issued ASU 2016-13 in order to provide more timely recording of credit losses on loans and other financial instruments. The ASU adds an impairment model (known as the current expected credit loss ("CECL") model) that is based on expected credit losses rather than incurred credit losses. It requires measurement of all expected credit losses for financial assets carried at amortized cost, including loans and related off-balance sheet credit exposure and investment securities, based on historical experience, current conditions, and reasonable and supportable forecasts. ASU 2016-13 also changes the recognition of other-than-temporary impairment of available for sale securities to an allowance methodology from a direct write-down methodology. ASU 2016-13 will be effective for the Company for annual reporting periods beginning after December 15, 2019, including interim periods within those fiscal years. Early adoption is permitted for annual reporting periods beginning after December 15, 2018. ASU 2016-13 will be applied through a cumulative-effect adjustment to retained earnings as of the beginning of the first reporting period in which the guidance is effective.

The Company has established a CECL implementation team in order to evaluate the impact the adoption of ASU 2016-13 will have on the Company's financial statements. The CECL implementation team, overseen by the Chief Credit Officer, Chief Financial Officer, and Chief Risk Officer, has developed a project plan that incorporates input from various departments within the bank including Credit, Financial Reporting, Risk, and Information Technology among others. Key implementation activities for 2018 included portfolio segmentation, credit risk driver identification, model development, as well as process and information systems enhancements. Key implementation initiatives for 2019 include model validation and development of governance and control and disclosure frameworks. The Company will adopt the standard on January 1, 2020.

FASB Accounting Standards Update No. 2016-15, *Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments ("ASU 2016-15")*

On August 26, 2016, the FASB issued ASU 2016-15, which amends guidance in ASC 230 on the classification of certain cash receipts and payments in the statement of cash flows. The amendments address eight cash flow issues. Management adopted the standard in first quarter of 2018. Adoption of ASU 2016-15 did not have a material impact on the Company's financial statements.

FASB Accounting Standards Update No. 2017-12, *Derivatives and Hedging (Topic 815): Targeted Improvements to Accounting for Hedging Activities ("ASU 2017-12")*

On August 28, 2017, the FASB issued ASU 2017-12, which amends the hedge accounting recognition and presentation requirements in ASC 815 in order to improve transparency and understandability of information and reduce the complexity. The update expands the types of transactions eligible for hedge accounting, eliminates the requirement to separately measure and present hedge ineffectiveness, simplifies hedge effectiveness assessments and updates documentation and presentation requirements. The update allows the reclassification of certain debt securities from held to maturity to available for sale if the debt security is eligible to be hedged under the last-of-layer method. ASU 2017-12 is effective for the Company for fiscal years beginning after December 15, 2018, and interim periods therein; however, early adoption was permitted. Adoption of ASU 2017-12 had no material impact on the Company's financial statements.

FASB Accounting Standards Update No. 2018-05, *Income Taxes (Topic 740): Amendments to SEC Paragraphs Pursuant to SEC Staff Accounting Bulletin No. 118 (SAB 118)*

On March 13, 2018, the FASB issued ASU 2018-05, which adds SEC guidance related to SAB 118 - *Income Tax Accounting Implications of the Tax Cuts and Jobs Act*. ASU 2018-05 was effective upon issuance. The adoption of ASU 2018-05 has not had a significant impact in 2018.

FASB Accounting Standards Update No. 2018-15, *Intangibles - Goodwill and Other Internal-Use Software (Subtopic 350-40): Customer's Accounting for Implementation Costs Incurred in a Cloud Computing Arrangement that is a Service Contract ("ASU 2018-15")*

On August 29, 2018, the FASB issued ASU 2018-15, which requires a customer in a cloud hosting arrangement that is a service contract to follow the internal use software requirements in ASC 350-40 to determine which implementation costs to capitalize or expense as incurred. Internal use software guidance requires the capitalization of costs incurred during the development phase. Capitalized costs will be amortized over the term of the hosting arrangement beginning when the arrangement is ready for its intended use. ASU 2018-15 is effective for the Company for fiscal years beginning after December 15, 2019; however, early adoption is permitted. The Company elected to early adopt the update prospectively in third quarter of 2018. The adoption of ASU 2018-15 has not had a significant impact in 2018.

(2) Securities

Trading Securities

The fair value and net unrealized gain (loss) included in trading securities is as follows (in thousands):

	December 31, 2018		December 31, 2017	
	Fair Value	Net Unrealized Gain (Loss)	Fair Value	Net Unrealized Gain (Loss)
U.S. government agency debentures	\$ 63,765	\$ 254	\$ 21,196	\$ 8
U.S. government agency residential mortgage-backed securities	1,791,584	9,966	392,673	(517)
Municipal and other tax-exempt securities	34,507	(1)	13,559	83
Asset-backed securities	42,656	685	23,885	(26)
Other trading securities	24,411	65	11,363	4
Total trading securities	\$ 1,956,923	\$ 10,969	\$ 462,676	\$ (448)

Investment Securities

The amortized cost and fair values of investment securities are as follows (in thousands):

	December 31, 2018			
	Amortized Cost	Fair Value	Gross Unrealized	
			Gain	Loss
Municipal and other tax-exempt securities	\$ 137,296	\$ 138,562	\$ 1,858	\$ (592)
U.S. government agency residential mortgage-backed securities	12,612	12,770	293	(135)
Other debt securities	205,279	215,966	12,257	(1,570)
Total investment securities	\$ 355,187	\$ 367,298	\$ 14,408	\$ (2,297)

	December 31, 2017			
	Amortized Cost	Fair Value	Gross Unrealized	
			Gain	Loss
Municipal and other tax-exempt securities	\$ 228,186	\$ 230,349	\$ 2,967	\$ (804)
U.S. government agency residential mortgage-backed securities	15,891	16,242	446	(95)
Other debt securities	217,716	233,444	17,095	(1,367)
Total investment securities	\$ 461,793	\$ 480,035	\$ 20,508	\$ (2,266)

The amortized cost and fair values of investment securities at December 31, 2018, by contractual maturity, are as shown in the following table (dollars in thousands):

	<u>Less than One Year</u>	<u>One to Five Years</u>	<u>Six to Ten Years</u>	<u>Over Ten Years</u>	<u>Total</u>	<u>Weighted Average Maturity²</u>
Municipal and other tax-exempt securities:						
Carrying value	\$ 41,475	\$ 46,363	\$ 35,077	\$ 14,381	\$ 137,296	4.73
Fair value	41,371	46,123	36,471	14,597	138,562	
Nominal yield ¹	2.25%	3.94%	6.00%	4.32%	4.00%	
Other debt securities:						
Carrying value	\$ 16,282	\$ 61,830	\$ 115,606	\$ 11,561	\$ 205,279	5.50
Fair value	16,327	63,923	125,050	10,666	215,966	
Nominal yield	3.88%	4.69%	5.76%	4.33%	5.21%	
Total fixed maturity securities:						
Carrying value	\$ 57,757	\$ 108,193	\$ 150,683	\$ 25,942	\$ 342,575	5.19
Fair value	57,698	110,046	161,521	25,263	354,528	
Nominal yield	2.71%	4.37%	5.82%	4.32%	4.73%	
Residential mortgage-backed securities:						
Carrying value					\$ 12,612	³
Fair value					12,770	
Nominal yield ⁴					2.77%	
Total investment securities:						
Carrying value					\$ 355,187	
Fair value					367,298	
Nominal yield					4.65%	

¹ Calculated on a taxable equivalent basis using a 25 percent effective tax rate.

² Expected maturities may differ from contractual maturities because borrowers may have the right to call or prepay obligations with or without penalty.

³ The average expected lives of residential mortgage-backed securities were 4.7 years based upon current prepayment assumptions.

⁴ The nominal yield on residential mortgage-backed securities is based upon prepayment assumptions at the purchase date. Actual yields earned may differ significantly based upon actual prepayments. See Quarterly Financial Summary - Unaudited for current yields on the investment securities portfolio.

Available for Sale Securities

The amortized cost and fair value of available for sale securities are as follows (in thousands):

	December 31, 2018				
	Amortized Cost	Fair Value	Gross Unrealized		OTTI
			Gain	Loss	
U.S. Treasury securities	\$ 496	\$ 493	\$ —	\$ (3)	\$ —
Municipal and other tax-exempt securities	2,782	2,864	82	—	—
Residential mortgage-backed securities:					
U.S. government agencies:					
FNMA	3,414,573	3,367,124	10,559	(58,008)	—
FHLMC	1,723,399	1,699,779	5,189	(28,809)	—
GNMA	748,351	737,805	401	(10,947)	—
Total U.S. government agencies	5,886,323	5,804,708	16,149	(97,764)	—
Private issue	40,948	59,736	18,788	—	—
Total residential mortgage-backed securities	5,927,271	5,864,444	34,937	(97,764)	—
Commercial mortgage-backed securities guaranteed by U.S. government agencies	2,986,297	2,953,889	7,955	(40,363)	—
Other debt securities	35,545	35,430	12	(127)	—
Total available for sale securities	\$ 8,952,391	\$ 8,857,120	\$ 42,986	\$ (138,257)	\$ —

	December 31, 2017				
	Amortized Cost	Fair Value	Gross Unrealized		OTTI
			Gain	Loss	
U.S. Treasury securities	\$ 1,000	\$ 1,000	\$ —	\$ —	\$ —
Municipal and other tax-exempt securities	27,182	27,080	181	(283)	—
Residential mortgage-backed securities:					
U.S. government agencies:					
FNMA	3,021,551	2,997,563	11,549	(35,537)	—
FHLMC	1,545,971	1,531,009	3,148	(18,110)	—
GNMA	787,626	780,580	1,607	(8,653)	—
Total U.S. government agencies	5,355,148	5,309,152	16,304	(62,300)	—
Private issue	74,311	93,221	19,301	—	(391)
Total residential mortgage-backed securities	5,429,459	5,402,373	35,605	(62,300)	(391)
Commercial mortgage-backed securities guaranteed by U.S. government agencies	2,858,885	2,834,961	1,963	(25,887)	—
Other debt securities	25,500	25,481	50	(69)	—
Perpetual preferred stock	12,562	15,767	3,205	—	—
Equity securities and mutual funds	14,487	14,916	515	(86)	—
Total available for sale securities	\$ 8,369,075	\$ 8,321,578	\$ 41,519	\$ (88,625)	\$ (391)

The amortized cost and fair values of available for sale securities at December 31, 2018, by contractual maturity, are as shown in the following table (dollars in thousands):

	<u>Less than One Year</u>	<u>One to Five Years</u>	<u>Six to Ten Years</u>	<u>Over Ten Years</u>	<u>Total</u>	<u>Weighted Average Maturity⁴</u>
U.S. Treasury securities:						
Amortized cost	\$ —	\$ 496	\$ —	\$ —	\$ 496	1.08
Fair value	—	493	—	—	493	
Nominal yield	—%	1.99%	—%	—%	1.99%	
Municipal and other tax-exempt securities:						
Amortized cost	\$ 1,057	\$ 1,725	\$ —	\$ —	2,782	1.67
Fair value	1,063	1,801	—	—	2,864	
Nominal yield ¹	6.69%	6.45%	—%	—%	6.54%	
Commercial mortgage-backed securities:						
Amortized cost	\$ 77,558	\$ 1,107,567	\$ 1,497,468	\$ 303,704	2,986,297	6.90
Fair value	76,902	1,088,991	1,486,939	301,057	2,953,889	
Nominal yield	1.66%	2.06%	2.44%	2.54%	2.29%	
Other debt securities:						
Amortized cost	\$ —	\$ —	\$ —	\$ 35,545	35,545	13.61
Fair value	—	—	—	35,430	35,430	
Nominal yield	—%	—%	—%	1.94% ⁵	1.94%	
Total fixed maturity securities:						
Amortized cost	\$ 78,615	\$ 1,109,788	\$ 1,497,468	\$ 339,249	\$ 3,025,120	6.98
Fair value	77,965	1,091,285	1,486,939	336,487	2,992,676	
Nominal yield	1.73%	2.07%	2.44%	2.48%	2.29%	
Residential mortgage-backed securities:						
Amortized cost					\$ 5,927,271 ²	
Fair value					5,864,444	
Nominal yield ³					2.41%	
Total available-for-sale securities:						
Amortized cost					\$ 8,952,391	
Fair value					8,857,120	
Nominal yield					2.37%	

¹ Calculated on a taxable equivalent basis using a 25 percent effective tax rate.

² The average expected lives of mortgage-backed securities were 4.1 years based upon current prepayment assumptions.

³ The nominal yield on mortgage-backed securities is based upon prepayment assumptions at the purchase date. Actual yields earned may differ significantly based upon actual prepayments. See Quarterly Financial Summary — Unaudited following for current yields on available for sale securities portfolio.

⁴ Expected maturities may differ from contractual maturities, because borrowers may have the right to call or prepay obligations with or without penalty.

⁵ Nominal yield on other debt securities with contractual maturity dates over ten years are based on variable rates which generally are reset within 35 days.

Sales of available for sale securities resulted in gains and losses as follows (in thousands):

	<u>Year Ended December 31,</u>		
	<u>2018</u>	<u>2017</u>	<u>2016</u>
Proceeds	\$ 745,643	\$ 1,309,215	\$ 899,381
Gross realized gains	7,117	10,223	11,696
Gross realized losses	(9,918)	(5,795)	(21)
Related federal and state income tax expense	(713)	1,722	4,542

The fair value of debt securities pledged as collateral for repurchase agreements, public trust funds on deposit and for other purposes, as required by law was \$9.1 billion at December 31, 2018 and \$7.3 billion at December 31, 2017.

The secured parties do not have the right to sell or re-pledge these securities.

Temporarily Impaired Securities as of December 31, 2018

(In thousands)

	Number of Securities	Less Than 12 Months		12 Months or Longer		Total	
		Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
Investment:							
Municipal and other tax-exempt securities	72	\$ 18,255	\$ 69	\$ 66,141	\$ 523	\$ 84,396	\$ 592
U.S. government agency residential mortgage-backed securities – Other	2	—	—	5,633	135	5,633	135
Other debt securities	72	13,372	64	23,028	1,506	36,400	1,570
Total investment securities	146	\$ 31,627	\$ 133	\$ 94,802	\$ 2,164	\$ 126,429	\$ 2,297

	Number of Securities	Less Than 12 Months		12 Months or Longer		Total	
		Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
Available for sale:							
U.S. Treasury securities	1	\$ —	\$ —	\$ 493	\$ 3	\$ 493	\$ 3
Municipal and other tax-exempt securities	—	—	—	—	—	—	—
Residential mortgage-backed securities:							
U.S. government agencies:							
FNMA	162	161,089	542	2,135,377	57,466	2,296,466	58,008
FHLMC	85	71,205	328	1,129,730	28,481	1,200,935	28,809
GNMA	42	278,530	288	376,263	10,659	654,793	10,947
Total U.S. agencies	289	510,824	1,158	3,641,370	96,606	4,152,194	97,764
Private issue ¹	—	—	—	—	—	—	—
Total residential mortgage-backed securities	289	510,824	1,158	3,641,370	96,606	4,152,194	97,764
Commercial mortgage-backed securities guaranteed by U.S. government agencies	197	179,258	394	1,969,504	39,969	2,148,762	40,363
Other debt securities	3	9,982	63	20,436	64	30,418	127
Total available for sale securities	490	\$ 700,064	\$ 1,615	\$ 5,631,803	\$ 136,642	\$ 6,331,867	\$ 138,257

¹ Includes securities for which an unrealized loss remains in AOCI after an other-than-temporary credit loss has been recognized in income.

Temporarily Impaired Securities as of December 31, 2017
(In thousands)

	Number of Securities	Less Than 12 Months		12 Months or Longer		Total	
		Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
Investment:							
Municipal and other tax- exempt securities	100	\$ 145,960	\$ 643	\$ 5,833	\$ 161	\$ 151,793	\$ 804
U.S. government agency residential mortgage-backed securities – Other	1	—	—	3,356	95	3,356	95
Other debt securities	49	20,091	1,238	3,076	129	23,167	1,367
Total investment securities	150	\$ 166,051	\$ 1,881	\$ 12,265	\$ 385	\$ 178,316	\$ 2,266

	Number of Securities	Less Than 12 Months		12 Months or Longer		Total	
		Fair Value	Unrealized Loss	Fair Value	Unrealized Loss	Fair Value	Unrealized Loss
Available for sale:							
U.S. Treasury securities	—	\$ —	\$ —	\$ —	\$ —	\$ —	\$ —
Municipal and other tax-exempt securities	19	12,765	18	4,802	265	17,567	283
Residential mortgage-backed securities:							
U. S. government agencies:							
FNMA	113	1,203,041	9,618	824,029	25,919	2,027,070	35,537
FHLMC	69	863,778	7,297	385,816	10,813	1,249,594	18,110
GNMA	27	201,887	1,452	248,742	7,201	450,629	8,653
Total U.S. agencies	209	2,268,706	18,367	1,458,587	43,933	3,727,293	62,300
Private issue ¹	8	5,898	391	—	—	5,898	391
Total residential mortgage-backed securities	217	2,274,604	18,758	1,458,587	43,933	3,733,191	62,691
Commercial mortgage-backed securities guaranteed by U.S. government agencies	185	1,465,703	11,824	652,296	14,063	2,117,999	25,887
Other debt securities	2	19,959	41	472	28	20,431	69
Perpetual preferred stock	—	—	—	—	—	—	—
Equity securities and mutual funds	111	911	7	2,203	79	3,114	86
Total available for sale securities	534	\$ 3,773,942	\$ 30,648	\$ 2,118,360	\$ 58,368	\$ 5,892,302	\$ 89,016

¹ Includes securities for which an unrealized loss remains in AOCI after an other-than-temporary credit loss has been recognized in income.

Based on evaluations of impaired securities as of December 31, 2018, the Company does not intend to sell any impaired available for sale securities before fair value recovers to the current amortized cost and it is more-likely-than-not that the Company will not be required to sell impaired securities before fair value recovers, which may be maturity.

No other-than-temporary impairment losses were recorded in earnings during 2018 and none were recorded in 2017. Cumulative other-than-temporary impairment on available for sale securities was \$45 million at December 31, 2018 and \$55 million at December 31, 2017. The decrease compared to the prior year was due to sales during 2018.

Fair Value Option Securities

Fair value option securities represent securities which the Company has elected to carry at fair value and are separately identified on the Consolidated Balance Sheets with changes in the fair value recognized in earnings as they occur. Certain residential mortgage-backed securities issued by U.S. government agencies and derivative contracts are held as an economic hedge of the mortgage servicing rights.

The fair value and net unrealized gain (loss) included in Fair value option securities is as follows (in thousands):

	December 31, 2018		December 31, 2017	
	Fair Value	Net Unrealized Gain (Loss)	Fair Value	Net Unrealized Gain (Loss)
U.S. government agency residential mortgage-backed securities	\$ 283,235	\$ 2,766	\$ 755,054	\$ (1,877)

(3) Derivatives

The following table summarizes the fair values of derivative contracts recorded as “derivative contracts” assets and liabilities in the balance sheet at December 31, 2018 (in thousands):

	Assets					
	Notional ¹	Gross Fair Value	Netting Adjustments	Net Fair Value Before Cash Collateral	Cash Collateral	Fair Value Net of Cash Collateral
Customer risk management programs:						
Interest rate contracts						
To-be-announced residential mortgage-backed securities	\$ 10,671,151	\$ 92,231	\$ (26,787)	\$ 65,444	\$ —	\$ 65,444
Interest rate swaps	1,924,131	36,112	(6,688)	29,424	(7,934)	21,490
Energy contracts	1,472,209	206,418	(60,983)	145,435	(106,752)	38,683
Agricultural contracts	21,210	842	(201)	641	—	641
Foreign exchange contracts	184,990	183,759	—	183,759	—	183,759
Equity option contracts	89,085	2,021	—	2,021	(648)	1,373
Total customer risk management programs	14,362,776	521,383	(94,659)	426,724	(115,334)	311,390
Internal risk management programs	15,909,988	50,410	(40,871)	9,539	—	9,539
Total derivative contracts	\$ 30,272,764	\$ 571,793	\$ (135,530)	\$ 436,263	\$ (115,334)	\$ 320,929
	Liabilities					
	Notional ¹	Gross Fair Value	Netting Adjustments	Net Fair Value Before Cash Collateral	Cash Collateral	Fair Value Net of Cash Collateral
Customer risk management programs:						
Interest rate contracts						
To-be-announced residential mortgage-backed securities	\$ 10,558,151	\$ 90,388	\$ (26,787)	\$ 63,601	\$ (63,596)	\$ 5
Interest rate swaps	1,924,131	36,288	(6,688)	29,600	(4,110)	25,490
Energy contracts	1,434,247	202,494	(60,983)	141,511	(1,490)	140,021
Agricultural contracts	21,214	812	(201)	611	—	611
Foreign exchange contracts	177,423	175,922	—	175,922	—	175,922
Equity option contracts	89,085	2,021	—	2,021	—	2,021
Total customer risk management programs	14,204,251	507,925	(94,659)	413,266	(69,196)	344,070
Internal risk management programs	19,634,642	66,422	(40,871)	25,551	(7,315)	18,236
Total derivative contracts	\$ 33,838,893	\$ 574,347	\$ (135,530)	\$ 438,817	\$ (76,511)	\$ 362,306

¹ Notional amounts for commodity contracts are converted into dollar-equivalent amounts based on dollar prices at the inception of the contract.

The following table summarizes the fair values of derivative contracts recorded as “derivative contracts” assets and liabilities in the balance sheet at December 31, 2017 (in thousands):

	Assets					
	Notional¹	Gross Fair Value	Netting Adjustments	Net Fair Value Before Cash Collateral	Cash Collateral	Fair Value Net of Cash Collateral
Customer risk management programs:						
Interest rate contracts						
To-be-announced residential mortgage-backed securities	\$ 12,347,542	\$ 23,606	\$ (18,096)	\$ 5,510	\$ —	\$ 5,510
Interest rate swaps	1,478,944	28,278	—	28,278	(4,964)	23,314
Energy contracts	1,190,067	103,044	(47,873)	55,171	(196)	54,975
Agricultural contracts	53,238	1,576	(960)	616	—	616
Foreign exchange contracts	132,397	129,551	—	129,551	(448)	129,103
Equity option contracts	99,633	5,503	—	5,503	(920)	4,583
Total customer risk management programs	15,301,821	291,558	(66,929)	224,629	(6,528)	218,101
Internal risk management programs	4,736,701	9,494	(7,093)	2,401	—	2,401
Total derivative contracts	\$ 20,038,522	\$ 301,052	\$ (74,022)	\$ 227,030	\$ (6,528)	\$ 220,502

	Liabilities					
	Notional¹	Gross Fair Value	Netting Adjustments	Net Fair Value Before Cash Collateral	Cash Collateral	Fair Value Net of Cash Collateral
Customer risk management programs:						
Interest rate contracts						
To-be-announced residential mortgage-backed securities	\$ 11,537,742	\$ 20,367	\$ (18,096)	\$ 2,271	\$ (704)	\$ 1,567
Interest rate swaps	1,478,944	28,298	—	28,298	(12,896)	15,402
Energy contracts	1,166,924	101,603	(47,873)	53,730	(42,767)	10,963
Agricultural contracts	48,552	1,551	(960)	591	—	591
Foreign exchange contracts	126,251	123,321	—	123,321	(53)	123,268
Equity option contracts	99,633	5,503	—	5,503	—	5,503
Total customer risk management programs	14,458,046	280,643	(66,929)	213,714	(56,420)	157,294
Internal risk management programs	5,728,421	21,762	(7,093)	14,669	—	14,669
Total derivative contracts	\$ 20,186,467	\$ 302,405	\$ (74,022)	\$ 228,383	\$ (56,420)	\$ 171,963

¹ Notional amounts for commodity contracts are converted into dollar-equivalent amounts based on dollar prices at the inception of the contract.

The following summarizes the pre-tax net gains (losses) on derivative instruments and where they are recorded in the Consolidated Statements of Earnings (in thousands):

	Year Ended December 31,					
	2018		2017		2016	
	Brokerage and Trading Revenue	Gain (Loss) on Derivatives, Net	Brokerage and Trading Revenue	Gain (Loss) on Derivatives, Net	Brokerage and Trading Revenue	Gain (Loss) on Derivatives, Net
Customer risk management programs:						
Interest rate contracts						
To-be-announced residential mortgage-backed securities	\$ 27,190	\$ —	\$ 34,532	\$ —	\$ 38,523	\$ —
Interest rate swaps	2,614	—	2,647	—	2,589	—
Energy contracts	8,443	—	5,536	—	5,027	—
Agricultural contracts	53	—	79	—	111	—
Foreign exchange contracts	535	—	1,352	—	945	—
Equity option contracts	—	—	—	—	—	—
Total customer risk management programs	38,835	—	44,146	—	47,195	—
Internal risk management programs	(13,643)	(422)	4,615	779	(4,592)	(15,685)
Total derivative contracts	\$ 25,192	\$ (422)	\$ 48,761	\$ 779	\$ 42,603	\$ (15,685)

As discussed in Note 7, certain derivative contracts not designated as hedging instruments related to mortgage loan commitments and forward sales contracts are included in Residential mortgage loans held for sale on the Consolidated Balance Sheets. See Note 7 for additional discussion of notional, fair value and impact on earnings of these contracts.

No derivative contracts have been designated as hedging instruments for financial reporting purposes.

(4) Loans and Allowances for Credit Losses

The portfolio segments of the loan portfolio are as follows (in thousands):

	December 31, 2018				December 31, 2017			
	Fixed Rate	Variable Rate	Non-accrual	Total	Fixed Rate	Variable Rate	Non-accrual	Total
Commercial	\$ 2,251,188	\$ 11,285,049	\$ 99,841	\$ 13,636,078	\$ 2,217,432	\$ 8,379,240	\$ 137,303	\$ 10,733,975
Commercial real estate	1,477,274	3,265,918	21,621	4,764,813	548,692	2,928,440	2,855	3,479,987
Residential mortgage	1,830,224	358,254	41,555	2,230,033	1,608,655	317,584	47,447	1,973,686
Personal	190,687	834,889	230	1,025,806	154,517	810,990	269	965,776
Total	\$ 5,749,373	\$ 15,744,110	\$ 163,247	\$ 21,656,730	\$ 4,529,296	\$ 12,436,254	\$ 187,874	\$ 17,153,424
Accruing loans past due (90 days) ¹				\$ 1,338				\$ 633
Foregone interest on nonaccrual loans				\$ 15,502				\$ 16,496

¹ Excludes residential mortgage loans guaranteed by agencies of the U.S. government.

At December 31, 2018, loans to businesses and individuals with collateral primarily located in Texas totaled \$6.4 billion or 30% of the total loan portfolio. Loans to businesses and individuals with collateral primarily located in Oklahoma totaled \$3.5 billion or 16% of our total loan portfolio. Loans to businesses and individuals with collateral primarily located in Colorado totaled \$3.3 billion or 15% of our total loan portfolio. Loans for which the collateral location is not relevant, such as unsecured loans and reserve-based energy loans, are distributed by the borrower's primary operating location. These geographic concentrations subject the loan portfolio to the general economic conditions within these areas. At December 31, 2017, loans to businesses and individuals with collateral primarily located in Texas totaled \$5.8 billion or 34% of the loan portfolio and loans to businesses and individuals with collateral primarily located in Oklahoma totaled \$3.3 billion or 19% of the loan portfolio.

Commercial

Commercial loans represent loans for working capital, facilities acquisition or expansion, purchases of equipment and other needs of commercial customers primarily located within our geographical footprint. Commercial loans are underwritten individually and represent on-going relationships based on a thorough knowledge of the customer, the customer's industry and market. While commercial loans are generally secured by the customer's assets including real property, inventory, accounts receivable, operating equipment, interest in mineral rights and other property and may also include personal guarantees of the owners and related parties, the primary source of repayment of the loans is the on-going cash flow from operations of the customer's business. Inherent lending risk is centrally monitored on a continuous basis from underwriting throughout the life of the loan for compliance with commercial lending policies.

At December 31, 2018, commercial loans with collateral primarily located in Texas totaled \$4.1 billion or 30% of the commercial loan portfolio segment. Commercial loans with collateral primarily located in Oklahoma totaled \$2.2 billion or 16% of the commercial loan portfolio segment. Commercial loans with collateral primarily located in Colorado totaled \$2.0 billion or 15% of the commercial loan portfolio segment. The commercial loan portfolio segment is further divided into loan classes. The services loan class totaled \$3.3 billion or 15% of total loans. Approximately \$2.3 billion of loans in the services class consisted of loans with individual balances of less than \$10 million. Businesses included in the services class include commercial services, Native American tribal governments, financial services, entertainment and recreation and education. The energy loan class totaled \$3.6 billion or 17% of total loans, including \$2.9 billion of outstanding loans to energy producers. Approximately 57% of committed production loans were secured by properties primarily producing oil and 43% are secured by properties producing natural gas. The healthcare loan class totaled \$2.7 billion or 13% of total loans. The healthcare loan class consists primarily of loans for the development and operation of senior housing and care facilities, including independent living, assisted living and skilled nursing. Healthcare also includes loans to hospitals and other medical service providers.

At December 31, 2017, commercial loans with collateral primarily located in Texas totaled \$3.6 billion or 34% of the commercial loan portfolio segment and commercial loans with collateral primarily located in Oklahoma totaled \$2.0 billion or 18% of the commercial loan portfolio segment. The energy loan class totaled \$2.9 billion or 17% of total loans, including \$2.5 billion of outstanding loans to energy producers. At December 31, 2017, approximately 57% of committed production loans were secured by properties primarily producing oil and 43% were secured by properties producing natural gas. The services loan class totaled \$2.5 billion or 15% of total loans. Approximately \$1.5 billion of loans in the services category consisted of loans with individual balances of less than \$10 million. The healthcare loan class totaled \$2.2 billion or 13% of total loans.

Commercial Real Estate

Commercial real estate loans are for the construction of buildings or other improvements to real estate and property held by borrowers for investment purposes primarily within our geographical footprint. We require collateral values in excess of the loan amounts, demonstrated cash flows in excess of expected debt service requirements, equity investment in the project and a portion of the project already sold, leased or permanent financing already secured. The expected cash flows from all significant new or renewed income producing property commitments are stress tested to reflect the risks in varying interest rates, vacancy rates and rental rates. As with commercial loans, inherent lending risks are centrally monitored on a continuous basis from underwriting throughout the life of the loan for compliance with applicable lending policies.

At December 31, 2018, 26% of commercial real estate loans are secured by properties primarily located in the Dallas and Houston areas of Texas. An additional 16% of commercial real estate loans are secured by properties located primarily in the Denver, Colorado metropolitan area. At December 31, 2017, 35% of commercial real estate loans were secured by properties in Texas, 12% of commercial real estate loans were secured by properties in Oklahoma.

Residential Mortgage and Personal

Residential mortgage loans provide funds for our customers to purchase or refinance their primary residence or to borrow against the equity in their home. Residential mortgage loans are secured by a first or second mortgage on the customer's primary residence. Personal loans consist primarily of loans secured by the cash surrender value of insurance policies and marketable securities. It also includes direct loans secured by and for the purchase of automobiles, recreational and marine equipment as well as other unsecured loans. Residential mortgage and personal loans are made in accordance with underwriting policies. Credit scoring is assessed based on significant credit characteristics including credit history, residential and employment stability. Residential mortgage loans retained in the Company's portfolio are primarily composed of various mortgage programs to support customer relationships including jumbo mortgage loans, non-builder construction loans and special loan programs for high net worth individuals and certain professionals. Jumbo loans may be fixed or variable rate and are fully amortizing. Jumbo loans generally conform to government sponsored entity standards, except that the loan size exceeds maximums required under these standards. These loans generally require a minimum FICO score of 720 and a maximum debt-to-income ratio ("DTI") of 38%. Loan-to-value ("LTV") ratios are tiered from 60% to 100%, depending on the market. Special mortgage programs include fixed and variable fully amortizing loans tailored to the needs of certain healthcare professionals. Variable rate loans are fully indexed at origination and may have fixed rates for 3 years to 10 years, then adjust annually thereafter.

At December 31, 2018 and 2017, residential mortgage loans included \$191 million and \$198 million, respectively, of loans guaranteed by U.S. government agencies previously sold into GNMA mortgage pools. These loans either have been repurchased or are eligible to be repurchased by the Company when certain defined delinquency criteria are met. Although payments on these loans generally are past due more than 90 days, interest continues to accrue based on the government guarantee.

Home equity loans totaled \$719 million at December 31, 2018 and \$733 million at December 31, 2017. At December 31, 2018, 59% of the home equity loan portfolio was comprised of first lien loans and 41% of the home equity portfolio was comprised of junior lien loans. Junior lien loans were distributed 40% to amortizing term loans and 60% to revolving lines of credit. At December 31, 2017, 64% of the home equity portfolio was comprised of first lien loans and 36% of the home equity loan portfolio was comprised of junior lien loans. Junior lien loans were distributed 46% to amortizing term loans and 54% to revolving lines of credit. Home equity loans generally require a minimum FICO score of 700 and a maximum DTI of 40%. The maximum loan amount available for our home equity loan products is generally \$400 thousand. Revolving loans have a 5 year revolving period followed by 15 year term of amortizing repayments. Interest-only home equity loans may not be extended for any additional revolving time. All other home equity loans may be extended at management's discretion for an additional 5 year revolving term subject to an update of certain credit information.

At December 31, 2018, 26% of residential mortgage loans are secured by properties located in Oklahoma, 28% of residential mortgage loans are secured by properties located in Texas and 19% of residential mortgage are secured by properties located in Colorado. At December 31, 2017, 31% of residential mortgage loans were secured by properties in Oklahoma, 30% of residential mortgage were secured by properties in Texas, 11% of residential mortgage loans are secured by properties in Colorado and 9% of residential mortgage loans are secured by properties in New Mexico.

Purchase Credit Impaired Loans

In conjunction with the acquisition of CoBiz Financial on October, 1, 2018, the Company acquired certain loans for which there was evidence of deterioration of credit quality since origination and for which it was probable that all contractually required payments would not be collected ("PCI loans"). At December 31, 2018, the carrying amount of PCI loans was \$31 million and the unpaid balance was \$47 million. The accretable yield related to these PCI loans was \$843 thousand.

Credit Commitments

Commitments to extend credit are agreements to lend to a customer as long as there is no violation of conditions established in the contract. Commitments generally have fixed expiration dates or other termination clauses and may require payment of a fee. At December 31, 2018, outstanding commitments totaled \$12 billion. Because some commitments are expected to expire before being drawn upon, the total commitment amounts do not necessarily represent future cash requirements. BOK Financial uses the same credit policies in making commitments as it does loans.

The amount of collateral obtained, if deemed necessary, is based upon management's credit evaluation of the borrower.

Standby letters of credit are conditional commitments issued to guarantee the performance of a customer to a third party. Because the credit risk involved in issuing standby letters of credit is essentially the same as that involved in extending loan commitments, BOK Financial uses the same credit policies in evaluating the creditworthiness of the customer. Additionally, BOK Financial uses the same evaluation process in obtaining collateral on standby letters of credit as it does for loan commitments. The term of these standby letters of credit is defined in each commitment and typically corresponds with the underlying loan commitment. At December 31, 2018, outstanding standby letters of credit totaled \$582 million. Commercial letters of credit are used to facilitate customer trade transactions with the drafts being drawn when the underlying transaction is consummated. At December 31, 2018, outstanding commercial letters of credit totaled \$1.9 million.

Allowances for Credit Losses

BOK Financial maintains an allowance for loan losses and an accrual for off-balance sheet credit risk. The accrual for off-balance sheet credit risk is maintained at a level that is appropriate to cover estimated losses associated with credit instruments that are not currently recognized as assets such as loan commitments, standby letters of credit or guarantees. As discussed in greater detail in Note 7, the Company also has separate accruals related to off-balance sheet credit risk related to residential mortgage loans previously sold with full or partial recourse and for residential mortgage loans sold to government sponsored agencies under standard representations and warranties.

The allowance for loan losses consists of specific allowances attributed to impaired loans that have not yet been charged down to amounts we expect to recover, general allowances for unimpaired loans based on estimated loss rates by loan class and nonspecific allowances based on general economic conditions, concentration in loans with large balances and other relevant factors.

The activity in the allowance for loan losses and the accrual for off-balance sheet credit risk related to loan commitments and standby letters of credit for the year ended December 31, 2018 is summarized as follows (in thousands):

	Commercial	Commercial Real Estate	Residential Mortgage	Personal	Nonspecific Allowance	Total
Allowance for loan losses:						
Beginning balance	\$ 124,269	\$ 56,621	\$ 18,451	\$ 9,124	\$ 22,217	\$ 230,682
Provision for loan losses	12,521	(147)	(1,156)	3,175	(4,449)	9,944
Loans charged off	(37,880)	—	(378)	(5,325)	—	(43,583)
Recoveries	3,316	3,552	1,047	2,499	—	10,414
Ending balance	\$ 102,226	\$ 60,026	\$ 17,964	\$ 9,473	\$ 17,768	\$ 207,457
Accrual for off-balance sheet credit risk:						
Beginning balance	\$ 3,644	\$ 45	\$ 43	\$ 2	\$ —	\$ 3,734
Provision for off-balance sheet credit risk	(1,989)	7	9	29	—	(1,944)
Ending balance	\$ 1,655	\$ 52	\$ 52	\$ 31	\$ —	\$ 1,790
Total provision for credit losses	\$ 10,532	\$ (140)	\$ (1,147)	\$ 3,204	\$ (4,449)	\$ 8,000

The activity in the allowance for loan losses and the accrual for off-balance sheet credit risk related to loan commitments and standby letters of credit for the year ended December 31, 2017 is summarized as follows (in thousands):

	<u>Commercial</u>	<u>Commercial Real Estate</u>	<u>Residential Mortgage</u>	<u>Personal</u>	<u>Nonspecific Allowance</u>	<u>Total</u>
Allowance for loan losses:						
Beginning balance	\$ 140,213	\$ 50,749	\$ 18,224	\$ 8,773	\$ 28,200	\$ 246,159
Provision for loan losses	(595)	4,008	116	2,964	(5,983)	510
Loans charged off	(19,810)	(76)	(649)	(5,064)	—	(25,599)
Recoveries	4,461	1,940	760	2,451	—	9,612
Ending balance	\$ 124,269	\$ 56,621	\$ 18,451	\$ 9,124	\$ 22,217	\$ 230,682
Accrual for off-balance sheet credit risk:						
Beginning balance	\$ 11,063	\$ 123	\$ 50	\$ 8	\$ —	\$ 11,244
Provision for off-balance sheet credit risk	(7,419)	(78)	(7)	(6)	—	(7,510)
Ending balance	\$ 3,644	\$ 45	\$ 43	\$ 2	\$ —	\$ 3,734
Total provision for credit losses	\$ (8,014)	\$ 3,930	\$ 109	\$ 2,958	\$ (5,983)	\$ (7,000)

The activity in the allowance for loan losses and the accrual for off-balance sheet credit risk related to loan commitments and standby letters of credit for the year ended December 31, 2016 is summarized as follows (in thousands):

	<u>Commercial</u>	<u>Commercial Real Estate</u>	<u>Residential Mortgage</u>	<u>Personal</u>	<u>Nonspecific Allowance</u>	<u>Total</u>
Allowance for loan losses:						
Beginning balance	\$ 130,334	\$ 41,391	\$ 19,509	\$ 4,164	\$ 30,126	\$ 225,524
Provision for loan losses	43,980	8,075	(1,972)	7,310	(1,926)	55,467
Loans charged off	(35,828)	—	(1,312)	(5,448)	—	(42,588)
Recoveries	1,727	1,283	1,999	2,747	—	7,756
Ending balance	\$ 140,213	\$ 50,749	\$ 18,224	\$ 8,773	\$ 28,200	\$ 246,159
Accrual for off-balance sheet credit risk:						
Beginning balance	\$ 1,506	\$ 153	\$ 30	\$ 22	\$ —	\$ 1,711
Provision for off-balance sheet credit risk	9,557	(30)	20	(14)	—	9,533
Ending balance	\$ 11,063	\$ 123	\$ 50	\$ 8	\$ —	\$ 11,244
Total provision for credit losses	\$ 53,537	\$ 8,045	\$ (1,952)	\$ 7,296	\$ (1,926)	\$ 65,000

The allowance for loan losses and recorded investment of the related loans by portfolio segment for each impairment measurement method at December 31, 2018 is as follows (in thousands):

	Collectively Measured for Impairment		Individually Measured for Impairment		Total	
	Recorded Investment	Related Allowance	Recorded Investment	Related Allowance	Recorded Investment	Related Allowance
Commercial	\$ 13,536,237	\$ 93,494	\$ 99,841	\$ 8,732	\$ 13,636,078	\$ 102,226
Commercial real estate	4,743,192	60,026	21,621	—	4,764,813	60,026
Residential mortgage	2,188,478	17,964	41,555	—	2,230,033	17,964
Personal	1,025,576	9,473	230	—	1,025,806	9,473
Total	21,493,483	180,957	163,247	8,732	21,656,730	189,689
Nonspecific allowance	—	—	—	—	—	17,768
Total	\$ 21,493,483	\$ 180,957	\$ 163,247	\$ 8,732	\$ 21,656,730	\$ 207,457

The allowance for loan losses and recorded investment of the related loans by portfolio segment for each impairment measurement method at December 31, 2017 is as follows (in thousands):

	Collectively Measured for Impairment		Individually Measured for Impairment		Total	
	Recorded Investment	Related Allowance	Recorded Investment	Related Allowance	Recorded Investment	Related Allowance
Commercial	\$ 10,596,672	\$ 115,438	\$ 137,303	\$ 8,831	\$ 10,733,975	\$ 124,269
Commercial real estate	3,477,132	56,621	2,855	—	3,479,987	56,621
Residential mortgage	1,926,239	18,451	47,447	—	1,973,686	18,451
Personal	965,507	9,124	269	—	965,776	9,124
Total	16,965,550	199,634	187,874	8,831	17,153,424	208,465
Nonspecific allowance	—	—	—	—	—	22,217
Total	\$ 16,965,550	\$ 199,634	\$ 187,874	\$ 8,831	\$ 17,153,424	\$ 230,682

Credit Quality Indicators

The Company utilizes loan class and risk grading as primary credit quality indicators. Substantially all commercial and commercial real estate loans and certain residential mortgage and personal loans are risk graded based on a quarterly evaluation of the borrowers' ability to repay the loans. Certain commercial loans and most residential mortgage and personal loans are small, homogeneous pools that are not risk graded.

The allowance for loan losses and recorded investment of the related loans by portfolio segment for risk graded and non-risk graded loans at December 31, 2018 is as follows (in thousands):

	Internally Risk Graded		Non-Graded		Total	
	Recorded Investment	Related Allowance	Recorded Investment	Related Allowance	Recorded Investment	Related Allowance
Commercial	\$ 13,586,654	\$ 101,303	\$ 49,424	\$ 923	\$ 13,636,078	\$ 102,226
Commercial real estate	4,764,813	60,026	—	—	4,764,813	60,026
Residential mortgage	505,046	3,310	1,724,987	14,654	2,230,033	17,964
Personal	948,890	6,633	76,916	2,840	1,025,806	9,473
Total	19,805,403	171,272	1,851,327	18,417	21,656,730	189,689
Nonspecific allowance	—	—	—	—	—	17,768
Total	\$ 19,805,403	\$ 171,272	\$ 1,851,327	\$ 18,417	\$ 21,656,730	\$ 207,457

The allowance for loan losses and recorded investment of the related loans by portfolio segment for risk graded and non-risk graded loans at December 31, 2017 is as follows (in thousands):

	Internally Risk Graded		Non-Graded		Total	
	Recorded Investment	Related Allowance	Recorded Investment	Related Allowance	Recorded Investment	Related Allowance
Commercial	\$ 10,706,035	\$ 123,383	\$ 27,940	\$ 886	\$ 10,733,975	\$ 124,269
Commercial real estate	3,479,987	56,621	—	—	3,479,987	56,621
Residential mortgage	234,477	2,947	1,739,209	15,504	1,973,686	18,451
Personal	877,390	6,461	88,386	2,663	965,776	9,124
Total	15,297,889	189,412	1,855,535	19,053	17,153,424	208,465
Nonspecific allowance	—	—	—	—	—	22,217
Total	\$ 15,297,889	\$ 189,412	\$ 1,855,535	\$ 19,053	\$ 17,153,424	\$ 230,682

Loans are considered to be performing if they are in compliance with the original terms of the agreement which is consistent with the regulatory guideline of "pass." Performing also includes loans considered to be "other loans especially mentioned" by regulatory guidelines and all residential mortgage loans guaranteed by agencies of the U.S. government that continue to accrue interest based on criteria of the guarantor's programs. Other loans especially mentioned are currently performing in compliance with the original terms of the agreement but may have a potential weakness that deserves management's close attention, consistent with regulatory guidelines.

The risk grading process identified certain loans that have a well-defined weakness (e.g. inadequate debt service coverage or liquidity or marginal capitalization; repayment may depend on collateral or other risk mitigation) that may jeopardize liquidation of the debt and represent a greater risk due to deterioration in the financial condition of the borrower. This is consistent with the regulatory guideline for "substandard." Because the borrowers are still performing in accordance with the original terms of the loan agreements, these loans were not placed in nonaccruing status.

Nonaccruing loans represent loans for which full collection of principal and interest in accordance with the original terms of the loan agreements is uncertain. This is substantially the same criteria used to determine whether a loan is impaired and includes certain loans considered “substandard” and all loans considered “doubtful” by regulatory guidelines.

The following table summarizes the Company’s loan portfolio at December 31, 2018 by the risk grade categories (in thousands):

	Internally Risk Graded				Non-Graded		Total
	Performing				Performing	Nonaccrual	
	Pass	Other Loans Especially Mentioned	Accruing Substandard	Nonaccrual			
Commercial:							
Energy	\$ 3,414,039	\$ 42,176	\$ 86,624	\$ 47,494	\$ —	\$ —	\$ 3,590,333
Services	3,161,157	49,761	32,661	8,567	—	—	3,252,146
Wholesale/retail	1,593,902	18,809	7,131	1,316	—	—	1,621,158
Manufacturing	668,438	30,934	22,230	8,919	—	—	730,521
Healthcare	2,664,381	14,920	37,698	16,538	—	—	2,733,537
Public finance	876,336	—	—	—	—	—	876,336
Other commercial and industrial	756,815	1,266	7,588	16,954	49,371	53	832,047
Total commercial	13,135,068	157,866	193,932	99,788	49,371	53	13,636,078
Commercial real estate:							
Residential construction and land development	148,234	—	—	350	—	—	148,584
Retail	885,588	11,926	1,289	20,279	—	—	919,082
Office	1,059,334	10,532	3,054	—	—	—	1,072,920
Multifamily	1,287,471	281	12	301	—	—	1,288,065
Industrial	776,898	—	1,208	—	—	—	778,106
Other commercial real estate	555,301	1,188	876	691	—	—	558,056
Total commercial real estate	4,712,826	23,927	6,439	21,621	—	—	4,764,813
Residential mortgage:							
Permanent mortgage	467,233	52	9,730	1,991	819,199	21,960	1,320,165
Permanent mortgages guaranteed by U.S. government agencies	—	—	—	—	183,734	7,132	190,866
Home equity	25,743	—	296	—	682,491	10,472	719,002
Total residential mortgage	492,976	52	10,026	1,991	1,685,424	39,564	2,230,033
Personal	944,256	115	4,443	76	76,762	154	1,025,806
Total	\$ 19,285,126	\$ 181,960	\$ 214,840	\$ 123,476	\$ 1,811,557	\$ 39,771	\$ 21,656,730

The following table summarizes the Company's loan portfolio at December 31, 2017 by the risk grade categories (in thousands):

	Internally Risk Graded				Non-Graded		Total
	Performing				Performing	Nonaccrual	
	Pass	Other Loans Especially Mentioned	Accruing Substandard	Nonaccrual			
Commercial:							
Energy	\$ 2,632,986	\$ 60,288	\$ 144,598	92,284	\$ —	\$ —	\$ 2,930,156
Services	2,478,945	13,927	26,533	2,620	—	—	2,522,025
Wholesale/retail	1,443,917	19,263	5,502	2,574	—	—	1,471,256
Manufacturing	472,869	6,653	11,290	5,962	—	—	496,774
Healthcare	2,182,231	3,186	43,305	14,765	—	—	2,243,487
Public finance	541,775	—	—	—	—	—	541,775
Other commercial and industrial	473,366	7	8,161	19,028	27,870	70	528,502
Total commercial	10,226,089	103,324	239,389	137,233	27,870	70	10,733,975
Commercial real estate:							
Residential construction and land development	113,190	1,828	395	1,832	—	—	117,245
Retail	686,915	4,243	98	276	—	—	691,532
Office	824,408	7,087	—	275	—	—	831,770
Multifamily	979,969	—	48	—	—	—	980,017
Industrial	573,014	—	—	—	—	—	573,014
Other commercial real estate	285,506	145	286	472	—	—	286,409
Total commercial real estate	3,463,002	13,303	827	2,855	—	—	3,479,987
Residential mortgage:							
Permanent mortgage	232,492	—	822	1,163	784,928	24,030	1,043,435
Permanent mortgages guaranteed by U.S. government agencies	—	—	—	—	188,327	9,179	197,506
Home equity	—	—	—	—	719,670	13,075	732,745
Total residential mortgage	232,492	—	822	1,163	1,692,925	46,284	1,973,686
Personal	875,696	1,548	63	83	88,200	186	965,776
Total	\$ 14,797,279	\$ 118,175	\$ 241,101	141,334	\$ 1,808,995	\$ 46,540	\$ 17,153,424

Impaired Loans

Loans are considered to be impaired when it is probable that the Company will not be able to collect all amounts due according to the contractual terms of the loan agreement. This includes all nonaccruing loans, all loans modified in a troubled debt restructuring and all loans repurchased from GNMA pools.

A summary of impaired loans follows (in thousands):

	As of December 31, 2018					Year Ended December 31, 2018	
	Unpaid Principal Balance	Recorded Investment			Related Allowance	Average Recorded Investment	Interest Income Recognized
		Total	With No Allowance	With Allowance			
Commercial:							
Energy	\$ 79,675	\$ 47,494	\$ 18,639	\$ 28,855	\$ 5,362	\$ 69,645	\$ —
Services	13,437	8,567	8,489	78	74	4,509	—
Wholesale/retail	1,722	1,316	1,015	301	101	1,784	—
Manufacturing	10,055	8,919	8,673	246	246	7,249	—
Healthcare	24,319	16,538	10,563	5,975	2,949	14,297	—
Public finance	—	—	—	—	—	—	—
Other commercial and industrial	26,955	17,007	17,007	—	—	17,976	—
Total commercial	156,163	99,841	64,386	35,455	8,732	115,460	—
Commercial real estate:							
Residential construction and land development	1,306	350	350	—	—	1,091	—
Retail	27,680	20,279	20,279	—	—	10,278	—
Office	—	—	—	—	—	137	—
Multifamily	301	301	301	—	—	151	—
Industrial	—	—	—	—	—	—	—
Other commercial real estate	851	691	691	—	—	581	—
Total commercial real estate	30,138	21,621	21,621	—	—	12,238	—
Residential mortgage:							
Permanent mortgage	28,716	23,951	23,951	—	—	24,572	1,233
Permanent mortgage guaranteed by U.S. government agencies ¹	196,296	190,866	190,866	—	—	180,813	7,172
Home equity	12,196	10,472	10,472	—	—	11,774	—
Total residential mortgage	237,208	225,289	225,289	—	—	217,159	8,405
Personal	278	230	230	—	—	250	—
Total	\$ 423,787	\$ 346,981	\$ 311,526	\$ 35,455	\$ 8,732	\$ 345,107	\$ 8,405

¹ All permanent mortgage loans guaranteed by U.S. government agencies are considered impaired as we do not expect full collection of contractual principal and interest. At December 31, 2018, \$7.1 million of these loans are nonaccruing and \$184 million are accruing based on the guarantee by U.S. government agencies.

Generally, no interest income is recognized on impaired loans until all principal balances, including amounts charged-off, have been recovered.

	As of December 31, 2017					Year Ended	
	Unpaid Principal Balance	Recorded Investment			Related Allowance	December 31, 2017	
		Total	With No Allowance	With Allowance		Average Recorded Investment	Interest Income Recognized
Commercial:							
Energy	\$ 111,011	\$ 92,284	\$ 40,968	\$ 51,316	\$ 8,814	\$ 112,392	\$ —
Services	5,324	2,620	2,620	—	—	5,396	—
Wholesale/retail	9,099	2,574	2,574	—	—	6,990	—
Manufacturing	6,073	5,962	5,962	—	—	5,446	—
Healthcare	25,140	14,765	14,765	—	—	7,795	—
Public finance	—	—	—	—	—	—	—
Other commercial and industrial	27,957	19,098	19,080	18	17	20,108	—
Total commercial	184,604	137,303	85,969	51,334	8,831	158,127	—
Commercial real estate:							
Residential construction and land development	3,285	1,832	1,832	—	—	2,633	—
Retail	509	276	276	—	—	301	—
Office	287	275	275	—	—	351	—
Multifamily	—	—	—	—	—	19	—
Industrial	—	—	—	—	—	38	—
Other commercial real estate	670	472	472	—	—	847	—
Total commercial real estate	4,751	2,855	2,855	—	—	4,189	—
Residential mortgage:							
Permanent mortgage	30,435	25,193	25,193	—	—	24,024	1,229
Permanent mortgage guaranteed by U.S. government agencies ¹	203,814	197,506	197,506	—	—	199,244	7,632
Home equity	14,548	13,075	13,075	—	—	12,297	—
Total residential mortgage	248,797	235,774	235,774	—	—	235,565	8,861
Personal	307	269	269	—	—	280	—
Total	\$ 438,459	\$ 376,201	\$ 324,867	\$ 51,334	\$ 8,831	\$ 398,161	\$ 8,861

¹ All permanent mortgage loans guaranteed by U.S. government agencies are considered impaired as we do not expect full collection of contractual principal and interest. At December 31, 2017, \$9.2 million of these loans are nonaccruing and \$188 million are accruing based on the guarantee by U.S. government agencies.

Troubled Debt Restructurings

At December 31, 2018 the Company has \$166 million in troubled debt restructurings (TDRs), of which \$86 million are accruing residential mortgage loans guaranteed by U.S. government agencies. Approximately \$71 million of TDRs are performing in accordance with the modified terms. The loans designated as TDRs had \$16.1 million in charge offs during the year ended December 31, 2018.

At December 31, 2017, TDRs totaled \$126 million, of which \$74 million were accruing residential mortgage loans guaranteed by U.S. government agencies. Approximately \$48 million of TDRs were performing. The loans designated as TDRs had \$117 thousand in charge offs during the year ended December 31, 2017.

TDRs generally consist of interest rate concessions, payment stream concessions or a combination of concessions to distressed borrowers. During the year ended December 31, 2018, \$75 million of loans were restructured. During the year ended December 31, 2017, \$57 million of loans were restructured.

Nonaccrual & Past Due Loans

Past due status for all loan classes is based on the actual number of days since the last payment was due according to the contractual terms of the loans.

A summary of loans currently performing, loans past due and accruing and nonaccrual loans as of December 31, 2018 is as follows (in thousands):

	Current	Past Due			Nonaccrual	Total
		30 to 59 Days	60 to 89 Days	90 Days or More		
Commercial:						
Energy	\$ 3,542,839	\$ —	—	\$ —	\$ 47,494	\$ 3,590,333
Services	3,231,532	6,009	6,038	—	8,567	3,252,146
Wholesale/retail	1,619,290	515	37	—	1,316	1,621,158
Manufacturing	721,204	392	6	—	8,919	730,521
Healthcare	2,716,204	241	—	554	16,538	2,733,537
Public finance	876,336	—	—	—	—	876,336
Other commercial and industrial	814,489	518	25	8	17,007	832,047
Total commercial	13,521,894	7,675	6,106	562	99,841	13,636,078
Commercial real estate:						
Residential construction and land development	147,705	249	280	—	350	148,584
Retail	884,424	14,379	—	—	20,279	919,082
Office	1,072,920	—	—	—	—	1,072,920
Multifamily	1,287,483	281	—	—	301	1,288,065
Industrial	776,898	1,208	—	—	—	778,106
Other commercial real estate	556,239	412	—	714	691	558,056
Total commercial real estate	4,725,669	16,529	280	714	21,621	4,764,813
Residential mortgage:						
Permanent mortgage	1,292,652	3,196	366	—	23,951	1,320,165
Permanent mortgages guaranteed by U.S. government agencies	37,459	24,369	16,345	105,561	7,132	190,866
Home equity	707,017	1,102	352	59	10,472	719,002
Total residential mortgage	2,037,128	28,667	17,063	105,620	41,555	2,230,033
Personal	1,024,298	479	796	3	230	1,025,806
Total	\$ 21,308,989	\$ 53,350	24,245	\$ 106,899	\$ 163,247	\$ 21,656,730

A summary of loans currently performing, loans past due and accruing and nonaccrual loans as of December 31, 2017 is as follows (in thousands):

	Current	Past Due			Nonaccrual	Total
		30 to 59 Days	60 to 89 Days	90 Days or More		
Commercial:						
Energy	\$ 2,833,668	\$ —	4,204	\$ —	\$ 92,284	\$ 2,930,156
Services	2,518,298	514	486	107	2,620	2,522,025
Wholesale/retail	1,468,284	398	—	—	2,574	1,471,256
Manufacturing	490,739	—	73	—	5,962	496,774
Healthcare	2,213,504	15,218	—	—	14,765	2,243,487
Public finance	541,775	—	—	—	—	541,775
Other commercial and industrial	509,116	85	78	125	19,098	528,502
Total commercial	10,575,384	16,215	4,841	232	137,303	10,733,975
Commercial real estate:						
Residential construction and land development	115,213	200	—	—	1,832	117,245
Retail	691,256	—	—	—	276	691,532
Office	831,118	254	—	123	275	831,770
Multifamily	979,625	22	370	—	—	980,017
Industrial	573,014	—	—	—	—	573,014
Other commercial real estate	285,937	—	—	—	472	286,409
Total commercial real estate	3,476,163	476	370	123	2,855	3,479,987
Residential mortgage:						
Permanent mortgage	1,014,588	3,435	219	—	25,193	1,043,435
Permanent mortgages guaranteed by U.S. government agencies	22,692	18,978	13,468	133,189	9,179	197,506
Home equity	717,007	2,206	440	17	13,075	732,745
Total residential mortgage	1,754,287	24,619	14,127	133,206	47,447	1,973,686
Personal	964,374	681	191	261	269	965,776
Total	\$ 16,770,208	\$ 41,991	19,529	\$ 133,822	\$ 187,874	\$ 17,153,424

(5) Premises and Equipment

Premises and equipment at December 31 are summarized as follows (in thousands):

	December 31,	
	2018	2017
Land	\$ 70,575	\$ 71,348
Buildings and improvements	266,733	249,139
Software	150,207	188,826
Furniture and equipment	129,988	223,163
Construction in progress	27,514	23,348
Premises and equipment	645,017	755,824
Less accumulated depreciation	314,984	438,489
Premises and equipment, net of accumulated depreciation	\$ 330,033	\$ 317,335

Depreciation expense of premises and equipment was \$51 million, \$48 million and \$40 million for the years ended December 31, 2018, 2017 and 2016, respectively.

(6) Goodwill and Intangible Assets

On October 1, 2018, the Company acquired CoBiz Financial, Inc. ("CoBiz"), parent company of CoBiz Bank. CoBiz is headquartered in Denver, Colorado serving the Colorado and Arizona markets. The Company paid total consideration of \$944 million, which included \$243 million in cash along with the issuance of 7.2 million shares of BOK Financial common stock valued at \$701 million in exchange for all the outstanding shares of CoBiz. Goodwill acquired is attributed to synergies expected to be gained through consolidation of administrative functions resulting in cost savings.

A summary of the preliminary purchase price allocation and resulting goodwill at October 1, 2018 follows (in thousands):

Cash and due from banks	\$ 80,827
Investment securities	17,287
Available for sale securities	546,776
Restricted equity securities	5,261
Loans (Unpaid principal balance - \$3,066,521)	2,937,499
Premises and equipment	5,515
Receivables	24,893
Intangible assets	106,733
Real estate and other repossessed assets	5,155
Derivative contracts asset, net	8,197
Cash surrender value of bank-owned life insurance	55,740
Other assets	56,642
Total assets acquired	3,850,525
Deposits	3,289,071
Funds purchased and repurchase agreements	37,218
Subordinated debentures	131,197
Accrued interest, taxes and expense	33,122
Derivative contracts liability, net	12,303
Other liabilities	5,254
Total liabilities assumed	3,508,165
Net assets acquired	342,360
Less: Purchase price	944,193
Goodwill	\$ 601,833

The preliminary purchase price allocation represents acquired assets and liabilities at estimated fair value. Fair value for loans and intangibles assets was determined by applying discounted cash flow measurement techniques using significant unobservable (Level 3) inputs. These inputs include estimates of loss rates and prepayment speeds, customer attrition rates, operating costs, alternative funding costs and discount rates. The fair value of other acquired assets and liabilities was determined primarily through the use of significant other observable (Level 2) inputs.

On May 1, 2018, the Company acquired a majority voting interest in Switchgrass Holdings, LLC, a restaurant franchise owner and operator, pursuant to merchant banking regulations and restrictions. The purchase price for the acquisition was \$14 million and included \$6.7 million of intangible assets.

On December 1, 2016, the Company acquired MBT Bancshares ("MBT"), parent company of Missouri Bank and Trust of Kansas City ("Mobank") following regulatory approval of the transaction. Mobank operated four banking branches in the Kansas City, Mo. area. BOK Financial paid \$103 million in an all-cash deal for all outstanding shares of MBT stock. The purchase price allocation resulted in \$15 million of identifiable intangibles and \$66 million of goodwill.

The pro-forma impact of all acquisition transactions on earnings for periods prior to the acquisition dates were not material to the Company's financial statements.

The following table presents the original cost and accumulated amortization of intangible assets (in thousands):

	Dec. 31,	
	2018	2017
Core deposit premiums	\$ 103,200	\$ 6,510
Less accumulated amortization	5,032	808
Net core deposit premiums	98,168	5,702
Other identifiable intangible assets	63,497	44,468
Less accumulated amortization	26,816	21,512
Net other identifiable intangible assets	36,681	22,956
Total intangible assets, net	\$ 134,849	\$ 28,658

Expected amortization expense for intangible assets that will continue to be amortized (in thousands):

	Core Deposit Premiums	Other Identifiable Intangible Assets	Total
2019	\$ 14,332	\$ 6,149	\$ 20,481
2020	12,892	6,304	19,196
2021	11,893	5,606	17,499
2022	10,981	4,238	15,219
2023	10,145	3,199	13,344
Thereafter	37,925	11,185	49,110
	\$ 98,168	\$ 36,681	\$ 134,849

The changes in the carrying value of goodwill by operating segment are as follows (in thousands):

	Commercial Banking	Consumer Banking	Wealth Management	Funds Management and Other	Total
Balance, December 31, 2016	272,196	39,023	71,520	66,160	448,899
Goodwill recognized during 2017	4,301	—	—	—	4,301
Sales of consolidated merchant banking investments during 2017	(5,219)	—	(25)	—	(5,244)
Adjustment ¹	41,992	4,435	19,207	(66,160)	(526)
Balance, December 31, 2017	313,270	43,458	90,702	—	447,430
Goodwill recognized during 2018 ²	—	—	—	601,833	601,833
Balance, December 31, 2018	\$ 313,270	\$ 43,458	\$ 90,702	\$ 601,833	\$ 1,049,263

¹ Goodwill from Mobank acquisition was not yet allocated to the segments as of December 31, 2016. Adjustment was made in 2017 for final purchase price adjustments and to allocate to the segments.

² Goodwill related to the CoBiz acquisition was not yet allocated to the operating segments as of December 31, 2018 and is included in Funds Management and Other above.

The annual goodwill evaluations for 2018 and 2017 did not indicate impairment for any reporting unit. Economic conditions did not indicate that impairment existed for any identifiable intangible assets and therefore no impairment evaluation was performed.

(7) Mortgage Banking Activities

Residential Mortgage Loan Production

The Company originates, markets and services conventional and government-sponsored residential mortgage loans. Generally, conforming fixed rate residential mortgage loans are held for sale in the secondary market and non-conforming and adjustable-rate residential mortgage loans are held for investment. The volume of mortgage loans originated for sale and secondary market prices are the primary drivers of originating and marketing revenue.

Residential mortgage loan commitments are generally outstanding for 60 to 90 days, which represents the typical period from commitment to originate a residential mortgage loan to when the closed loan is sold to an investor. Residential mortgage loan commitments are subject to both credit and interest rate risk. Credit risk is managed through underwriting policies and procedures, including collateral requirements, which are generally accepted by the secondary loan markets. Exposure to interest rate fluctuations is partially managed through forward sales of residential mortgage-backed securities and forward sales contracts. These latter contracts set the price for loans that will be delivered in the next 60 to 90 days.

The unpaid principal balance of residential mortgage loans held for sale, notional amounts of derivative contracts related to residential mortgage loan commitments and forward contract sales and their related fair values included in Mortgage loans held for sale on the Consolidated Balance Sheets were (in thousands):

	December 31, 2018		December 31, 2017	
	Unpaid Principal Balance/Notional	Fair Value	Unpaid Principal Balance/Notional	Fair Value
Residential mortgage loans held for sale	\$ 145,057	\$ 146,971	\$ 212,525	\$ 215,113
Residential mortgage loan commitments	160,848	5,378	222,919	6,523
Forward sales contracts	274,000	(3,128)	380,159	(258)
		<u>\$ 149,221</u>		<u>\$ 221,378</u>

No residential mortgage loans held for sale were 90 days or more past due or considered impaired as of December 31, 2018 or December 31, 2017. No credit losses were recognized on residential mortgage loans held for sale for the years ended December 31, 2018, 2017 and 2016.

Mortgage banking revenue was as follows (in thousands):

	Year Ended		
	2018	2017	2016
Production revenue:			
Net realized gains on sales of mortgage loans	\$ 36,379	\$ 45,128	\$ 68,947
Net change in unrealized gain on mortgage loans held for sale	(674)	2,031	(5,311)
Net change in the fair value of mortgage loan commitments	(1,145)	(3,210)	1,599
Net change in the fair value of forward sales contracts	(2,870)	(5,451)	4,393
Total mortgage production revenue	<u>31,690</u>	<u>38,498</u>	<u>69,628</u>
Servicing revenue	<u>66,097</u>	<u>66,221</u>	<u>64,286</u>
Total mortgage banking revenue	<u>\$ 97,787</u>	<u>\$ 104,719</u>	<u>\$ 133,914</u>

Mortgage production revenue includes gain (loss) on residential mortgage loans held for sale and changes in the fair value of derivative contracts not designated as hedging instruments related to residential mortgage loan commitments and forward sales contracts. Servicing revenue includes servicing fee income and late charges on loans serviced for others.

Residential Mortgage Servicing

The Company generally retains the right to service residential mortgage loans sold and may purchase mortgage servicing rights. The unpaid principal balance of loans serviced for others is the primary driver of servicing revenue.

The following represents a summary of mortgage servicing rights (Dollars in thousands):

	December 31,		
	2018	2017	2016
Number of residential mortgage loans serviced for others	132,463,000	136,528,000	139,340,000
Outstanding principal balance of residential mortgage loans serviced for others	\$ 21,658,335	\$ 22,046,632	\$ 21,997,568
Weighted average interest rate	3.99%	3.94%	3.97%
Remaining contractual term (in months)	293	297	301

Activity in capitalized mortgage servicing rights during the three years ended December 31, 2018 is as follows (in thousands):

Balance, December 31, 2015	\$ 218,605
Additions, net	71,405
Change in fair value due to loan runoff	(40,744)
Change in fair value due to market changes	(2,193)
Balance, December 31, 2016	247,073
Additions, net	39,149
Change in fair value due to loan runoff	(33,527)
Change in fair value due to market changes	172
Balance, December 31, 2017	252,867
Additions, net	35,247
Change in fair value due to loan runoff	(33,528)
Change in fair value due to market changes	4,668
Balance, December 31, 2018	\$ 259,254

Changes in the fair value of mortgage servicing rights due to market changes are included in Other operating revenue in the Consolidated Statements of Earnings. Changes in fair value due to loan runoff are included in Mortgage banking costs.

Mortgage servicing rights are not traded in active markets. Fair value is determined by discounting the projected net cash flows. Significant assumptions used to determine fair value considered to be significant unobservable inputs were as follows:

	December 31,	
	2018	2017
Discount rate – risk-free rate plus a market premium	9.90%	9.84%
Prepayment rate - based upon loan interest rate, original term and loan type	8.05% - 15.74%	8.72%-15.16%
Loan servicing costs – annually per loan based upon loan type:		
Performing loans	\$67 - \$93	\$65 - \$88
Delinquent loans	\$150 - \$500	\$150 - \$500
Loans in foreclosure	\$1,000 - \$4,000	\$1,000 - \$4,000
Primary/secondary mortgage rate spread	105 bps	105 bps
Escrow earnings rate – indexed to rates paid on deposit accounts with comparable average life	2.57%	2.24%

Changes in primary residential mortgage interest rates directly affect the prepayment speeds used in valuing our mortgage servicing rights. A separate third party model is used to estimate prepayment speeds based on interest rates, housing turnover rates, estimated loan curtailment, anticipated defaults and other relevant factors. The prepayment model is updated periodically for changes in market conditions and adjusted to better correlate with actual performance of BOK Financial's servicing portfolio.

The aging status of our mortgage loans serviced for others by investor at December 31, 2018 follows (in thousands):

	Current	Past Due			Total
		30 to 59 Days	60 to 89 Days	90 Days or More	
FHLMC	\$ 7,798,790	\$ 58,271	\$ 11,139	\$ 25,239	\$ 7,893,439
FNMA	6,458,561	63,321	12,413	20,858	6,555,153
GNMA	6,568,459	200,747	56,024	15,996	6,841,226
Other	362,268	4,297	81	1,871	368,517
Total	\$ 21,188,078	\$ 326,636	\$ 79,657	\$ 63,964	\$ 21,658,335

(8) Deposits

Interest expense on deposits is summarized as follows (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Transaction deposits	\$ 65,859	\$ 28,627	\$ 13,906
Savings	439	359	386
Time:			
Certificates of deposits under \$100,000	5,751	7,702	8,776
Certificates of deposits \$100,000 and over	19,739	12,393	10,123
Other time deposits	3,729	4,722	7,303
Total time	29,219	24,817	26,202
Total	\$ 95,517	\$ 53,803	\$ 40,494

The aggregate amounts of time deposits in denominations of \$250,000 or more at December 31, 2018 and 2017 were \$756 million and \$797 million, respectively.

Time deposit maturities are as follows: 2019 – \$1.3 billion, 2020 – \$262 million, 2021 – \$98 million, 2022 – \$115 million, 2023 – \$130 million and \$211 million thereafter.

The aggregate amount of overdrawn customer transaction deposits that have been reclassified as loan balances was \$27 million at December 31, 2018 and \$5.9 million at December 31, 2017.

(9) Other Borrowings

Information relating to other borrowings is summarized as follows (dollars in thousands):

	As of December 31, 2018		Year Ended December 31, 2018		Maximum Outstanding At Any Month End
	Balance	Rate	Average Balance	Rate	
Parent company and other non-bank subsidiaries:					
Other borrowings	\$ 5,207	1.57%	\$ 2,660	1.35%	\$ 5,335
Subordinated debentures	275,913	5.34%	177,884	5.52%	275,913
Total parent company and other non-bank subsidiaries	281,120		180,544	5.46%	
Subsidiary banks:					
Funds purchased	402,450	2.34%	419,322	1.89%	949,531
Repurchase agreements	615,961	0.36%	464,582	0.28%	615,961
Other borrowings:					
Federal Home Loan Bank advances	6,100,000	2.65%	6,207,142	2.06%	6,500,000
GNMA repurchase liability	15,552	4.43%	14,783	4.47%	16,529
Other	3,631	4.80%	11,856	4.45%	15,096
Total other borrowings	6,119,183		6,233,781	2.07%	
Subordinated debentures	—	—%	—	—%	—
Total Subsidiary banks	7,137,594		7,117,685	1.94%	
Total other borrowed funds	\$ 7,418,714		\$ 7,298,229	2.03%	

	As of December 31, 2017		Year Ended December 31, 2017		Maximum Outstanding At Any Month End
	Balance	Rate	Average Balance	Rate	
Parent company and other non-bank subsidiaries:					
Other borrowings	\$ —	—%	\$ 935	11.11%	\$ 3,104
Subordinated debentures	144,677	5.60%	147,954	5.57%	151,875
Total parent company and other non-bank subsidiaries	144,677		148,889	5.65%	
Subsidiary banks:					
Funds purchased	58,628	1.00%	58,064	0.73%	80,967
Repurchase agreements	516,335	0.17%	433,791	0.10%	536,094
Other borrowings:					
Federal Home Loan Bank advances	5,100,000	1.47%	5,882,466	1.13%	6,200,000
GNMA repurchase liability	19,947	4.22%	20,509	4.59%	24,139
Other	14,950	2.61%	15,382	2.38%	15,506
Total other borrowings	5,134,897		5,918,357	1.14%	
Subordinated debentures	—	—%	—	—%	—
Total Subsidiary banks	5,709,860		6,410,212	1.07%	
Total other borrowed funds	\$ 5,854,537		\$ 6,559,101	1.18%	

	As of		Year Ended		
	December 31, 2016		December 31, 2016		
	Balance	Rate	Average Balance	Rate	Maximum Outstanding At Any Month End
Parent company and other non-bank subsidiaries:					
Other borrowings	\$ 1,092	8.27%	\$ 2,073	16.11%	\$ 3,157
Subordinated debentures	151,857	5.49%	75,039	5.57%	151,857
Total parent company and other non-bank subsidiaries	152,949		77,112	5.86%	
Subsidiary banks:					
Funds purchased	57,929	0.38%	78,222	0.24%	567,103
Repurchase agreements	668,661	0.02%	589,145	0.04%	668,661
Other borrowings:					
Federal Home Loan Bank advances	4,800,000	0.72%	5,985,656	0.55%	6,500,000
GNMA repurchase liability	22,471	4.26%	15,637	4.74%	22,471
Other	15,292	2.66%	15,670	2.41%	15,797
Total other borrowings	4,837,763		6,016,963	0.57%	
Subordinated debentures	—	—%	140,414	1.35%	226,434
Total Subsidiary banks	5,564,353		6,824,744	0.54%	
Total other borrowed funds	\$ 5,717,302		\$ 6,901,856	0.60%	

Aggregate annual principal repayments at December 31, 2018 are as follows (in thousands):

	Parent Company and Other Non-bank Subsidiaries	Subsidiary Banks
2019	\$ —	\$ 7,134,538
2020	—	575
2021	—	575
2022	—	575
2023	—	625
Thereafter	281,120	706
Total	\$ 281,120	\$ 7,137,594

Funds purchased are unsecured and generally mature within one day to ninety days from the transaction date. Securities repurchase agreements are recorded as secured borrowings that generally mature within ninety days and are secured by certain available for sale securities.

Additional information relating to securities sold under agreements to repurchase and related liabilities at December 31, 2018 and 2017 is as follows (dollars in thousands):

Security Sold/Maturity	December 31, 2018			
	Amortized Cost	Fair Value	Repurchase Liability ¹	Average Rate
U.S. government agency mortgage-backed securities:				
Overnight ¹	\$ 636,864	\$ 628,229	\$ 615,961	0.36%
Long-term	—	—	—	—%
Total Agency Securities	\$ 636,864	\$ 628,229	\$ 615,961	0.36%

Security Sold/Maturity	December 31, 2017			
	Amortized Cost	Fair Value	Repurchase Liability ¹	Average Rate
U.S. government agency mortgage-backed securities:				
Overnight ¹	\$ 525,452	\$ 523,914	\$ 516,335	0.17%
Long-term	—	—	—	—%
Total Agency Securities	\$ 525,452	\$ 523,914	\$ 516,335	0.17%

¹ BOK Financial maintains control over the securities underlying overnight repurchase agreements and generally transfers control over securities underlying longer-term dealer repurchase agreements to the respective counterparty.

Borrowings from the Federal Home Loan Banks are used for funding purposes. In accordance with policies of the Federal Home Loan Banks, BOK Financial has granted a blanket pledge of eligible assets (generally unencumbered U.S. Treasury and residential mortgage-backed securities, 1-4 family loans and multifamily loans) as collateral for these advances. The Federal Home Loan Banks have issued letters of credit totaling \$266 million to secure BOK Financial's obligations to depositors of public funds. The unused credit available to BOK Financial at December 31, 2018 pursuant to the Federal Home Loan Bank's collateral policies is \$1.9 billion.

In 2016, BOK Financial issued \$150 million of subordinated debt that will mature on June 30, 2056. Interest on this debt bears an interest rate of 5.375%, payable quarterly. On June 30, 2021, BOK Financial will have the option to redeem the debt at the principal amount plus accrued interest, subject to regulatory approval.

As a result of the acquisition of CoBiz Financial, we obtained \$60 million of subordinated debt issued in June 2015 that will mature on June 25, 2030. This debt bears interest at the rate of 5.625% through June 2025 and thereafter, the notes will bear interest at an annual floating rate equal to three-month LIBOR plus 3.17%. The debt contains a call option that allows for repayment prior to contractual maturity. The call option is available on June 25, 2025 and quarterly thereafter at 100% of the principal amount.

Also through CoBiz Financial, we acquired junior subordinated debentures split across three issuance tranches. Junior subordinated debentures of \$21 million will mature September 17, 2033 and bear an interest rate of three-month LIBOR plus 2.95% that resets quarterly. Junior subordinated debentures of \$31 million will mature on July 23, 2034 and bear an interest rate of three-month LIBOR plus 2.60% that resets quarterly. Junior subordinated debentures of \$20 million will mature on September 30, 2035 and bear an interest rate of three-month LIBOR plus 1.45% that resets quarterly. The junior subordinated debentures are subject to early redemption prior to maturity.

In conjunction with the acquisition of MBT, BOK Financial assumed \$7.2 million of variable rate subordinated trust preferred debt. Interest was payable quarterly at three-month LIBOR plus 2.95% on \$3.1 million and three-month LIBOR plus 1.82% on \$4.1 million. This trust preferred debt was redeemed during 2017.

BOK Financial Securities, Inc. may borrow funds from Pershing, LLC ("Pershing"), a clearing broker/dealer and a wholly owned subsidiary of Bank of New York Mellon, for the purposes of financing securities purchases or to facilitate funding of investment banking activities, on terms to be negotiated at the time of the borrowing. BOK Financial Securities, Inc. had no borrowings from Pershing outstanding at December 31, 2018 or December 31, 2017.

In 2007, BOKF, NA issued \$250 million of subordinated debt due May 15, 2017. Interest on this debt was based upon a fixed rate of 5.75% through May 14, 2012 and is based on a floating rate of three-month LIBOR plus 0.69% thereafter. The outstanding balance was called during 2016.

The Company has a liability related to the repurchase of certain delinquent residential mortgage loans previously sold into GNMA mortgage pools. Interest is payable at rates contractually due to investors.

(10) Federal and State Income Taxes

The Tax Cuts and Jobs Act (the "Tax Reform Act"), which was enacted on December 22, 2017, reduced the federal corporate tax rate from 35% to 21% for periods beginning January 1, 2018. We completed our accounting during 2018 for uncertainties that resulted from the Tax Reform Act.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of deferred tax assets and liabilities are as follows (in thousands):

	December 31,	
	2018	2017
Deferred tax assets:		
Available for sale securities mark to market	\$ 24,441	\$ 12,083
Share-based compensation	4,434	7,598
Credit loss allowances	49,804	58,666
Valuation adjustments	9,619	8,102
Deferred compensation	25,608	12,215
Unearned fees	9,814	9,265
Purchased loan discount	27,283	—
Other	31,812	30,859
Total deferred tax assets	182,815	138,788
Deferred tax liabilities:		
Depreciation	13,901	15,817
Mortgage servicing rights	61,844	63,112
Lease financing	10,040	9,973
Acquired identifiable intangible	28,620	—
Other	32,954	34,880
Total deferred tax liabilities	147,359	123,782
Net deferred tax assets	\$ 35,456	\$ 15,006

No valuation allowance was necessary on deferred tax assets as of December 31, 2018 and 2017.

The significant components of the provision for income taxes attributable to continuing operations for BOK Financial are shown below (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Current income tax expense:			
Federal	\$ 103,748	\$ 141,607	\$ 107,379
State	15,253	14,592	11,028
Total current income tax expense	119,001	156,199	118,407
Deferred income tax expense:			
Federal	(190)	25,525	(11,340)
State	250	869	(690)
Total deferred income tax expense	60	26,394	(12,030)
Total income tax expense	\$ 119,061	\$ 182,593	\$ 106,377

The reconciliations of income attributable to continuing operations at the U.S. federal statutory tax rate to income tax expense are as follows (in thousands):

	Year Ended December 31,		
	2018	2017	2016
Amount:			
Federal statutory tax	\$ 118,752	\$ 181,397	\$ 118,530
Tax exempt revenue	(8,311)	(12,402)	(10,544)
Effect of state income taxes, net of federal benefit	12,430	10,701	6,478
Utilization of tax credits, net of proportional amortization of low-income housing limited partnership investments	(4,559)	(6,811)	(6,256)
Share-based compensation	(2,105)	(2,817)	—
Implementation of Tax Reform Act	(1,728)	11,672	—
Deposit insurance	3,099	—	—
Other, net	1,483	853	(1,831)
Total income tax expense	\$ 119,061	\$ 182,593	\$ 106,377

	Year Ended December 31,		
	2018	2017	2016
Percent of pretax income:			
Federal statutory tax	21.0%	35.0%	35.0%
Tax exempt revenue	(1.5)	(2.4)	(3.1)
Effect of state income taxes, net of federal benefit	2.2	2.0	1.9
Utilization of tax credits, net of proportional amortization of low-income housing limited partnership investments	(0.8)	(1.3)	(1.8)
Share-based compensation	(0.4)	(0.5)	—
Implementation of Tax Reform Act	(0.3)	2.3	—
Deposit insurance	0.5	—	—
Other, net	0.4	0.1	(0.6)
Total	21.1%	35.2%	31.4%

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows (in thousands):

	2018	2017	2016
Balance as of January 1	\$ 18,110	\$ 15,841	\$ 13,232
Additions for tax for current year positions	2,649	4,645	5,640
Settlements during the period	—	—	—
Lapses of applicable statute of limitations	(1,890)	(2,376)	(3,031)
Balance as of December 31	\$ 18,869	\$ 18,110	\$ 15,841

Of the above unrecognized tax benefits, \$12.9 million, if recognized, would have affected the effective tax rate.

BOK Financial recognizes interest and penalties accrued related to unrecognized tax benefits in income tax expense. The Company recognized \$1.7 million for 2018, \$1.2 million for 2017 and \$1.0 million for 2016 in interest and penalties. The Company had approximately \$5.0 million and \$4.0 million accrued for the payment of interest and penalties at December 31, 2018 and 2017, respectively. Federal statutes remain open for federal tax returns filed in the previous three reporting periods. Various state income tax statutes remain open for the previous three to six reporting periods.

(11) Employee Benefits

BOK Financial sponsors a defined benefit cash balance Pension Plan for all employees who satisfy certain age and service requirements. Pension Plan benefits were curtailed as of April 1, 2006. No participants may be added to the plan and no additional service benefits will be accrued. During 2018 and 2017, interest accrued on employees' account balances at a variable rate tied to the five-year trailing average of five-year U.S. Treasury securities plus 1.5%. The rate has a floor of 3.0% and a ceiling of 5.0%. The 2018 quarterly variable rates ranged from 3.00% to 3.24%.

The following table presents information regarding this plan (in thousands):

	December 31,	
	2018	2017
Change in projected benefit obligation:		
Projected benefit obligation at beginning of year	\$ 30,897	\$ 34,964
Interest cost	973	1,153
Actuarial loss (gain)	(1,417)	223
Benefits paid	(6,033)	(5,443)
Projected benefit obligation at end of year ^{1,2}	\$ 24,547	\$ 30,897
Change in plan assets:		
Plan assets at fair value at beginning of year	\$ 40,419	\$ 41,769
Actual return on plan assets	(804)	4,093
Benefits paid	(6,033)	(5,443)
Plan assets at fair value at end of year	\$ 33,582	\$ 40,419
Funded status of the plan	\$ 9,035	\$ 9,522
Components of net periodic benefit:		
Interest cost	\$ 973	\$ 1,153
Expected return on plan assets	(2,065)	(2,041)
Other	509	184
Net periodic benefit cost (credit)	\$ (583)	\$ (704)

¹ Projected benefit obligation equals accumulated benefit obligation.

² Projected benefit obligation is based on January 1 measurement date.

Weighted-average assumptions as of December 31:	2018	2017
Discount rate	4.10%	3.30%
Expected return on plan assets	5.50%	5.50%

As of December 31, 2018, expected future benefit payments related to the Pension Plan were as follows (in thousands):

2019	\$ 3,562
2020	2,257
2021	2,194
2022	2,299
2023	2,495
Thereafter	19,175
Total estimated future benefit payments	\$ 31,982

Assets of the Pension Plan consist primarily of shares in the Cavanal Hill Active Core Fund. The stated objective of this fund is to provide an attractive total return with a well-balanced mix of equities and bonds. The typical portfolio mix is approximately 60% equities and 40% bonds. The net asset value of shares in the Cavanal Hill Funds is reported daily based on market quotations for the Fund's securities. Management considers the Fund's recent and long-term performance as indicators when setting the expected return on plan assets. The maximum tax deductible Pension Plan contribution for 2018 was \$6.6 million. No minimum contribution was required for 2018, 2017 or 2016.

Employee contributions to the Thrift Plan are eligible for Company matching equal to 6% of base compensation, as defined in the plan. The Company-provided matching contribution rates range from 50% for employees with less than 4 years of service to 200% for employees with 15 or more years of service. Additionally, a maximum Company-provided, non-elective annual contribution of up to \$750 per participant is provided for employees whose annual base compensation is less than \$40,000. Participants may direct investments in their accounts to a variety of options, including a BOK Financial common stock fund and Cavanal Hill funds. Employer contributions, which are invested in accordance with the participant's investment options, vest over five years. Thrift Plan expenses were \$25.1 million for 2018, \$22.8 million for 2017 and \$22.4 million for 2016.

(12) Share-Based Compensation Plans

The shareholders and Board of Directors of BOK Financial have approved various share-based compensation plans. An independent compensation committee of the Board of Directors determines the number of awards granted to the Chief Executive Officer and other senior executives. Share-based compensation is granted to other officers and employees as determined by the Chief Executive Officer.

The following table presents stock options outstanding under these plans (in thousands, except for per share data):

	Number	Weighted-Average Exercise Price	Aggregate Intrinsic Value
Options outstanding at:			
December 31, 2016	218,524	51.95	6,793
December 31, 2017	117,551	53.26	4,592
December 31, 2018	63,058	\$ 54.89	\$ 1,163
Options vested at:			
December 31, 2016	93,117	\$ 46.22	\$ 3,429
December 31, 2017	51,286	48.62	2,241
December 31, 2018	33,573	53.09	679

No options have been awarded since 2013. At December 31, 2018, the weighted average remaining contractual life of options outstanding was 2.12 years and the weighted average remaining contractual life of vested options was 1.04 years. The aggregate intrinsic value of options exercised was \$2.3 million for 2018, \$3.5 million for 2017 and \$6.2 million for 2016.

The Company also awards non-vested shares to certain officers and employees. Vesting of all non-vested shares is subject to service requirements. Additionally, vesting of certain non-vested shares is subject to performance criteria based on changes in the Company's earnings per share relative to defined peers. The following represents a summary of the non-vested stock awards for the three years ended December 31, 2018 (in thousands):

	Shares	Weighted Average Grant Date Fair Value
Non-vested at January 1, 2016	791,109	
Granted	256,670	\$55.35
Vested	(213,941)	\$55.87
Forfeited	(47,132)	\$57.86
Non-vested at December 31, 2016	786,706	
Granted	177,807	\$86.95
Vested	(194,419)	\$63.07
Forfeited	(102,991)	\$78.70
Non-vested at December 31, 2017	667,103	
Granted	150,419	\$85.58
Vested	(242,215)	\$74.85
Forfeited	(47,700)	\$75.68
Non-vested at December 31, 2018	527,607	

Compensation expense recognized on non-vested shares totaled \$3.6 million for 2018, \$23.2 million for 2017 and \$10.2 million for 2016. Unrecognized compensation cost of non-vested shares totaled \$14.2 million at December 31, 2018. We expect to recognize compensation expense of \$9.7 million in 2019, \$4.3 million in 2020, and \$138 thousand in 2021.

Compensation cost for 189,179 non-vested shares is variable based on the current fair value of BOK Financial common shares. Vesting of 188,827 non-vested shares may be increased or decreased based on performance criteria defined in the plan documents.

(13) Related Parties

In compliance with applicable banking regulations, the Company may extend credit to certain executive officers, directors, principal shareholders and their affiliates (collectively referred to as "related parties") in the ordinary course of business. The Company's loans to related parties do not involve more than the normal credit risk.

Activity in loans to related parties is summarized as follows (in thousands):

	Year Ended December 31,	
	2018	2017
Beginning balance	\$ 110,246	\$ 136,945
Advances	1,479,735	1,559,291
Payments	(1,514,841)	(1,585,865)
Adjustments ¹	125	(125)
Ending balance	\$ 75,265	\$ 110,246

¹ Adjustments generally consist of changes in status as a related party.

As defined by banking regulations, loan commitments and equity investments from the subsidiary banks to a single affiliate may not exceed 10% of unimpaired capital and surplus while loan commitments and equity investments to all affiliates may not exceed 20% of unimpaired capital and surplus. All loans to affiliates must be fully secured by eligible collateral. At December 31, 2018, loan commitments and equity investments were limited to \$310 million to a single affiliate and \$621 million to all affiliates. The largest loan commitment and equity investment to a single affiliate was \$253 million and the aggregate loan commitments and equity investments to all affiliates were \$313 million. The largest outstanding amount to a single affiliate at December 31, 2018 was \$883 thousand and the total outstanding amounts to all affiliates were \$883 thousand. At December 31, 2017, total loan commitments and equity investments to all affiliates were \$323 million and the total outstanding amounts to all affiliates were \$16 million.

We have \$4.7 million of impaired loans from a related party with no allowance as the fair value of the collateral exceeds the outstanding principal balance at December 31, 2018. There were no nonaccruing or impaired related party loans outstanding at December 31, 2017.

Certain related parties are customers of the Company for services other than loans, including consumer banking, corporate banking, risk management, wealth management, brokerage and trading, or fiduciary/trust services. The Company engages in transactions with related parties in the ordinary course of business in compliance with applicable regulations.

The Company rents office space in facilities owned by affiliates of Mr. Kaiser, its Chairman and principal shareholder. Lease payments totaled \$683 thousand for 2018, \$1.0 million for 2017 and \$1.1 million for 2016. The Company also invested \$3.1 million and \$580 thousand during the years ended 2018 and 2017, respectively, in QRC Valve Distributors, which is indirectly owned by Mr. Kaiser.

QuikTrip Corporation has entered into a fee sharing agreement with TransFund, BOKF's electronic funds transfer network ("TransFund"), respecting transactions completed at TransFund automated teller machines placed in QuikTrip locations. In 2018, BOKF paid QuikTrip approximately \$9.2 million pursuant to this agreement. A BOK Financial director, is Chief Executive Officer, Chairman, and a significant shareholder of QuikTrip Corporation.

Cavanal Hill Investment Management, Inc., a wholly-owned subsidiary of BOKF, NA, is the administrator to and investment advisor for the Cavanal Hill Funds (the "Funds"), a diversified, open-ended investment company established as a business trust under the Investment Company Act of 1940 (the "1940 Act"). BOKF, NA is custodian and Cavanal Hill Distributors, Inc. is distributor for the Funds. The Funds' products are offered to customers, employee benefit plans, trusts and the general public in the ordinary course of business. Approximately 89% of the Funds' assets of \$3.4 billion are held for the Company's clients. A Company executive officer serves on the Funds' board of trustees and officers of BOKF, NA serve as president and secretary of the Funds. A majority of the members of the Funds' board of trustees are, however, independent of the Company and the Funds are managed by its board of trustees.

(14) Commitments and Contingent Liabilities

Litigation Contingencies

As a member of Visa, BOK Financial is obligated for a proportionate share of certain covered litigation losses incurred by Visa under a retrospective responsibility plan. A contingent liability was recognized for the Company's share of Visa's covered litigation liabilities. Visa funded an escrow account to cover litigation claims, including covered litigation losses under the retrospective responsibility plan, with proceeds from its initial public offering in 2008 and from available cash.

BOK Financial currently owns 252,233 Visa Class B shares which are convertible into 411,089 shares of Visa Class A shares after the final settlement of all covered litigation. Class B shares may be diluted in the future if the escrow fund is not adequate to cover future covered litigation costs. Therefore, no value has been currently assigned to the Class B shares and no value may be assigned until the Class B shares are converted into a known number of Class A shares.

On June 24, 2015, BOKF, NA received a complaint alleging that an employee had colluded with a bond issuer and an individual in misusing revenues pledged to municipal bonds for which BOKF, NA served as trustee under the bond indenture. The Company conducted an investigation and concluded that employees in one of its Corporate Trust offices had, with respect to a single group of affiliated bond issuances, violated Company policies and procedures by waiving financial covenants, granting forbearances and accepting without disclosure to the bondholders, debt service payments from sources other than pledged revenues. The relationship manager was terminated. The Company reported the circumstances to, and cooperated with an investigation by, the Securities and Exchange Commission ("SEC").

On December 28, 2015, in an action brought by the SEC, the United States District Court for the District of New Jersey entered a judgment against the principals involved in issuing the bonds, precluding the principals from denying the alleged violations of the federal securities laws and requiring the principals to pay all outstanding principal, accrued interest, and other amounts required under the bond documents (now estimated to be approximately \$40 million, less the value of the facilities securing repayment of the bonds), subject to oversight by a court appointed monitor. The obligation of the principal to pay all principal and interest on the bonds is non-dischargeable in bankruptcy.

On September 7, 2016, BOKF, NA agreed, and the SEC entered, a consent order finding that the BOKF, NA had violated Section 17(a) of the Securities Act of 1933 and Section 10(b) of the Securities Exchange Act and requiring the BOKF, NA to disgorge \$1,067,721 of fees and pay a civil penalty of \$600,000. The BOKF, NA has disgorged the fees and paid the penalty.

On August 26, 2016, the BOKF, NA was sued in the United States District Court for New Jersey by two bondholders in a putative class action on behalf of all holders of the bonds alleging the BOKF, NA participated in the fraudulent sale of securities by the principals. On September 14, 2016, the BOKF, NA was sued in the District Court of Tulsa County, Oklahoma by 19 bondholders alleging the BOKF, NA participated in the fraudulent sale of securities by the principals. Two separate small groups of bondholders have filed arbitration complaints with the Financial Institutions Regulatory Association respecting the bonds and other bonds for which the BOKF, NA served as indenture trustee. Management has been advised by counsel that the BOKF, NA has valid defenses to the claims.

The time by which the principal must perform the Court ordered payment plan currently expires on March 31, 2019. BOKF, NA expects the Court ordered payment plan to be continued from time to time until the principals complete the payment of the bonds, though there is no assurance that it will be. Accordingly, no loss is probable at this time and no provision for loss has been made. If the payment plan does not result in payment of the bonds, a loss could become probable. A reasonable estimate cannot be made at this time though the amount could be material to the Company.

On March 5, 2018, BOKF, NA was sued in the Fulton, Georgia County District Court by the administratrix of a deceased resident who had sued for and obtained a judgment for wrongful death against one of the operators of a nursing home financed by one of the bonds which are the subject of the litigation discussed above. The judgment is alleged to total approximately \$8 million in principal and interest at this time. Plaintiff alleges that BOKF, in its capacity as indenture trustee for the bonds, colluded with the borrower and others to defraud creditors of the nursing home by misleading the public about the solvency of the nursing home. Plaintiff alleges that this conduct has prevented her from collecting on her judgment. BOKF, NA is advised by counsel that the BOKF, NA has valid defenses to the plaintiffs' claims and no loss is probable.

On March 14, 2017, BOKF, NA was sued in the United States District Court for the Northern District of Oklahoma by bondholders in a second putative class action representing a different set of municipal securities. The bondholders in this second action allege two individuals purchased facilities from the principals who are the subject of the SEC New Jersey proceedings by means of the fraudulent sale of \$60 million of municipal securities for which BOKF, NA also served as indenture trustee. The bondholders allege BOKF, NA failed to disclose that the seller of the purchased facilities had engaged in the conduct complained of in the New Jersey action. BOKF, NA properly performed all duties as indenture trustee of this second set of municipal securities, timely commenced proceedings against the issuer of the securities when default occurred, is cooperating with the SEC in actions against the two principals, is not a target of the SEC proceedings, and has been advised by counsel that BOKF, NA has valid defenses to the claims of these bondholders. Management is advised by counsel that a loss is not probable and that the loss, if any, cannot be reasonably estimated.

On March 7, 2017, a plaintiff filed a putative class action in the United States District Court for the Northern District of Texas alleging an extended overdraft fee charged by BOKF, NA is interest and exceeds permitted rates. This action makes the same allegations as a putative class action that was dismissed by the United States District Court for the Northern District of Oklahoma on October 19, 2015. On August 22, 2018, a plaintiff filed a second putative class action in the United States District Court for New Mexico making the same allegations as the Texas action. On September 18, 2018, the District Court dismissed the Texas action. Management is advised by counsel that a loss is not probable in the New Mexico action or the Texas action and that the loss, if any, cannot be reasonably estimated.

On July 6, 2018, a plaintiff served a petition in a putative class action in the Oklahoma District Court for Tulsa County Oklahoma alleging BOKF NA breached its Demand Deposit Agreements by charging overdraft and not sufficient funds fees to deposit accounts on the day of the transaction triggering the fee and by the bank's debit hold process causing overdraft fees. Management is advised by counsel that a loss is not probable and that the loss, if any, cannot be reasonably estimated.

In the ordinary course of business, BOK Financial and its subsidiaries are subject to legal actions and complaints. Management believes, based upon the opinion of counsel, that the actions and liability or loss, if any, resulting from the final outcomes of the proceedings, will not have a material effect on the Company's financial condition, results of operations or cash flows.

Alternative Investment Commitments

The Company sponsors two private equity funds and invests in several tax credit entities and other funds as permitted by banking regulations. Consolidation of these investments is based on the variable interest model.

BOKF Equity, LLC, an indirect wholly-owned subsidiary, is the general partner of two consolidated private equity funds ("the Funds"). The Funds provide alternative investment opportunities to certain customers, some of which are related parties, through unaffiliated limited partnerships. Substantially all committed capital invested by these Funds has been returned to the partners.

Consolidated tax credit entities represented the Company's interest in entities earning federal new market tax credits related to qualifying loans. These entities were liquidated in 2018.

The Company also has interests in various alternative investments generally consisting of unconsolidated limited partnership interests in entities for which investment return is in the form of low income housing tax credits or other investments in merchant banking activities. The Company is prohibited by banking regulations from controlling or actively managing the activities of these investments and the Company's maximum exposure to loss is restricted to its investment balance. The Company's obligation to fund alternative investments is included in Other liabilities in the Consolidated Balance Sheets.

A summary of consolidated and unconsolidated alternative investments as of December 31, 2018 and December 31, 2017 is as follows (in thousands):

	December 31, 2018				
	Loans	Other Assets	Other Liabilities	Other Borrowings	Non-controlling Interests
Consolidated:					
Private equity funds	\$ —	\$ 9,516	\$ —	\$ —	\$ 8,644
Tax credit entities	—	—	—	—	—
Other	—	17,602	1,448	5,207	2,292
Total consolidated	\$ —	\$ 27,118	\$ 1,448	\$ 5,207	\$ 10,936
Unconsolidated:					
Tax credit entities	\$ 58,981	\$ 165,567	\$ 53,198	\$ —	\$ —
Other	—	62,406	20,687	—	—
Total unconsolidated	\$ 58,981	\$ 227,973	\$ 73,885	\$ —	\$ —

	December 31, 2017				
	Loans	Other Assets	Other Liabilities	Other Borrowings	Non-controlling Interests
Consolidated:					
Private equity funds	\$ —	\$ 14,783	\$ —	\$ —	\$ 11,927
Tax credit entities	10,000	10,964	—	10,964	10,000
Other	—	1,040	—	—	1,040
Total consolidated	\$ 10,000	\$ 26,787	\$ —	\$ 10,964	\$ 22,967
Unconsolidated:					
Tax credit entities	\$ 52,852	\$ 153,506	\$ 47,859	\$ —	\$ —
Other	—	38,397	22,968	—	—
Total unconsolidated	\$ 52,852	\$ 191,903	\$ 70,827	\$ —	\$ —

Other Commitments and Contingencies

Cavalan Hill Funds' assets include U.S. Treasury and government securities money market funds. Assets of these funds consist of highly-rated, short-term obligations of the U.S. Treasury and Agencies. The net asset value of units in these funds was \$1.00 at December 31, 2018. An investment in these funds is not insured by the Federal Deposit Insurance Corporation or guaranteed by BOK Financial or any of its subsidiaries. BOK Financial may, but is not obligated to purchase assets from these funds to maintain the net asset value at \$1.00. No assets were purchased from the funds in 2018 or 2017.

Total rent expense for BOK Financial was \$28.5 million in 2018, \$27.5 million in 2017 and \$25.8 million in 2016. At December 31, 2018, future minimum lease payments for premises under operating leases were as follows: \$25.8 million in 2019, \$24.8 million in 2020, \$21.3 million in 2021, \$15.2 million in 2022, \$13.0 million in 2023 and \$78.6 million thereafter. BOKF, NA is obligated under a long-term lease for its bank premises in downtown Tulsa. The lease term, which began November 1, 1976, is for fifty-seven years with an option to terminate in 2024 with a two-year prior written notice. Premises leases may include options to renew at then current market rates and may include escalation provisions based upon changes in consumer price index or similar benchmarks.

The Federal Reserve Bank requires member banks to maintain certain minimum average cash balances. Member banks may satisfy reserve balance requirements through holdings of vault cash and balances maintained directly with a Federal Reserve Bank. The combined average balance of vault cash and balances held at the Federal Reserve Bank was \$1.2 billion for the year ended December 31, 2018 and \$1.9 billion for the year ended December 31, 2017.

(15) Shareholders Equity

Preferred Stock

One billion shares of preferred stock with a par value of \$0.00005 per share are authorized. The Series A Preferred Stock has no voting rights except as otherwise provided by Oklahoma corporate law and may be converted into one share of Common Stock for each 36 shares of Series A Preferred Stock at the option of the holder. Dividends are cumulative at an annual rate of ten percent of the \$0.06 per share liquidation preference value when declared and are payable in cash. Aggregate liquidation preference is \$15 million. No Series A Preferred Stock was outstanding in 2018, 2017 or 2016.

Common Stock

Common stock consists of 2.5 billion authorized shares with a \$0.00006 par value. Holders of common shares are entitled to one vote per share at the election of the Board of Directors and on any question arising at any shareholders' meeting and to receive dividends when and as declared. Additionally, regulations restrict the ability of national banks and bank holding companies to pay dividends.

Subsidiary Banks

The amounts of dividends that BOK Financial's subsidiary banks can declare and the amounts of loans the subsidiary banks can extend to affiliates are limited by various federal banking regulations and state corporate law. Generally, dividends declared during a calendar year are limited to net profits, as defined, for the year plus retained profits for the preceding two years. The amounts of dividends are further restricted by minimum capital requirements.

Regulatory Capital

BOK Financial and the subsidiary banks are subject to various capital requirements administered by the federal banking agencies. Failure to meet minimum capital requirements can initiate certain mandatory and additional discretionary actions by regulators that could have a material effect on BOK Financial's operations. These capital requirements include quantitative measures of assets, liabilities and certain off-balance sheet items. The capital standards are also subject to qualitative judgments by the regulators.

New capital rules were effective for BOK Financial on January 1, 2015. Components of these rules will phase in through January 1, 2019. A bank falling below the minimum capital requirements, including the capital conservation buffer, would be subject to regulatory restrictions on capital distributions (including but not limited to dividends and share repurchases) and executive bonus payments. For a banking institution to qualify as well capitalized, Common Equity Tier 1, Tier I, Total and Leverage capital ratios must be at least 6.5%, 8%, 10% and 5%, respectively. Tier I capital consists primarily of common stockholders' equity, excluding unrealized gains or losses on available for sale securities, less goodwill, core deposit premiums and certain other intangible assets. Total capital consists primarily of Tier I capital plus preferred stock, subordinated debt and allowances for credit losses, subject to certain limitations. The subsidiary banks exceeded the regulatory definition of well capitalized as of December 31, 2018 and December 31, 2017.

A summary of regulatory capital minimum requirements and levels follows (dollars in thousands):

	Minimum Capital Requirement	Capital Conservation Buffer¹	Minimum Capital Requirement Including Capital Conservation Buffer	Well Capitalized Bank Requirement	December 31, 2018		December 31, 2017	
Common Equity Tier 1 Capital (to Risk Weighted Assets):								
Consolidated	4.50%	2.50%	7.00%	N/A	\$ 3,356,524	10.92%	\$ 3,074,981	12.05 %
BOKF, NA	4.50%	N/A	4.50%	6.50%	2,894,119	10.50%	2,870,694	11.34 %
CoBiz Bank ²	4.50%	N/A	4.50%	6.50%	317,944	10.65%	399,768	12.19 %
Tier I Capital (to Risk Weighted Assets):								
Consolidated	6.00%	2.50%	8.50%	N/A	\$ 3,356,524	10.92%	\$ 3,074,981	12.05 %
BOKF, NA	6.00%	N/A	6.00%	8.00%	2,894,119	10.50%	2,870,694	11.34 %
CoBiz Bank ²	6.00%	N/A	6.00%	8.00%	317,944	10.65%	399,768	12.19 %
Total Capital (to Risk Weighted Assets):								
Consolidated	8.00%	2.50%	10.50%	N/A	\$ 3,841,684	12.50%	\$ 3,455,709	13.54 %
BOKF, NA	8.00%	N/A	8.00%	10.00%	3,103,366	11.26%	3,105,117	12.27 %
CoBiz Bank ²	8.00%	N/A	8.00%	10.00%	382,944	12.83%	434,012	13.23 %
Leverage (Tier I Capital to Average Assets):								
Consolidated	4.00%	N/A	4.00%	N/A	\$ 3,356,524	8.96%	\$ 3,074,981	9.31 %
BOKF, NA	4.00%	N/A	4.00%	5.00%	2,894,119	8.56%	2,870,694	8.73 %
CoBiz Bank ²	4.00%	N/A	4.00%	5.00%	317,944	8.25%	399,768	10.47 %

¹ Capital conservation buffer is effective January 1, 2016 and is phased in through 2019. The phased in capital conservation buffer was 1.875% at December 31, 2018 and 1.25% at December 31, 2017. The fully phased in requirement of 2.50% is included in the table above.

² CoBiz Bank was acquired by BOK Financial effective October 1, 2018.

Accumulated Other Comprehensive Income (Loss)

AOCI includes unrealized gains and losses on available for sale ("AFS") securities and non-credit related unrealized losses on AFS securities for which an other-than-temporary impairment has been recorded in earnings. AOCI also includes unrealized gains on AFS securities that were transferred from AFS to investment securities in 2011. Such amounts were amortized over the estimated remaining life of the security as an adjustment to yield, offsetting the related amortization of premium on the transferred securities. Unrealized losses on employee benefit plans will be reclassified into income as pension plan costs are recognized over the remaining service period of plan participants. Gains and losses in AOCI are net of deferred income taxes.

A rollforward of the components of accumulated other comprehensive income (loss) is included as follows (in thousands):

	Unrealized Gain (Loss) on			Total
	Available for Sale Securities	Investment Securities Transferred from AFS	Employee Benefit Plans	
Balance, December 31, 2015	\$ 23,284	\$ 68	\$ (1,765)	\$ 21,587
Net change in unrealized gain (loss)	(41,333)	—	(188)	(41,521)
Reclassification adjustments included in earnings:				
Interest revenue, Investment securities, Taxable securities	—	(112)	—	(112)
Gain on available for sale securities, net	(11,675)	—	—	(11,675)
Other comprehensive income (loss), before income taxes	(53,008)	(112)	(188)	(53,308)
Federal and state income tax ¹	(20,637)	(44)	(73)	(20,754)
Other comprehensive income (loss), net of income taxes	(32,371)	(68)	(115)	(32,554)
Balance, December 31, 2016	(9,087)	—	(1,880)	(10,967)
Net change in unrealized gain (loss)	(28,170)	—	2,018	(26,152)
Reclassification adjustments included in earnings:				
Interest revenue, Investment securities, Taxable securities	—	—	—	—
Gain on available for sale securities, net	(4,428)	—	—	(4,428)
Other comprehensive income (loss), before income taxes	(32,598)	—	2,018	(30,580)
Federal and state income tax ¹	(12,708)	—	785	(11,923)
Other comprehensive income (loss), net of income taxes	(19,890)	—	1,233	(18,657)
Reclassification of stranded accumulated other comprehensive loss related to tax reform	(6,408)	—	(142)	(6,550)
Balance, December 31, 2017	(35,385)	—	(789)	(36,174)
Transition adjustment for net unrealized gains on equity securities	(2,709)	—	—	(2,709)
Net change in unrealized gain (loss)	(46,941)	—	(1,069)	(48,010)
Reclassification adjustments included in earnings:				
Interest revenue, Investment securities, Taxable securities	—	—	—	—
Loss on available for sale securities, net	2,801	—	—	2,801
Other comprehensive income (loss), before income taxes	(44,140)	—	(1,069)	(45,209)
Federal and state income tax ²	(11,235)	—	(272)	(11,507)
Other comprehensive income (loss), net of income taxes	(32,905)	—	(797)	(33,702)
Balance, December 31, 2018	\$ (70,999)	\$ —	\$ (1,586)	\$ (72,585)

¹ Calculated using a 39 percent blended federal and state statutory tax rate.

² Calculated using a 25 percent blended federal and state statutory tax rate.

(16) Earnings Per Share

The following table presents the computation of basic and diluted earnings per share (dollars in thousands, except per share data):

	Year Ended		
	2018	2017	2016
Numerator:			
Net income attributable to BOK Financial Corp. shareholders	\$ 445,646	\$ 334,644	\$ 232,668
Less: Earnings allocated to participating securities	3,737	3,561	2,883
Numerator for basic earnings per share – income available to common shareholders	441,909	331,083	229,785
Effect of reallocating undistributed earnings of participating securities	1	2	1
Numerator for diluted earnings per share – income available to common shareholders	\$ 441,910	\$ 331,085	\$ 229,786
Denominator:			
Weighted average shares outstanding	67,190,257	65,440,832	65,901,110
Less: Participating securities included in weighted average shares outstanding	561,617	695,468	815,483
Denominator for basic earnings per common share	66,628,640	64,745,364	65,085,627
Dilutive effect of employee stock compensation plans ¹	33,633	60,920	58,271
Denominator for diluted earnings per common share	66,662,273	64,806,284	65,143,898
Basic earnings per share	\$ 6.63	\$ 5.11	\$ 3.53
Diluted earnings per share	\$ 6.63	\$ 5.11	\$ 3.53
¹ Excludes employee stock options with exercise prices greater than current market price.	—	—	—

(17) Reportable Segments

BOK Financial operates three principal lines of business: Commercial Banking, Consumer Banking and Wealth Management. Commercial Banking includes lending, treasury and cash management services and customer risk management products to small businesses, middle market and larger commercial customers. Commercial Banking also includes the TransFund EFT network. Consumer Banking includes retail lending and deposit services, lending and deposit services to small business customers served through the consumer branch network and all mortgage banking activities. Wealth Management provides fiduciary services, private bank services and investment advisory services in all markets. Wealth Management also underwrites state and municipal securities and engages in brokerage and trading activities.

In addition to its lines of business, BOK Financial has a Funds Management unit. The primary purpose of this unit is to manage overall liquidity needs and interest rate risk. Each line of business borrows funds from and provides funds to the Funds Management unit as needed to support their operations. Operating results for Funds Management and Other include the effect of interest rate risk positions and risk management activities, securities gains and losses including impairment charges, the provision for credit losses in excess of net loans charged off, tax planning strategies and certain executive compensation costs that are not attributed to the lines of business.

BOK Financial allocates resources and evaluates performance of its lines of business after allocation of funds, actual net credit losses and capital costs. In addition, we measure the performance of our business lines after allocation of certain indirect expenses and taxes on statutory rates. The allocation for the prior comparable periods have been revised on a comparable basis.

The cost of funds borrowed from the Funds Management unit by the operating lines of business is transfer priced at rates that approximate market rates for funds with similar duration. Market rates are generally based on the applicable LIBOR or interest rate swap rates, adjusted for prepayment risk. This method of transfer-pricing funds that support assets of the operating lines of business tends to insulate them from interest rate risk.

The value of funds provided by the operating lines of business to the Funds Management unit is based on rates which approximate the wholesale market rates for funds with similar duration and re-pricing characteristics. Market rates are generally based on LIBOR or interest rate swap rates. The funds credit formula applied to deposit products with indeterminate maturities is established based on their re-pricing characteristics reflected in a combination of the short-term LIBOR rates and a moving average of an intermediate term swap rate, with an appropriate spread applied to both. Shorter duration products are weighted towards the short-term LIBOR rate and longer duration products are weighted towards intermediate swap rates. The expected duration ranges from 30 days for certain rate-sensitive deposits to five years.

Substantially all revenue is from domestic customers. No single external customer accounts for more than 10% of total revenue.

Net loans charged off and provision for credit losses represents net loans charged off as attributed to the lines of business and the provision for credit losses in excess of net charge-offs attributed to Funds Management and Other.

The operations of CoBiz, acquired on October 1, 2018 were not yet allocated to the operating segments at December 31, 2018. Accordingly, the operations, assets and liabilities of CoBiz were included in Funds Management and Other for 2018. The acquisition of Mobank on December 1, 2016 was allocated to the operating segments in 2017.

Reportable segments reconciliation to the Consolidated Financial Statements for the year ended December 31, 2018 is as follows (in thousands):

	Commercial	Consumer	Wealth Management	Funds Management and Other	BOK Financial Consolidated
Net interest and dividend revenue from external sources	\$ 726,856	\$ 83,231	\$ 81,527	\$ 93,253	\$ 984,867
Net interest revenue (expense) from internal sources	(156,254)	73,448	31,505	51,301	—
Net interest and dividend revenue	570,602	156,679	113,032	144,554	984,867
Provision for credit losses	30,358	5,143	(288)	(27,213)	8,000
Net interest and dividend revenue after provision for credit losses	540,244	151,536	113,320	171,767	976,867
Other operating revenue	162,701	178,123	296,369	(20,409)	616,784
Other operating expense	192,811	210,187	248,959	376,209	1,028,166
Net direct contribution	510,134	119,472	160,730	(224,851)	565,485
Gain (loss) on financial instruments, net	26	(25,021)	7	24,988	—
Change in fair value of mortgage servicing rights	—	4,668	—	(4,668)	—
Gain (loss) on repossessed assets, net	(6,532)	247	—	6,285	—
Corporate expense allocations	45,818	63,700	44,190	(153,708)	—
Net income before taxes	457,810	35,666	116,547	(44,538)	565,485
Federal and state income taxes	121,434	9,085	30,003	(41,461)	119,061
Net income	336,376	26,581	86,544	(3,077)	446,424
Net income attributable to non-controlling interests	—	—	—	778	778
Net income attributable to BOK Financial Corp. shareholders	\$ 336,376	\$ 26,581	\$ 86,544	\$ (3,855)	\$ 445,646
Average assets	\$ 18,431,411	\$ 8,303,262	\$ 8,446,006	\$ (243,149)	\$ 34,937,530

Reportable segments reconciliation to the Consolidated Financial Statements for the year ended December 31, 2017 is as follows (in thousands):

	Commercial	Consumer	Wealth Management	Funds Management and Other	BOK Financial Consolidated
Net interest and dividend revenue from external sources	\$ 618,325	\$ 84,286	\$ 45,024	\$ 94,066	\$ 841,701
Net interest revenue (expense) from internal sources	(89,106)	53,916	38,344	(3,154)	—
Net interest and dividend revenue	529,219	138,202	83,368	90,912	841,701
Provision for credit losses	13,877	4,786	(696)	(24,967)	(7,000)
Net interest and dividend revenue after provision for credit losses	515,342	133,416	84,064	115,879	848,701
Other operating revenue	208,404	184,878	301,434	378	695,094
Other operating expense	228,119	221,679	246,626	329,093	1,025,517
Net direct contribution	495,627	96,615	138,872	(212,836)	518,278
Gain (loss) on financial instruments, net	52	(2,054)	—	2,002	—
Change in fair value of mortgage servicing rights	—	172	—	(172)	—
Gain (loss) on repossessed assets, net	(2,681)	223	387	2,071	—
Corporate expense allocations	34,253	67,320	40,562	(142,135)	—
Net income before taxes	458,745	27,636	98,697	(66,800)	518,278
Federal and state income taxes	188,241	10,750	38,848	(55,246)	182,593
Net income	270,504	16,886	59,849	(11,554)	335,685
Net income attributable to non-controlling interests	—	—	—	1,041	1,041
Net income attributable to BOK Financial Corp. shareholders	\$ 270,504	\$ 16,886	\$ 59,849	\$ (12,595)	\$ 334,644
Average assets	\$ 17,730,654	\$ 8,544,117	\$ 7,072,622	\$ (399,899)	\$ 32,947,494

Reportable segments reconciliation to the Consolidated Financial Statements for the year ended December 31, 2016 is as follows (in thousands):

	Commercial	Consumer	Wealth Management	Funds Management and Other	BOK Financial Consolidated
Net interest and dividend revenue from external sources	\$ 501,042	\$ 77,283	\$ 33,006	\$ 135,897	\$ 747,228
Net interest revenue (expense) from internal sources	(62,655)	43,156	29,043	(9,544)	—
Net interest and dividend revenue	438,387	120,439	62,049	126,353	747,228
Provision for credit losses	32,961	4,925	(801)	27,915	65,000
Net interest and dividend revenue after provision for credit losses	405,426	115,514	62,850	98,438	682,228
Other operating revenue	198,902	216,285	283,222	(24,389)	674,020
Other operating expense	217,993	247,478	250,995	301,124	1,017,590
Net direct contribution	386,335	84,321	95,077	(227,075)	338,658
Gain (loss) on financial instruments, net	10	(26,252)	(42)	26,284	—
Change in fair value of mortgage servicing rights	—	(2,193)	—	2,193	—
Gain on repossessed assets, net	669	979	—	(1,648)	—
Corporate expense allocations	36,134	65,567	42,378	(144,079)	—
Net income before taxes	350,880	(8,712)	52,657	(56,167)	338,658
Federal and state income taxes	146,740	(3,389)	20,976	(57,950)	106,377
Net income	204,140	(5,323)	31,681	1,783	232,281
Net loss attributable to non-controlling interests	—	—	—	(387)	(387)
Net income attributable to BOK Financial Corp. shareholders	\$ 204,140	\$ (5,323)	\$ 31,681	\$ 2,170	\$ 232,668
Average assets	\$ 17,175,325	\$ 8,254,666	\$ 7,373,080	\$ (524,669)	\$ 32,278,402

(18) Fees and Commissions Revenue

Fees and commissions revenue by reportable segment and primary service line is as follows for the year ended December 31, 2018.

	Commercial	Consumer	Wealth Management	Funds Management and Other	Consolidated	Out of Scope ¹	In Scope ²
Trading revenue	\$ —	\$ —	\$ 28,077	\$ —	\$ 28,077	\$ 28,077	\$ —
Customer hedging revenue	7,748	—	27,512	3,574	38,834	38,834	—
Retail brokerage revenue	—	—	19,030	3,120	22,150	—	22,150
Investment banking revenue	7,628	—	11,634	—	19,262	6,380	12,882
Brokerage and trading revenue	15,376	—	86,253	6,694	108,323	73,291	35,032
TransFund EFT network revenue	72,280	4,017	(82)	6	76,221	—	76,221
Merchant services revenue	7,666	59	—	79	7,804	—	7,804
Transaction card revenue	79,946	4,076	(82)	85	84,025	—	84,025
Personal trust revenue	—	—	96,839	—	96,839	—	96,839
Corporate trust revenue	—	—	22,292	—	22,292	—	22,292
Institutional trust & retirement plan services revenue	—	—	44,400	—	44,400	—	44,400
Investment management services and other	—	—	19,729	1,443	21,172	—	21,172
Fiduciary and asset management revenue	—	—	183,260	1,443	184,703	—	184,703
Commercial account service charge revenue	41,931	1,445	2,331	1,565	47,272	—	47,272
Overdraft fee revenue	370	36,177	134	(145)	36,536	—	36,536
Check card revenue	—	20,967	—	339	21,306	—	21,306
Automated service charge and other deposit fee revenue	282	6,621	62	74	7,039	—	7,039
Deposit service charges and fees	42,583	65,210	2,527	1,833	112,153	—	112,153
Mortgage production revenue	—	31,690	—	—	31,690	31,690	—
Mortgage servicing revenue	—	67,980	—	(1,883)	66,097	66,097	—
Mortgage banking revenue	—	99,670	—	(1,883)	97,787	97,787	—
Other revenue	24,044	9,218	24,507	(1,118)	56,651	38,306	18,345
Total fees and commissions revenue	\$ 161,949	\$ 178,174	\$ 296,465	\$ 7,054	\$ 643,642	\$ 209,384	\$ 434,258

¹ Out of scope revenue generally relates to financial instruments or contractual rights and obligations within the scope of other applicable accounting guidance.

² In scope revenue represents revenue subject to FASB ASC Topic 606, *Revenue from Contracts with Customers*.

(19) Fair Value Measurements

Fair value is defined by applicable accounting guidance as the price to sell an asset or transfer a liability in an orderly transaction between market participants in the principal market for the given asset or liability at the measurement date based on market conditions at that date. An orderly transaction assumes exposure to the market for a customary period for marketing activities prior to the measurement date and not a forced liquidation or distressed sale. Certain assets and liabilities are recorded in the Company's financial statements at fair value. Some are recorded on a recurring basis and some on a non-recurring basis.

For some assets and liabilities, observable market transactions and market information might be available. For other assets and liabilities, observable market transactions and market information might not be available. A hierarchy for fair value has been established which categorizes into three levels the inputs to valuation techniques used to measure fair value. The three levels are as follows:

Quoted Prices in Active Markets for Identical Assets or Liabilities (Level 1) - fair value is based on unadjusted quoted prices in active markets for identical assets or liabilities.

Significant Other Observable Inputs (Level 2) - fair value is based on significant other observable inputs which are generally determined based on a single price for each financial instrument provided to us by an applicable third-party pricing service and is based on one or more of the following:

- Quoted prices for similar, but not identical, assets or liabilities in active markets;
- Quoted prices for identical or similar assets or liabilities in inactive markets;
- Inputs other than quoted prices that are observable, such as interest rate and yield curves, volatilities, prepayment speeds, loss severities, credit risks and default rates;
- Other inputs derived from or corroborated by observable market inputs.

Significant Unobservable Inputs (Level 3) - fair value is based upon model-based valuation techniques for which at least one significant assumption is not observable in the market.

Transfers between levels are recognized as of the end of the reporting period. There were no transfers in or out of quoted prices in active markets for identical instruments to significant other observable inputs or significant unobservable inputs during the year ended December 31, 2018 and 2017, respectively. Transfers between significant other observable inputs and significant unobservable inputs during the year ended December 31, 2018 and 2017 are included in the summary of changes in recurring fair values measured using unobservable inputs. Additionally, \$208 million of held-to-maturity other debt securities were transferred from significant other observable inputs to significant unobservable inputs at December 31, 2018 due to a lack of currently available observable inputs.

The underlying methods used by the third-party pricing services are considered in determining the primary inputs used to determine fair values. Management has evaluated the methodologies employed by the third-party pricing services by comparing the price provided by the pricing service with other sources, including brokers' quotes, sales or purchases of similar instruments and discounted cash flows to establish a basis for reliance on the pricing service values. Significant differences between the pricing service provided value and other sources are discussed with the pricing service to understand the basis for their values. Based on all observable inputs, management may adjust prices obtained from third-party pricing services to more appropriately reflect the prices that would be received to sell assets or paid to transfer liabilities in orderly transactions in the current market. No significant adjustments were made to prices provided by third-party pricing services at December 31, 2018 and 2017.

Assets and Liabilities Measured at Fair Value on a Recurring Basis

The fair value of financial assets and liabilities that are measured on a recurring basis is as follows as of December 31, 2018 (in thousands):

	Total	Quoted Prices in Active Markets for Identical Instruments	Significant Other Observable Inputs	Significant Unobservable Inputs
Assets:				
Trading securities:				
U.S. government agency debentures	\$ 63,765	\$ —	\$ 63,765	\$ —
U.S. government agency residential mortgage-backed securities	1,791,584	—	1,791,584	—
Municipal and other tax-exempt securities	34,507	—	34,507	—
Asset-backed securities	42,656	—	42,656	—
Other trading securities	24,411	—	24,411	—
Total trading securities	1,956,923	—	1,956,923	—
Available for sale securities:				
U.S. Treasury securities	493	493	—	—
Municipal and other tax-exempt securities	2,864	—	2,864	—
U.S. government agency residential mortgage-backed securities	5,804,708	—	5,804,708	—
Privately issued residential mortgage-backed securities	59,736	—	59,736	—
Commercial mortgage-backed securities guaranteed by U.S. government agencies	2,953,889	—	2,953,889	—
Other debt securities	35,430	—	34,958	472
Total available for sale securities	8,857,120	493	8,856,155	472
Fair value option securities – U.S. government agency residential mortgage-backed securities	283,235	—	283,235	—
Residential mortgage loans held for sale	149,221	—	134,014	15,207
Mortgage servicing rights, net ¹	259,254	—	—	259,254
Derivative contracts, net of cash margin ²	320,929	44,074	276,855	—
Liabilities:				
Derivative contracts, net of cash margin ²	362,306	—	362,306	—

¹ A reconciliation of the beginning and ending fair value of mortgage servicing rights and disclosures of significant assumptions used to determine fair value are presented in Note 7, Mortgage Banking Activities.

² See Note 3 for detail of fair value of derivative contracts by contract type. Derivative contracts in a net asset position that were valued based on quoted prices in active markets or identical instruments (Level 1) are exchange-traded interest rate, energy and agricultural derivative contracts, net of cash margin. Derivative contracts in a net liability position that were valued using quoted prices in active markets for identical instruments (Level 1) are exchange-traded interest rate derivative contracts, fully offset by cash margin.

The fair value of financial assets and liabilities that are measured on a recurring basis is as follows as of December 31, 2017 (in thousands):

	Total	Quoted Prices in Active Markets for Identical Instruments	Significant Other Observable Inputs	Significant Unobservable Inputs
Assets:				
Trading securities:				
U.S. government agency debentures	\$ 21,196	\$ —	\$ 21,196	\$ —
U.S. government agency residential mortgage-backed securities	392,673	—	392,673	—
Municipal and other tax-exempt securities	13,559	—	13,559	—
Asset-backed securities	23,885	—	23,885	—
Other trading securities	11,363	—	11,363	—
Total trading securities	462,676	—	462,676	—
Available for sale securities:				
U.S. Treasury securities	1,000	1,000	—	—
Municipal and other tax-exempt securities	27,080	—	22,278	4,802
U.S. government agency residential mortgage-backed securities	5,309,152	—	5,309,152	—
Privately issued residential mortgage-backed securities	93,221	—	93,221	—
Commercial mortgage-backed securities guaranteed by U.S. government agencies	2,834,961	—	2,834,961	—
Other debt securities	25,481	—	25,009	472
Perpetual preferred stock	15,767	—	15,767	—
Equity securities and mutual funds	14,916	—	14,916	—
Total available for sale securities	8,321,578	1,000	8,315,304	5,274
Fair value option securities – U.S. government agency residential mortgage-backed securities	755,054	—	755,054	—
Residential mortgage loans held for sale	221,378	—	209,079	12,299
Mortgage servicing rights, net ¹	252,867	—	—	252,867
Derivative contracts, net of cash margin ²	220,502	8,179	212,323	—
Liabilities:				
Derivative contracts, net of cash margin ²	171,963	—	171,963	—

¹ A reconciliation of the beginning and ending fair value of mortgage servicing rights and disclosures of significant assumptions used to determine fair value are presented in Note 7, Mortgage Banking Activities.

² See Note 3 for detail of fair value of derivative contracts by contract type. Derivative contracts in a net asset position that were valued based on quoted prices in active markets for identical instruments (Level 1) are exchange-traded interest rate, energy and agricultural derivative contracts, net of cash margin. Derivative contracts in a net liability position that were valued using quoted prices in active markets for identical instruments based on quoted prices in active markets for identical instruments (Level 1) are exchange-traded interest rate and energy derivative contracts, fully offset by cash margin.

Following is a description of the Company's valuation methodologies used for assets and liabilities measured on a recurring basis:

Securities

The fair values of trading, available for sale and fair value option securities are based on quoted prices for identical instruments in active markets, when available. If quoted prices for identical instruments are not available, fair values are based on significant other observable inputs such as quoted prices of comparable instruments or interest rates and credit spreads, yield curves, volatilities, prepayment speeds and loss severities.

The fair value of certain available for sale and held-to-maturity municipal and other debt securities may be based on significant unobservable inputs. These significant unobservable inputs include limited observed trades, projected cash flows, current credit rating of the issuers and, when applicable, the insurers of the debt and observed trades of similar debt. Discount rates are primarily based on reference to interest rate spreads on comparable securities of similar duration and credit rating as determined by the nationally-recognized rating agencies adjusted for a lack of trading volume. Significant unobservable inputs are developed by investment securities professionals involved in the active trading of similar securities. A summary of significant inputs used to value these securities follows. A management committee composed of senior members from the Company's Capital Markets, Risk Management and Finance departments assess the appropriateness of these inputs quarterly.

Derivatives

All derivative instruments are carried on the balance sheet at fair value. Fair values for exchange-traded contracts are based on quoted prices. Fair values for over-the-counter interest rate, commodity and foreign exchange contracts are based on valuations provided either by third-party dealers in the contracts, quotes provided by independent pricing services, or a third-party provided pricing model that uses significant other observable market inputs.

Credit risk is considered in determining the fair value of derivative instruments. Management determines fair value adjustments based on various risk factors including but not limited to counterparty credit rating or equivalent loan grading, derivative contract notional size, price volatility of the underlying commodity, duration of the derivative contracts and expected loss severity. Expected loss severity is based on historical losses for similarly risk graded commercial loan customers. Decreases in counterparty credit rating or grading and increases in price volatility and expected loss severity all tend to increase the credit quality adjustment which reduces the fair value of asset contracts.

We also consider our own credit risk in determining the fair value of derivative contracts. Changes in our credit rating would affect the fair value of our derivative liabilities. In the event of a credit downgrade, the fair value of our derivative liabilities would increase.

Residential Mortgage Loans Held for Sale

Residential mortgage loans held for sale are carried on the balance sheet at fair value. The fair values of conforming residential mortgage loans held for sale are based upon quoted market prices of such loans sold in securitization transactions, including related unfunded loan commitments. The fair value of mortgage loans that are unable to be sold to U.S. government agencies is determined using quoted prices of loans that are sold in securitization transactions with a liquidity discount applied.

The following represents the changes related to assets measured at fair value on a recurring basis using significant unobservable inputs (in thousands):

	Available for Sale Securities		Residential mortgage loans held for sale
	Municipal and other tax-exempt securities	Other debt securities	
Balance, December 31, 2016	\$ 5,789	\$ 4,152	\$ 11,617
Transfer to Level 3 from Level 2 ¹	—	—	3,507
Purchases and capital calls	—	—	—
Redemptions and distributions	(1,100)	—	—
Proceeds from sales	—	(3,900)	(2,944)
Gain (loss) recognized in earnings:			
Mortgage banking revenue	—	—	119
Other comprehensive income (loss):			
Net change in unrealized gain (loss)	113	220	—
Balance, December 31, 2017	4,802	472	12,299
Transfer to Level 3 from Level 2 ¹	—	—	6,183
Purchases and capital calls	—	—	—
Redemptions and distributions	(5,095)	—	—
Proceeds from sales	—	—	(2,706)
Gain (loss) recognized in earnings:			
Mortgage banking revenue	—	—	(569)
Other comprehensive income (loss):			
Net change in unrealized gain (loss)	293	—	—
Balance, December 31, 2018	\$ —	\$ 472	\$ 15,207

¹ Recurring transfers to Level 3 from Level 2 consist of residential mortgage loans intended for sale to U.S. government agencies that fail to meet conforming standards.

A summary of quantitative information about assets measured at fair value on a recurring basis using significant unobservable inputs (Level 3) as of December 31, 2018 follows (in thousands):

Quantitative Information about Level 3 Recurring Fair Value Measurements				
	Fair Value	Valuation Technique(s)	Significant Unobservable Input	Range (Weighted Average)
Available for sale securities:				
Other debt securities	472	Discounted cash flows ¹	Interest rate spread	7.88%-7.88% (7.88%) ³
Residential mortgage loans held for sale	15,207	Quoted prices of loans sold in securitization transactions, with a liquidity discount applied	Liquidity discount applied to the market value of mortgage loans qualifying for sale to U.S. government agencies	94.44%-94.44% (94.44%) ²
				92.38%

¹ Discounted cash flows developed using discount rates primarily based on reference to interest rate spreads for comparable securities of similar duration and credit rating as determined by the nationally-recognized rating agencies, adjusted for lack of trading volume.

² Represents fair value as a percentage of par value.

³ Interest rate yields used to value investment grade taxable securities based on comparable short-term taxable securities which are generally yielding approximately 3%.

A summary of quantitative information about Recurring Fair Value Measurements based on Significant Unobservable Inputs (Level 3) as of December 31, 2017 follows (in thousands):

Quantitative Information about Level 3 Recurring Fair Value Measurements

	Fair Value	Valuation Technique(s)	Significant Unobservable Input	Range (Weighted Average)
Available for sale securities:				
Municipal and other tax-exempt securities	\$ 4,802	Discounted cash flows ¹	Interest rate spread	6.60%-6.60% (6.60%) ²
Other debt securities	472	Discounted cash flows ¹	Interest rate spread	92.25%-94.76% (93.75%) ³ 6.85%-6.85% (6.85%) ⁴ 94.39%-94.39% (94.39%) ³
Residential mortgage loans held for sale	12,299	Quoted prices of loans sold in securitization transactions, with a liquidity discount applied	Liquidity discount applied to the market value of mortgage loans qualifying for sale to U.S. government agencies	94.75%

¹ Discounted cash flows developed using discount rates primarily based on reference to interest rate spreads for comparable securities of similar duration and credit rating as determined by the nationally-recognized rating agencies, adjusted for lack of trading volume.

² Interest rate yields used to value investment grade tax-exempt securities represent a spread of 372 to 466 basis points over average yields for comparable tax-exempt securities.

³ Represents fair value as a percentage of par value.

⁴ Interest rate yields used to value investment grade taxable securities based on comparable short-term taxable securities which are generally yielding less than 3%.

Fair Value of Assets and Liabilities Measured on a Non-Recurring Basis

Assets measured at fair value on a non-recurring basis include pension plan assets, which are based on quoted prices in active markets for identical instruments, collateral for certain impaired loans and real property and other assets acquired to satisfy loans, which are based primarily on comparisons to completed sales of similar assets. See Note 6 for information related to the non-recurring fair value measurement of CoBiz Financial.

The following represents the carrying value of assets measured at fair value on a non-recurring basis and related losses recorded during the year. The carrying value represents only those assets with the balance sheet date for which the fair value was adjusted during the year:

	Carrying Value at December 31, 2018			Fair Value Adjustments for the Year Ended December 31, 2018 Recognized In:	
	Quoted Prices in Active Markets for Identical Instruments	Significant Other Observable Inputs	Significant Unobservable Inputs	Gross charge-offs against allowance for loan losses	Net losses and expenses of repossessed assets, net
	Impaired loans	\$ —	\$ 1,074	\$ 17,401	\$ 17,434
Real estate and other repossessed assets	—	4,795	6,366	—	7,269

	Carrying Value at December 31, 2017			Fair Value Adjustments for the Year Ended December 31, 2017 Recognized In:	
	Quoted Prices in Active Markets for Identical Instruments	Significant Other Observable Inputs	Significant Unobservable Inputs	Gross charge-offs against allowance for loan losses	Net losses and expenses of repossessed assets, net
	Impaired loans	\$ —	\$ 7,436	\$ 7,626	\$ 12,145
Real estate and other repossessed assets	—	3,483	5,481	—	6,372

The fair value of collateral-dependent impaired loans and real estate and other repossessed assets and the related fair value adjustments are generally based on unadjusted third-party appraisals. Our appraisal review policies require appraised values to be supported by observed inputs derived principally from or corroborated by observable market data. Appraisals that are not based on observable inputs or that require significant adjustments or fair value measurements that are not based on third-party appraisals are considered to be based on significant unobservable inputs. Non-recurring fair value measurements of collateral-dependent impaired loans and real estate and other repossessed assets based on significant unobservable inputs are generally due to estimates of current fair values between appraisal dates. Significant unobservable inputs include listing prices for comparable assets, uncorroborated expert opinions or management's knowledge of the collateral or industry. Non-recurring fair value measurements of collateral dependent loans secured by mineral rights are generally determined by our internal staff of engineers on projected cash flows under current market conditions and are based on significant unobservable inputs. Projected cash flows are discounted according to risk characteristics of the underlying oil and gas properties. Assets are evaluated to demonstrate with reasonable certainty that crude oil, natural gas and natural gas liquids can be recovered from known oil and gas reservoirs under existing economic and operating conditions at current prices with existing conventional equipment, operating methods and costs. Significant unobservable inputs are developed by asset management and workout professionals and approved by senior Credit Administration executives.

A summary of quantitative information about Non-recurring Fair Value Measurements based on Significant Unobservable Inputs (Level 3) as of December 31, 2018 follows (in thousands):

Quantitative Information about Level 3 Non-recurring Fair Value Measurements

	Fair Value	Valuation Technique(s)	Significant Unobservable Input	Range (Weighted Average)
Impaired loans	\$ 17,401	Discounted cash flows	Management knowledge of industry and non-real estate collateral including but not limited to recoverable oil & gas reserves, forward looking commodity prices, and estimated operating costs	35% - 80% (50%) ¹
Real estate and other repossessed assets	6,366	Discounted cash flows	Recoverable oil and gas reserves, forward-looking commodity prices, estimated operating costs	N/A

¹ Represents fair value as a percentage of the unpaid principal balance.

The table above excludes the initial measurement of assets and liabilities that were acquired as part of the CoBiz acquisition in October 1, 2018. These assets and liabilities were recorded at their fair value upon acquisition in accordance with U.S. GAAP and were not re-measured during the periods presented unless specifically required by U.S. GAAP. Acquisition date fair values represent either Level 2 fair value measurements (investment securities, deposits, property, equipment, and debt) or Level 3 fair value measurements (loans and core deposit intangible assets). Refer to Note 6, Goodwill and Intangible Assets, for further detail regarding the CoBiz acquisition.

A summary of quantitative information about Non-recurring Fair Value Measurements based on Significant Unobservable Inputs (Level 3) as of December 31, 2017 follows (in thousands):

Quantitative Information about Level 3 Non-recurring Fair Value Measurements

	Fair Value	Valuation Technique(s)	Significant Unobservable Input	Range (Weighted Average)
Impaired loans	\$ 7,626	Discounted cash flows	Recoverable oil and gas reserves, forward-looking commodity prices and estimated operating costs	40% - 86% (59%) ¹
Real estate and other repossessed assets	5,481	Discounted cash flows	Recoverable oil and gas reserves, forward-looking commodity prices and estimated operating costs	N/A

¹ Represents fair value as a percentage of the unpaid principal balance.

The fair value of pension plan assets was approximately \$34 million at December 31, 2018 and \$40 million at December 31, 2017, determined by significant other observable inputs. Fair value adjustments of pension plan assets along with changes in the projected benefit obligation are recognized in other comprehensive income.

Fair Value of Financial Instruments

The following table presents the carrying values and estimated fair values of all financial instruments, including those financial assets and liabilities that are not measured and reported at fair value on a recurring basis or non-recurring (dollars in thousands):

	December 31, 2018				
	Carrying Value	Estimated Fair Value	Quoted Prices in Active Markets for Identical Instruments (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash and due from banks	\$ 741,749	\$ 741,749	\$ 741,749	\$ —	\$ —
Interest-bearing cash and cash equivalents	401,675	401,675	401,675	—	—
Trading securities:					
U.S. government agency debentures	63,765	63,765	—	63,765	—
U.S. government agency residential mortgage-backed securities	1,791,584	1,791,584	—	1,791,584	—
Municipal and other tax-exempt securities	34,507	34,507	—	34,507	—
Asset-backed securities	42,656	42,656	—	42,656	—
Other trading securities	24,411	24,411	—	24,411	—
Total trading securities	1,956,923	1,956,923	—	1,956,923	—
Investment securities:					
Municipal and other tax-exempt securities	137,296	138,562	—	138,562	—
U.S. government agency residential mortgage-backed securities	12,612	12,770	—	12,770	—
Other debt securities	205,279	215,966	—	7,905	208,061
Total investment securities	355,187	367,298	—	159,237	208,061
Available for sale securities:					
U.S. Treasury securities	493	493	493	—	—
Municipal and other tax-exempt securities	2,864	2,864	—	2,864	—
U.S. government agency residential mortgage-backed securities	5,804,708	5,804,708	—	5,804,708	—
Privately issued residential mortgage-backed securities	59,736	59,736	—	59,736	—
Commercial mortgage-backed securities guaranteed by U.S. government agencies	2,953,889	2,953,889	—	2,953,889	—
Other debt securities	35,430	35,430	—	34,958	472
Total available for sale securities	8,857,120	8,857,120	493	8,856,155	472
Fair value option securities – U.S. government agency residential mortgage-backed securities	283,235	283,235	—	283,235	—
Residential mortgage loans held for sale	149,221	149,221	—	134,014	15,207
Loans:					
Commercial	13,636,078	13,526,162	—	—	13,526,162
Commercial real estate	4,764,813	4,713,747	—	—	4,713,747
Residential mortgage	2,230,033	2,213,951	—	—	2,213,951
Personal	1,025,806	1,024,368	—	—	1,024,368
Total loans	21,656,730	21,478,228	—	—	21,478,228
Allowance for loan losses	(207,457)	—	—	—	—
Loans, net of allowance	21,449,273	21,478,228	—	—	21,478,228
Mortgage servicing rights	259,254	259,254	—	—	259,254
Derivative instruments with positive fair value, net of cash margin	320,929	320,929	44,074	276,855	—
Deposits with no stated maturity	23,150,383	23,150,383	—	—	23,150,383
Time deposits	2,113,380	2,073,538	—	—	2,073,538
Other borrowed funds	7,142,801	6,771,953	—	—	6,771,953
Subordinated debentures	275,913	261,977	—	261,977	—
Derivative instruments with negative fair value, net of cash margin	362,306	362,306	—	362,306	—

December 31, 2017

	Carrying Value	Estimated Fair Value	Quoted Prices in Active Markets for Identical Instruments (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Cash and due from banks	\$ 602,510	\$ 602,510	\$ 602,510	\$ —	\$ —
Interest-bearing cash and cash equivalents	1,714,544	1,714,544	1,714,544	—	—
Trading securities:					
U.S. government agency debentures	21,196	21,196	—	21,196	—
U.S. government agency residential mortgage-backed securities	392,673	392,673	—	392,673	—
Municipal and other tax-exempt securities	13,559	13,559	—	13,559	—
Asset-backed securities	23,885	23,885	—	23,885	—
Other trading securities	11,363	11,363	—	11,363	—
Total trading securities	462,676	438,791	—	438,791	—
Investment securities:					
Municipal and other tax-exempt securities	228,186	230,349	—	230,349	—
U.S. government agency residential mortgage-backed securities	15,891	16,242	—	16,242	—
Other debt securities	217,716	233,444	—	233,444	—
Total investment securities	461,793	480,035	—	480,035	—
Available for sale securities:					
U.S. Treasury securities	1,000	1,000	1,000	—	—
Municipal and other tax-exempt securities	27,080	27,080	—	22,278	4,802
U.S. government agency residential mortgage-backed securities	5,309,152	5,309,152	—	5,309,152	—
Privately issued residential mortgage-backed securities	93,221	93,221	—	93,221	—
Commercial mortgage-backed securities guaranteed by U.S. government agencies	2,834,961	2,834,961	—	2,834,961	—
Other debt securities	25,481	25,481	—	25,009	472
Perpetual preferred stock	15,767	15,767	—	15,767	—
Equity securities and mutual funds	14,916	14,916	—	14,916	—
Total available for sale securities	8,321,578	8,321,578	1,000	8,315,304	5,274
Fair value option securities – U.S. government agency residential mortgage-backed securities	755,054	755,054	—	755,054	—
Residential mortgage loans held for sale	221,378	221,378	—	208,946	12,432
Loans:					
Commercial	10,733,975	10,524,627	—	—	10,524,627
Commercial real estate	3,479,987	3,428,733	—	—	3,428,733
Residential mortgage	1,973,686	1,977,721	—	—	1,977,721
Personal	965,776	956,706	—	—	956,706
Total loans	17,153,424	16,887,787	—	—	16,887,787
Allowance for loan losses	(230,682)	—	—	—	—
Loans, net of allowance	16,922,742	16,887,787	—	—	16,887,787
Mortgage servicing rights	252,867	252,867	—	—	252,867
Derivative instruments with positive fair value, net of cash margin	220,502	220,502	8,179	212,323	—
Deposits with no stated maturity	19,962,889	19,962,889	—	—	19,962,889
Time deposits	2,098,416	2,064,558	—	—	2,064,558
Other borrowed funds	5,709,860	5,703,121	—	—	5,703,121
Subordinated debentures	144,677	148,207	—	148,207	—
Derivative instruments with negative fair value, net of cash margin	171,963	171,963	—	171,963	—

Because no market exists for certain of these financial instruments and management does not intend to sell these financial instruments, the fair values shown in the tables above may not represent values at which the respective financial instruments could be sold individually or in the aggregate at the given reporting date.

Fair Value Election

As more fully disclosed in Note 2 and Note 7 to the Consolidated Financial Statements, the Company has elected to carry all U.S. government agency residential mortgage-backed securities held as economic hedges against changes in the fair value of mortgage servicing rights and all residential mortgage loans originated for sale at fair value. Changes in the fair value of these financial instruments are recognized in earnings.

(20) Parent Company Only Financial Statements

Summarized financial information for BOK Financial – Parent Company Only follows:

Balance Sheets

(In thousands)

	December 31,	
	2018	2017
Assets		
Cash and cash equivalents	\$ 167,093	\$ 205,876
Available for sale securities	—	16,185
Loan to bank subsidiary	65,228	—
Investment in bank subsidiaries	4,236,654	3,255,912
Investment in non-bank subsidiaries	218,007	170,966
Other assets	32,999	4,065
Total assets	\$ 4,719,981	\$ 3,653,004
Liabilities and Shareholders' Equity		
Liabilities:		
Other liabilities	\$ 11,959	\$ 12,960
Subordinated debentures	275,913	144,677
Total liabilities	287,872	157,637
Shareholders' equity:		
Common stock	5	4
Capital surplus	1,334,030	1,035,895
Retained earnings	3,369,654	3,048,487
Treasury stock	(72,585)	(36,174)
Accumulated other comprehensive loss	(198,995)	(552,845)
Total shareholders' equity	4,432,109	3,495,367
Total liabilities and shareholders' equity	\$ 4,719,981	\$ 3,653,004

Statements of Earnings

(In thousands)

	Year Ended December 31,		
	2018	2017	2016
Dividends, interest and fees received from bank subsidiaries	\$ 426,071	\$ 150,149	\$ 15,237
Dividends, interest and fees received from non-bank subsidiaries	12,800	17,500	25,923
Other revenue	954	936	1,612
Total revenue	439,825	168,585	42,772
Interest expense	9,827	8,239	4,182
Other operating expense	12,110	2,014	1,978
Total expense	21,937	10,253	6,160
Net income before taxes, other losses, net, and equity in undistributed income of subsidiaries	417,888	158,332	36,612
Other losses, net	(3,921)	—	—
Net income before taxes and equity in undistributed income of subsidiaries	413,967	158,332	36,612
Federal and state income taxes	(7,078)	(4,305)	(1,920)
Net income before equity in undistributed income of subsidiaries	421,045	162,637	38,532
Equity in undistributed income of bank subsidiaries	37,515	181,552	216,120
Equity in undistributed income of non-bank subsidiaries	(12,914)	(9,545)	(21,984)
Net income attributable to BOK Financial Corp. shareholders	\$ 445,646	\$ 334,644	\$ 232,668

Statements of Cash Flows

(In thousands)

	Year Ended December 31,		
	2018	2017	2016
Cash Flows From Operating Activities:			
Net income	\$ 445,646	\$ 334,644	\$ 232,668
Adjustments to reconcile net income to net cash provided by operating activities:			
Equity in undistributed income of bank subsidiaries	(37,515)	(181,552)	(216,120)
Equity in undistributed income of non-bank subsidiaries	12,914	9,545	21,984
Change in other assets	(1,072)	12	(2,933)
Change in other liabilities	(13,434)	7,457	(1,285)
Net cash provided by operating activities	406,539	170,106	34,314
Cash Flows From Investing Activities:			
Proceeds from sales of available for sale securities	—	3,000	1,632
Investment in subsidiaries	(31,901)	(4,355)	(26,000)
Acquisitions, net of cash acquired	(232,680)	—	(105,520)
Net cash used in investing activities	(264,581)	(1,355)	(129,888)
Cash Flows From Financing Activities:			
Net change in other borrowed funds	—	(7,217)	—
Issuance of subordinated debentures, net of issuance costs	—	—	144,615
Issuance of common and treasury stock, net	(88)	4,368	12,455
Dividends paid	(127,188)	(116,041)	(113,455)
Repurchase of common stock	(53,465)	(7,403)	(66,792)
Net cash used in financing activities	(180,741)	(126,293)	(23,177)
Net increase (decrease) in cash and cash equivalents	(38,783)	42,458	(118,751)
Cash and cash equivalents at beginning of period	205,876	163,418	282,169
Cash and cash equivalents at end of period	\$ 167,093	\$ 205,876	\$ 163,418
Cash paid for interest	\$ 11,457	\$ 6,211	\$ 4,127

(21) Subsequent Events

The Company evaluated events from the date of the Consolidated Financial Statements on December 31, 2018 through the issuance of those consolidated financial statements included in this Annual Report on Form 10-K. No events were identified requiring recognition in and/or disclosure in the Consolidated Financial Statements.

Annual Financial Summary – Unaudited

Consolidated Daily Average Balances, Average Yields and Rates

(Dollars in Thousands, Except Per Share Data)

	Year Ended		
	December 31, 2018		
	Average Balance	Revenue/ Expense	Yield/ Rate
Assets			
Interest-bearing cash and cash equivalents	\$ 1,240,600	\$ 22,333	1.80%
Trading securities	1,530,400	57,948	3.84%
Investment securities	395,895	15,848	4.00%
Available for sale securities	8,309,355	197,472	2.35%
Fair value option securities	464,160	15,205	3.18%
Restricted equity securities	347,447	21,555	6.20%
Residential mortgage loans held for sale	201,218	8,123	4.07%
Loans	18,709,433	898,896	4.80%
Allowance for loan losses	(218,840)		
Loans, net of allowance	18,490,593	898,896	4.86%
Total earning assets	30,979,668	1,237,380	3.98%
Receivable on unsettled securities sales	795,723		
Cash and other assets	3,162,139		
Total assets	\$ 34,937,530		
Liabilities and equity			
Interest-bearing deposits:			
Transaction	\$ 10,581,732	\$ 65,859	0.62%
Savings	503,597	439	0.09%
Time	2,133,427	29,219	1.37%
Total interest-bearing deposits	13,218,756	95,517	0.72%
Funds purchased and repurchase agreements	883,904	9,207	1.04%
Other borrowings	6,236,441	129,008	2.07%
Subordinated debentures	177,884	9,827	5.52%
Total interest-bearing liabilities	20,516,985	243,559	1.19%
Non-interest bearing demand deposits	9,590,455		
Due on unsettled securities purchases	531,071		
Other liabilities	559,802		
Total equity	3,739,217		
Total liabilities and equity	\$ 34,937,530		
Tax-equivalent Net Interest Revenue		\$ 993,821	2.79%
Tax-equivalent Net Interest Revenue to Earning Assets			3.20%
Less tax-equivalent adjustment		8,954	
Net Interest Revenue		984,867	
Provision for credit losses		8,000	
Other operating revenue		616,784	
Other operating expense		1,028,166	
Net income before taxes		565,485	
Federal and state income taxes		119,061	
Net income		446,424	
Net income attributable to non-controlling interests		778	
Net income attributable to BOK Financial Corporation shareholders		\$ 445,646	
Earnings Per Average Common Share Equivalent:			
Net income:			
Basic		\$ 6.63	
Diluted		\$ 6.63	

Yield calculations are shown on a tax equivalent at the statutory federal and state rates for the periods presented. The yield calculations exclude security trades that have been recorded on trade date with no corresponding interest income and the unrealized gains and losses. The yield calculation also include average loan balances for which the accrual of interest has been discontinued and are net of unearned income. Yield/rate calculations are generally based on the conventions that determine how interest income and expense is accrued.

Annual Financial Summary – Unaudited (continued)

Consolidated Daily Average Balances, Average Yields and Rates

(Dollars in Thousands, Except Per Share Data)

	Year Ended					
	December 31, 2017			December 31, 2016		
	Average Balance	Revenue/ Expense	Yield/ Rate	Average Balance	Revenue/ Expense	Yield/ Rate
Assets						
Interest-bearing cash and cash equivalents	\$ 2,009,011	\$ 22,128	1.10%	\$ 2,038,919	\$ 10,726	0.53%
Trading securities	521,742	17,637	3.51%	317,808	9,213	3.43%
Investment securities	491,989	18,792	3.82%	561,254	19,835	3.54%
Available for sale securities	8,453,415	178,068	2.13%	8,867,383	176,625	2.03%
Fair value option securities	593,744	16,755	2.81%	323,695	6,723	1.93%
Restricted equity securities	318,744	18,490	5.80%	320,975	17,238	5.37%
Residential mortgage loans held for sale	245,133	8,706	3.59%	370,600	12,658	3.45%
Loans	17,176,102	709,378	4.13%	16,357,867	593,700	3.63%
Allowance for loan losses	(249,430)			(243,631)		
Loans, net of allowance	16,926,672	709,378	4.19%	16,114,236	593,700	3.68%
Total earning assets	29,560,450	989,954	3.36%	28,914,870	846,718	2.95%
Receivable on unsettled securities sales	545,338			253,915		
Cash and other assets	2,841,706			3,109,617		
Total assets	\$ 32,947,494			\$ 32,278,402		
Liabilities and equity						
Interest-bearing deposits:						
Transaction	\$ 10,220,068	\$ 28,627	0.28%	\$ 9,744,998	\$ 13,906	0.14%
Savings	458,451	359	0.08%	414,103	386	0.09%
Time	2,193,273	24,817	1.13%	2,259,242	26,202	1.16%
Total interest-bearing deposits	12,871,792	53,803	0.42%	12,418,343	40,494	0.33%
Funds purchased and repurchase agreements	491,855	856	0.17%	667,367	434	0.07%
Other borrowings	5,919,292	68,152	1.15%	6,019,036	34,882	0.58%
Subordinated debentures	147,954	8,239	5.57%	215,453	6,079	2.82%
Total interest-bearing liabilities	19,430,893	131,050	0.67%	19,320,199	81,889	0.42%
Non-interest bearing demand deposits	9,312,989			8,474,230		
Due on unsettled securities purchases	183,902			137,488		
Other liabilities	584,842			997,069		
Total equity	3,434,868			3,349,416		
Total liabilities and equity	\$ 32,947,494			\$ 32,278,402		
Tax-equivalent Net Interest Revenue		\$ 858,904	2.69%		\$ 764,829	2.53%
Tax-equivalent Net Interest Revenue to Earning Assets			2.92%			2.66%
Less tax-equivalent adjustment		17,203			17,601	
Net Interest Revenue		841,701			747,228	
Provision for credit losses		(7,000)			65,000	
Other operating revenue		695,094			674,020	
Other operating expense		1,025,517			1,017,590	
Net income before taxes		518,278			338,658	
Federal and state income taxes		182,593			106,377	
Net income		335,685			232,281	
Net income attributable to non-controlling interests		1,041			(387)	
Net income attributable to BOK Financial Corporation shareholders		\$ 334,644			\$ 232,668	
Earnings Per Average Common Share Equivalent:						
Net income:						
Basic		\$ 5.11			\$ 3.53	
Diluted		\$ 5.11			\$ 3.53	

Quarterly Financial Summary – Unaudited

Consolidated Daily Average Balances, Average Yields and Rates

(In Thousands, Except Per Share Data)

	Three Months Ended					
	December 31, 2018			September 30, 2018		
	Average Balance	Revenue/Expense	Yield/Rate	Average Balance	Revenue/Expense	Yield/Rate
Assets						
Interest-bearing cash and cash equivalents	\$ 563,132	\$ 3,170	2.23%	\$ 688,872	\$ 3,441	1.98%
Trading securities	1,929,601	19,636	4.10%	1,762,794	17,419	3.98%
Investment securities	364,737	3,887	4.26%	379,566	3,856	4.06%
Available for sale securities	8,704,963	55,085	2.51%	8,129,214	48,916	2.37%
Fair value option securities	277,575	2,578	3.56%	469,398	3,881	3.25%
Restricted equity securities	362,729	5,798	6.39%	328,842	5,232	6.36%
Residential mortgage loans held for sale	179,553	1,795	4.00%	207,488	2,151	4.27%
Loans	21,579,331	276,711	5.09%	18,203,785	220,245	4.80%
Allowance for loan losses	(209,613)			(214,160)		
Loans, net of allowance	21,369,718	276,711	5.14%	17,989,625	220,245	4.86%
Total earning assets	33,752,008	368,660	4.33%	29,955,799	305,141	4.04%
Receivable on unsettled securities sales	799,548			768,785		
Cash and other assets	3,834,187			2,971,233		
Total assets	\$ 38,385,743			\$ 33,695,817		
Liabilities and equity						
Interest-bearing deposits:						
Transaction	\$ 11,773,651	\$ 23,343	0.79%	\$ 10,010,031	\$ 17,029	0.67%
Savings	526,275	148	0.11%	503,821	108	0.09%
Time	2,146,786	8,309	1.54%	2,097,441	7,398	1.40%
Total interest-bearing deposits	14,446,712	31,800	0.87%	12,611,293	24,535	0.77%
Funds purchased and repurchase agreements	1,205,568	4,135	1.36%	1,193,583	3,768	1.25%
Other borrowings	6,361,141	40,220	2.51%	5,765,440	32,036	2.20%
Subordinated debentures	276,378	3,752	5.38%	144,702	2,025	5.55%
Total interest-bearing liabilities	22,289,799	79,907	1.42%	19,715,018	62,364	1.25%
Non-interest bearing demand deposits	10,648,683			9,325,002		
Due on unsettled securities purchases	493,887			544,263		
Other liabilities	610,286			496,634		
Total equity	4,343,088			3,614,900		
Total liabilities and equity	\$ 38,385,743			\$ 33,695,817		
Tax-equivalent Net Interest Revenue		\$ 288,753	2.91%		\$ 242,777	2.79%
Tax-equivalent Net Interest Revenue to Earning Assets			3.40%			3.21%
Less tax-equivalent adjustment		3,067			1,894	
Net Interest Revenue		285,686			240,883	
Provision for credit losses		9,000			4,000	
Other operating revenue		136,455			167,941	
Other operating expense		284,643			252,617	
Net income before taxes		128,498			152,207	
Federal and state income taxes		20,121			34,662	
Net income		108,377			117,545	
Net income attributable to non-controlling interests		(79)			289	
Net income attributable to BOK Financial Corp. shareholders		\$ 108,456			\$ 117,256	
Earnings Per Average Common Share Equivalent:						
Basic		\$ 1.50			\$ 1.79	
Diluted		\$ 1.50			\$ 1.79	

Yield calculations are shown on a tax equivalent at the statutory federal and state rates for the periods presented. The yield calculations exclude security trades that have been recorded on trade date with no corresponding interest income and the unrealized gains and losses. The yield calculation also include average loan balances for which the accrual of interest has been discontinued and are net of unearned income. Yield/rate calculations are generally based on the conventions that determine how interest income and expense is accrued

Quarterly Financial Summary – Unaudited (continued)
 Consolidated Daily Average Balances, Average Yields and Rates

Three Months Ended								
June 30, 2018			March 31, 2018			December 31, 2017		
Average Balance	Revenue / Expense	Yield / Rate	Average Balance	Revenue / Expense	Yield / Rate	Average Balance	Revenue / Expense	Yield / Rate
\$ 1,673,387	\$ 7,740	1.86%	\$ 2,059,517	\$ 7,982	1.57%	\$ 1,976,395	\$ 6,311	1.27%
1,482,302	13,084	3.63%	933,404	7,809	3.40%	560,321	4,629	3.38%
399,088	3,941	3.95%	441,207	4,164	3.78%	462,869	4,606	3.98%
8,163,142	47,463	2.30%	8,236,938	46,008	2.23%	8,435,916	45,623	2.21%
487,192	3,927	3.16%	626,251	4,819	2.95%	792,647	5,770	2.90%
348,546	5,408	6.21%	349,176	5,117	5.86%	337,673	4,956	5.87%
218,600	2,333	4.28%	199,380	1,844	3.71%	257,927	2,389	3.72%
17,751,242	212,266	4.80%	17,261,481	189,674	4.45%	17,181,007	185,614	4.29%
(222,856)			(228,996)			(246,143)		
17,528,386	212,266	4.86%	17,032,485	189,674	4.51%	16,934,864	185,614	4.35%
30,301,191	296,162	3.91%	29,878,358	267,417	3.61%	29,758,612	259,898	3.49%
618,240			998,803			821,275		
2,986,604			2,847,791			2,872,228		
\$ 33,906,035			\$ 33,724,952			\$ 33,452,115		
\$ 10,189,354	\$ 13,993	0.55%	\$ 10,344,469	\$ 11,494	0.45%	\$ 10,142,744	\$ 8,914	0.35%
503,671	95	0.08%	480,110	88	0.07%	466,496	87	0.07%
2,138,880	6,875	1.29%	2,151,044	6,637	1.25%	2,134,469	6,296	1.17%
12,831,905	20,963	0.66%	12,975,623	18,219	0.57%	12,743,709	15,297	0.48%
593,250	782	0.53%	532,412	522	0.40%	488,330	340	0.28%
6,497,020	31,825	1.96%	6,326,967	24,927	1.60%	6,209,903	21,242	1.36%
144,692	2,047	5.67%	144,682	2,003	5.61%	144,673	2,025	5.55%
20,066,867	55,617	1.11%	19,979,684	45,671	0.93%	19,586,615	38,904	0.79%
9,223,327			9,151,272			9,417,351		
527,804			558,898			332,155		
575,865			556,524			600,604		
3,512,172			3,478,574			3,515,390		
\$ 33,906,035			\$ 33,724,952			\$ 33,452,115		
	\$ 240,545	2.80%		\$ 221,746	2.68%		\$ 220,994	2.70%
		3.17%			2.99%			2.97%
	1,983			2,010			4,131	
	238,562			219,736			216,863	
	—			(5,000)			(7,000)	
	156,399			155,989			166,836	
	246,476			244,430			263,987	
	148,485			136,295			126,712	
	33,330			30,948			54,347	
	115,155			105,347			72,365	
	783			(215)			(127)	
	\$ 114,372			\$ 105,562			\$ 72,492	
	\$ 1.75			\$ 1.61			\$ 1.11	
	\$ 1.75			\$ 1.61			\$ 1.11	

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A. CONTROLS AND PROCEDURES

As of the end of the period covered by this report and pursuant to Rule 13a-15 of the Securities Exchange Act of 1934 (the "Exchange Act"), the Company's management, including the Chief Executive Officer and Chief Financial Officer, conducted an evaluation of the effectiveness and design of the Company's disclosure controls and procedures (as that term is defined in Rules 13a-15(e) and 15d-15(e) of the Exchange Act). Based upon that evaluation, the Company's Chief Executive Officer and Chief Financial Officer concluded, as of the end of the period covered by this report, that the Company's disclosure controls and procedures were effective in recording, processing, summarizing and reporting information required to be disclosed by the Company, within the time periods specified in the Securities and Exchange Commission's rules and forms.

In addition and as of the end of the period covered by this report, there have been no changes in internal control over financial reporting (as defined in Rule 13a-15(f) and 15d-15(f), as amended, of the Exchange Act) during the Company's fourth fiscal quarter that have materially affected, or are reasonably likely to materially affect, the internal control over financial reporting.

Management's Report on Internal Control over Financial Reporting appears within Item 8, "Financial Statements and Supplementary Data." The independent registered public accounting firm, Ernst & Young LLP, has audited the financial statements included in Item 8 and has issued an audit report on the Company's internal control over financial reporting, which appears therein.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information set forth under the headings "Election of Directors," "Executive Officers," "Insider Reporting," "Director Nominations," and "Report of the Audit Committee" in BOK Financial's 2019 Annual Proxy Statement is incorporated herein by reference.

The Company has a Code of Ethics which is applicable to all Directors, officers and employees of the Company, including the Chief Executive Officer and the Chief Financial Officer, the principal executive officer and principal financial and accounting officer, respectively. A copy of the Code of Ethics will be provided without charge to any person who requests it by writing to the Company's headquarters at Bank of Oklahoma Tower, P.O. Box 2300, Tulsa, Oklahoma 74192 or telephoning the Chief Risk Officer at (918) 588-6000. The Company will also make available amendments to or waivers from its Code of Ethics applicable to Directors or executive officers, including the Chief Executive Officer and the Chief Financial Officer, in accordance with all applicable laws and regulations.

There are no material changes to the procedures by which security holders may recommend nominees to the Company's board of directors since the Company's 2018 Annual Proxy Statement to Shareholders.

ITEM 11. EXECUTIVE COMPENSATION

The information set forth under the heading "Compensation Discussion and Analysis," "Compensation Committee Interlocks and Insider Participation", "Compensation Committee Report," "Executive Compensation Tables," and "Director Compensation" in BOK Financial's 2019 Annual Proxy Statement is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information set forth under the headings “Security Ownership of Certain Beneficial Owners and Management” and “Election of Directors” in BOK Financial's 2019 Annual Proxy Statement is incorporated herein by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

Information regarding related parties is set forth in Note 13 of the Company's Notes to Consolidated Financial Statements, which appears elsewhere herein. Additionally, the information set forth under the headings “Certain Transactions,” “Director Independence” and “Related Party Transaction Review and Approval Process” in BOK Financial's 2019 Annual Proxy Statement is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTANT FEES AND SERVICES

The information set forth under the heading “Principal Accountant Fees and Services” in BOK Financial's 2019 Annual Proxy Statement is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) (1) Financial Statements

The following financial statements of BOK Financial Corporation are filed as part of this Form 10-K in Item 8:

- Consolidated Statements of Earnings for the years ended December 31, 2018, 2017 and 2016
- Consolidated Statements of Comprehensive Income for the years ended December 31, 2018, 2017 and 2016
- Consolidated Balance Sheets as of December 31, 2018 and 2017
- Consolidated Statements of Changes in Equity for the years ended December 31, 2018, 2017 and 2016
- Consolidated Statements of Cash Flows for the years ended December 31, 2018, 2017 and 2016
- Notes to Consolidated Financial Statements
- Annual Financial Summary - Unaudited
- Quarterly Financial Summary - Unaudited
- Reports of Independent Registered Public Accounting Firm

(a) (2) Financial Statement Schedules

The schedules to the Consolidated Financial Statements required by Regulation S-X are not required under the related instructions or are inapplicable and are therefore omitted.

(a) (3) Exhibits

Exhibit Number	Description of Exhibit
2.0	Agreement and Plan of Merger by and among BOK Financial Corporation, CoBiz Financial Inc., and BOKF Merger Corporation Number Sixteen dated June 17, 2018, incorporated by reference to EX 99.1 of Form 8-K filed on June 18, 2018.
3.0	The Articles of Incorporation of BOK Financial, incorporated by reference to (i) Amended and Restated Certificate of Incorporation of BOK Financial filed with the Oklahoma Secretary of State on May 28, 1991, filed as Exhibit 3.0 to S-1 Registration Statement No. 33-90450, and (ii) Amendment attached as Exhibit A to Information Statement and Prospectus Supplement filed November 20, 1991.
3.1	Bylaws of BOK Financial, as amended and restated as of October 30, 2007, incorporated by reference to Exhibit 3.1 of Form 8-K filed on November 5, 2007.
4.0	The rights of the holders of the Common Stock of BOK Financial are set forth in its Certificate of Incorporation.
4.1	Subordinated Notes Indenture, dated as of June 27, 2016, between the Company and U.S. Bank National Association, as trustee (incorporated by reference to Exhibit 4.1 to the Company's filing on Form 8-K filed June 27, 2016).
4.2	Form of 5.375% Subordinated Notes due 2056 Global Security (incorporated by reference to Exhibit 4.2 to the Company's Registration Statement on Form 8-A filed on June 24, 2016). Pursuant to Item 601(b)(4)(iii)(A) of Regulation S-K, BOK Financial is not filing certain documents. BOK Financial agrees to furnish a copy of each such documents to the Commission upon the request of the Commission.
4.3	Form of Subordinated Notes Indenture, to be dated as of June 25, 2015 between CoBiz Financial Inc. and U.S. Bank National Association, as trustee, incorporated by reference to Exhibit 4.1 to CoBiz Financial Inc. Form 8-K filed June 25, 2015.
4.5	Form of 5.625% Subordinated Notes due June 25, 2030, incorporated by reference to Exhibit 4.2 to CoBiz Financial Inc. Form 8-K filed June 25, 2015.
10.4	Employment and Compensation Agreements.
10.4.2	Amended and Restated Deferred Compensation Agreement (Amended as of December 1, 2003) between Steven G. Bradshaw and BOK Financial Corporation, incorporated by reference to Exhibit 10.4.2 of Form 10-K for the fiscal year ended December 31, 2003.
10.4.2 (a)	409A Deferred Compensation Agreement between Steven G. Bradshaw and BOK Financial Corporation dated December 31, 2004, incorporated by reference to Exhibit 10.4.2 (a) of Form 8-K filed on January 5, 2005.
10.4.2 (b)	Amended and Restated Employment Agreement (amended as of June 30, 2013) between BOK Financial and Steven G. Bradshaw, incorporated by reference to Exhibit 99.A of Form 8-K filed August 20, 2013.
10.4.7	Amended and Restated Employment Agreement (amended June 15, 2013) between BOK Financial and Steven Nell incorporated by reference to Exhibit 99.B of Form 8-K filed September 4, 2013.
10.4.9	Amended and Restated Employment Agreement (amended as of June 15, 2013) between BOK Financial and Norman Bagwell, incorporated by reference to Exhibit 99.A of Form 8-K filed September 4, 2013.
10.4.10	Amended and Restated Employment Agreement (amended as of June 15, 2013) between BOK Financial and Stacy C. Kymes incorporated by reference to Exhibit 10.4.10 of Form 10-K for the fiscal year ended December 31, 2015.
10.4.11	Employment Agreement between BOK Financial and Scott B. Grauer dated December 18, 2013.
10.7.7	BOK Financial Corporation 2001 Stock Option Plan, incorporated by reference to Exhibit 4.0 of S-8 Registration Statement No. 333-62578.

Exhibit Number	Description of Exhibit
10.7.8	BOK Financial Corporation Directors' Stock Compensation Plan, incorporated by reference to Exhibit 4.0 of S-8 Registration Statement No. 33-79836.
10.7.9	Bank of Oklahoma Thrift Plan (Amended and Restated Effective as of January 1, 1995), incorporated by reference to Exhibit 10.7.6 of Form 10-K for the year ended December 31, 1994.
10.7.10	Trust Agreement for the Bank of Oklahoma Thrift Plan (December 30, 1994), incorporated by reference to Exhibit 10.7.7 of Form 10-K for the year ended December 31, 1994.
10.7.11	BOK Financial Corporation 2003 Stock Option Plan, incorporated by reference to Exhibit 4.0 of S-8 Registration Statement No. 333-106531.
10.7.12	BOK Financial Corporation 2003 Executive Incentive Plan, incorporated by reference to Exhibit 4.0 of S-8 Registration Statement No. 333-106530.
10.7.13	10b5-1 Repurchase Plan between BOK Financial Corporation and BOSCO, Inc. dated May 27, 2008, incorporated by reference to Exhibit 10.1 of Form 8-K filed May 30, 2008.
10.7.14	BOK Financial Corporation 2003 Executive Incentive Plan, as amended and restated, for the Chief Executive Officer and for Direct Reports to the Chief Executive Officer, incorporated by reference to the Schedule 14 A Definitive Proxy Statement filed on March 15, 2011.
10.7.16	BOK Financial Corporation 2009 Omnibus Incentive Plan, Amended and Restated effective April 30, 2013, incorporated by reference to the Schedule 14A Definitive Proxy Statement filed on March 20, 2013.
10.8	Lease Agreement between One Williams Center Co. and National Bank of Tulsa (predecessor to BOK) dated June 18, 1974, incorporated by reference to Exhibit 10.9 of S-1 Registration Statement No. 33-90450.
21	Subsidiaries of BOK Financial, filed herewith.
23	Consent of independent registered public accounting firm - Ernst & Young LLP, filed herewith.
31.1	Certification of Chief Executive Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002, filed herewith.
31.2	Certification of Chief Financial Officer Pursuant to Section 302 of the Sarbanes-Oxley Act of 2002, filed herewith.
32	Certification of Chief Executive Officer and Chief Financial Officer Pursuant to 18 U.S.C. Section 1350, as Adopted Pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, filed herewith.
99	Additional Exhibits.
101	Interactive data files pursuant to Rule 405 of Regulation S-T: (i) the Consolidated Balance Sheets, (ii) the Consolidated Statements of Earnings, (iii) the Consolidated Statements of Changes in Equity, (iv) the Consolidated Statement of Cash Flows and (v) the Notes to the Consolidated Financial Statements, filed herewith.

(b) Exhibits

See Item 15 (a) (3) above.

(c) Financial Statement Schedules

See Item 15 (a) (2) above.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

BOK FINANCIAL CORPORATION

DATE: March 1, 2019

BY: /s/ George B. Kaiser
George B. Kaiser
Chairman of the Board of Directors

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below on March 1, 2019, by the following persons on behalf of the registrant and in the capacities indicated.

OFFICERS

/s/ George B. Kaiser
George B. Kaiser
Chairman of the Board of Directors

/s/ Steven G. Bradshaw
Steven G. Bradshaw
Director, President and Chief Executive Officer

/s/ Steven E. Nell
Steven E. Nell
Director, Executive Vice President and
Chief Financial Officer

/s/ John C. Morrow
John C. Morrow
Senior Vice President and
Chief Accounting Officer

DIRECTORS

/s/ Alan S. Armstrong

Alan S. Armstrong

/s/ V. Burns Hargis

V. Burns Hargis

/s/ C. Frederick Ball, Jr.

C. Frederick Ball, Jr.

/s/ Douglas D. Hawthorne

Douglas D. Hawthorne

/s/ Steve Bangert

Steve Bangert

/s/ Kimberley D. Henry

Kimberley D. Henry

Peter C. Boylan III

/s/ E. Carey Joullian, IV

E. Carey Joullian, IV

/s/ Chester E. Cadieux, III

Chester E. Cadieux, III

/s/ Stanley A. Lybarger

Stanley A. Lybarger

Gerard P. Clancy

/s/ Steven J. Malcolm

Steven J. Malcolm

/s/ John W. Coffey

John W. Coffey

/s/ Emmet C. Richards

Emmet C. Richards

/s/ Joseph W. Craft, III

Joseph W. Craft, III

/s/ Claudia San Pedro

Claudia San Pedro

/s/ Jack E. Finley

Jack E. Finley

/s/ Michael C. Turpen

Michael C. Turpen

/s/ David F. Griffin

David F. Griffin

/s/ R.A. Walker

R.A. Walker

EMPLOYMENT AGREEMENT

December 18, 2013

This Employment Agreement (“Agreement”) is made this 18th day of December, 2013 (the “Agreement Date”) between the following parties (“Parties”):

- (i) BOK Financial Corporation, an Oklahoma corporation (“BOK Financial”); and,
- (ii) Scott B. Grauer, an individual currently residing in Tulsa, Oklahoma (the “Executive”).

BOK Financial and Executive, in consideration of the promises and covenants set forth herein (the receipt and adequacy of which are hereby acknowledged) and intending to be legally bound hereby, agree as follows:

- (1) **Purpose of This Agreement.** The purpose of this Agreement is as follows:
 - (a) BOK Financial is a financial holding company, subject to regulation by the Board of Governors of the Federal Reserve System. The subsidiaries of BOK Financial include BOKF, NA, a national association engaged in banking and BOSC, Inc., a registered broker-dealer.
 - (b) The Executive has extensive prior experience in financial services and banking and is currently employed as Executive Vice President, Wealth Management and Chief Executive Officer, BOSC, Inc. of BOK Financial and BOKF, NA, reporting to the Chief Executive Officer.
 - (c) The purpose of this Agreement is to set forth the terms and conditions on which BOK Financial shall employ the Executive and the Executive shall serve as an officer of BOK Financial, BOKF, NA, and other of their affiliates.
- (2) **Prior Agreement Superseded.** This agreement supersedes, from and after the Effective Date, any employment agreement between Executive and BOK Financial and/or BOKF, NA (excluding, for avoidance of doubt, any rights of Executive arising under the BOK Financial 2003 Stock Option Plan or, the BOK Financial 2009 Omnibus Incentive Plan.
- (3) **Employment.** Effective as of the Agreement Date, BOK Financial hereby employs the Executive, and the Executive hereby accepts employment with BOK Financial, on the following terms and conditions:
 - (a) Executive shall serve as Executive Vice President, Wealth Management and Chief Executive Officer, BOSC, Inc. of BOK Financial and BOKF, NA. Executive shall be responsible for those divisions and business lines of BOK Financial and BOKF, NA as the Chief Executive has heretofore established and as may hereafter be established by the Chief Executive Officer from time to time.

- (b) Executive shall devote all time and attention reasonably necessary to the affairs of BOK Financial and BOKF, NA and shall serve BOK Financial and BOKF, NA diligently, loyally, and to the best of his ability.
 - (c) Executive shall serve in such other or additional positions as an officer and/or director of BOK Financial and BOKF, NA or any of their affiliates as the Chief Executive Officer of BOK Financial may reasonably request; provided, however, Executive's residence and place of work shall be in the Tulsa, Oklahoma area.
 - (d) Notwithstanding anything herein to the contrary, Executive shall not be precluded from engaging in any charitable, civic, political or community activity or membership in any professional organization.
- (4) **Compensation.** As the sole, full and complete compensation to the Executive for the performance of all duties of Executive under this Agreement and for all services rendered by Executive to BOK Financial and/or to any affiliate of BOK Financial:
- (a) BOK Financial shall pay the Executive an annual salary (the "Annual Salary") equal to Executive's Annual Salary in effect as of the Agreement Date during the Term (as hereafter defined). The Annual Salary shall be payable in installments in arrears, less usual and customary payroll deductions for FICA, federal and state withholding, and the like, at the times and in the manner in effect in accordance with the usual and customary payroll policies generally in effect from time to time at BOK Financial.
 - (b) The Annual Salary shall not be decreased at any time during the Term of this Agreement. The Annual Salary may be increased annually in accordance with BOK Financial's compensation review practices in effect from time to time for senior executives.
 - (c) BOK Financial shall pay and provide to Executive pension, thrift, medical insurance, disability insurance plan benefits, and other fringe benefits, on the same terms and conditions generally in effect for senior executive employees of the BOK Financial and its affiliates (the "Additional Benefits").
 - (d) BOK Financial may, from time to time in BOK Financial's sole discretion consistent with the practices generally in effect for senior executive employees of the BOK Financial and its affiliates, pay or provide, or agree to pay or provide Executive a bonus, stock option, restricted stock, other incentive or performance based compensation.
 - (i) BOKF Financial shall provide annual incentive and long term incentive awards to Executive in accordance with BOK Financial's Executive Incentive Compensation Plan as adopted by the BOK Financial's Board of Directors from time to time.
 - (ii) All such bonus, stock option, restricted stock, or other incentive or performance based compensation, regardless of its nature (hereinafter called "Performance Compensation") shall not constitute Annual Salary.
 - (e) BOK Financial shall reimburse Executive for reasonable and necessary entertainment, travel and other expenses in accordance with BOK Financial's standard policies in general effect for senior executives of BOK Financial.

- (f) Executive shall be allowed vacation, holidays, and other employee benefits not described above in accordance with BOK Financial's standard policy in general effect for BOK Financial's senior executives. Executive shall be entitled to four weeks paid vacation each year.
 - (g) BOK Financial shall permit Executive to participate in a deferred compensation plan on the terms and conditions established by BOK Financial for senior executives.
 - (h) Executive hereby agrees to accept the foregoing compensation as the sole, full and complete compensation to Executive for the performance of all duties of Executive under this Agreement and for all services rendered by Executive to BOK Financial or any affiliate of BOK Financial.
- (5) **Term of Employment.** The term (the "Term") of Executive's employment ("Employment") pursuant to this Agreement shall commence on the Agreement Date (the "Commencement") and shall continue thereafter provided that upon ninety days prior written notice, either Party may terminate this Agreement.
- (6) **Termination of Employment.** Notwithstanding the provisions of paragraph 5 of this Agreement, the Employment may be terminated on the following terms and conditions:
- (a) **Termination by BOK Financial Without Cause.** In the event BOK Financial terminates Employment of Executive without cause during the Term or upon termination of this Agreement as provided in Paragraph 5:
 - (i) BOK Financial shall forthwith upon such termination (A) pay to Executive BOK Financial's standard severance pay for senior executives in effect at the time of termination and, in addition, an amount equal to Executive's then Annual Salary payable in one lump sum payment, (B) the Executive shall be entitled to receive any Additional Benefits accrued through, but not beyond the effective date of such termination which are payable under the terms and provisions of benefit plans then in effect in accordance with paragraph 4(c) above, (C) Executive shall be entitled to receive pay for vacation in accordance with BOK Financial's then existing policy for terminating senior executives, (D) options held by Executive under the BOKF 2003 Stock Option Plan and the BOKF 2009 Omnibus Incentive Plan shall vest shall be exercisable for a period of ninety days following such termination as provided in such plans, (E) Restricted stock held by Executive shall continue to be owned by the Executive, but shall remain subject to all restrictions applicable to the restricted stock as provided under the Executive Incentive Plan and the 2009 Omnibus Incentive Plan, and (F) Executive shall be entitled to receive those amounts due Executive pursuant to paragraph 8(b) and shall be bound by the Non-Solicitation Agreement (as hereafter defined).
 - (ii) If Executive is terminated for any reason other than for cause following a Change of Control (as hereafter defined), BOK Financial shall pay Executive upon such termination in one lump sum payment an amount equal to two times Executive's then Annual Salary at the time of termination in addition to an amount equal to Executive's then Annual Salary through, but not beyond the effective date of the

termination. This payment shall be in lieu of any payment that would otherwise be paid pursuant to paragraph 6(a)(i)(A), but Executive shall be entitled to the benefit of the other provisions of paragraph 6(a)(i). As used herein, a Change of Control shall be deemed to have occurred if, and only if:

- (A) George B. Kaiser, affiliates of George B. Kaiser, George B. Kaiser Foundation, George Kaiser Family Foundation, and/or members of the family of George B. Kaiser collectively cease to own more shares of the voting capital stock of BOK Financial than any other shareholder (or group of shareholders acting in concert to control BOK Financial to the exclusion of George B. Kaiser, affiliates of George B. Kaiser, George B. Kaiser Foundation, George Kaiser Family Foundation, and/or members of the family of George B. Kaiser); or,
 - (B) BOK Financial shall cease to own directly and indirectly more than fifty percent (50%) of the voting capital stock of BOKF, NA.
- (b) Termination by BOK Financial for Cause. BOK Financial may terminate the Employment for cause on the following terms and conditions:
- (i) BOK Financial shall be deemed to have cause to terminate Executive's Employment only in one or more of the following events:
 - (A) The Executive shall fail to substantially perform his obligations under this Agreement (except as a result of Executive's incapacity due to physical or mental illness) after having first received notice of such failure and thirty days within which to correct the failure;
 - (B) The Executive commits any act which is reasonably deemed to have been intended by Executive to injure BOK Financial or any of its affiliates;
 - (C) The Executive is charged, indicted or convicted of any criminal act or act involving moral turpitude which BOK Financial reasonably deems adversely affects the suitability of Executive to serve BOK Financial or any of its affiliates;
 - (D) The Executive commits any dishonest or fraudulent act which BOK Financial reasonably deems material to BOK Financial or any of its affiliates, including the reputation of BOK Financial or any of its affiliates; or,
 - (E) Any refusal by Executive to obey orders or instructions of the Chief Executive Officer of BOK Financial or BOKF, NA, unless such instructions would require Executive to commit an illegal act, could subject Executive to personal liability, would require Executive to violate the terms of this Agreement, are inconsistent with recognized ethical standards, or would otherwise be inconsistent with the duties of an officer of a bank.
 - (ii) BOK Financial shall be deemed to have cause to terminate Executive's Employment only when a majority of the members of the Board of Directors of BOK Financial

finds that, in the good faith opinion of such majority, the Executive committed one or more of the acts set forth in clauses (A) through (E) of the preceding subparagraph, such finding to have been made after at least twenty (20) business days' notice to the Executive and an opportunity for the Executive, together with his counsel, to be heard before such majority. The determination of such majority, made as set forth above, shall be binding upon BOK Financial and the Executive.

- (iii) The effective date of a termination for cause shall be the date of the action of such majority finding the termination was with cause. In the event BOK Financial terminates Executive's Employment for cause, (A) BOK Financial shall pay Executive the Executive's then Annual Salary through, but not beyond, the effective date of the termination and (B) the Executive shall receive those Additional Benefits accrued through but not beyond the effective date of such termination which are payable under the terms and provisions of benefit plans then in effect in accordance with paragraph 4(c) above, (C) BOK Financial shall pay the Executive for vacation in accordance with BOK Financial's then existing policy for senior executives, and (D) Executive shall be entitled to receive those amounts due Executive pursuant to paragraph 8(b) and Executive shall be bound by the provisions of the Non-Solicitation Agreement.

- (7) **Provisions Respecting Illness and Death.** In the event Executive becomes disabled as defined in Section 409A(a)(2)(C) of the Internal Revenue Code, BOK Financial may terminate Executive's Employment without further or additional compensation being due the Executive from BOK Financial except Annual Salary accrued through the date of termination, Additional Benefits accrued through the date of such termination under benefit plans then in effect in accordance with paragraph 4(c) above, and vacation in accordance with BOK Financial's then existing policy for senior executives, and the provisions of paragraph 8 shall apply. Without limiting the generality of paragraph 4(c), Executive shall upon such termination receive those benefits provided in BOK Financial's long term disability policy then in effect. In the event of the death of the Executive, the Employment of the Executive shall automatically terminate as of the date of death without further or additional compensation being due the Executive, except BOK Financial shall pay to the estate of the Executive the Annual Salary in effect on the date of death and accrued through the date of termination and the Additional Benefits accrued through the date of such termination under benefit plans then in effect in accordance with paragraph 4(c) above. BOK Financial shall make the payments due Executive in one lump sum within forty-five days following the date of termination.
- (8) **Agreement Not to Solicit.** The provisions of this paragraph are hereafter called the "Non-Solicitation Agreement".
 - (a) Executive agrees that, for a period of two (2) years following any termination of the Employment for cause, and for a period of one (1) year following any termination of the Employment for any reason other than cause (including expiration of the Term), Executive shall not directly or indirectly (whether as an officer, director, employee, partner, stockholder, creditor or agent, or representative of other persons or entities) contact or solicit, in any manner indirectly or directly, individuals or entities who were at any time during the original or any extended Term clients of BOK Financial or any of its affiliates for the purpose of providing banking, trust, investment, or other services provided by BOK Financial or any of its affiliates during the Term or contact or solicit employees of BOK Financial or any affiliates of BOK Financial to seek employment with any person or entity except BOK

Financial and its affiliates. This Non-Solicitation Agreement shall not apply to ownership by Executive of up to ten percent (10%) of the common stock of a corporation traded on the facilities of a national securities exchange engaged in the banking business of which Executive is not a director, officer, employee, agent or representative.

- (b) BOK Financial shall pay Executive, in addition to any other amounts which may be due Executive, during each year in which the Non-Solicitation Agreement is in effect, \$3,000 payable in installments in arrears, less usual and customary payroll deductions for FICA, federal and state withholding, and the like, at the times and in the manner in effect in accordance with the usual and customary payroll policies generally in effect from time to time at BOK Financial. Notwithstanding the foregoing, the amounts due for the first six months of the Non-Competition Agreement shall be paid in a lump sum as soon administratively possible following such six month period if Executive is determined to be a "specified employee as defined in Section 409A(a)(2)(B)(i).
 - (c) Executive agrees that the Non-Solicitation Agreement and all the restrictions set forth in this Non-Solicitation Agreement are fair and reasonable.
 - (d) Executive agrees that (i) any remedy at law for any breach of this Non- Agreement would be inadequate, (ii) in the event of any breach of this Non-Solicitation Agreement, the terms of this Non-Solicitation Agreement shall constitute incontrovertible evidence of irreparable injury to BOK Financial, and (iii) BOK Financial shall be entitled to both immediate and permanent injunctive relief without the necessity of establishing or posting any bond therefor to preclude any such breach (in addition to any remedies of law to which BOK Financial may be entitled).
- (9) **Confidential Information.** All references in this Section 9 to BOK Financial shall include BOK Financial's affiliates.
- (a) Executive acknowledges that, during the Term and prior to the Term, Executive has had and will have access to Confidential Information (as hereinafter defined), all of which shall be made accessible to Executive only in strict confidence; that unauthorized disclosure of Confidential Information will damage BOK Financial's business; that Confidential Information would be susceptible to immediate competitive application by a competitor of BOK Financial; that BOK Financial's business is substantially dependent on access to and the continuing secrecy of Confidential Information; that Confidential Information is unique to BOK Financial and known only to Executive and certain key employees and contractors of BOK Financial; that BOK Financial shall at all times retain ownership and control of all Confidential Information; and that the restrictions contained in this Section 9 are reasonable and necessary for the protection of BOK Financial's business.
 - (b) All documents or other records containing or reflecting Confidential Information ("Confidential Documents") prepared by or to which Executive has access are and shall remain the property of BOK Financial. Executive shall not copy or use any Confidential Document for any purpose not relating directly to Executive's Employment on BOK Financial's behalf, or use or disclose any Confidential Document to any party other than BOK Financial or its employees and shall not sell Confidential Documents to any party. Upon the termination of this Agreement or upon BOK Financial's request before or after such termination, Executive shall immediately deliver to BOK Financial or its designee

(and shall not keep in Executive's possession or deliver to anyone else) all Confidential Documents and all other property belonging to BOK Financial. This paragraph shall not bar Employee from complying with any subpoena or court order, provided that Executive shall at the earliest practicable date provide a copy of the subpoena or court order to BOK Financial's Chief Executive Officer.

- (c) During the Term and for a period of four (4) years thereafter, regardless of the reason for termination of Executive's employment, (i) Executive shall not disclose any Confidential Information to any third party and (ii) Executive shall use Confidential Information only in connection with and in furtherance of Executive's Employment by BOK Financial and on behalf of its affiliates.
 - (d) As used herein, Confidential Information means all nonpublic information concerning or arising from BOK Financial's business, including particularly but not by way of limitation trade secrets used, developed or acquired by BOK Financial in connection with its business; information concerning the manner and details of BOK Financial's operations, organization and management; financial information and/or documents and nonpublic policies, procedures and other printed or written material generated or used in connection with BOK Financial's business; BOK Financial's business plans and strategies; electronic files or documents prepared by BOK Financial or Executive containing the identities of BOK Financial's customers (including their addresses and telephone numbers), the nature and amounts of their assets and liabilities, and the specific individual customer needs being addressed by BOK Financial; the nature of fees and charges assessed by BOK Financial; nonpublic forms, contracts and other documents used in BOK Financial's business; the nature and content of any proprietary computer software used in BOK Financial's business, whether owned by BOK Financial or used by BOK Financial under license from a third party; and all other nonpublic information concerning BOK Financial's concepts, prospects, customers, employees, contractors, earnings, products, services, equipment, systems, and/or prospective and executed contracts and other business arrangements. Confidential Information shall not include (i) general skills and general knowledge of the industry obtained by reason of Executive's association with BOK Financial; (ii) information that is or becomes public knowledge through no fault or action of Executive; (iii) any information received from an independent third party who is under no duty of confidentiality with respect to the information; or (iv) any information that, on advice of counsel, Executive is required to disclose by law or regulation.
- (10) **Surrender of Records and Property.** Upon termination of Executive's employment with BOK Financial for whatever reason, in addition to Executive's obligations pursuant to Paragraph 9(b), Executive shall deliver promptly to BOK Financial all records, manuals, books, blank forms, documents, letters, memoranda, notes, notebooks, reports, data, tables, calculations or copies thereof that relate in any way to the business, products, practices or techniques of BOK Financial or any of its affiliates, and all other information of BOK Financial or any of its affiliates, including, but not limited to, all documents that in whole or in part contain any information which is defined in this Agreement as Confidential Information and which is in the possession or under the control of Executive.
- (11) **Compliance with Section 409A.** This Agreement is subject to the following provisions in order to ensure compliance with Section 409A of the Internal Revenue Code of 1986, as amended (Section 409A").

- (a) If any payment, compensation or other benefit provided to the Executive in connection with his employment termination is determined, in whole or in part, to constitute “nonqualified deferred compensation” within the meaning of Section 409A and the Executive is a specified employee as defined in Section 409A(2)(B) (i), no part of such payments shall be paid before the day that is six (6) months plus one (1) day after the date of termination.
- (b) The Parties acknowledge and agree that Section 409A and its application, if any, to the terms of this Agreement may be subject to change as additional guidance and regulations become available. Anything to the contrary herein notwithstanding, all benefits or payments provided by the Company to the Executive that would be deemed to constitute “nonqualified deferred compensation” within the meaning of Section 409A are intended to comply with Section 409A. If, however, any such benefit or payment is deemed to not comply with Section 409A, the Company and the Executive agree to renegotiate in good faith any such benefit or payment (including, without limitation, as to the timing of any severance payments payable hereof) so that either (i) Section 409A will not apply or (ii) compliance with Section 409A will be achieved.
- (c) All payments required to be made by Bank hereunder to the Executive may be adjusted to the withholding of such amounts, if any, relating to tax and other payroll deductions as the Bank may reasonably determine should be withheld pursuant to any applicable law or regulation.

(12) **Miscellaneous Provisions.** The following miscellaneous provisions shall apply to this Agreement:

- (a) All notices or advices required or permitted to be given by or pursuant to this Agreement, shall be given in writing. All such notices and advices shall be (i) delivered personally or (ii) delivered for overnight delivery by a nationally recognized overnight courier service. Such notices and advices shall be deemed to have been given (i) the first business day following the date of delivery if delivered personally or (ii) on the date of receipt if delivered for overnight delivery by a nationally recognized overnight courier service. All such notices and advices and all other communications related to this Agreement shall be given as follows:

If to BOK Financial:

BOK Financial Corporation
 Attn: Stanley A. Lybarger
 Bank of Oklahoma Tower
 P.O. Box 2300
 Tulsa, Oklahoma 74192
 Telephone No.: (918) 588-6000
 Facsimile No.: (918) 295-6379
 slybarger@mail.bok.com

and

Chief Human Resources Officer
 Attn: Stephen D. Grossi
 Bank of Oklahoma Tower

P.O. Box 2300
Tulsa, Oklahoma 74192
Telephone No. 918- 595-3153

With a Copy to: Frederic Dorwart
Old City Hall
124 East Fourth Street
Tulsa, OK 74103-5010
Telephone No.: (918) 583-9945
Facsimile No.: (918) 583-8251
FDorwart@FDLaw.com

If to Executive: Scott B. Grauer
9629 Colonial Drive
Claremore, OK 74019

or to such other address as the Party may have furnished to the other Parties in accordance herewith, except that notice of change of addresses shall be effective only upon receipt.

- (b) This Agreement is made and executed in Tulsa, Oklahoma and all actions or proceedings with respect to, arising directly or indirectly in connection with, out of, related to or from this Agreement, shall be litigated in courts having situs in Tulsa, Oklahoma.
- (c) This Agreement shall be subject to, and interpreted by and in accordance with, the laws of the State of Oklahoma without regard to its conflict of law provisions.
- (d) This Agreement is the entire Agreement of the Parties respecting the subject matter hereof. There are no other agreements, representations or warranties, whether oral or written, respecting the subject matter hereof, except as stated in this Agreement.
- (e) This Agreement, and all the provisions of this Agreement, shall be deemed drafted by all of the Parties hereto.
- (f) This Agreement shall not be interpreted strictly for or against any Party, but solely in accordance with the fair meaning of the provisions hereof to effectuate the purposes and interest of this Agreement.
- (g) Each Party hereto has entered into this Agreement based solely upon the agreements, representations and warranties expressly set forth herein and upon her or his own knowledge and investigation. Neither Party has relied upon any representation or warranty of any other Party hereto except any such representations or warranties as are expressly set forth herein.
- (h) Each of the persons signing below on behalf of a Party hereto represents and warrants that he or she has full requisite power and authority to execute and deliver this Agreement on behalf of the Parties for whom he or she is signing and to bind such Party to the terms and conditions of this Agreement.

- (i) This Agreement may be executed in counterparts, each of which shall be deemed an original. This Agreement shall become effective only when all of the Parties hereto shall have executed the original or counterpart hereof. This Agreement may be executed and delivered by a facsimile transmission of a counterpart signature page hereof.
- (j) In any action brought by a Party hereto to enforce the obligations of any other Party hereto, the prevailing Party shall be entitled to collect from the opposing Party to such action such Party's reasonable litigation costs and attorneys fees and expenses (including court costs, reasonable fees of accountants and experts, and other expenses incidental to the litigation).
- (k) This Agreement shall be binding upon and shall inure to the benefit of the Parties and their respective heirs, personal representatives, successors and assigns.
- (l) This is not a third party beneficiary contract, except BOK Financial (including each affiliate thereof) shall be a third party beneficiary of this Agreement.
- (m) This Agreement may be amended or modified only in a writing, as agreed to by the Parties hereto, which specifically references this Agreement.
- (n) A Party to this Agreement may decide or fail to require full or timely performance of any obligation arising under this Agreement. The decision or failure of a Party hereto to require full or timely performance of any obligation arising under this Agreement (whether on a single occasion or on multiple occasions) shall not be deemed a waiver of any such obligation. No such decisions or failures shall give rise to any claim of estoppel, laches, course of dealing, amendment of this Agreement by course of dealing, or other defense of any nature to any obligation arising hereunder.
- (o) In the event any provision of this Agreement, or the application of such provision to any person or set of circumstances, shall be determined to be invalid, unlawful, or unenforceable to any extent for any reason, the remainder of this Agreement, and the application of such provision to persons or circumstances other than those as to which it is determined to be invalid, unlawful, or unenforceable, shall not be affected and shall continue to be enforceable to the fullest extent permitted by law.
- (p) None of the compensation or other payments to Executive provided for in, or that may be made pursuant to, this Agreement are intended by the Parties to be deferred compensation within the meaning of Section 409A. If, however, the Executive is a "specified employee" as defined in Section 409A(a)(2)(B)(i), then the other provisions of this Agreement notwithstanding, no compensation that is "deferred compensation" within the meaning of Section 409A shall be paid to Executive sooner than six months and one day following the date of Executive's separation from service from the Company, as such date is determined in accordance with Section 409A.

Dated as of the Agreement Date.

BOK Financial Corporation

/s/ Stanley A. Lybarger

Name: Stanley A. Lybarger

Title: President and Chief Executive
Officer

Executive

/s/ Scott B. Grauer

Individually

BOK FINANCIAL CORPORATION
SUBSIDIARIES OF THE REGISTRANT

Banking Subsidiaries

BOKF, National Association (1)

CoBiz Bank (7)

Other subsidiaries of BOK Financial Corporation

BOK Capital Service Corporation

BOKC Real Estate Corporation (6)

BOKF Capital Corporation

BOKF-CC (Collision Works), LLC

BOKF-CC (FSE), LLC

BOKF-CC (Heartland), LLC

BOKF-CC (O2 Concepts), LLC

BOKF-CC (QRC), LLC

BOKF-CC (Switchgrass), LLC

BOKF Energy Fund Investment I, LLC

BOKF Equity, LLC

BOKF Private Equity Limited Partnership

BOKF Private Equity Limited Partnership II

BOK Financial Securities, Inc.

Cavanal Hill Distributors, Inc.

CoBiz IM, Inc. (7)

CoBiz Insurance, Inc. (7)

CoBiz Risk Management, Inc. (8)

CoBiz Wealth, LLC (7)

HFP II, LLC

The Milestone Group, Inc. (5)

RMA Holdings, Inc. (7)

Switchgrass I, LLC

Switchgrass II, LLC
Switchgrass III, LLC
Switchgrass IV, LLC
Switchgrass V, LLC
Switchgrass VI, LLC
Switchgrass Holdings, LLC
Switchgrass Management, LLC
Switchgrass Properties, LLC

Subsidiaries of BOKF, National Association (1)

Affiliated BancServices, Inc.
Affiliated Financial Holding Co.
Affiliated Financial Insurance Agency, Inc.
BancOklahoma Agri-Service Corporation
BOK Delaware, Inc. (3)
BOK Financial Asset Management, Inc. (2)
BOK Financial Equipment Finance, Inc.
BOK Funding Trust (3)
BOKFCDF Fund I, LLC
BOKF Community Development Fund, LLC
BOKF Community Development Fund II
BOKF Community Development Corporation
BOKF Petro Holding, LLC
BOKF Special Assets I, LLC
BOSC Agency, Inc. (Oklahoma)
BOSC Agency, Inc. (New Mexico) (4)
BOSC Agency, Inc. (Texas) (2)
Calicotte Ranch HOA, LLC
Cavanal Hill Investment Management, Inc.
Cottonwood Valley Ventures, Inc.
CVV Management, Inc.
CVV Partnership, an Oklahoma General Partnership

Oklahoma New Markets Fund I, LLC

Ottawa Land Partners, LLC (6)

Subsidiaries of CoBiz Bank (7)

AWREI, Inc.

CoBiz Public Finance Inc.

Western Real Estate Investors, Inc.

All Subsidiaries listed above were incorporated in Oklahoma, except as noted.

- (1) Chartered by the United States Government
- (2) Incorporated in Texas
- (3) Incorporated in Delaware
- (4) Incorporated in New Mexico
- (5) Incorporated in Colorado
- (6) Incorporated in Kansas
- (7) Incorporated in Colorado
- (8) Incorporated in Nevada

Consent of Independent Registered Public Accounting Firm

We consent to the incorporation by reference in the following Registration Statements:

- Registration Statement (Form S-8, No. 33-44121) pertaining to the Reoffer Prospectus of the Bank of Oklahoma Master Thrift Plan and Trust Agreement as amended October 6, 2008.
- Registration Statement (Form S-8, No. 333-40280) pertaining to the Reoffer Prospectus of the BOK Financial Corporation Master Thrift Plan for Hourly Employees as amended October 6, 2008.
- Registration Statement (Form S-8, No. 33-79836) pertaining to the Reoffer Prospectus of the BOK Financial Corporation Directors' Stock Compensation Plan.
- Registration Statement (Form S-8, No. 333-32649) pertaining to the Reoffer Prospectus of the BOK Financial Corporation 1997 Stock Option Plan.
- Registration Statement (Form S-8, No. 333-93957) pertaining to the Reoffer Prospectus of the BOK Financial Corporation 2000 Stock Option Plan.
- Registration Statement (Form S-8, No. 333-62578) pertaining to the Reoffer Prospectus of the BOK Financial Corporation 2001 Stock Option Plan.
- Registration Statement (Form S-8, No. 333-106530) pertaining to the Reoffer Prospectus of the BOK Financial Corporation 2003 Executive Incentive Plan.
- Registration Statement (Form S-8, No. 333-106531) pertaining to the Reoffer Prospectus of the BOK Financial Corporation 2003 Stock Option Plan.
- Registration Statement (Form S-8, No. 333-135224) pertaining to the Reoffer Prospectus of the BOK Financial Corporation 2003 Stock Option Plan.
- Registration Statement (Form S-8, No. 333-158846) pertaining to the Reoffer Prospectus of the BOK Financial Corporation 2009 Omnibus Incentive Plan.
- Registration Statement (Form S-3, (No. 333-212120) pertaining to the Reoffer Prospectus of the BOK Financial Corporation 2016 Subordinated Note Issuance.
- Registration Statement (Form S-4, (No. 333-226211) pertaining to the Registration Statement for the registration of BOK Financial Corporation's common stock.

of our reports dated March 1, 2019, with respect to the consolidated financial statements of BOK Financial Corporation and the effectiveness of internal control over financial reporting of BOK Financial Corporation included in this Annual Report (Form 10-K) of BOK Financial Corporation for the year ended December 31, 2018.

/s/ Ernst & Young LLP

Tulsa, Oklahoma

March 1, 2019

**CERTIFICATION PURSUANT TO
SECTION 302
OF THE SARBANES-OXLEY ACT OF 2002
FOR THE CHIEF EXECUTIVE OFFICER**

I, Steven G. Bradshaw, President and Chief Executive Officer of BOK Financial Corporation (“BOK Financial”), certify that:

1. I have reviewed this Annual Report on Form 10-K of BOK Financial;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 1, 2019

/s/ Steven G. Bradshaw

Steven G. Bradshaw

President

Chief Executive Officer

BOK Financial Corporation

**CERTIFICATION PURSUANT TO
SECTION 302
OF THE SARBANES-OXLEY ACT OF 2002
FOR THE CHIEF FINANCIAL OFFICER**

I, Steven E. Nell, Chief Financial Officer of BOK Financial Corporation (“BOK Financial”), certify that:

1. I have reviewed this Annual Report on Form 10-K of BOK Financial;
2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;
3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;
4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:
 - a. Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;
 - b. Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;
 - c. Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and
 - d. Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and
5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):
 - a. All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and
 - b. Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 1, 2019

/s/ Steven E. Nell

Steven E. Nell
Executive Vice President
Chief Financial Officer
BOK Financial Corporation

**CERTIFICATION PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002**

In connection with the Annual Report of BOK Financial Corporation (“BOK Financial”) on Form 10-K for the fiscal year ending December 31, 2018 as filed with the Securities and Exchange Commission on the date hereof (the “Report”), we, Steven G. Bradshaw and Steven E. Nell, Chief Executive Officer and Chief Financial Officer, respectively, of BOK Financial, certify, pursuant to 18 U.S.C. § 1350, as adopted pursuant to § 906 of the Sarbanes-Oxley Act of 2002, that to our knowledge:

1. The Report fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934; and
2. The information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of BOK Financial as of, and for, the periods presented.

March 1, 2019

/s/ Steven G. Bradshaw

Steven G. Bradshaw

President

Chief Executive Officer

BOK Financial Corporation

/s/ Steven E. Nell

Steven E. Nell

Executive Vice President

Chief Financial Officer

BOK Financial Corporation

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OUR FAMILY OF BRANDS

Consumer and Commercial Banking:

 BOK FINANCIAL

 BANK OF ALBUQUERQUE

 BANK OF ARKANSAS

 BANK OF OKLAHOMA

 BANK OF TEXAS

mobank

Transaction and Payment Processing:

TransFund

Wealth Management:

 BOK FINANCIAL
PRIVATE WEALTH

 BOK FINANCIAL
ADVISORS

 BOK FINANCIAL
SECURITIES

 BOK FINANCIAL
INSURANCE

 BOK FINANCIAL
ASSET MANAGEMENT

 CAVANAL HILL

 THE
MILESTONE
GROUP

Mortgage Banking:

 BOK FINANCIAL
MORTGAGE

HomeDirect
Mortgage

CORPORATE HEADQUARTERS:

Bank of Oklahoma Tower
P.O. Box 2300
Tulsa, Oklahoma 74192
918.588.6000



www.bokf.com