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## 20 years of banking history in 67 tables and charts

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# 20-years of banking history in 67 tables and charts

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*American Enterprise Institute*

AEI Economics Working Paper 2021-05  
March 2021

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# **20-Years of Banking History in 67 Tables & Charts**

**Paul H Kupiec**

**March 2021**

## **ABSTRACT**

I review 20 years of financial data and highlight important changes in the banking industry. Post financial crisis laws and regulations and new Federal Reserve monetary policies have left a lasting impact on the industry. By 2021, the number of independent depository institutions declined to just over half of the number that existed in 2000, and the assets and activities of the industry have become much more concentrated in a few large “systemically important” institutions.

Moreover, the characteristics of the largest banks has changed. In 2000, they invested 57.5 percent of their assets in private sector business and consumer loans. By 2021, that share fell to a historically low 40 percent. In response to higher regulatory capital requirements and other enhanced prudential regulations, the largest banks replaced business and consumer loans with interest-bearing Federal Reserve deposits, US Treasury securities and other federally-guaranteed securities. The largest banks now dedicate 30 percent of their assets to directly funding the federal government and government-guaranteed activities.

Under the post-crisis policy regime, the largest banks increased slightly their share of equity funding whereas these same banks dramatically increased their use of government-insured and implicitly-insured deposits. In 2000, the largest banks used deposits to raise about 66 percent of their funding. Today deposits fund 80 percent of their operations. The increase in deposits was used to replace subordinated debt, federal funds and other credit instruments whose owners faced loss should the bank fail. Historically, at-risk bank creditors were the most active monitors of a bank’s financial condition, increasing interest rates or withdrawing their funding at the first sign of bank distress. Today, monitoring of the largest banks is left almost exclusively to federal government regulators who have a checkered history when it comes to prescience and transparency.

To be clear, the largest banks are not being accused of anything nefarious. They are merely responding to the incentives created by Congress, heightened prudential regulatory standards, and the unconventional Federal Reserve monetary policies that have impacted the banking industry and wider economy.

## **I. Introduction and summary findings**

The US banking system has undergone major changes in the past 20 years as new regulations and new approaches to monetary policy left a lasting impact on the industry. The bursting of the dot-com bubble followed by the September 11, 2001 terrorist attacks triggered an extended period of low interest rates as Federal Reserve monetary policy counteracted the economic shock of these events. The average effective federal funds rate stood at 6.24 percent in 2000; in December 2001, it was reduced to below 2 percent and remained there until December 2004. These historically low interest rates along with innovations in the securitizations and mortgage-financing industry fueled an unsustainable boom in housing prices. When the housing bubble finally burst, several large depository institutions required government support to prevent their failures. While federal government assistance rescued all but a few of the largest institutions, hundreds of smaller depository institutions failed and many more were acquired as the crisis accelerated consolidation in the banking industry.

In the year 2000, there were 9920 depository institutions, only three of which held over \$250 billion in assets. These three banks accounted for 18 percent of the assets in the entire banking system. Over the next 20 years, thousands of institutions disappeared as they were acquired by other depository institutions, voluntarily relinquished their charters, or failed and were resolved by the Federal Deposit Insurance Corporation. By the third quarter of 2020, there were 5042 depository institutions, thirteen of which had assets in excess of \$250 billion. Together these 13 “systemically important” banks accounted for almost 56 percent of all banking system assets.

Notwithstanding the consolidation in the number of depository institutions, the total assets in the banking industry still grew faster than the rate of nominal GDP. By 2020, paced by

the growth of the largest banks, banking system total assets grew to about 2.9 times their 2000 level. Over this same period, nominal GDP doubled. The growth in bank assets, while strong, did not keep pace with the growth of total credit in the US economy. In 2000, total outstanding loans and debt securities in the US were about 2.8 times nominal GDP. By 2020, as the accumulating federal government debt grew to more than 550 percent of its 2000 levels, total outstanding loans and debt securities grew to more than 4 times nominal GDP. While banks remained an important source for providing credit to the US economy, the share of overall credit provided by the banking system declined from 19.1 percent in 2000 to 18.3 percent in 2020.

The bursting of the housing bubble triggered a financial crisis that required the Federal Reserve to pioneer new approaches for implementing monetary policy. The Fed introduced its so-called zero interest rate policy (or ZIRP) which reduced its short-term target interest rate, the federal funds rate, to few basis points above zero. The Fed also began paying interest on bank reserve balances held at Federal Reserve banks. The Fed kept the federal funds rate hovering just above zero for years while it engaged in massive open market purchases of Treasury and government agency mortgage-backed securities in an attempt to lower long-term Treasury and mortgage interest rates.

In response to the financial crisis, Congress passed the Dodd-Frank Act, a law that mandated heightened prudential standards for and greatly expanded the Federal Reserve Board's regulatory powers over the largest systemically important banking institutions. It also permanently increased federal deposit insurance coverage to \$250,000 per depositor and imposed new requirements on residential mortgage lenders.

While some depository institutions with total assets smaller \$250 billion may be designated systemically important, all banks larger than \$250 billion are so designated and

required to comply with Dodd-Frank Act heightened prudential standards. These standards include mandatory periodic Federal Reserve Board stress tests, new and more stringent capital and liquidity requirements, limits on bank trading activities, a new government resolution regime for bank holding companies and the production of so-called “living will” resolution plans—blueprints for resolving the largest banks without causing a financial crisis and without government assistance.

***The largest banks change their investing behavior***

Businesses and consumers react when faced with significant changes in regulations and economic conditions. Banks, especially the largest banks, responded to the post-crisis economic and regulatory developments by changing their funding strategies, scaling back trading activities, reducing labor costs, and altering their investment holdings. Faced with new stringent regulatory capital and liquidity requirements and near-zero short term interest rates, the largest banks rebalanced their asset holdings away from loans to businesses and consumers and toward investments in liquid federal government-guaranteed securities and Federal Reserve interest-bearing deposits.

Business and consumer loans carry substantially higher regulatory risk weights (100 to 150 percent) compared to the risk weights assigned to US Treasury securities and Federal Reserve deposits (0 percent), and federally guaranteed agency securities (0 to 20 percent). The higher an asset’s risk weight, the larger the amount of equity that a bank must use to fund each dollar invested in the asset. The higher share of equity funding lowers the expected return bank shareholders can anticipate earning when the bank invests in that asset. When the government significantly increased the minimum regulatory capital levels the largest banks were required to maintain, banks adjusted to meet these new requirements by making fewer business and

consumer loans and holding more Federal Reserve deposits and government-guaranteed securities.

In 2000, banks with assets in excess of \$250 billion invested about 57.5 percent of their assets in loans leases and about 8.5 percent of their assets in federal government guaranteed securities and Federal Reserve deposits. In 2000, the Federal Reserve did not pay interest on banks' deposits held at Federal Reserve Banks. By 2020, after substantially higher minimum regulatory capital standards were in force and the Federal Reserve paid interest on bank deposits, banks with assets in excess of \$250 billion invested 40 percent of their assets in consumer and business loans and over 30 percent of their assets in federally-guaranteed securities and interest bearing Federal Reserve deposits. In 2021, these 13 banks held 55.6 percent of all assets in the banking system, but only made 44.3 percent of the banking system's total non-government guaranteed business and consumer loans.

Commercial and industrial (C&I) loans provide credit to private sector borrowers to help small and not-so-small businesses fund their operations. C&I loans do not require a borrower to secure the loan with real estate. In the year 2000, the largest banks invested over 20 percent of their assets in C&I loans. By 2020, the largest banks' C&I loans accounted for less than 10 percent of their total assets. Business credit was not the only type of credit impacted by the new rules. In 2006, the largest banks held 23.5 percent of their assets in nongovernment-guaranteed 1-to-4 family residential mortgage loans. By 2020, that share dropped to 10 percent.

The Dodd-Frank Act exempted smaller banks from the enhanced prudential capital and liquidity management standards imposed on the largest banks, but they were still required to meet new Basel III minimum regulatory capital rules adopted by banking regulators in 2013. However, small banks could continue to use the so-called "standardized approach" to calculate

their minimum capital requirement whereas the largest banks were required to use the Basel III “advanced approach” to calculate the regulatory capital levels they were required to maintain.

Because banks of different asset sizes were subjected to different regulatory regimes, it may not come as a surprise that small and large banks evolved their businesses differently over this period. These differences are apparent when I categorize banks into five different size categories: very small banks with assets under \$1 billion; banks with assets between \$1 billion and \$10 billion; banks with assets between \$10 billion and \$100 billion; banks with assets between \$100 billion and \$250 billion; and banks with assets over \$250 billion. Banks in the smallest two size categories are typically considered “community banks,” although some institutions operating within a localized geographic footprint can accumulate far more than \$10 billion in assets. Banks with assets in the \$100-\$250 billion range are typically large regional institutions, whereas banks with assets in excess of \$250 billion are Dodd-Frank systemically important institutions.

For smaller banks, the switch from the Basel II to Basel III minimum regulatory capital regime added some new higher-risk weight investment categories to the standardized approach, but it left many of the Basel II risk weights unchanged. Under the new standardized approach, small banks did not have to satisfy many of the heightened prudential standards imposed on the largest banks. Small banks were exempt from satisfying the supplementary leverage ratio, the Global Systemically Important Bank (GSIB) supplementary capital requirements, new minimum liquidity requirements and the annual Federal Reserve Board stress testing process, all of which contribute to the amount of capital a Basel III advanced approach bank is required to maintain.

Small banks still faced slightly higher minimum regulatory capital requirements under Basel III primarily because of changes in the definition of regulatory capital and the imposition



of a new “capital conservation buffer” that limits an institution’s ability to pay dividends or repurchase its shares should its capital fall below designated threshold levels. However, at the time the rule was adopted in 2013, the FDIC estimated that 95 percent of small banks already had sufficient regulatory capital to comply with Basel III.

The data suggest that the adoption of Basel III had only a modest impact on the tradeoff between regulatory capital and profitability faced by small banks. After the adoption of Basel III, smaller banks typically maintained the share of their assets dedicated to funding business, agricultural and consumer loans. The data show that, for all size categories of banks with assets under \$250 billion, on average banks increased the share of their assets invested in consumer and business loans. Throughout the period, banks with assets under \$100 billion remained the predominant suppliers of commercial real estate loans, multifamily residential mortgages, farmland loans and other agricultural loans.

### ***Banks change how they fund their activities***

Banks reacted to the Federal Reserve’s post-crisis ZIRP and the increase in federal deposit insurance coverage by greatly expanding their use of deposits to fund their operations. The largest banks posted the greatest increase in deposit funding. Banks with assets in excess of \$250 billion increased the share of deposits used to fund their assets from 63 percent in 2008 to 80 percent in 2021. Banks with assets between \$10 and \$250 billion posted similarly large increases in the share of their assets funded with deposits. The smallest banks typically funded their operations using over 80 percent of deposits even before the Great Recession, and so their deposit share of funding increased by only about 3.5 percentage points in the post-crisis period.

The Dodd-Frank Act increased federal insurance coverage on deposits to \$250,000 per depositor. As a practical matter, should a large bank become distressed and require an FDIC

resolution, the bank's depositors will usually be fully protected. A failing large bank will typically be sold to another healthy large insured depository institution, and in the process the failing bank's deposits will be transferred in full to the acquiring institution. It would be extremely rare for a large bank's depositors to suffer a loss. This in part explains how the largest banks are able to attract and retain 80 percent of their funding from depositors even though it is estimated that only about 40 percent of their deposit balances are fully insured, a much smaller percentage of deposits than are insured at smaller banks. For example, it is estimated that more than 75 percent of deposit balances are fully insured at banks with assets smaller than \$1 billion.

Large banks utilized the influx of new deposit financing to reduce their use of more expensive non-government guaranteed funding sources and Federal Home Loan Bank advances. Federal Home Loan Bank advances are available to member banks at government-subsidized rates, but they require banks to post collateral.<sup>1</sup> In 2000, banks with assets larger than \$10 billion used a significant share of long-term subordinated debt to fund their operations. Subordinated debt accounted for as much as 2.4 percent of assets in banks with assets between \$100 and \$250 billion. Because it has a long maturity, subordinated debt cannot "run" should a bank become distressed. Subordinated debt owners typically suffer losses should an issuing bank fail. By 2020, banks in all size categories had responded to the new regulatory and monetary policy regime by reducing the share of assets funded with subordinated debt to less than 50 basis points.

In addition to jettisoning their subordinated debt, large banks used their new deposits to substantially reduce other funding sources. They reduced funds borrowed using federal funds and other short-term, non-federally-insured instruments. Compared to pre-crisis levels, the

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<sup>1</sup> The 1989 Financial Institutions Reform, Recovery, and Enforcement Act allowed commercial banks to join the Federal Home Loan Banking system and thus be eligible to borrowing using Federal Home Loan Bank advances.

borrowed federal funds to asset ratios of banks larger than \$10 billion declined by more than 6 percentage points. These banks' "other borrowed funds" to assets ratios declined by over 7 percentage points. For some bank size categories, the declines were much larger.

The reductions in the use of federal funds and other non-federally insured sources of bank credit has important consequences for early-warning indications of underlying financial distress. This collection of bank creditors historically have been the earliest to recognize institutions in distress. Because these bank creditors take losses if a bank fails, they are active bank monitors. These creditors typically withdraw their funds from the bank or sharply raise the interest rates they charge at the first sign of bank distress. Post-crisis, these private sector bank monitors have effectively been replaced by bank regulators via banks' decision to replace these funding sources with federally insured and implicitly-insured deposits. History suggests that the federal government regulators of all types are often slow to recognize problems that emerge on their watch and less than transparent in their public disclosures of underlying problematic issues.

Historically, smaller banks did not make significant use of subordinated debt, federal funds borrowings or other short-term non-insured sources of credit to fund their balance sheets. Many relied on Federal Home Loan Bank advances as a source of funding. When these banks increased their share of deposit funding in the post-crisis period, they typically used the proceeds to reduce their use of Federal Home Loan Bank advances.

When it comes to bank equity capital, banks in all size categories posted increases in their equity-to-asset ratios as they anticipated the US adoption of the Basel II regulatory capital regime. By the time Basel II was formally adopted in 2007, on average, banks in all size categories had increased their equity-to-asset ratios to accommodate the increase in minimum capital required by Basel II. Banks in the smallest size category, assets under \$1 billion,

historically maintained, on average, the highest equity-to-asset ratios and consequently required the smallest adjustment to meet the new Basel II requirements. In contrast, the largest banks, banks with assets in excess of \$250 billion, historically maintained, on average, the lowest equity-to-asset ratios and yet, in anticipation of Basel II, these banks raised their equity-to-asset ratios by only 1.18 percentage points on average. In contrast, banks with assets in the range \$10-\$250 billion on average raised their equity-to-asset ratios by as much as 4 percentage points.

Relative to the impact of Basel II, the data indicate that the 2013 adoption of Basel III capital regulations had only a muted impact on bank equity-to-asset ratios. In fact, by 2020, many of the largest banks' equity-to-asset ratios declined relative to the peak values they reached in the period between 2010 and 2013.

Subordinated debt is a component of a bank's loss-absorbing capital base. It protects depositors and the deposit insurance fund from losses in the event an issuing bank fails. Large banks' reductions in subordinated debt funding offset the additional loss absorbing capacity generated by the increase in bank equity-to-asset ratios. As a result, the largest banks' average loss absorbing capacity as measured by the ratio of total bank equity plus subordinated debt to assets was only 92 basis points larger in 2020 than in the year 2000.

***Bank income, expenses and returns are impacted by post-crisis reforms***

In terms of after-tax income per dollar of bank assets (ROA), under normal economic conditions, most bank size categories seem to have lost a few basis points in the post-crisis period. Comparing average ROAs of banks in different size categories in the period 2000-2007 with those in the period 2012-2019, banks in the \$10-\$100 billion range posted average ROAs that were 16.8 basis points lower in the post-crisis period. Banks with assets between \$100 and \$250 billion posted ROAs that were, on average 13.6 basis points lower. The smallest banks

experienced a decline of about 4.5 basis points in their average ROAs whereas the largest banks actually gained about 3.7 basis points in return.

The details that explain the reduction in bank average ROAs vary depending on the bank size category examined. Decomposing the change in average ROAs between the 2000-2007 period and 2012-2019 period, banks in the two largest size categories experienced a reduction in the yield they earned on their interest-bearing assets of about 30 basis points. All bank size categories experienced a decline in their noninterest income per dollar of bank assets as the contribution of service fees on domestic deposits and other banking fees declined under the Fed's ZIRP regime. The decline in bank revenue per dollar of assets was offset by much lower bank interest expense for all bank size categories and a significant reduction in noninterest expenses per dollar of bank assets for some bank size categories. For example, larger banks significantly reduced the salary and benefits expenses per dollar of assets.

The overall trend toward reductions in bank ROAs under normal economic conditions coupled with higher bank equity-to-asset ratios resulted in reduced average returns on bank equity (ROE) in the post-crisis period. Comparing bank-size-category average ROEs over the 2000-2007 period with average ROEs over the period 2012-2019, banks with assets between \$100 and \$250 billion experienced a reduction of 3.58 percentage points, from 12.4 in the pre-crisis period to 8.8 percent post crisis. The ROEs of banks with assets between \$10 and \$100 billion dropped from 12.5 percent to 9.4 percent, while the largest banks saw average ROEs slip from 12.5 percent to just under 10 percent.

To summarize, the banking system has experienced some important changes over the last 20 years. Not only have the number of independent banks in operation been reduced by half, but the concentration of banking system assets in the largest banks has increased dramatically.

Moreover, the shift in banking system assets to large systemically important banks has coincided with significant changes in the way the largest banks operate, especially with regard to the assets they decide to hold and the way these banks fund their operations.

The largest banks have satisfied new, more stringent risk-weighted capital standards and prudential regulations by replacing high risk-weight assets with low risk-weight assets. Instead of investing in private sector loans, the largest banks have become major suppliers of credit to the federal government and government-guaranteed activities. Thirty percent of the largest banks' assets are invested in assets that carry a federal government guarantee. Not only did the largest banks increase their holding of federally-insured investments, but they also increased their reliance on federally guaranteed and implicitly-guaranteed deposits to fund their operations. Eighty percent of the largest banks' funding is implicitly guaranteed by the federal government. And by removing at-risk private sector creditors from their funding mix, banks have eliminated the monitors that traditionally have been the "canaries in the coal mine" when it comes to detecting weak financial institutions.

The balance of this paper includes the data analysis that supports my summary findings. The analysis is based on publicly available data sources including: the US national income and product accounts as reported by the Federal Reserve Bank of a Saint Louis in their FRED online database; Federal Reserve Flow of Funds data also reported in the FRED database; and bank quarterly "Reports of Conditions and Income" as reported by the Federal Deposit Insurance Corporation in their Statistics on Depository Institutions database.

The historical record is interpreted from the time trends exhibited by the annual average values of various income, balances sheet and off-balance bank characteristics. Annual averages are calculated for banks in various size categories. The annual averages are calculated by

weighting each bank's data by the share of its assets relative to its particular size category for the year in question. When the analysis was undertaken, only the first three quarters of 2020 data were publicly available, and these data points are designated 2020.1, 2020.2, and 2020.3. When analyzing income statements from 2020, the data banks reported were annualized. These data are designated 2020.1\*, 2020.2\*, 2020.3\*. The analysis is presented in simple charts and tables. There are no overly "clever" identification schemes, complex econometric models, or statistical hypothesis tests to intimidate a reader. The trends I discuss are clearly evident in the charts and tables that follow. There are in fact many charts and tables, more than most people may care to read. They are presented in part to fully justify my interpretation of banking system developments and in part to provide a useful reference for the readers that are interested in the details.

The remainder of the paper is organized as follows. Section II reviews the history of US aggregate credit supply and demand. Section III discusses the structural changes experienced by the banking industry since 2000. Section IV is focused on the evolution of bank investments. Section V analyzes bank funding trends. Section VI reviews bank revenues, expenses and profitability over the past two decades and Section VII offers concluding remarks.

## **II. 20-years of aggregate US borrowing and lending history**

The total amount of debt in US economy in the form of loans and debt securities is determined by the borrowing decisions made by individual households, nonfinancial businesses, financial businesses, state, local and federal government activities and by foreign firms that obtain funding in the US. These economic actors may choose to borrow more or less depending on the level of interest rates, the current state of the economy, the outlook for future economic growth or other considerations. Chart 1 shows that, as interest rates declined over the first 20

years of this century, total borrowing by all sectors of the economy increased from 2.8 times nominal GDP in 2000, to over 4 times nominal GDP by early 2020.

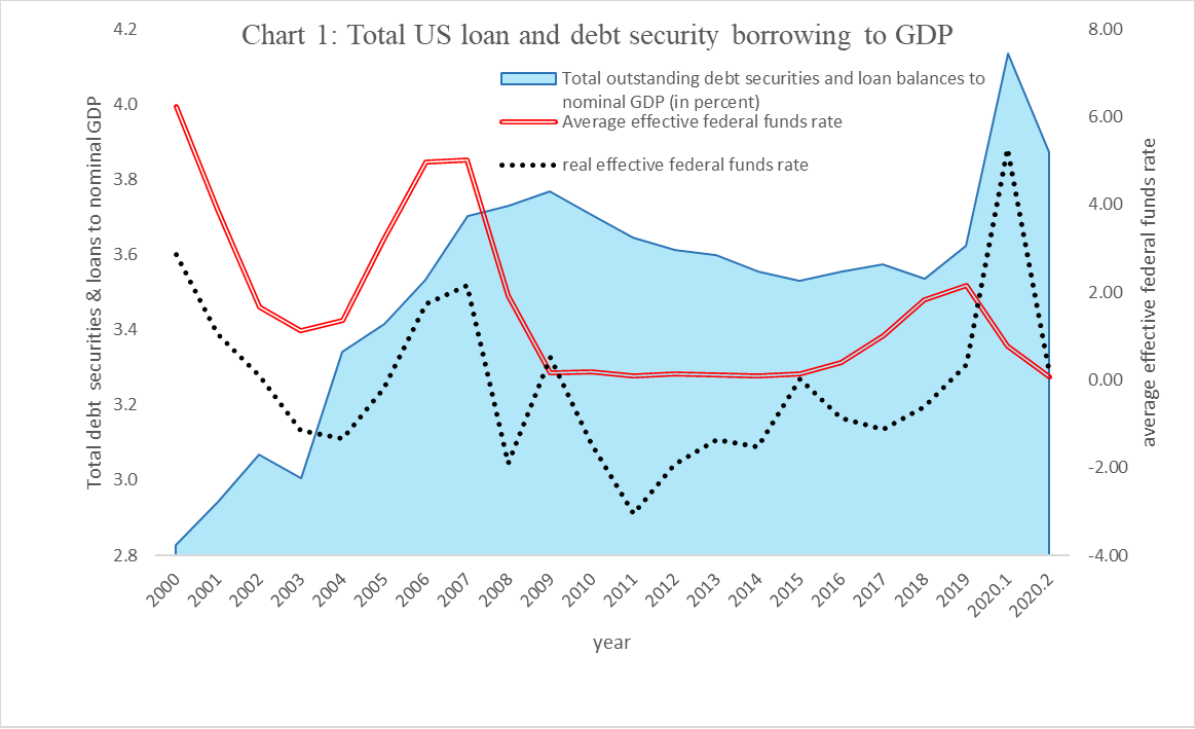


Chart 2 plots total debt security and loan borrowings by economic sector and year. Chart 2 shows that the domestic nonfinancial sector accounts for the largest share of borrowing. This sector includes households, nonprofit organizations, nonfinancial businesses, state and local governments and the federal government.



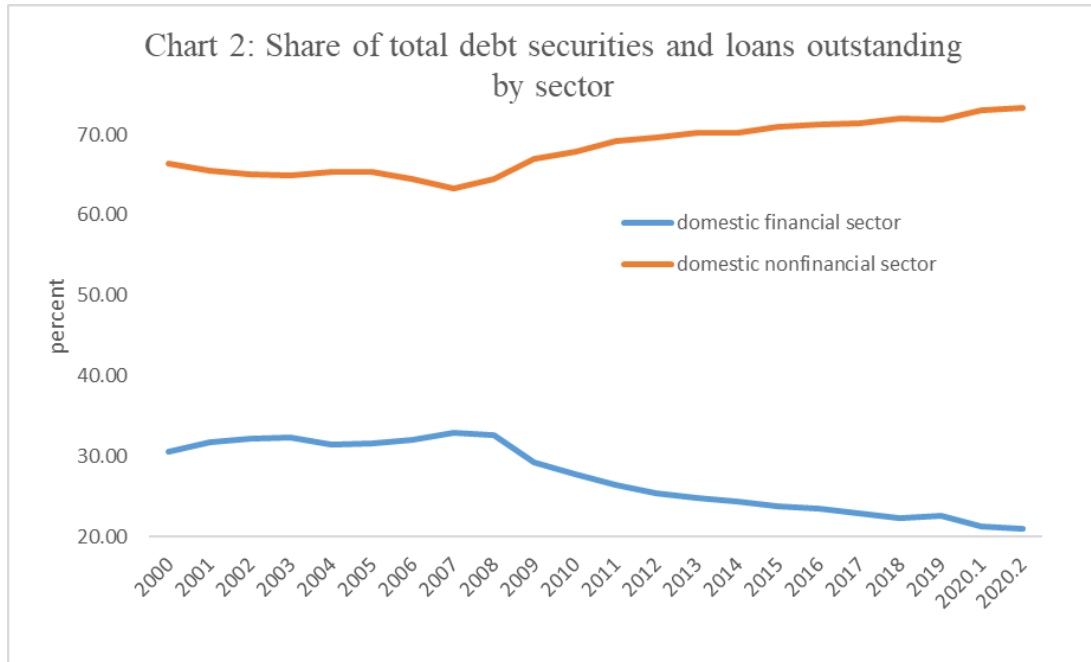
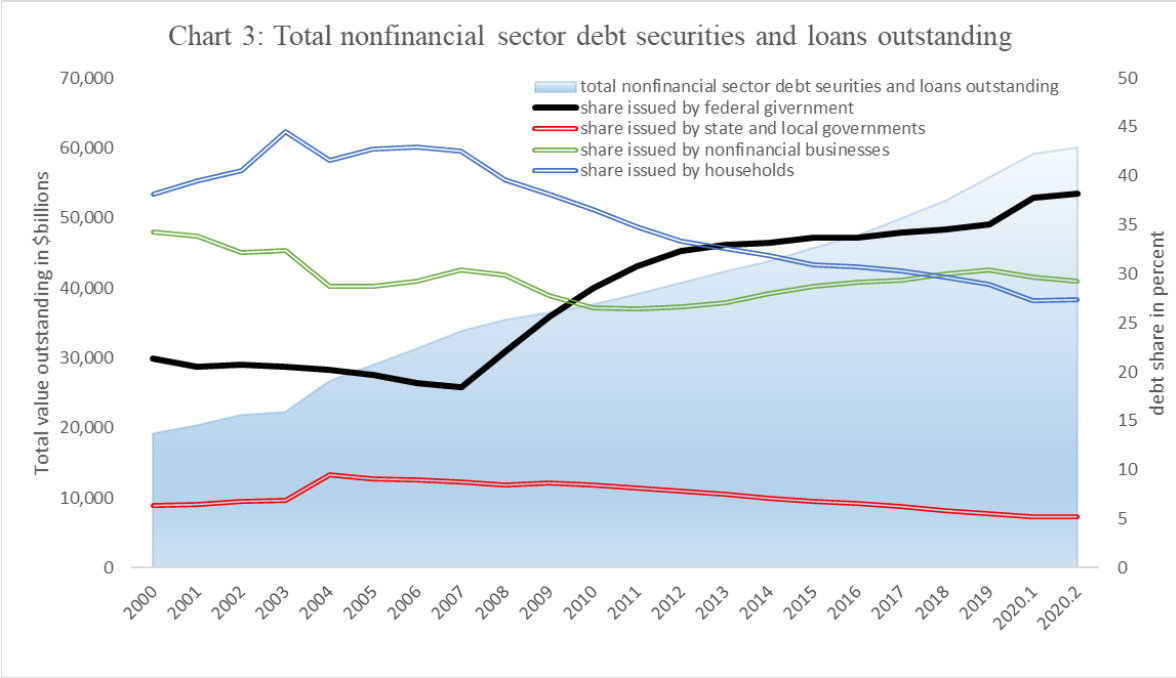


Chart 3 shows the share of borrowing that owes to the respective groups that comprise the nonfinancial sector. Over the past 20 years, the federal government share of nonfinancial sector borrowing has increased from 21.4 percent to 38.2 percent while the shares of all other groups declined.

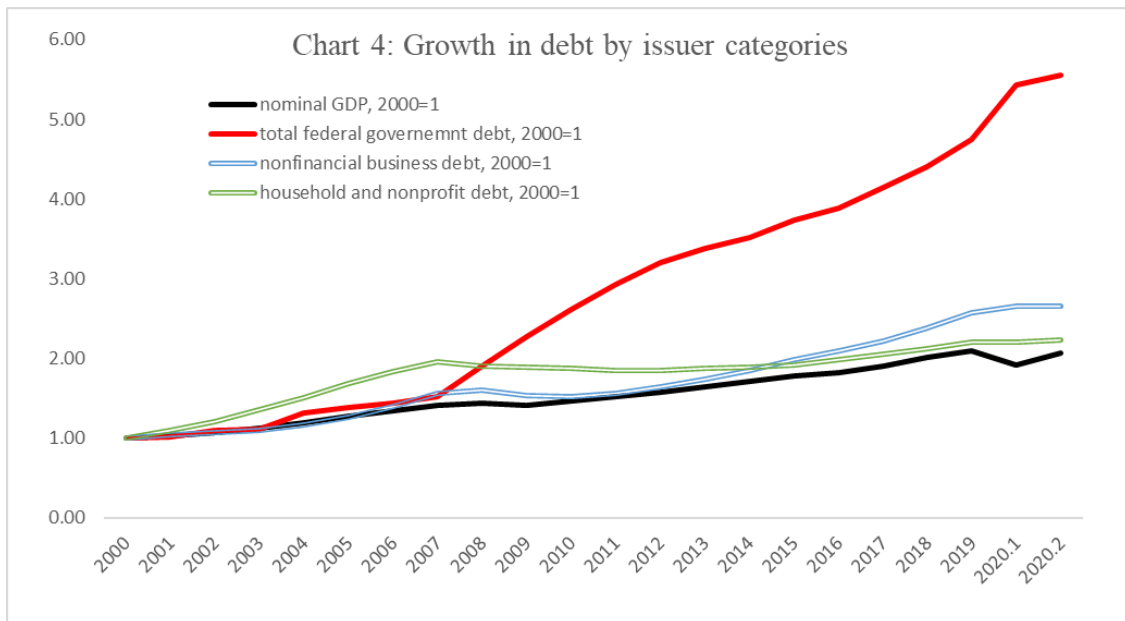
Chart 4 shows how the total debt securities and loans outstanding of nonfinancial sector borrowers grew relative to nominal GDP. All components of the nonfinancial sector posted growth rates in excess of nominal GDP. Between 2000 and 2020, nominal GDP doubled, household and nonprofit total borrowings grew by a factor of 2.23 and nonfinancial business borrowings grew to 2.65 times their 2000 level. The growth rate in federal government debt far outpaced the growth rate of the indebtedness of all other nondomestic borrowers. By 2020, federal government total borrowing was 5.56 times larger than it was in the year 2000.



Thus far, the discussion has focused on borrowers, or the outstanding dollar values of debt securities and loans issued by the respective borrowers. These debt securities and loans have been purchased and are being held as income-generating assets by households, businesses, financial institutions or foreign investors. The remainder of this section focuses on the sources providing credit to different segments of the economy.

Chart 5 shows the share of total US debt securities and loans held over time by the five largest investor classes: banks, mutual funds, life insurance companies, government-sponsored enterprises like Fannie Mae and Freddie Mac, and the Federal Reserve System. The share of total debt held by banks and life insurance companies declined slightly over this period. The bank share of total outstanding debt fell from 19 percent to 18.33 percent while life insurance share dropped by 0.4 percent to 6.4 percent. Mutual funds increased their share from 3.8 percent to 6.7 percent. The share owned by government-sponsored enterprises increased from 6.45 to over 12 percent in 2009 before declining. By 2020, government-sponsored enterprises held an 8.6

percent share of all domestic debt. The biggest gain in ownership share, by far, was recorded by the Federal Reserve System. Over this period, the Fed’s share of total outstanding debt went from 1.8 percent to 8.8 percent by mid-year 2020. Table 1 provides additional detail about total debt outstanding, the ratio of total debt to nominal GDP, and the share of total debt owned by specific categories of investors.



The share of total outstanding debt securities and loans owned by depository institutions declined slightly as the growth in the holdings of government-sponsored enterprises and the Federal Reserve System far outpaced those of banks. Banking system total assets and loans still grew faster than the nominal growth rate in GDP. Chart 6 shows the relative growth rate of bank assets and loans relative to the growth rate of consumer prices and nominal GDP. While nominal GDP doubled over this 20-year period, banking system total assets and loans in 2020 were 2.85 and 2.34 times their respective year-2000 levels.

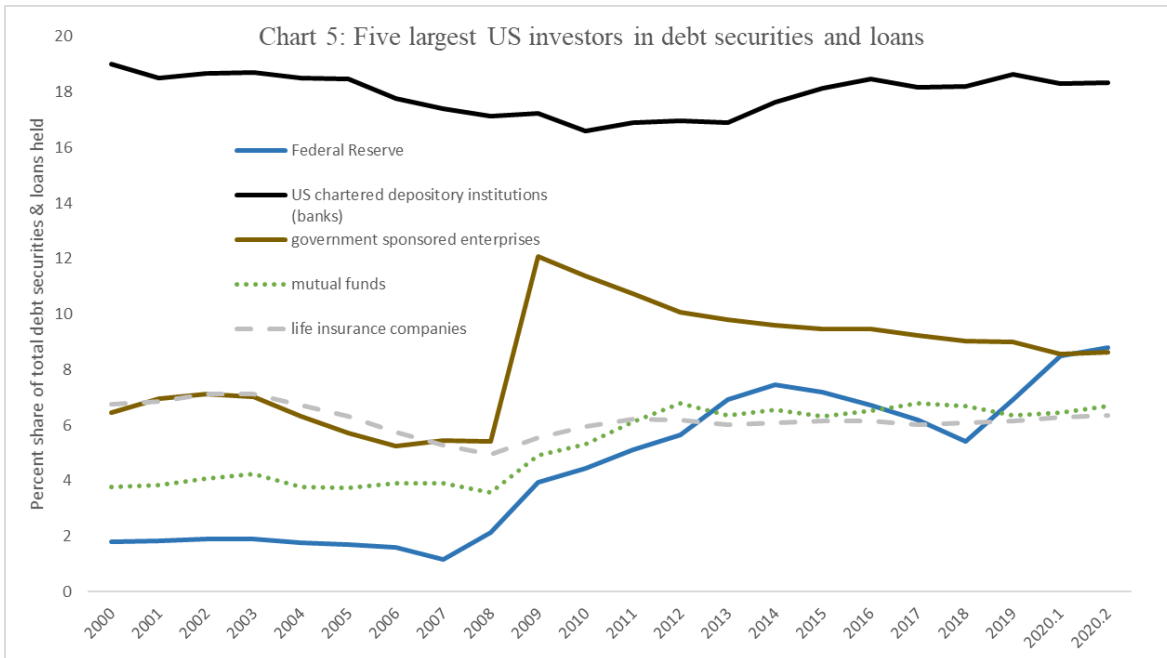
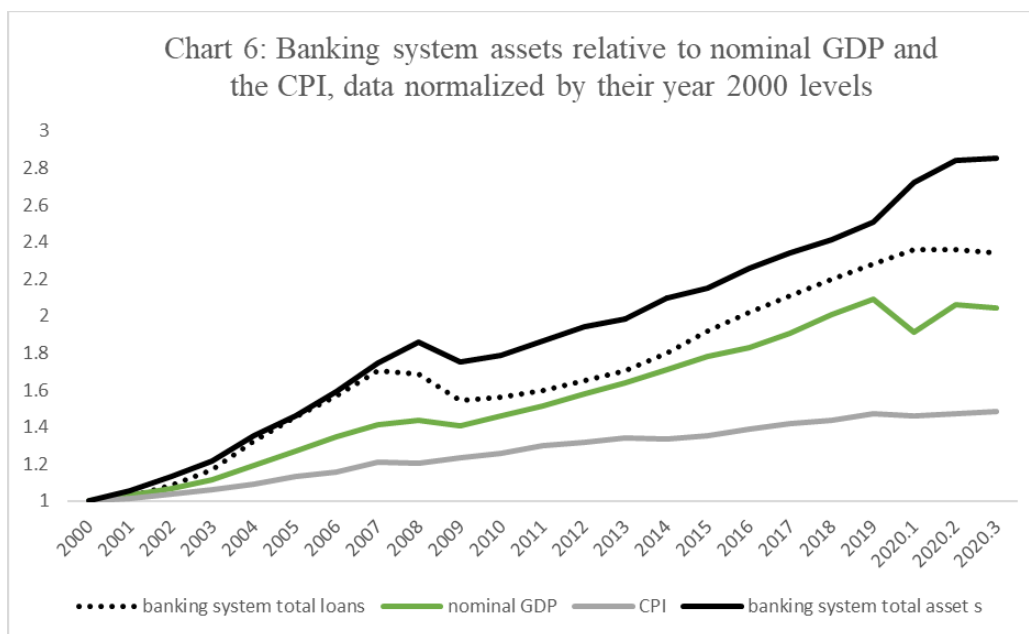


Table 2 reports total banking system assets by year, the ratio of banking system assets to GDP, and the share of banking system total assets associated with each bank asset-size category. As the figures reported in Table 2 show, the share of banking system assets held by the smallest bank-size categories declined precipitously over this 20-year period as the total asset share of the largest bank category, banks with assets greater than \$250 billion, grew from just shy of 18 percent of total system assets in 2000, to 55.6 percent of total system assets in 2020. Chart 7 illustrates the dramatic difference in the growth rate of the largest bank asset-size category relative to the growth rate of smaller banks, nominal GDP and consumer prices.

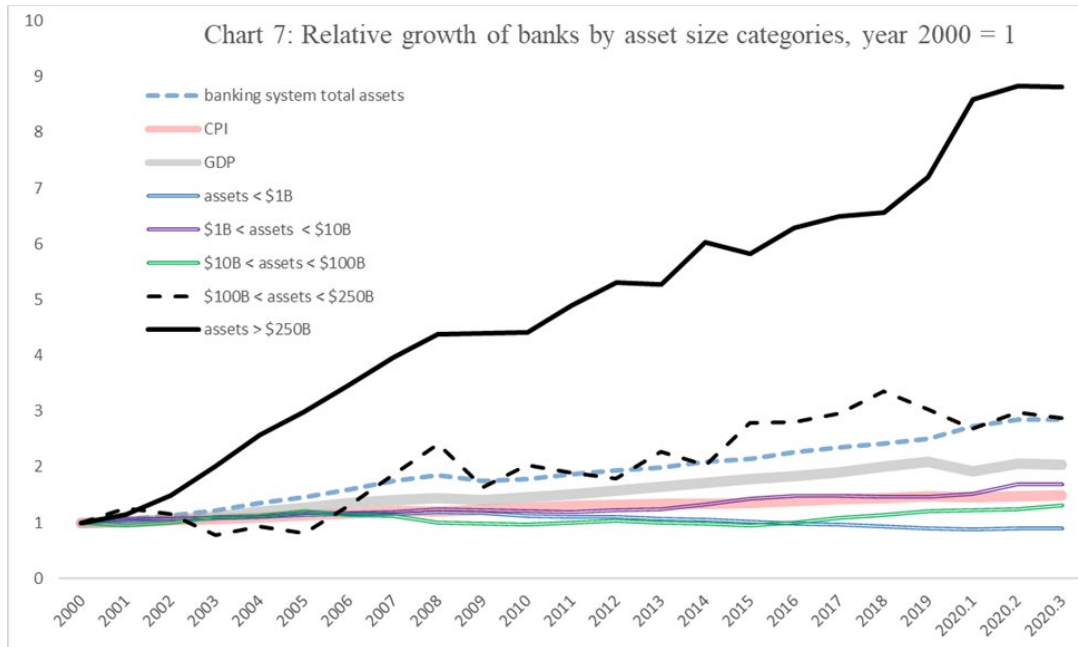
**Table 1: Share of total loans and debt securities outstanding held as assets by designated entities**

year	issuers of securities backed securities	brokers and dealers	holding companies	banks in US affiliated areas	foreign banking offices in the US	US chartered depository institutions	credit unions	federal government	finance companies	government sponsored enterprises	life insurance companies	monetary authority (Federal Reserve)	mutual funds	nonfinancial corporate business	property causality insurers	private pension funds	realestate investment trusts	state and local governments	rest of worlds	domestic financial sector total	domestic nonfinancial sector total
2000	4.93	1.77	0.08	0.19	1.89	19.01	1.39	0.91	3.85	6.45	6.76	1.81	3.78	0.80	1.87	2.16	0.13	3.26	8.77	76.71	13.93
2001	5.40	1.58	0.09	0.21	1.74	18.49	1.48	0.87	3.74	6.95	6.87	1.85	3.85	0.77	1.85	1.86	0.17	3.31	9.39	76.93	13.06
2002	5.83	1.64	0.10	0.20	1.63	18.67	1.53	0.82	3.87	7.12	7.14	1.91	4.09	0.80	1.91	1.73	0.21	3.29	10.17	77.57	12.93
2003	5.84	1.71	0.13	0.20	1.59	18.71	1.54	0.79	3.96	7.02	7.14	1.89	4.25	0.79	1.91	1.72	0.22	3.20	10.43	77.71	12.87
2004	6.66	1.73	0.08	0.23	1.44	18.50	1.47	0.66	4.09	6.31	6.74	1.76	3.77	0.76	2.00	1.56	0.51	3.01	11.65	74.42	14.03
2005	7.76	1.68	0.08	0.23	1.59	18.46	1.43	0.66	3.92	5.73	6.31	1.70	3.75	0.73	1.95	1.51	0.57	3.17	11.80	73.59	13.81
2006	8.61	1.96	0.07	0.20	1.74	17.77	1.37	0.61	3.71	5.24	5.77	1.60	3.90	0.60	1.85	1.49	0.59	3.50	13.36	72.83	13.17
2007	8.10	2.30	0.11	0.17	1.94	17.41	1.33	0.57	3.45	5.45	5.28	1.18	3.92	0.37	1.68	1.43	0.42	3.23	14.02	71.93	13.37
2008	6.99	1.33	0.13	0.16	1.84	17.15	1.33	0.87	3.08	5.43	4.97	2.13	3.59	0.36	1.59	1.34	0.29	2.74	13.43	69.92	14.65
2009	4.74	1.36	0.15	0.15	1.46	17.24	1.41	1.39	2.80	12.08	5.57	3.95	4.92	0.39	1.73	1.49	0.33	3.07	14.32	69.35	15.93
2010	3.85	1.57	0.19	0.12	1.41	16.61	1.39	1.59	2.49	11.39	5.95	4.46	5.33	0.50	1.73	1.62	0.49	3.05	15.33	68.51	16.15
2011	3.36	1.55	0.37	0.11	1.44	16.90	1.44	1.59	2.38	10.76	6.24	5.13	6.11	0.45	1.77	1.77	0.69	2.88	16.03	70.05	16.22
2012	2.90	1.56	0.36	0.11	1.39	16.98	1.46	1.68	2.24	10.08	6.19	5.66	6.78	0.42	1.70	1.90	0.77	2.85	16.47	70.19	16.02
2013	2.28	1.28	0.24	0.10	1.38	16.92	1.50	2.13	2.14	9.81	6.01	6.91	6.35	0.42	1.69	1.90	0.88	2.74	16.46	69.47	14.79
2014	2.10	1.21	0.21	0.09	1.42	17.64	1.55	1.97	2.09	9.59	6.09	7.45	6.57	0.43	1.68	1.99	0.88	2.65	16.83	70.55	14.53
2015	1.87	0.96	0.12	0.08	1.52	18.12	1.60	2.06	1.80	9.48	6.17	7.19	6.33	0.47	1.67	1.93	0.77	2.54	16.86	70.25	14.23
2016	1.61	1.00	0.24	0.08	1.44	18.48	1.69	2.13	1.70	9.46	6.15	6.71	6.54	0.41	1.60	1.94	0.71	2.64	16.49	70.28	13.40
2017	1.46	0.98	0.29	0.08	1.42	18.17	1.73	2.17	1.58	9.23	6.03	6.19	6.78	0.44	1.57	2.01	0.75	2.58	16.72	69.69	13.17
2018	1.42	1.10	0.29	0.08	1.46	18.19	1.76	2.22	1.52	9.03	6.09	5.43	6.71	0.45	1.61	2.08	0.85	2.63	16.95	69.25	13.77
2019	1.43	1.16	0.32	0.10	1.63	18.63	1.78	2.19	1.42	9.00	6.16	6.92	6.37	0.57	1.56	2.12	0.64	2.58	16.83	71.45	13.63
2020.1	1.35	1.08	0.30	0.10	1.47	18.31	1.77	2.25	1.34	8.55	6.29	8.48	6.47	0.56	1.59	2.14	0.60	2.65	16.78	72.90	13.21
2020.2	1.33	1.07	0.27	0.10	1.37	18.33	1.80	2.26	1.33	8.62	6.36	8.79	6.69	0.57	1.62	2.16	0.60	2.71	16.69	73.19	12.94



**Table 2: Banking system total assets by year and bank size categories**

year	banking system total assets (\$000)	banking system assets to nominal GDP	percent share of banking system total assets by bank size category				
			bank assets < \$1 billion	\$1 billion < bank assets < \$10 billion	\$10 billion < bank assets < \$100 billion	\$100 billion < bank assets < \$250 billion	bank assets > \$250 billion
2000	7,471,626,862	0.73	17.16	16.14	35.93	12.79	17.98
2001	7,878,812,197	0.74	16.81	16.24	32.17	15.21	19.57
2002	8,447,180,646	0.77	16.16	15.25	31.74	13.12	23.73
2003	9,085,782,353	0.79	15.29	14.53	32.43	8.15	29.60
2004	10,117,461,821	0.83	13.97	13.11	29.89	8.81	34.22
2005	10,894,972,953	0.84	13.31	12.92	29.79	7.18	36.80
2006	11,881,703,092	0.86	12.48	11.91	25.89	10.52	39.20
2007	13,050,535,122	0.90	11.44	11.01	23.06	13.65	40.84
2008	13,893,882,069	0.94	11.00	10.81	19.31	16.56	42.32
2009	13,111,534,882	0.91	11.55	11.32	20.08	11.97	45.07
2010	13,349,398,973	0.89	10.79	10.84	19.40	14.56	44.42
2011	13,938,928,596	0.90	10.19	10.28	19.35	13.04	47.14
2012	14,510,879,169	0.90	9.68	10.21	19.25	11.77	49.09
2013	14,806,444,485	0.88	9.23	10.12	18.22	14.64	47.79
2014	15,650,450,038	0.89	8.58	10.29	16.92	12.45	51.76
2015	16,073,354,677	0.88	8.09	10.69	15.98	16.58	48.67
2016	16,874,537,963	0.90	7.51	10.63	15.97	15.84	50.06
2017	17,504,658,716	0.90	7.08	10.22	16.65	16.20	49.85
2018	18,034,369,207	0.87	6.57	9.83	16.93	17.76	48.91
2019	18,734,943,536	0.87	6.17	9.46	17.37	15.41	51.58
2020.1	20,342,730,612	1.04	5.57	8.97	16.07	12.62	56.76
2020.2	21,234,448,639	1.00	5.45	9.63	15.71	13.36	55.85
2020.3	21,315,403,030	1.02	5.39	9.57	16.52	12.91	55.61



### III. Structural changes in the banking industry

Since 2000, the banking industry, defined as all depository institutions insured by the Federal Deposit Insurance Corporation (FDIC), has experienced significant consolidation. Table 3 shows that the number of independent banks in the smallest asset size category, banks with assets less than \$1 billion, declined from 9374 in December 2000 to 4117 in September 2020. The number of institutions in the other asset size categories increased with the greatest increase in banks with assets between \$1 billion and \$10 billion. Table 3 shows that the number of new bank charters declined to virtually zero from 2011 through 2016. While there were 559 bank failures over this 20-year span, the vast majority of banks, some 5435 in number, vanished because they were acquired by another depository institution, were voluntarily liquidated, or simply gave up their bank charters. The growth in the number of institutions in the two largest size categories, 13 new institutions with assets between \$100 billion and \$250 billion, and 10 new institutions with assets greater than \$250 billion is especially important because the

investments, funding and operating characteristics of these institutions are much different from those of smaller banks.

**Table 3: Number of FDIC insured depository institutions by asset size category**

year	bank assets < \$1 billion	\$1 billion < \$10 billion bank assets	\$10 billion < \$100 billion assets	\$100 billion < \$250 billion assets	bank assets > \$250 billion	change in the total number of banks	Number of new banks opened	Number of bank failures
2000	9374	441	96	6	3		188	
2001	9082	447	91	7	3	-290	125	4
2002	8810	453	96	6	4	-261	90	11
2003	8611	473	100	4	6	-175	110	3
2004	8388	483	105	6	6	-206	120	4
2005	8211	516	107	5	6	-143	167	0
2006	8039	533	105	8	6	-154	178	0
2007	7870	555	101	12	6	-147	175	3
2008	7635	564	93	16	6	-230	90	25
2009	7344	570	89	11	7	-293	24	140
2010	6994	565	89	13	6	-354	5	157
2011	6702	556	89	12	7	-301	0	92
2012	6424	560	89	11	9	-273	0	51
2013	6148	565	87	14	8	-271	1	24
2014	5830	580	85	14	10	-303	0	18
2015	5482	601	82	18	8	-328	1	8
2016	5180	627	88	18	9	-269	0	5
2017	4922	633	96	19	9	-243	5	8
2018	4632	645	108	21	9	-264	7	0
2019	4382	661	114	19	10	-229	13	4
2020.1	4293	685	116	18	13	-61	2	1
2020.2	4164	760	118	20	13	-50	2	1
2020.3	4117	771	122	19	13	-33	1	0

#### IV. The evolution of bank investments

Banks typically invest in a variety of assets besides loans and leases. Chart 8 shows the time profile of the total amount the banking system assets held in the most important investment categories. Table 4 provides a percentage accounting of the total invested balances

The data in Table 4 show that, over the last 20 years, share of banking system assets invested in loans and leases dropped from 61.3 percent to 50.2 percent. The share of banking system assets allocated to trading accounts also declined from a high of 6.82 percent of assets in



2008 to 3.6 percent in 2020.<sup>3</sup> The decline after 2008 owes to new more stringent trading book minimum regulatory capital requirements and the trading book restrictions imposed by the Dodd-Frank Act. Offsetting the declining share of assets allocated to bank loans and leases and trading assets was a large increase in the share of banking system assets held in cash and deposits due from other depository institutions, primarily from Federal Reserve banks. The share of banking system assets allocated to cash and reserves held at the Federal Reserve grew from 5.3 to 13.4 percent of assets. The banking system also posted a modest increase in the share of its assets invested in securities.

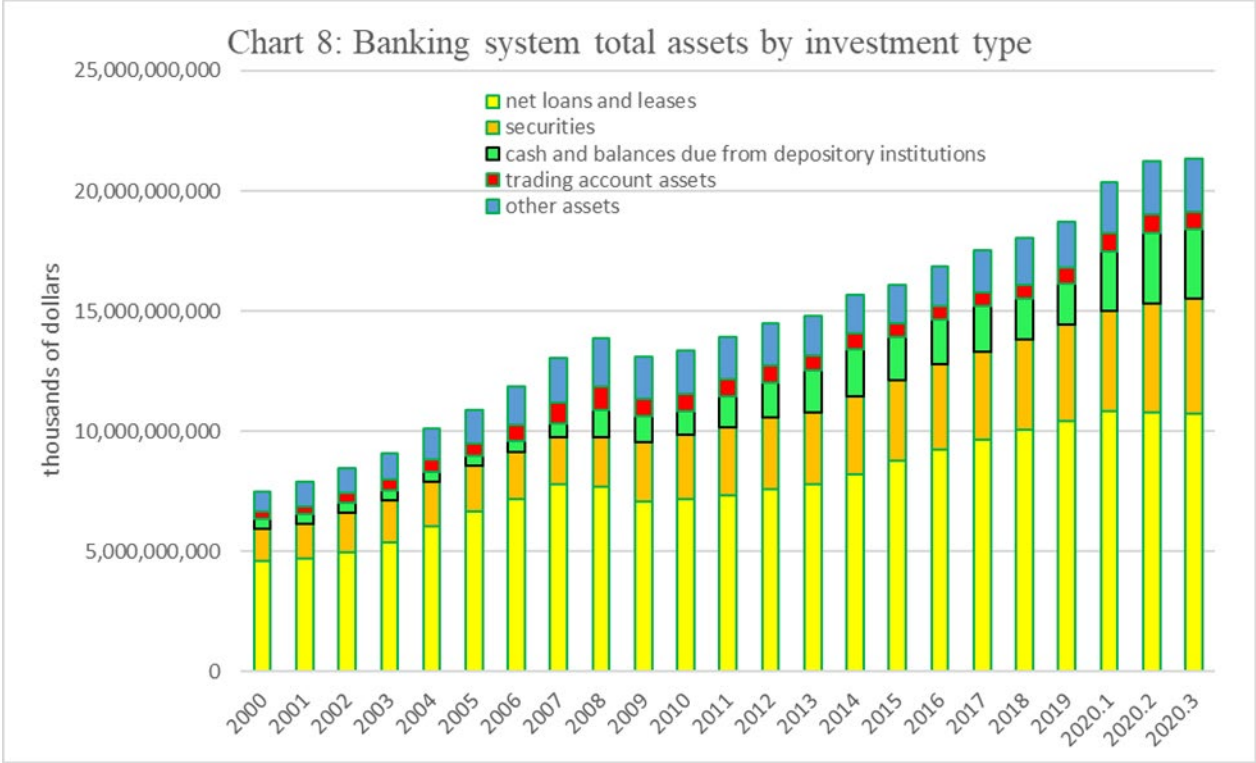
The change in a bank's investment profile over this 20-year period varied depending on the size of the banks' balance sheet. The banks experiencing the largest change in their investment portfolio were banks in the two largest asset-size size categories. Chart 9 shows that, while the loan-to-asset ratios<sup>2</sup> of banks in the smallest three size categories varied over time, after 20 years, the share of assets invested in loans changed by only a few percentage points. In contrast, the ratio of loans to asset of banks with assets between \$100- \$250 billion exhibit substantial volatility. Their ratios increased from 50 percent in 2000 to 74 percent in 2005, dropped precipitously to a low of 49 percent in 2013 and then rebounded into the high 50 percent range late in the sample. On balance, the loan-to-asset ratio of this group of banks increased by about 7.5 percentage points over this time period.

Banks with assets greater than \$250 billion exhibited, by far, the biggest shift in lending behavior. In 2000, these banks dedicated 57.5 percent of their assets to loans and leases. By the

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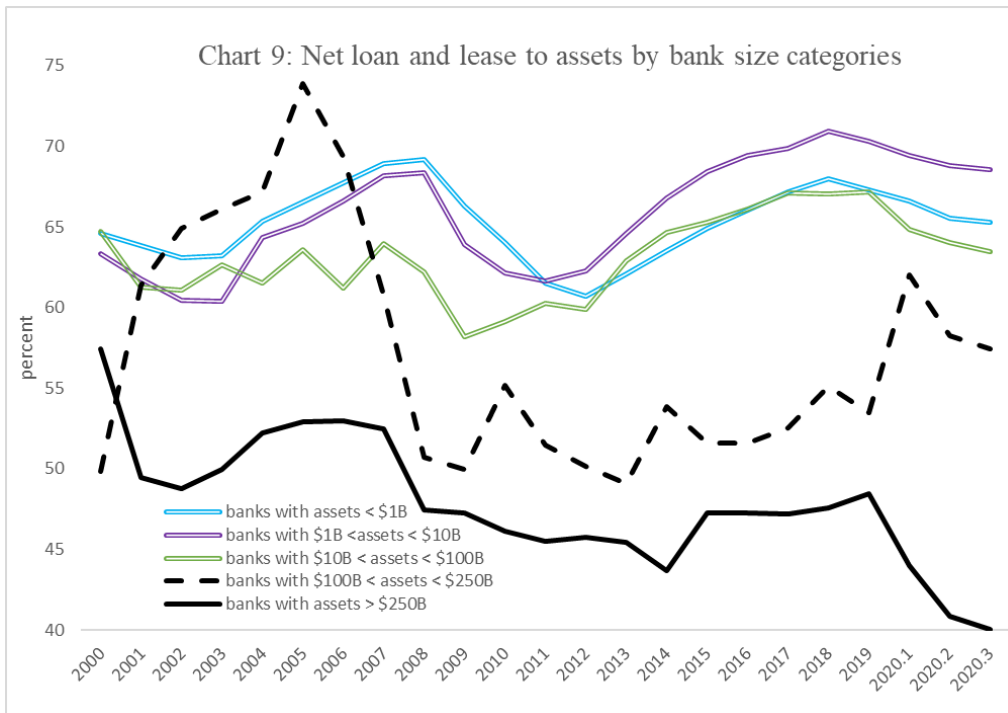
<sup>2</sup> Loan ratios are actually the ratio of net loans and lease to total assets, but I will continue to refer to them as loan-to-asset ratios. Net means net of provisions for loan and leases losses.

third quarter 2020, on average, the largest banks' share of assets allocated to loans and leases declined to 40 percent.

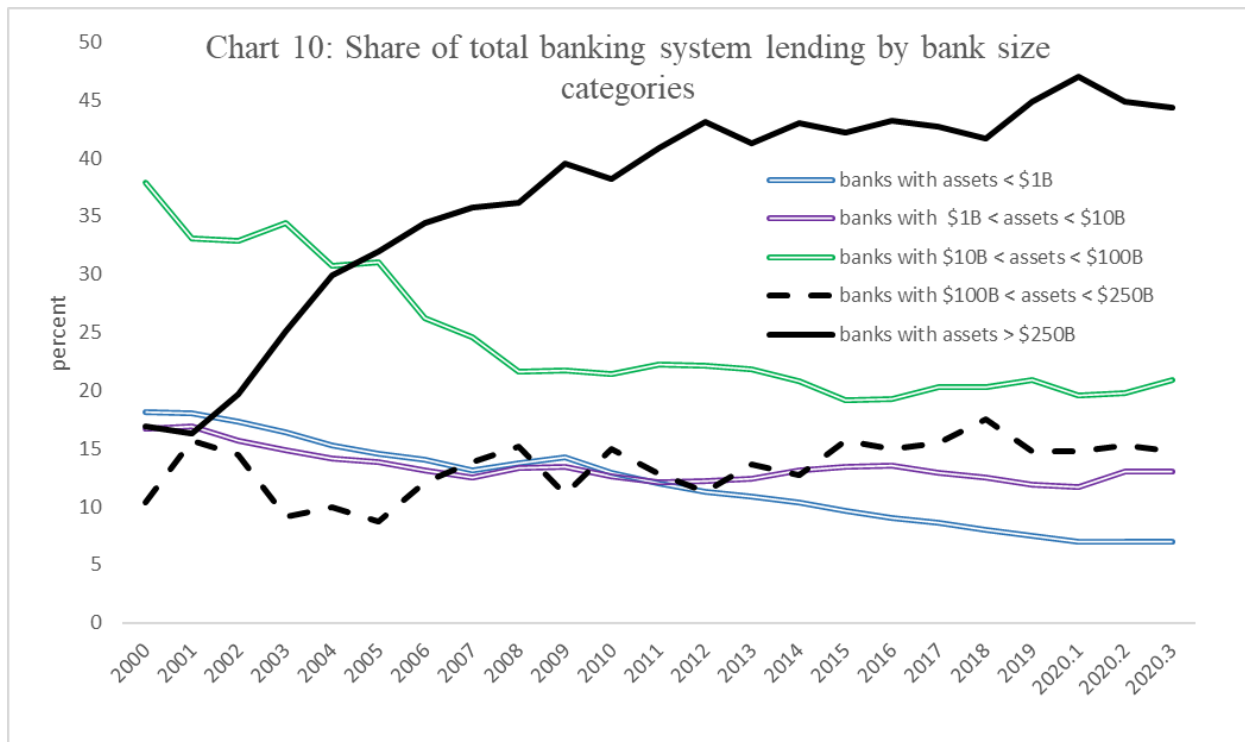


**Table 4: Banking system primary investments as a percentage of total**

year	total assets (\$000)	cash and balances			trading account assets
		due from depository institutions	securities	net loans and leases	
2000	7,471,626,862	5.33	18.24	61.26	4.08
2001	7,878,812,197	5.41	18.63	59.49	3.87
2002	8,447,180,646	5.03	19.37	58.88	4.72
2003	9,085,782,353	4.70	19.51	58.92	4.96
2004	10,117,461,821	4.17	18.41	59.74	5.07
2005	10,894,972,953	4.00	17.41	61.01	4.70
2006	11,881,703,092	3.96	16.71	60.29	5.26
2007	13,050,535,122	4.03	15.02	59.86	6.71
2008	13,893,882,069	8.20	14.69	55.50	6.82
2009	13,111,534,882	8.07	19.09	53.87	5.43
2010	13,349,398,973	7.49	20.00	53.63	5.43
2011	13,938,928,596	9.40	20.47	52.41	5.15
2012	14,510,879,169	10.01	20.76	52.13	4.99
2013	14,806,444,485	11.76	20.29	52.63	4.16
2014	15,650,450,038	12.62	20.59	52.56	4.19
2015	16,073,354,677	11.27	20.89	54.55	3.45
2016	16,874,537,963	10.96	21.13	54.71	3.33
2017	17,504,658,716	11.14	20.79	55.10	3.25
2018	18,034,369,207	9.61	20.69	55.84	3.17
2019	18,734,943,536	9.11	21.29	55.70	3.52
2020.1	20,342,730,612	12.00	20.72	53.15	3.92
2020.2	21,234,448,639	13.80	21.30	50.84	3.58
2020.3	21,315,403,030	13.49	22.51	50.24	3.56



While banks with balance sheets larger than \$250 billion decreased the share of assets dedicated to loans and leases, their total growth in size more than compensated. The share of total banking system loans and leases made by the largest banks increased dramatically over this 20-year period. Chart 10 shows the share of total banking system loans and leases held by each bank asset-size category. The chart shows that the total share of banking system loans and leases held by banks in the three smallest size categories declined in total by nearly 32 percentage points over this period. Fully 27.5 percentage points of this decline accrued to banks with assets greater than \$250 billion with the remainder going to banks with assets between \$100 billion and \$250 billion. When it comes to total system lending, banks with assets greater than \$100 billion—the banks in the two largest size categories—accounted for 59.1 percent of total banking system lending in the third quarter of 2020 up from 27.3 percent of total lending in the year 2000.



### *A detailed analysis of bank loan books*

Banks in different size categories tend to specialize in investing in specific types of loans. Commercial and industrial (C&I) loans, loans to businesses that are not collateralized by real estate, are a bellwether for economic activity. Chart 11 shows that the volume of C&I loans to businesses closely tracks the level of aggregate economic activity. The aberration in this relationship that appears in the second and third quarters of 2020, where the banking system made more C&I loans than might be expected based on the decline in GDP, owes to the Paycheck Protection Program. To aid small businesses impacted by the Covid-19 pandemic, Congress created a new loan guarantee program that allowed banks to make government-guaranteed C&I loans to qualified businesses. This guarantee program removed the underwriting requirements on new C&I loans that banks would have required in normal times when banks fully retained their C&I loan credit risk exposure.

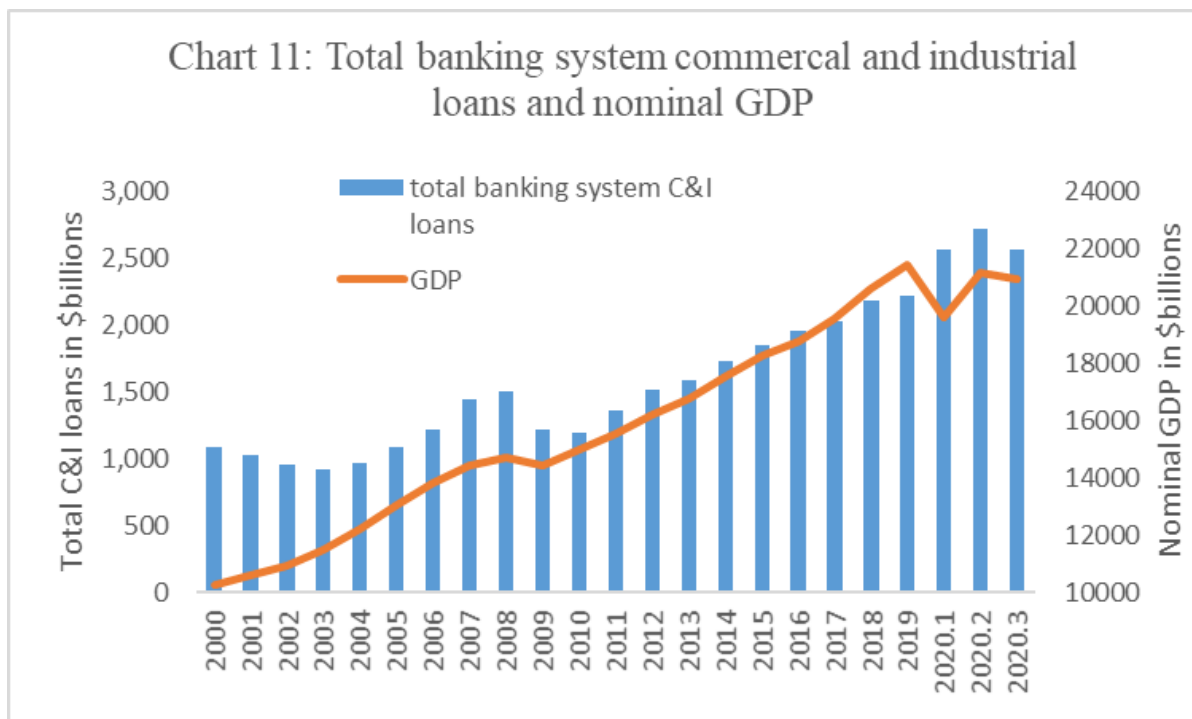
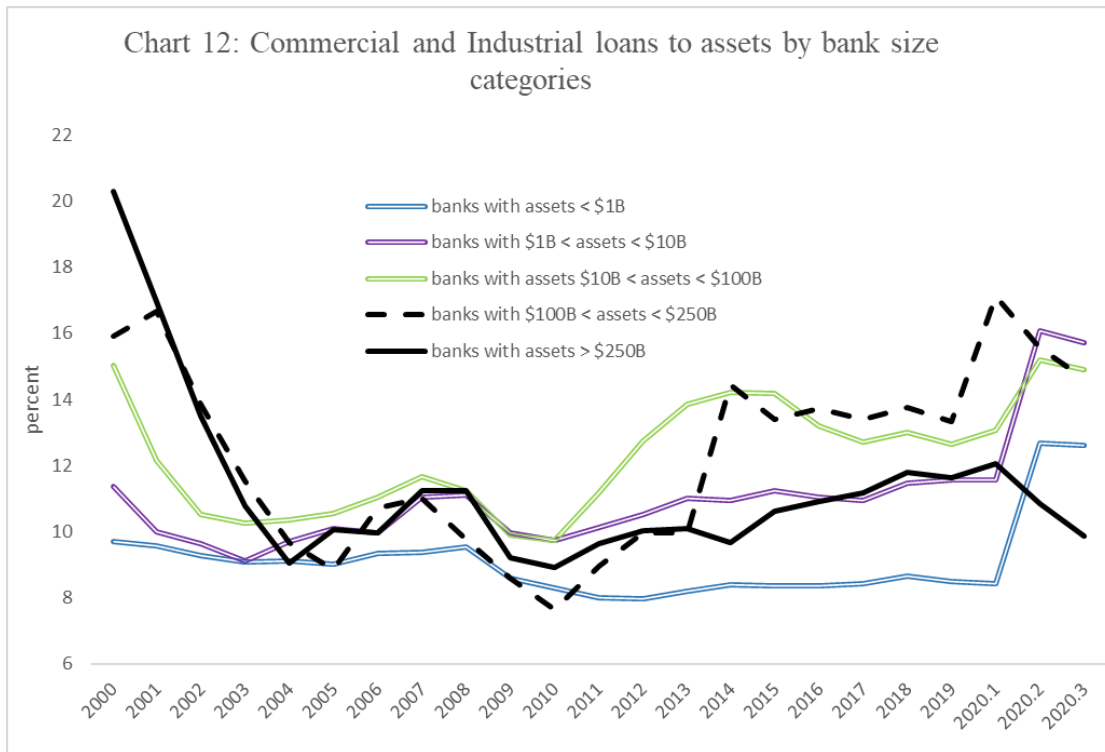


Chart 12 shows the evolution of bank C&I loan-to-asset ratios by bank size categories over the past 20 years. Banks in the largest size category invested more than 20 percent of their balance sheet in C&I loans in 2000, but over time the share of the assets dedicated to C&I loans declined to less than 10 percent. Over this same period, banks in the smallest two size categories (assets less than \$10 billion) increased the share of their balance sheets invested in C&I loans, while the share dedicated to C&I loans for banks in the other size categories varied over the interim period but entered 2020 with shares close to their year-2000 C&I loan share.



While the share of their balance sheets dedicated to C&I lending declined by half between 2000 and 2020, the growth in total assets of banks in the largest size category more than compensated, and the largest banks nearly doubled the share of total banking system C&I loans. Chart 13 shows the share of banking system C&I loans made by each bank size category. While banks in the \$1-\$10 billion and \$100-\$250 billion categories retained their share of C&I lending,

the smallest banks and banks in the \$10 billion to \$100 billion size category lost C&I market share to the largest banks. The overall share of C&I lending by banks with assets over \$250 billion (45.6 percent) is slightly larger than their share of total bank lending (44.3 percent).

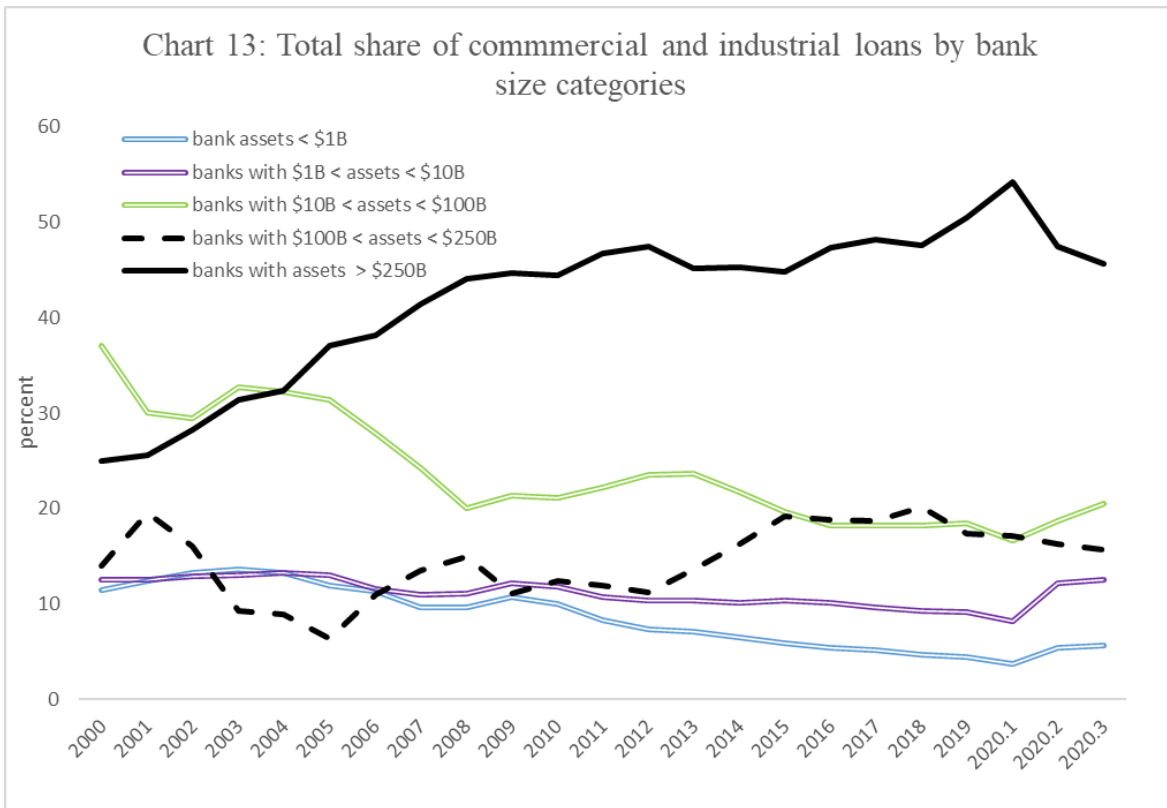


Table 5 reports the share of banks assets invested in 1-4 family real estate loans by bank size categories. The data show that, over this 20-year period, banks in all size categories reduced the shares of their balance sheets dedicated to 1-4 family mortgages. The declines from peak values were substantial in many size categories. The largest banks’ share of assets declined from a peak of nearly 23.5 percent to a little more than 10 percent in 2020. Banks with assets between \$100 billion and \$250 billion experienced the largest share decline, from just over 43 percent in 2005, to 12.5 percent in 2020.

**Table 5: Share of bank assets in 1-4 family real estate loans by bank size categories**

year	banks with assets < \$1B	banks with \$1B < assets < \$10B	banks with \$10B < assets < \$100B	banks with \$100B < assets < \$250B	banks with assets > \$250B
2000	24.54	23.45	20.75	16.64	13.19
2001	23.22	22.49	22.01	21.95	9.59
2002	21.94	21.88	23.14	27.69	13.02
2003	20.80	21.26	24.81	33.21	15.28
2004	21.20	22.24	22.59	37.58	20.56
2005	20.68	21.00	24.11	43.20	21.46
2006	20.62	20.12	22.38	29.02	23.48
2007	20.50	18.28	23.81	22.12	22.01
2008	21.27	18.78	24.47	15.68	18.52
2009	20.80	18.28	20.85	14.28	20.61
2010	20.51	18.49	21.93	11.63	19.89
2011	19.94	17.97	21.38	12.47	17.39
2012	19.65	18.58	17.89	12.81	16.54
2013	19.53	18.54	16.80	12.03	15.27
2014	19.93	19.40	15.58	13.66	13.28
2015	20.30	18.73	15.32	11.70	13.79
2016	20.40	18.72	15.38	11.33	13.24
2017	20.58	18.17	15.24	11.39	12.93
2018	20.40	18.72	16.13	10.35	12.44
2019	20.08	17.90	15.58	10.69	12.20
2020.1	19.91	17.55	14.63	12.68	10.35
2020.2	18.21	15.78	13.73	12.37	10.11
2020.3	18.16	15.72	13.35	12.53	10.20

Chart 14 shows the share of total banking system 1-4 family residential real estate loans held by banks in various size categories. Among the size groups, the largest banks hold the smallest share of their balance sheet in these mortgages. However, because these banks are so large, they still provide nearly 50 percent of all 1-4 family residential mortgage loans made by the banking system.

Chart 15 shows the share of bank balance sheets devoted to commercial real estate loans by bank size categories. The chart shows that smaller banks on average have a higher concentration of commercial real estate loans among their asset holdings and, over the past 20 years, these banks increased this concentration. Banks with assets between \$10 billion and \$100 billion more than doubled the share of their assets invested in commercial real estate loans while



banks with less than \$1 billion in assets and banks in the \$1-\$10 billion size class increased their commercial real estate share by 34 percent and 88 percent respectively.

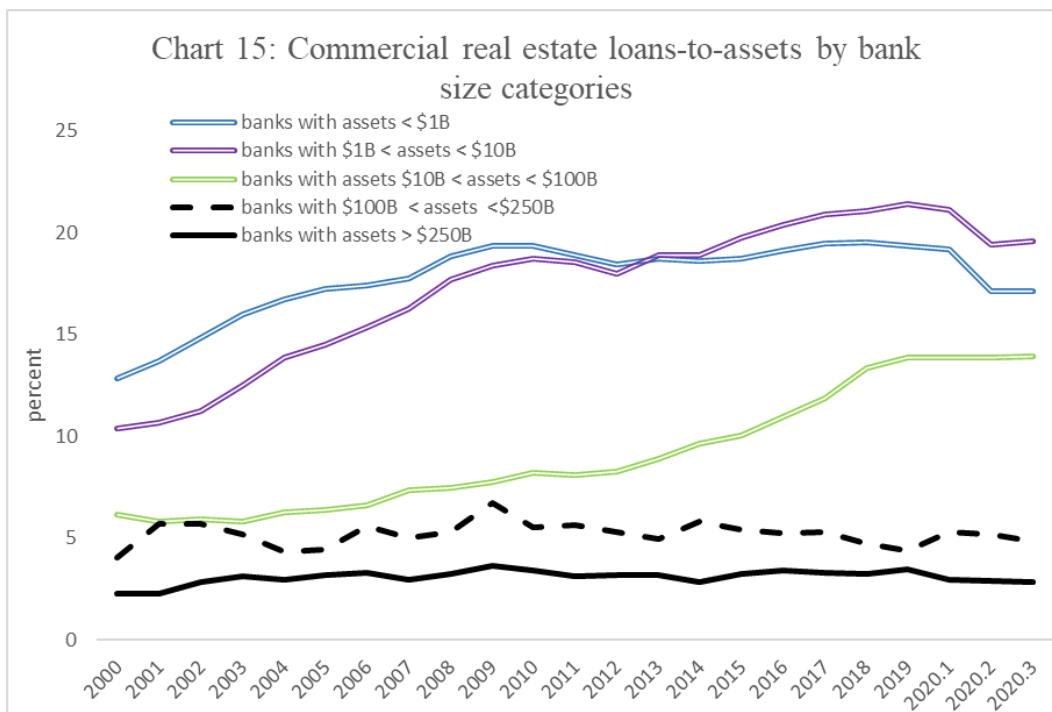
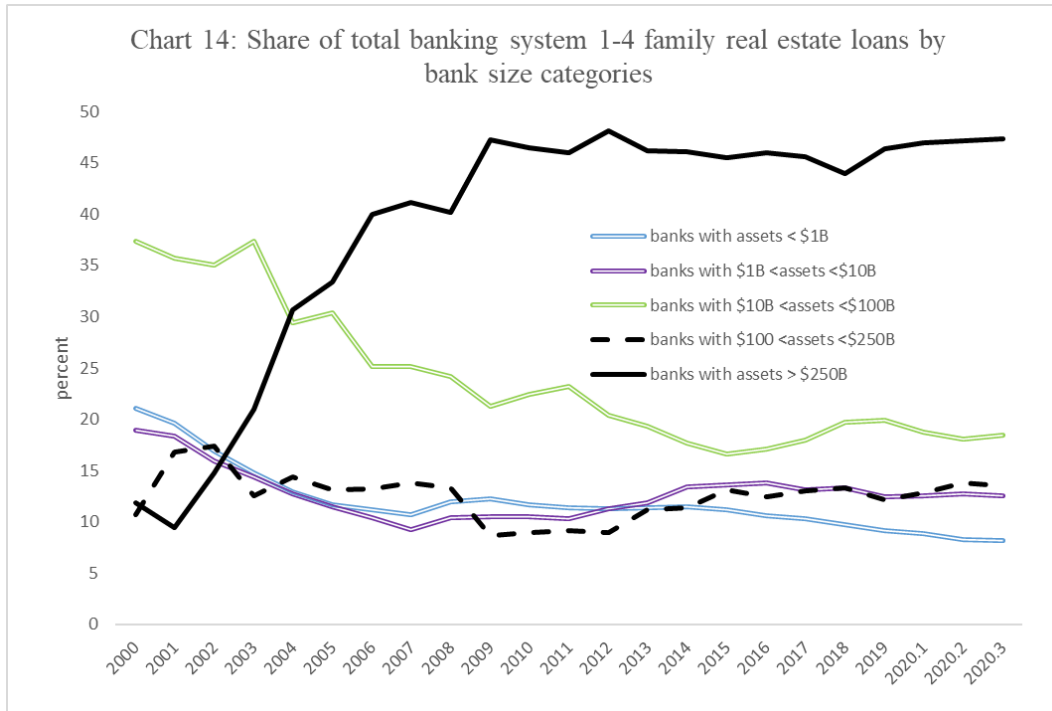


Chart 16 shows the share of total banking system commercial real estate loans made by banks in the different size categories. Smaller banks have historically been the most important source of commercial real estate loans, and banks in the \$1 billion to \$100 billion size categories maintained their share of total commercial real estate credit. In contrast, banks in the smallest size category have lost almost 19 percent of their market share, 16 percentage points of which accrued to banks larger than \$250 billion. Still, the largest banks' share of total commercial real estate loans (22 percent) is less than half their share of total banking system loans.

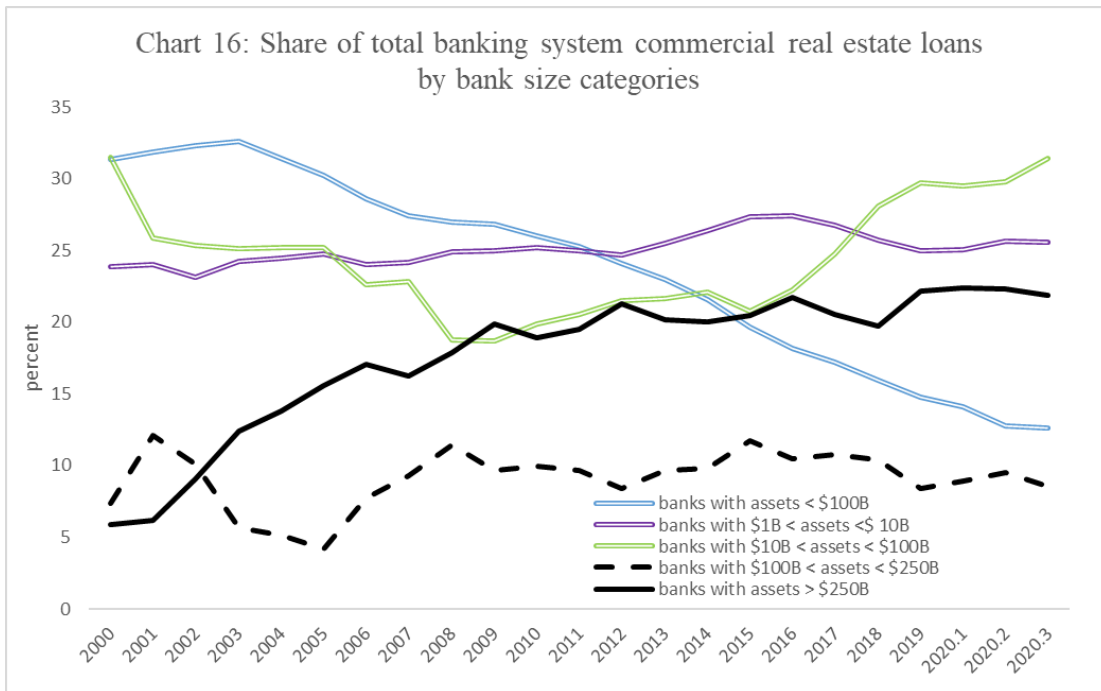


Chart 17 shows the share of bank assets invested in construction and development loans by bank size categories. Historically construction and development loans comprise a larger portion of smaller-sized bank assets. Chart 17 shows that this pattern holds true throughout this period. Chart 18 shows the share of total banking system construction and development loans made by banks in different size categories. Over the last 20 years, smaller banks have lost market share to banks larger than \$250 billion, which are now the largest source for this type of credit.

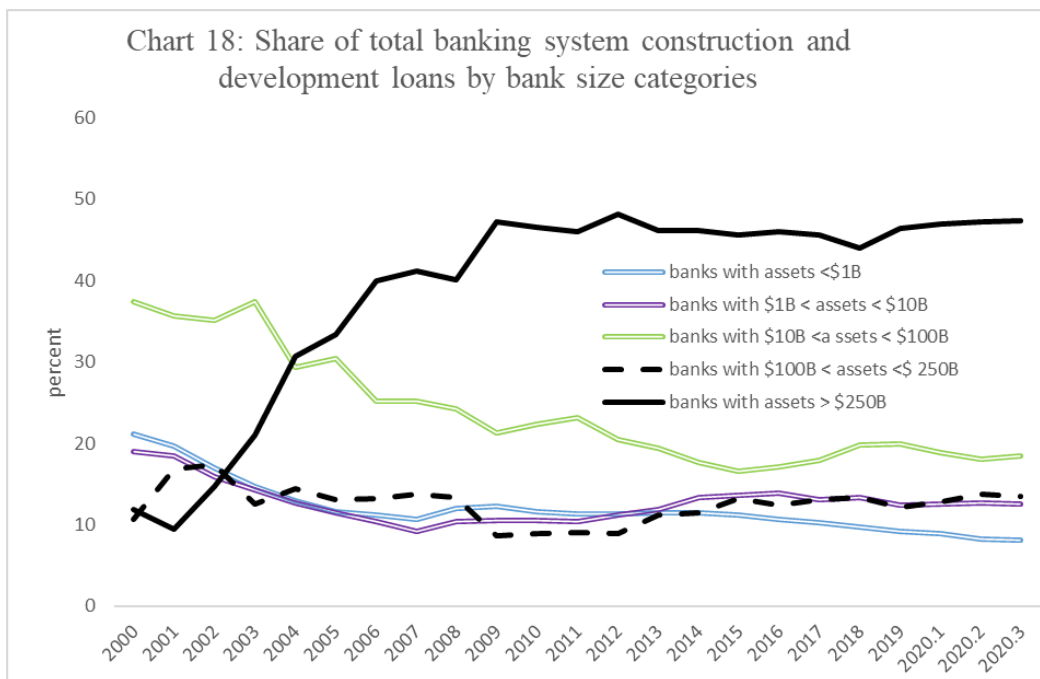
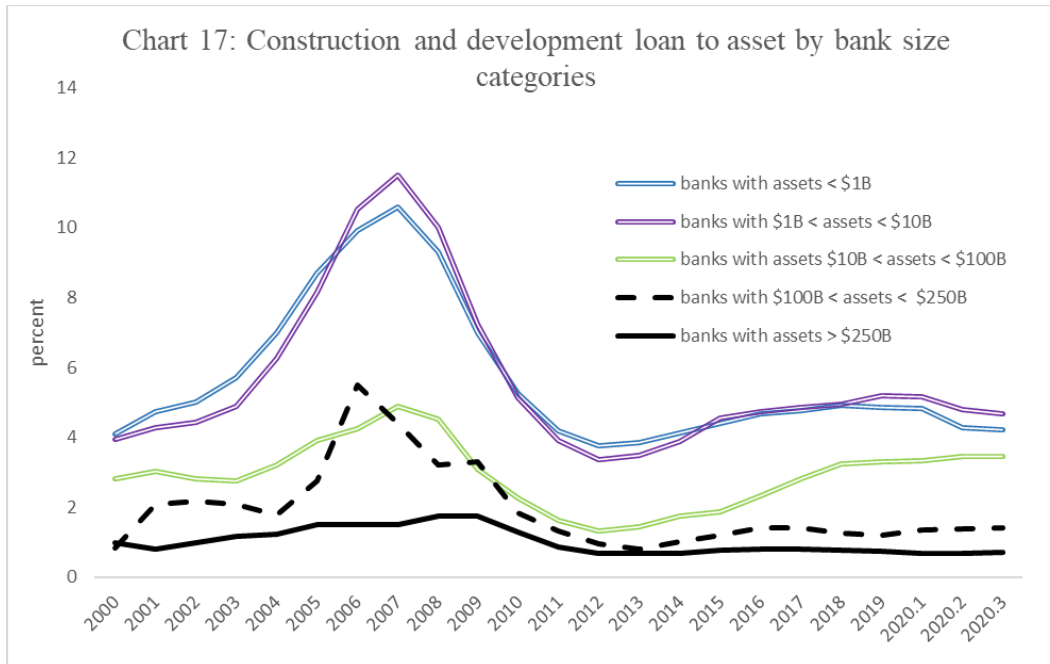


Chart 19 shows that, over the past two decades, banks with assets between \$1 billion and \$100 billion more than doubled the share of their assets invested in multifamily real estate. Table 6 reports the share of total banking system multifamily mortgage credit provided by the various bank size groups. Banks with assets in the \$10-\$100 billion range are the most important

purveyors of multifamily property mortgages, providing 34.5 percent of the banking system credit, followed by the largest banks which provide nearly 30 percent of the banking system’s multifamily loans.

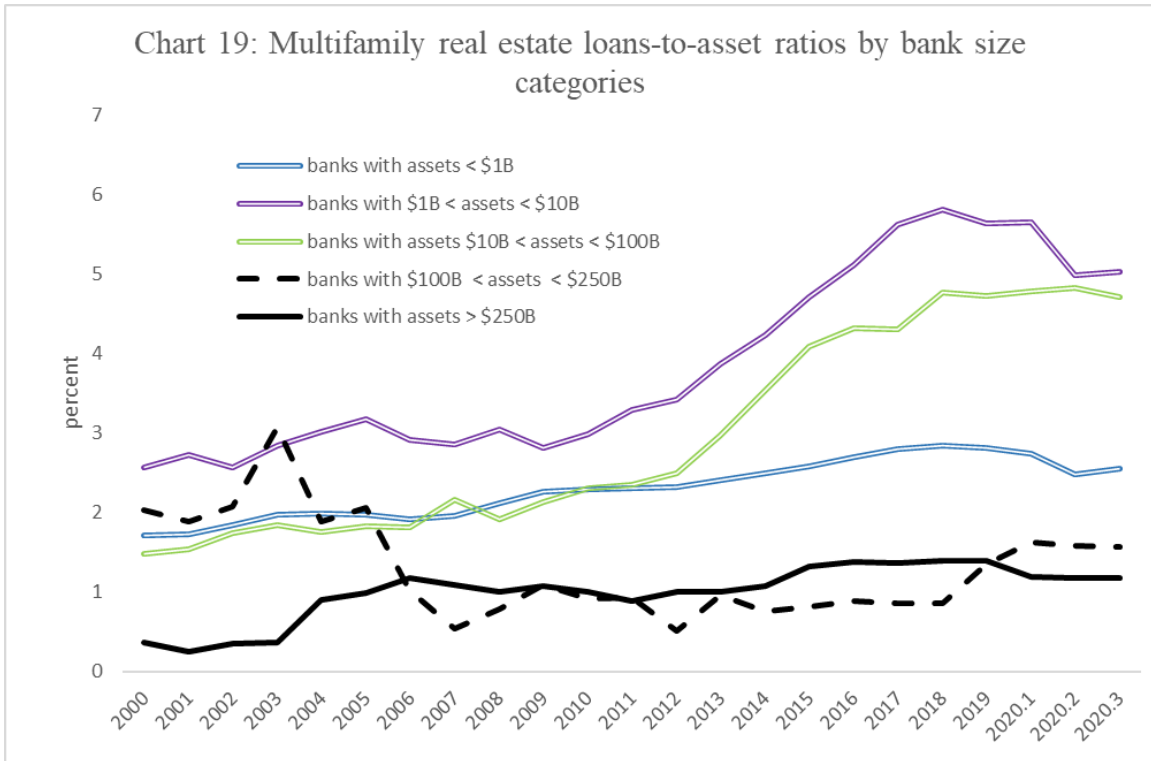
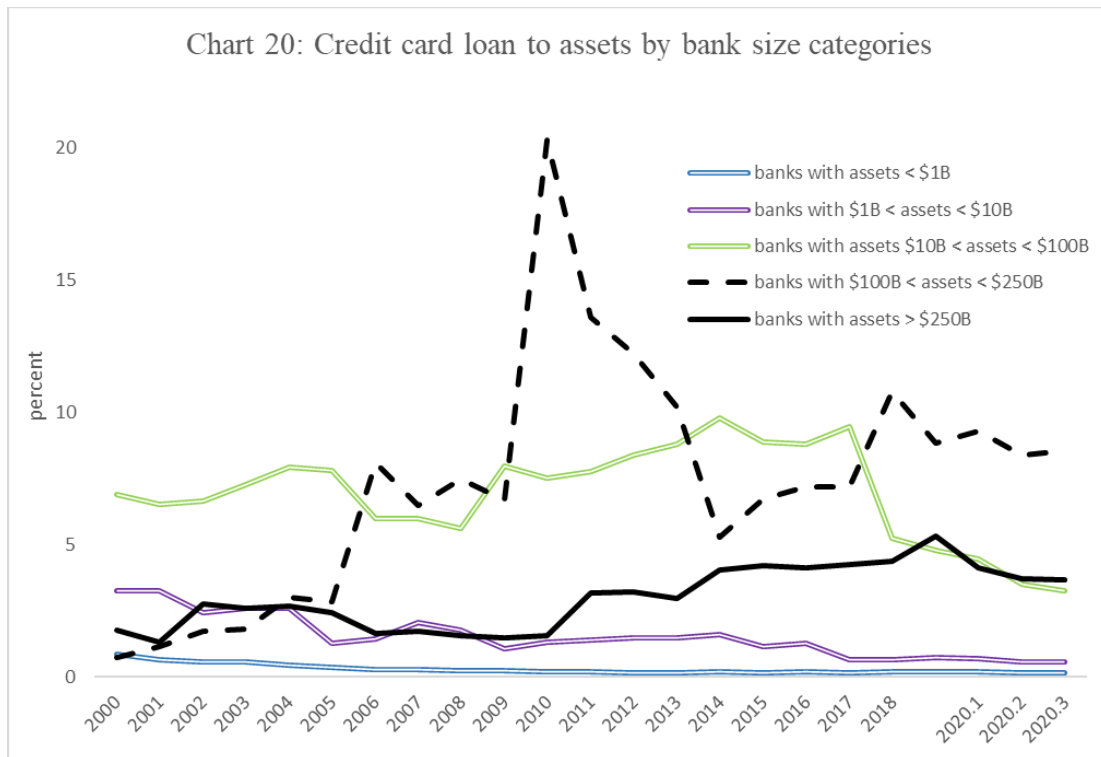


Chart 20 shows that credit card loans account for a negligible portion of the assets of the smallest two bank-size categories. For banks with assets in the \$10-\$100 billion range, the share of assets invested in credit card loans peaked at 9.8 percent in 2014 before declining to under 3.5 percent in late 2020. The credit card loan to asset ratio for banks with assets of \$100-\$250 billion increased from a negligible amount in 2000, to 20.3 percent in 2010, before declining to 5.3 percent in 2014 and rebounding to 8.6 percent in 2020. Over this same period, the largest banks increased the portion of their balance sheets allocated to credit card loans from under 2 percent in 2000, to 5.3 percent in 2019, before cutting the share to under 4 percent by mid-2020. Table 7 reports the market share of total credit card lending by banks in each size category. In 2000,

banks in the \$10-\$100 billion size category were the most important source of credit card loans and banks in the two largest size categories accounted for about 11.7 percent of total credit card lending. By 2020, banks in the two largest size categories grew their credit card market share to about 84 percent of the banking system total.

**Table 6: Share of total banking system multifamily real estate loans**

year	banks with assets < \$1B	bank with \$1B < assets < \$10B	banks with \$10B < assets < \$100B	banks with \$100B < assets < \$250B	banks with assets > 250B
2000	18.75	26.52	33.93	16.58	4.22
2001	18.60	28.26	31.65	18.36	3.13
2002	18.63	24.56	34.57	16.99	5.25
2003	18.10	24.72	35.66	15.01	6.51
2004	16.60	23.66	31.38	9.98	18.38
2005	15.19	23.79	31.42	8.57	21.03
2006	14.74	21.31	28.84	6.57	28.55
2007	14.45	20.18	32.11	4.74	28.52
2008	15.70	22.19	24.79	8.77	28.56
2009	16.08	19.60	26.33	8.05	29.93
2010	15.53	20.27	28.04	8.34	27.81
2011	14.96	21.55	28.99	7.69	26.82
2012	13.97	21.73	29.87	3.72	30.71
2013	12.49	22.05	30.51	7.89	27.05
2014	11.25	22.91	31.46	4.96	29.42
2015	9.77	23.48	30.50	6.29	29.96
2016	8.90	23.98	30.36	6.20	30.56
2017	8.57	24.89	31.05	6.02	29.46
2018	7.78	23.84	33.67	6.34	28.37
2019	7.09	21.76	33.50	8.48	29.17
2020.1	6.60	21.91	33.26	8.85	29.38
2020.2	6.05	21.42	33.89	9.42	29.22
2020.3	6.10	21.36	34.54	9.02	28.98



Smaller banks have by far the largest market share of farm-related loans. Chart 21 shows the market share of total banking system farmland loans by bank size category. Chart 22 shows the market share of total banking system farm production loans by bank size category. For both loan categories, small banks are, far and away, the most important purveyors of agricultural credit.

Bank regulatory reports require banks to report their lending on specific loan categories where the maximum loans balance is less than \$1 million. These “small dollar” loans are intended to be a proxy for bank small business lending. However, the correspondence between the reported loans and actual loans made to businesses that meet the government definition of a qualified small businesses may be weak as the bank reporting requirement is determined by the size of the loan and does not consider if the borrower meets the standard of a qualified small business.

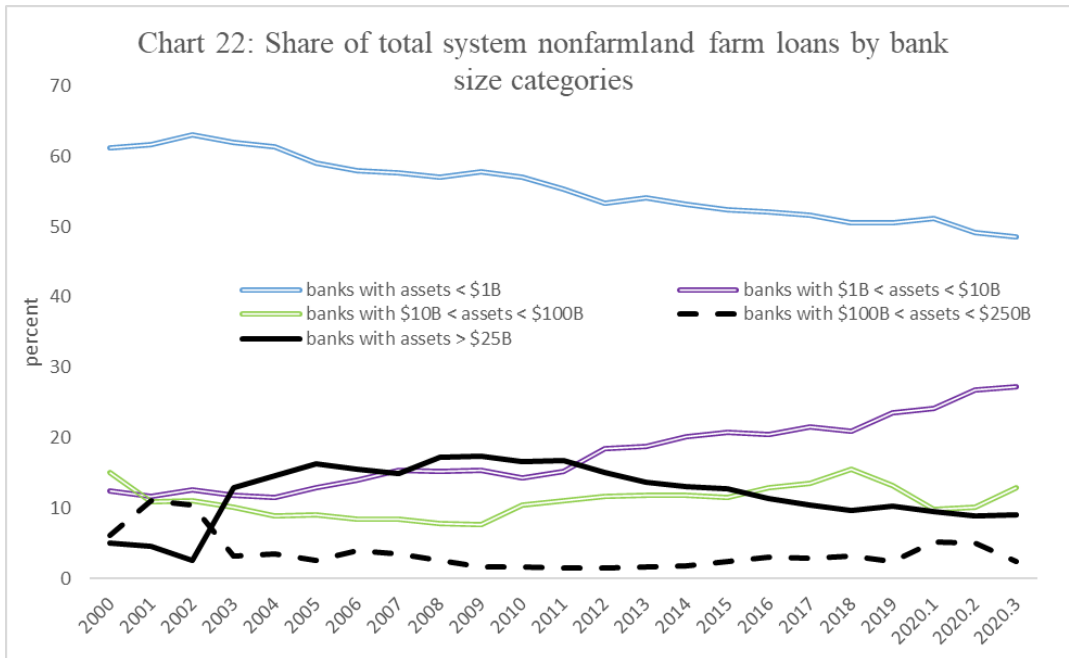
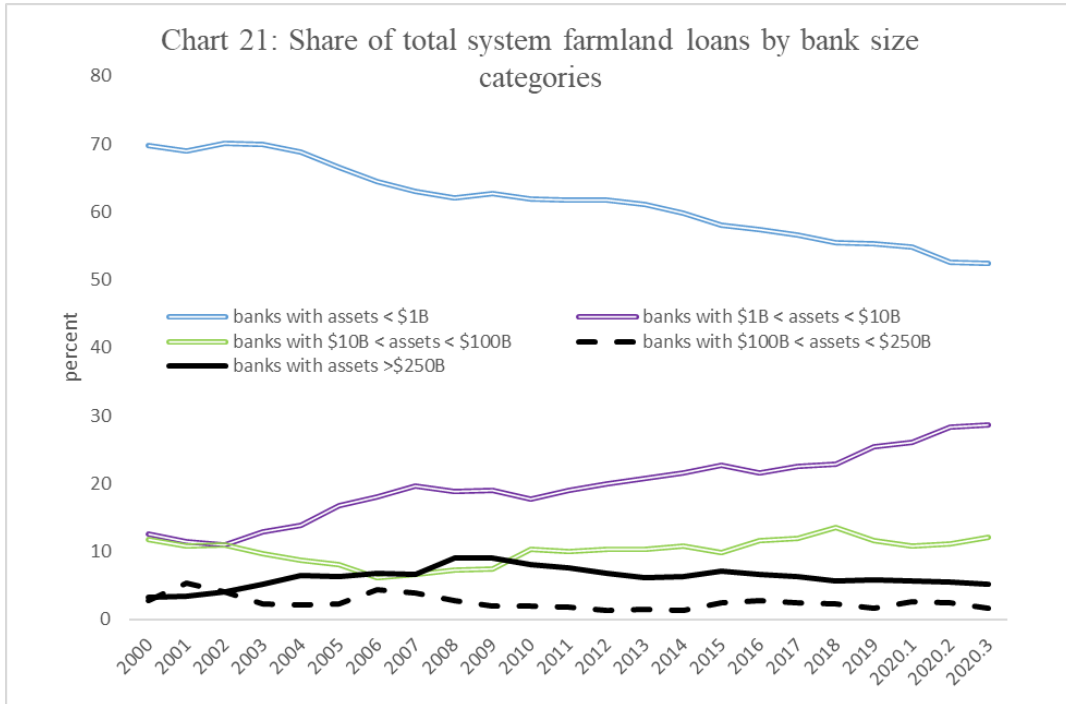
**Table 7: Share of total system credit card loans by bank size categories**

year	banks with assets < \$1B	banks with \$1B < assets < \$10B	banks with \$10B < assets < \$100B	banks with \$100B < assets < \$250B	banks with assets > \$250B
2000	4.04	14.69	69.59	2.69	8.99
2001	3.51	16.65	66.34	5.42	8.08
2002	2.71	10.63	61.29	6.47	18.91
2003	2.29	10.08	63.10	3.92	20.61
2004	1.53	8.64	60.00	6.67	23.17
2005	1.37	4.49	63.80	5.64	24.71
2006	1.13	5.23	47.75	26.23	19.67
2007	0.90	6.99	42.81	27.40	21.90
2008	0.78	5.95	33.79	38.78	20.70
2009	0.80	3.71	49.90	24.90	20.69
2010	0.38	2.71	27.69	56.15	13.08
2011	0.41	2.89	30.48	35.92	30.31
2012	0.33	3.16	33.68	30.00	32.83
2013	0.34	3.15	34.35	31.99	30.17
2014	0.34	3.59	36.08	14.36	45.63
2015	0.28	2.59	30.14	23.68	43.31
2016	0.28	2.83	29.62	23.95	43.32
2017	0.24	1.31	31.86	23.57	43.02
2018	0.23	1.27	17.70	38.16	42.64
2019	0.22	1.37	16.59	27.08	54.74
2020.1	0.22	1.41	16.65	27.35	54.36
2020.2	0.22	1.42	14.47	29.43	54.46
2020.3	0.21	1.48	14.43	29.58	54.31

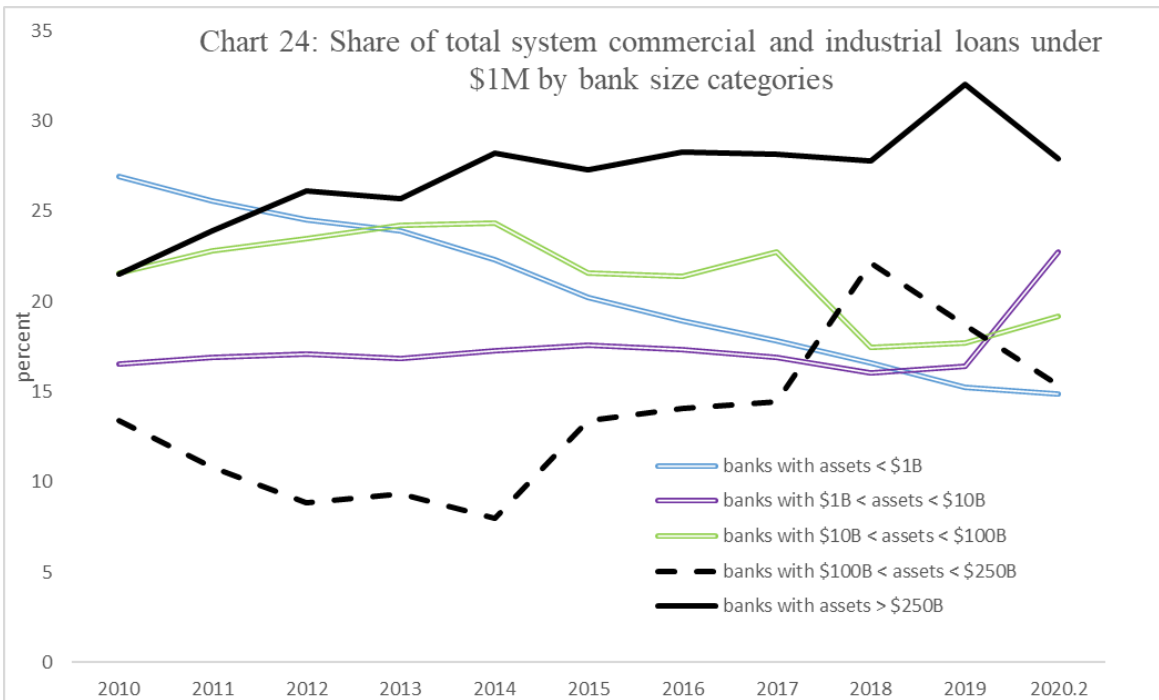
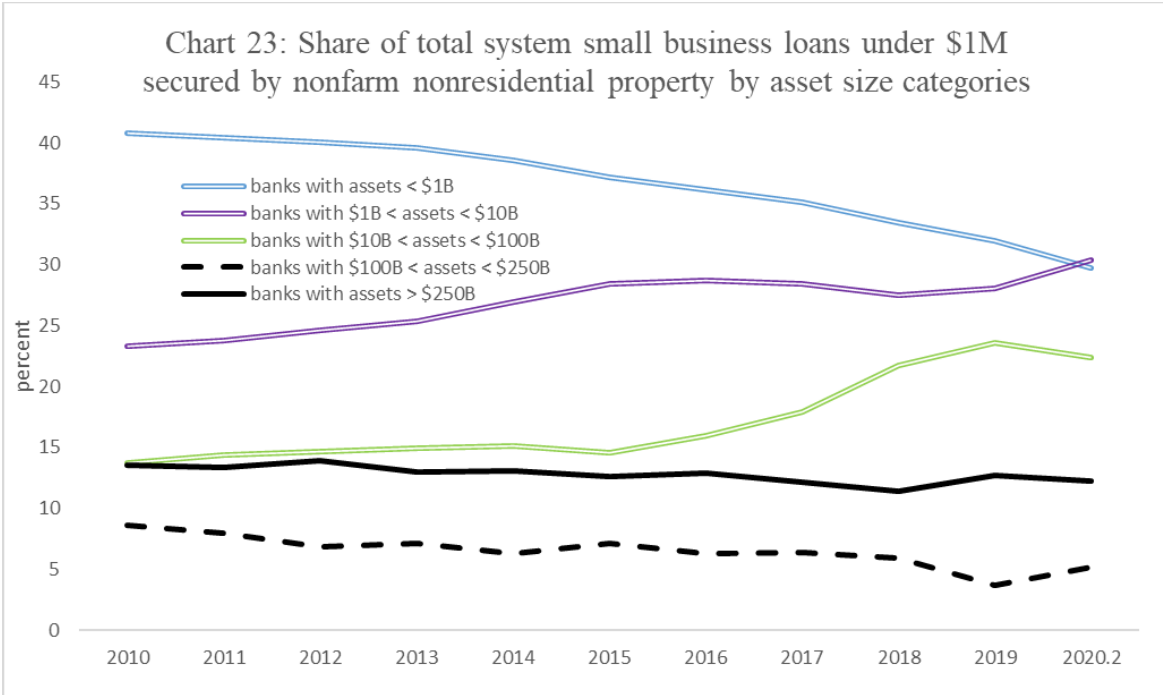
Charts 23 and 24 show the market share of total small business loans collateralized by nonfarm, nonresidential real estate and C&I loans by banks size categories. The charts show that small banks are the predominant source of small-dollar business loans collateralized by real estate whereas the largest banks have the dominant market share in small business C&I lending.

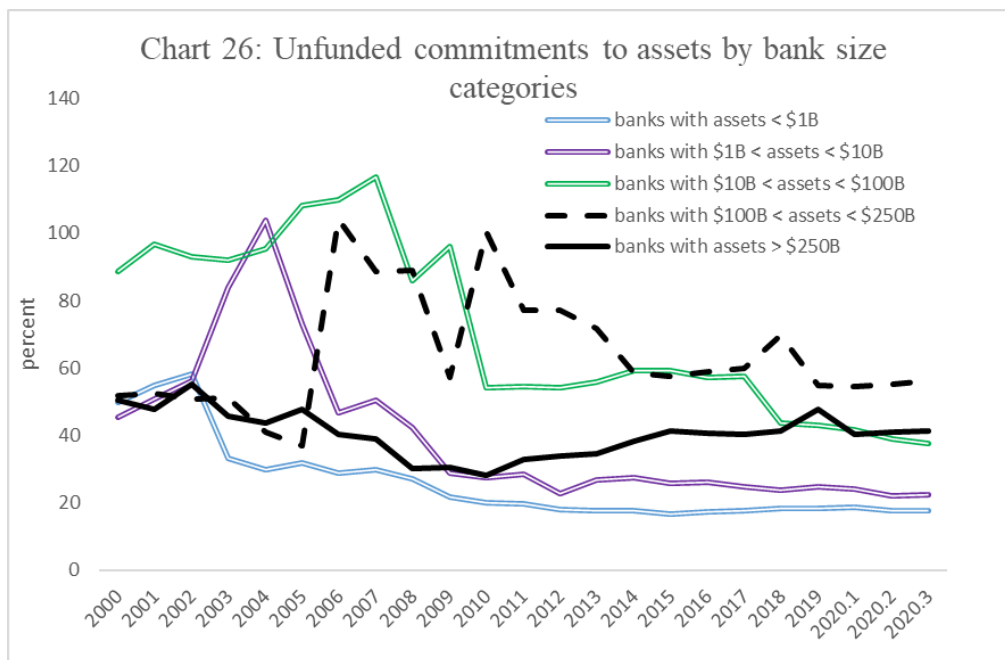
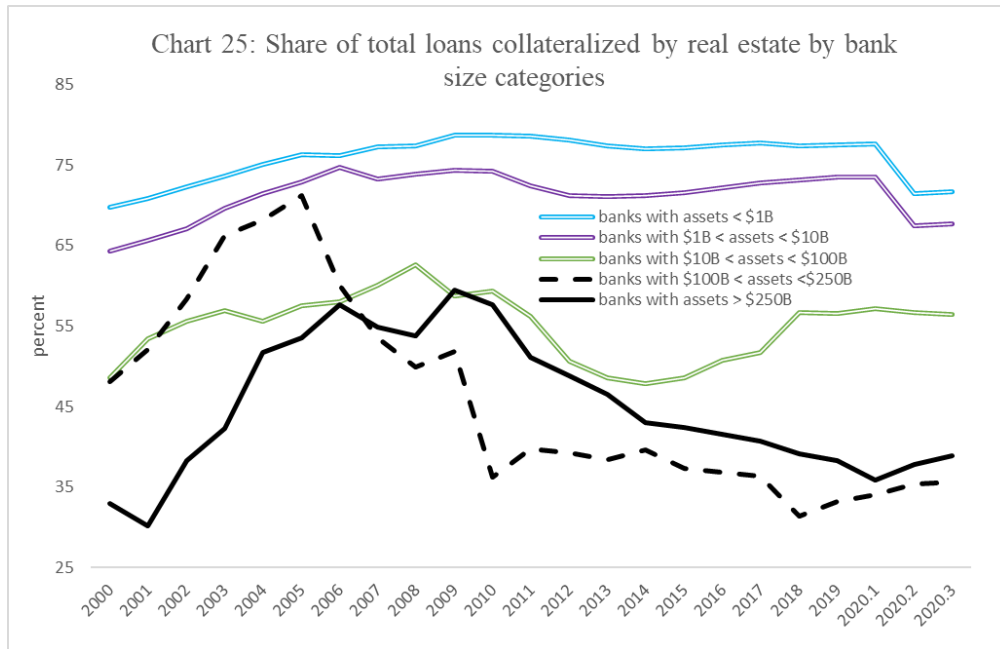
Chart 25 shows the share of all bank loans that are collateralized by real estate. The data show that, compared to banks in the two largest size categories which have been decreasing their reliance on real estate collateral since the financial crisis, smaller banks tend to secure a much larger share of their loans with real estate.

Chart 26 shows banks' unfunded lending commitments to assets by bank size categories. Basel II increased the capital requirements on short-term unfunded commitments and the data show that banks reduced their commitment-to-asset ratios after the adoption of Basel II.









**Trends in bank securities holdings**

Chart 27 shows the evolution of bank securities-to-asset ratio by bank size category over the 20-year span. The data show that the banks in the two smallest size categories have been reducing the share of their assets invested in securities. In contrast, banks in the two largest size

categories have increased the share of their assets invested in securities. Banks in the largest size category on average doubled their securities-to-asset ratios over this period. Chart 28 shows the share of total banking system securities held by banks in the various size categories. Over this period, the share of banking system securities held by the largest banks went from 12.5 percent in 2000, to 63 percent in 2020.

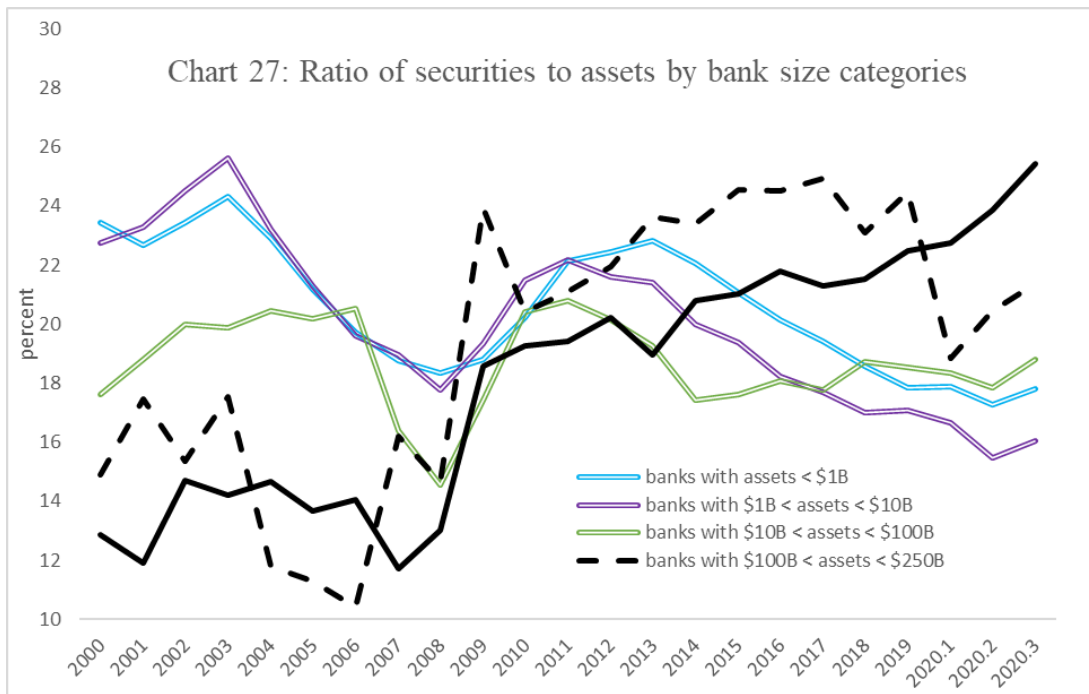


Chart 29 plots the share of US government guaranteed securities holdings to total assets by bank size categories. Since the financial crisis, banks in the two largest size categories have greatly expanded the share of their assets invested in US government guaranteed obligations. In 2020, the largest banks had over 20 percent of their assets invested in these securities.

Chart 30 plots the ratio of banks' US government guaranteed securities and Federal Reserve deposits to assets by bank size categories. The chart shows that, for the largest banks, the share of assets dedicated to funding the federal government directly or indirectly through the Federal Reserve has increased from 8 percent in 2000, to over 30 percent in 2020. For banks in

the \$100-\$250 billion size category, this ratio increased from just under 11 percent in 2000, to over 28 percent in 2020. In contrast, over this period, banks in the two smallest size categories drastically cut the share of their assets invested in these instruments.

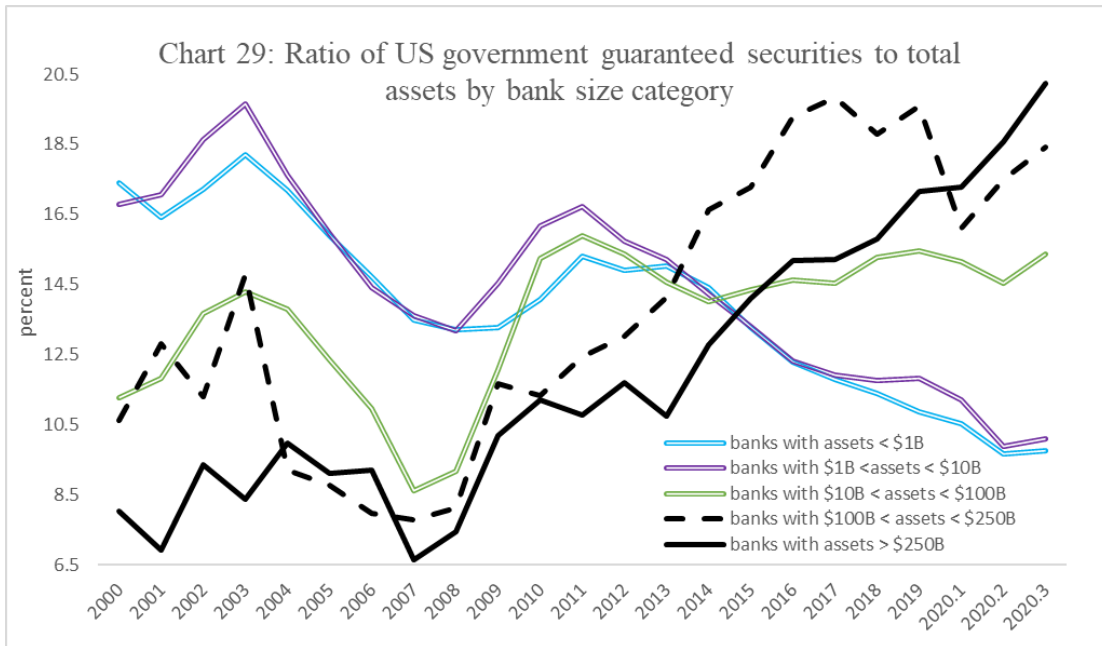
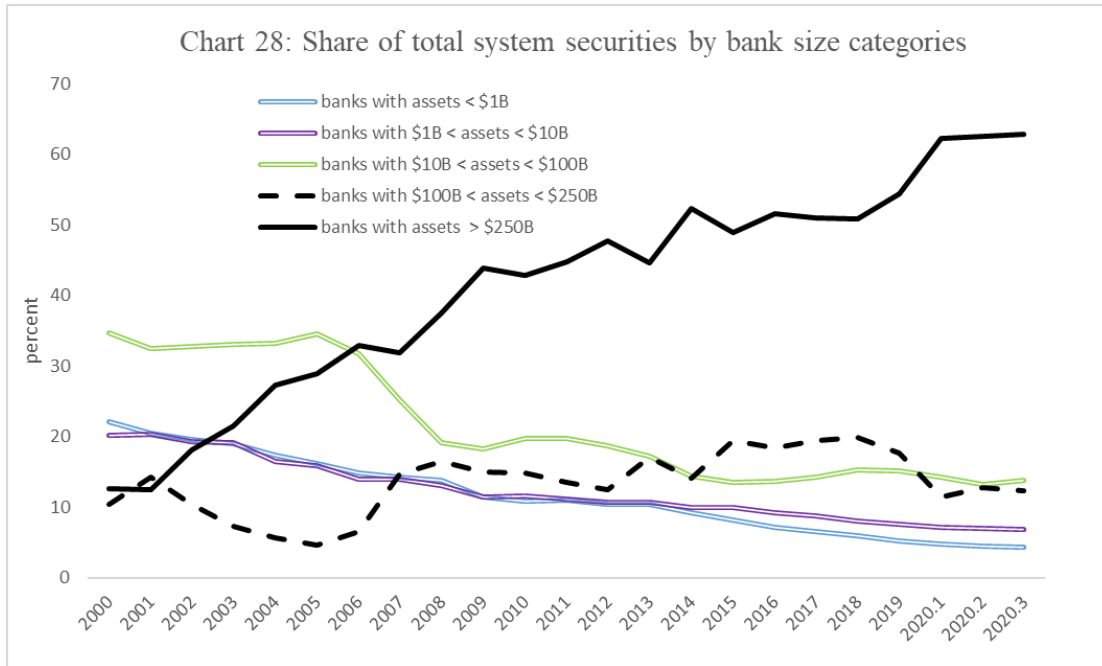


Chart 31 plots the ratio of bank municipal securities holdings to assets by bank size categories. Municipal securities are a much larger share of small bank balance sheets. Banks in smallest two bank size categories nearly doubled their asset shares of municipal securities over the last 10 years

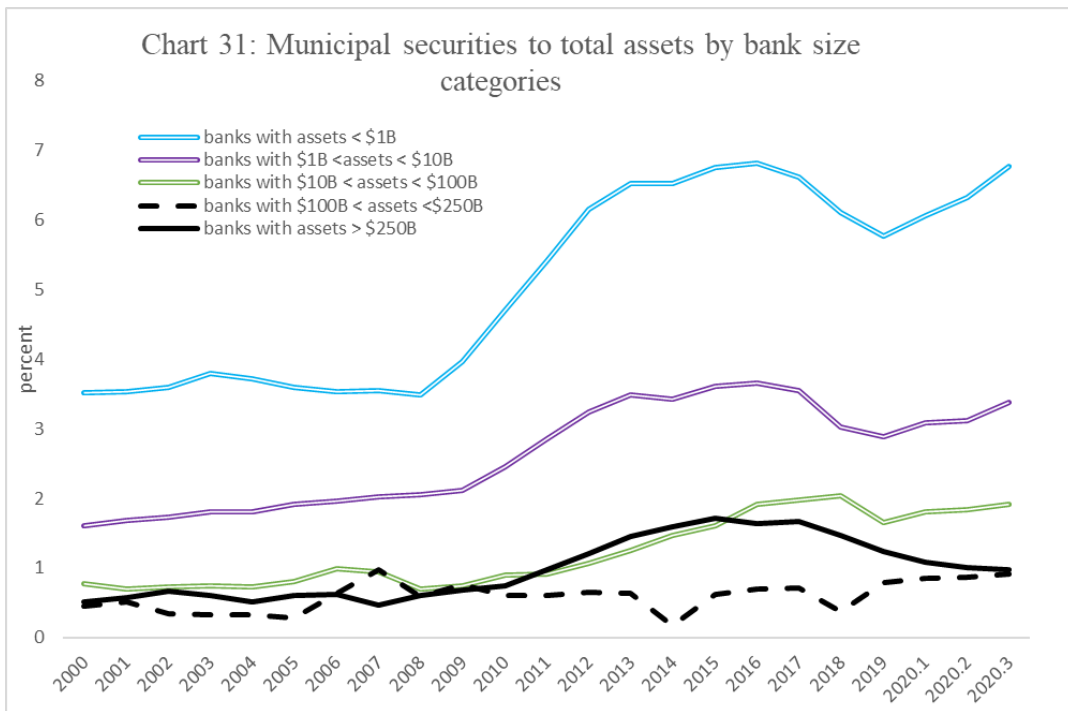
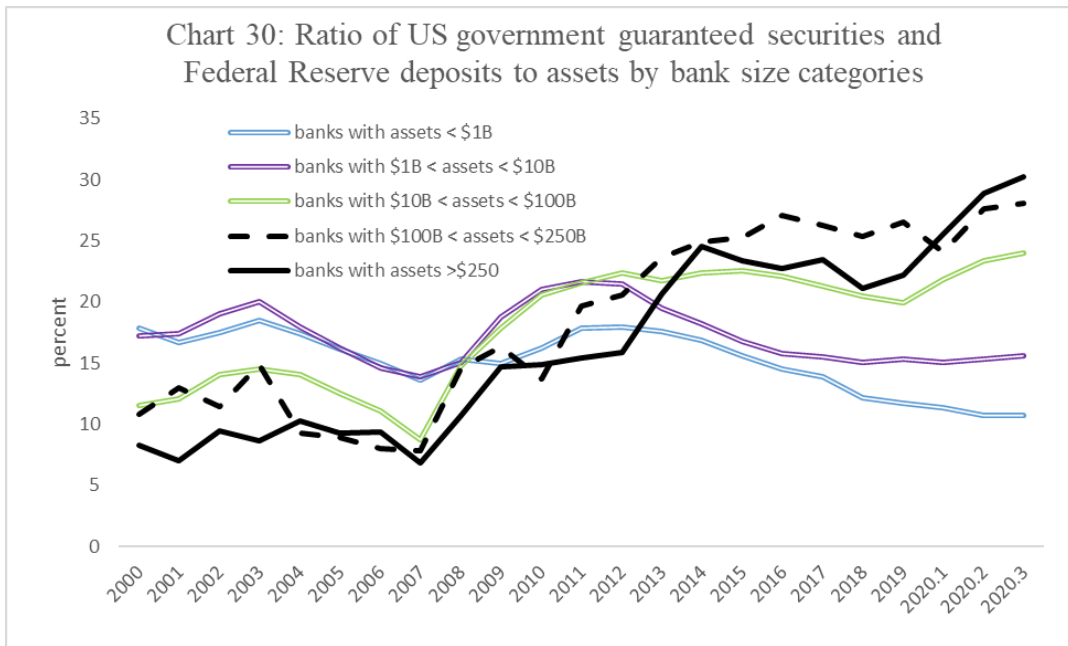


Chart 32 shows the ratio of bank trading account assets to total assets by each bank size category. The post-crisis increase in minimum regulatory capital needed to hold trading book assets and other trading book restrictions like the Volcker rule discouraged banks from holding trading book assets. Measured as a share of total bank assets, the trading books of the largest banks fell from over 16.5 percent of assets in 2002, to 5.8 percent of assets in 2020. The ratio of trading book assets to assets declined even more for banks with assets between \$100 and \$250 billion.

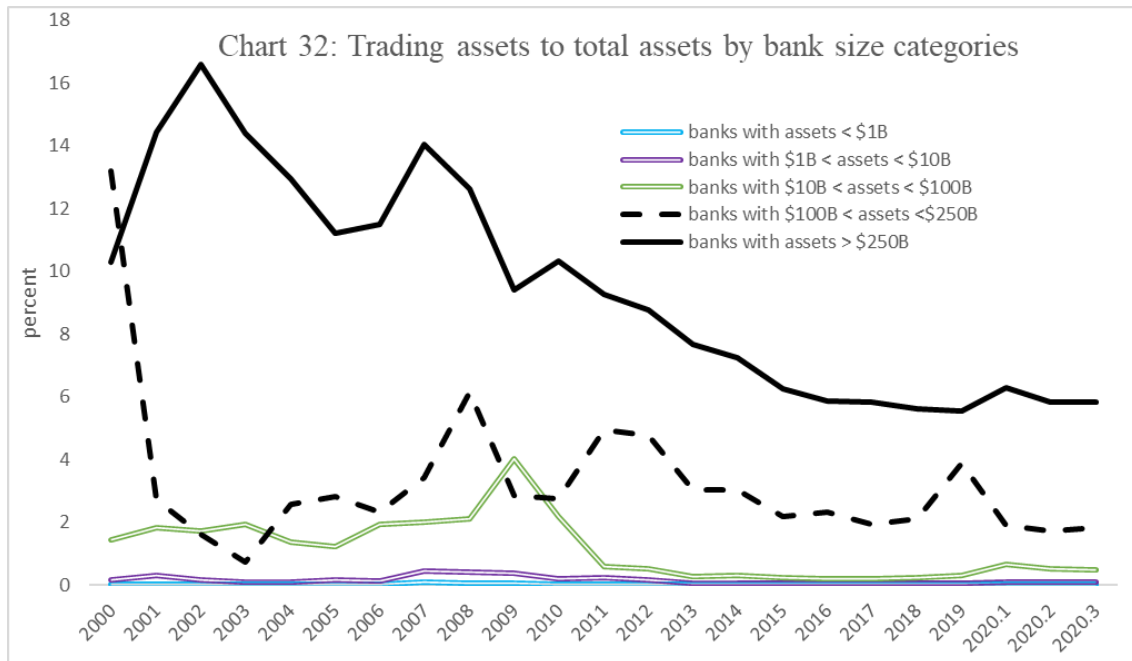
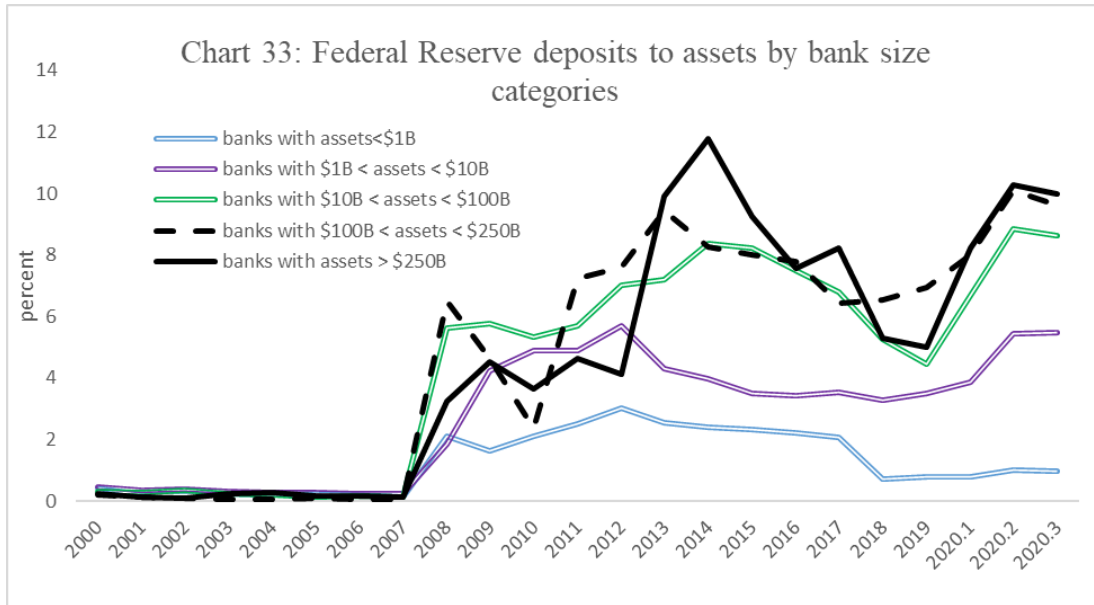


Chart 33 shows the share of bank balance sheets invested in Federal Reserve deposits by bank size category. Before the Federal Reserve paid interest on bank reserve deposits, Federal Reserve deposits accounted for a negligible share of all banks' balance sheets. In 2020, with the Fed paying interest on bank reserves and after the Fed has injected trillions of dollars in bank reserves through QE securities purchases, banks in the largest two size categories hold nearly 10

percent of their assets in Federal Reserve deposits. Banks with assets between \$10 and \$100 billion hold 9 percent of their assets in Fed deposits.



## V. Monetary policy and new regulations change the way banks are funded

Banks fund themselves using a variety of financial instruments including insured and uninsured deposits, subordinated debt, Federal Home Loan advances, purchased federal funds and repurchase agreements, other types of borrowing, and equity. This section will review the evolution of the financing side of bank balance sheets over the last 20 years.

Over the past two decades, all but the smallest banks increased significantly the share of their balance sheets that are funded by deposits. Chart 34 plots the evolution of bank deposit-to-asset ratios by bank size categories. Over this period, banks in the \$100-\$250 billion size category on average increased the share of assets funded with deposits by almost 30 percentage points. Banks in the \$10-\$100 billion size category on average added over 18 percentage points to their deposit-asset ratios, while banks in the largest size group increased their ratios by little over thirteen percentage points on average. Chart 35 provides estimates of the share of deposits

that are fully guaranteed by the Federal Deposit Insurance Corporation by bank size categories. Throughout the period, the smaller the bank size category, the higher on average are the estimated share of deposits that are fully government guaranteed. In practice, the depositors of very large institutions are usually fully protected from loss in an FDIC resolution process even if their deposits are beyond the \$250,000 guarantee limit.

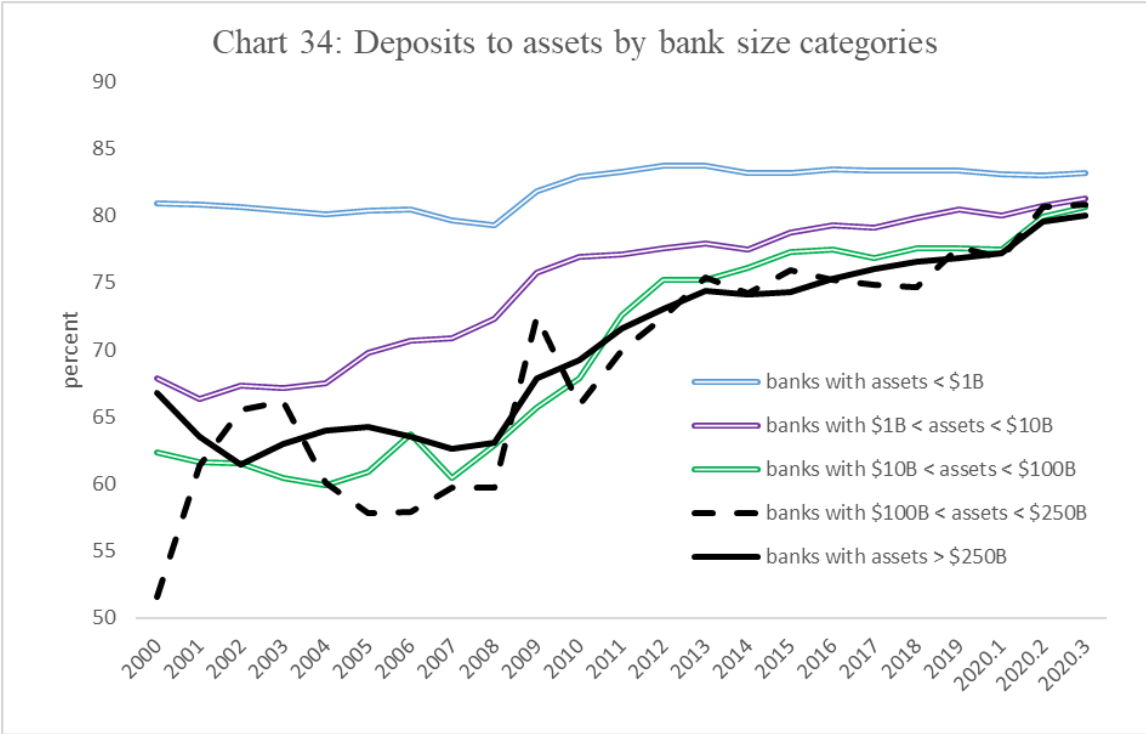


Chart 36 shows the evolution of banks’ subordinated debt to asset ratios by bank size categories. While small banks never used a significant amount of subordinated debt to fund their operations, larger banks typically did issue meaningful quantities of subordinated debt. Subordinated debt is not guaranteed and, like equity shares, the owners of the subordinated debt are potentially exposed to loss should an issuing institution fail. Over this time period, the largest banks reduced their use of subordinated debt and substituted deposit funding.



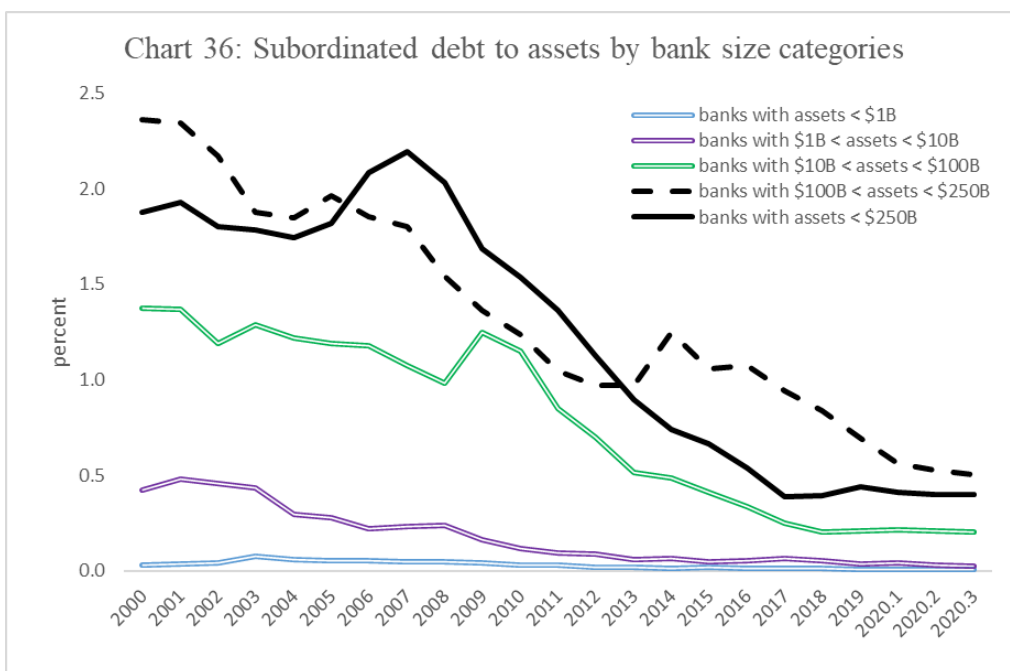
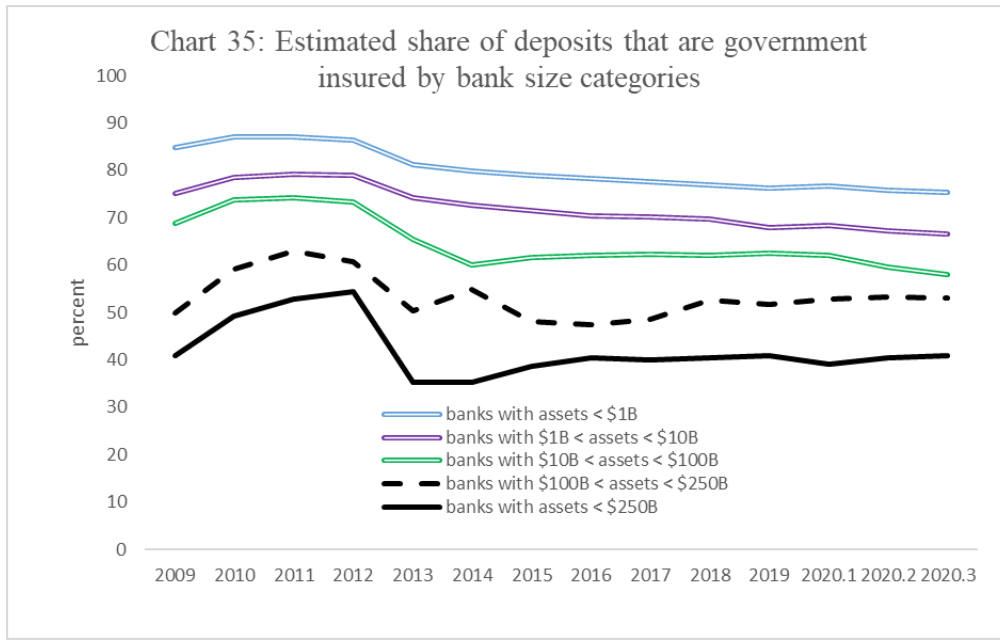


Chart 37 plots the use of other borrowed money over this time period by bank size categories. Other borrowed money is a residual bank borrowings category. It excludes deposits, federal funds purchased, funds borrowed using repurchase agreements, and trading liabilities but includes mortgage indebtedness, obligations under capitalized leases and borrowings from

Federal Home Loan Banks. Chart 37 shows that all banks use of other borrowed funds declined over this period as banks increased their use of deposit funding. Chart 38 shows that much of the decline in other borrowed money can be attributed to a decline in banks' borrowings from Federal Home Loan Banks.

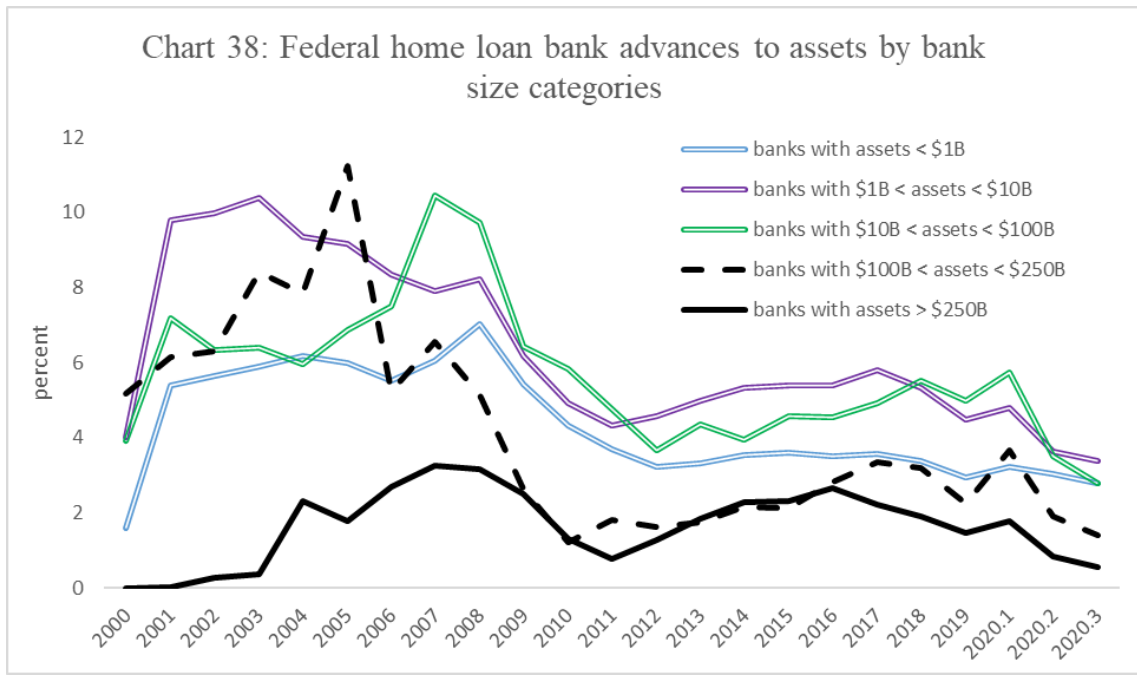
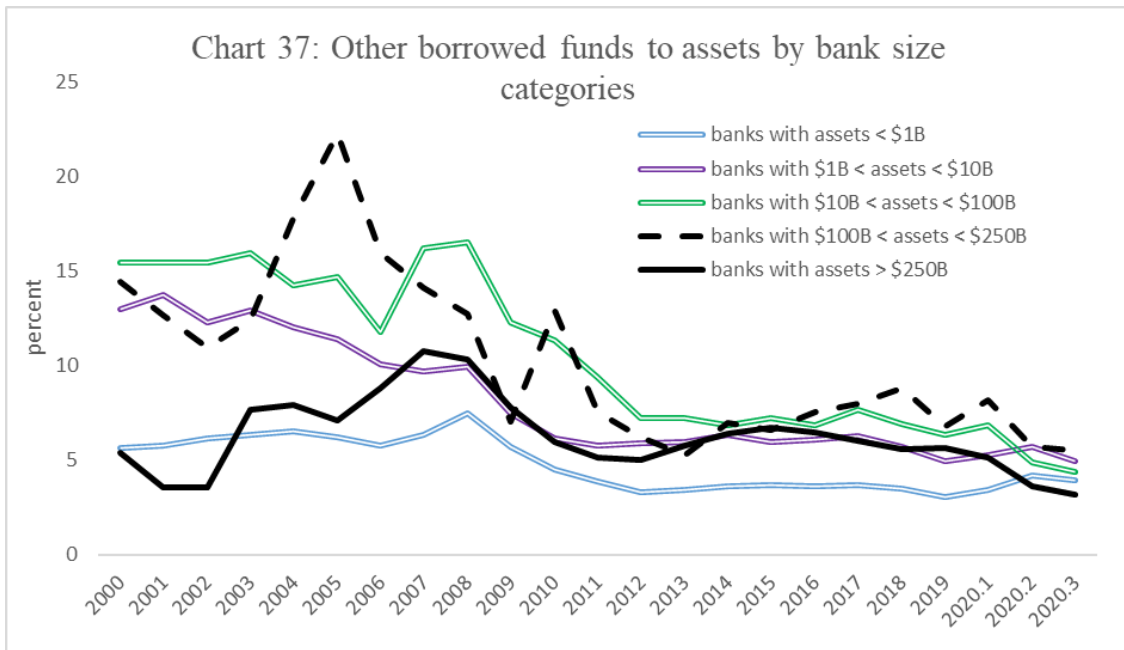


Chart 39 tracks banks' use of federal funds and repurchase agreements as a source of funding. As the use of bank deposit funding surged, banks' borrowing in the federal funds and repo markets declined markedly. On average, the largest banks are the biggest customers for this source of funding, but as of 2020, even these banks chose to fund less than 2 percent of their balance sheets in this manner.

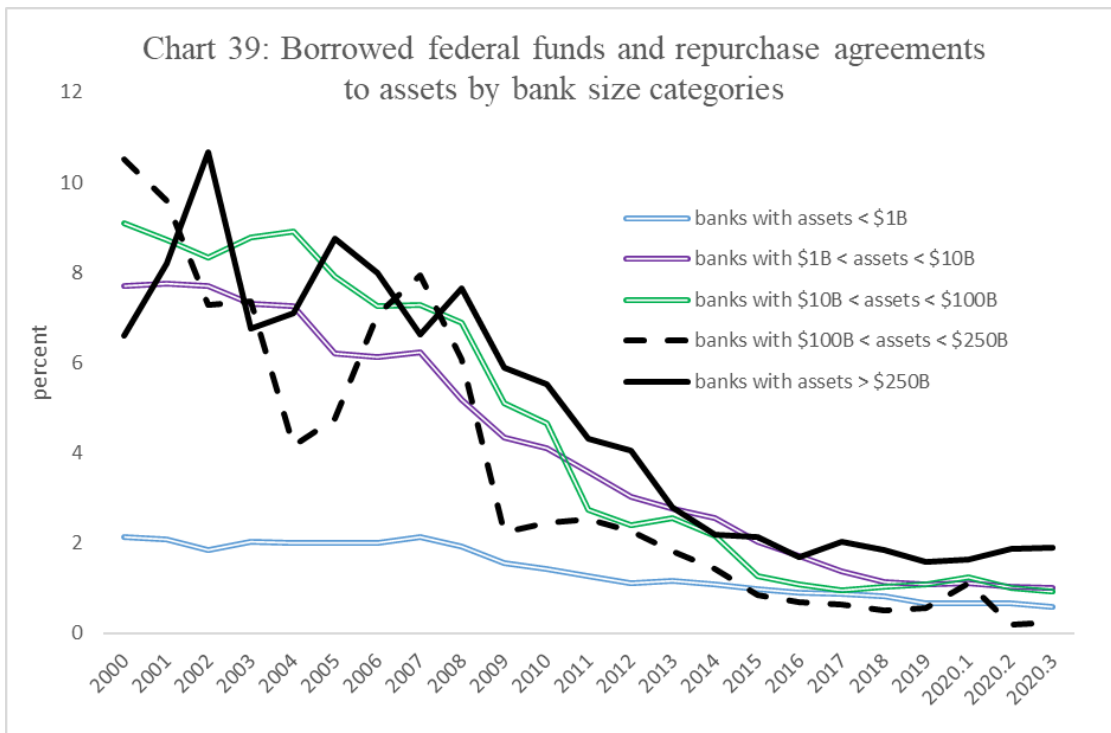
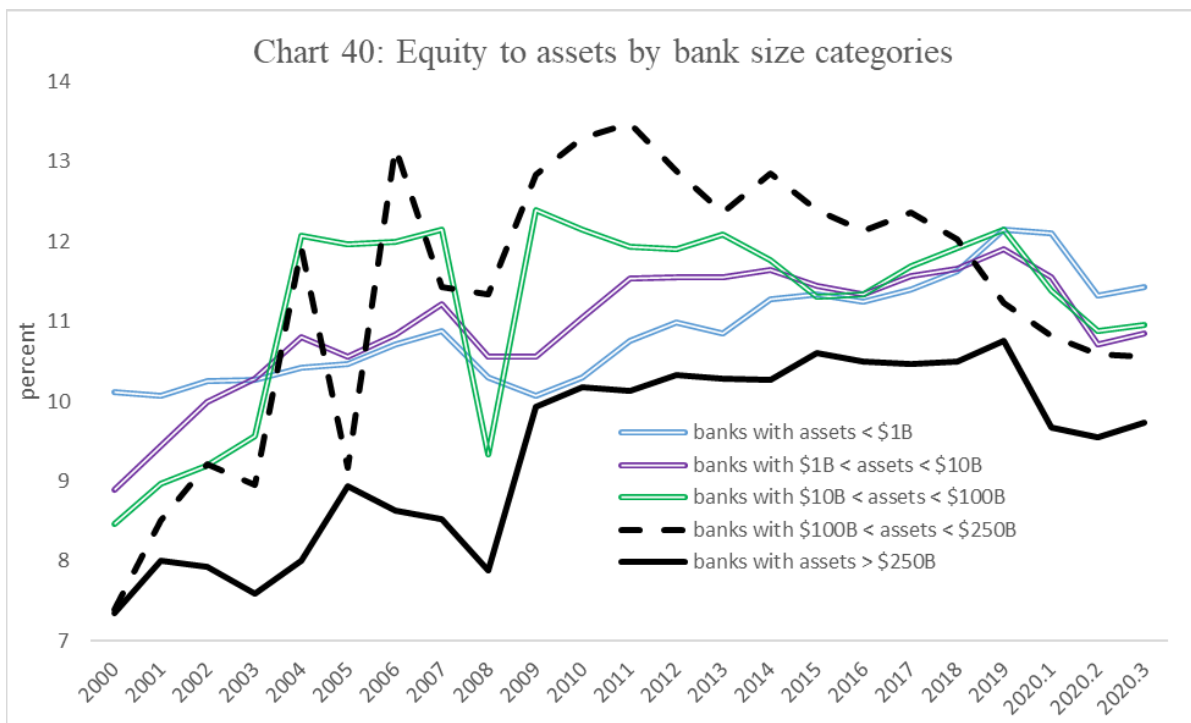


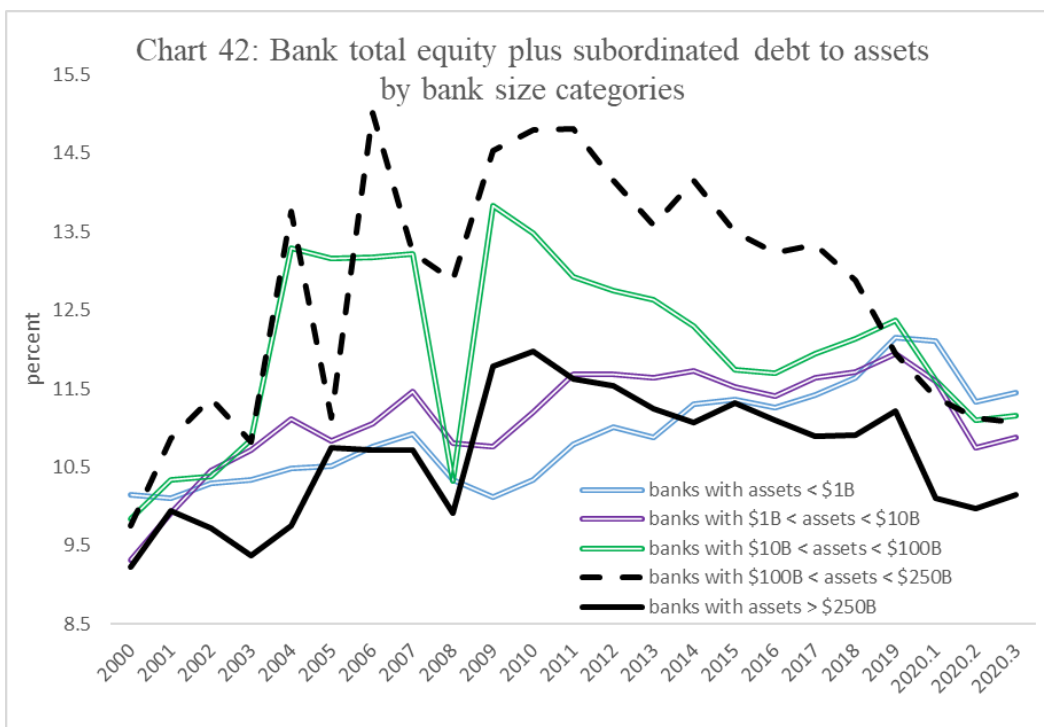
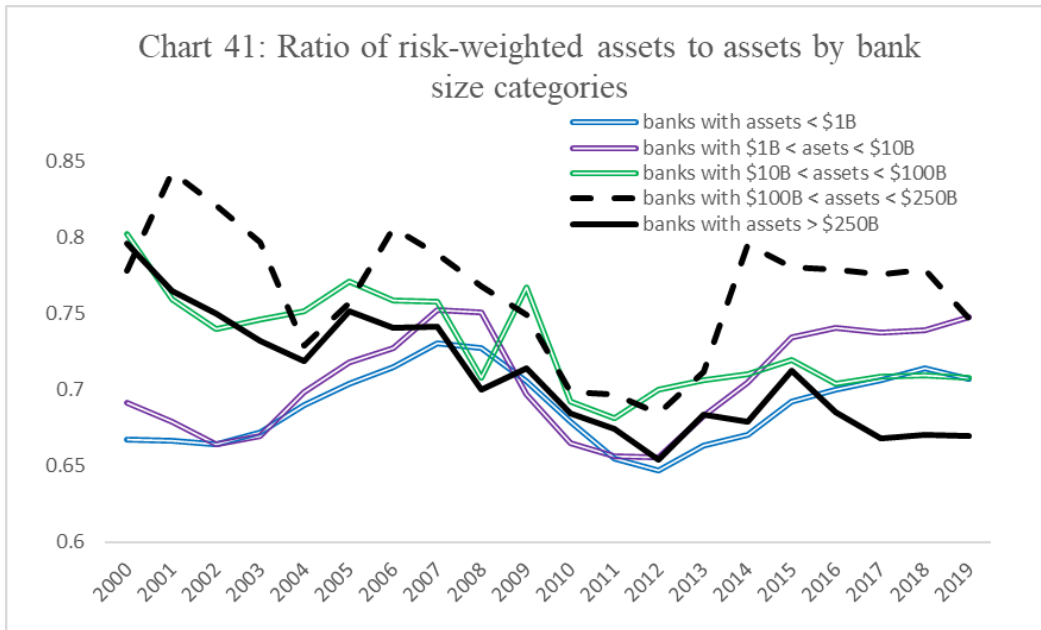
Chart 40 plots bank equity to asset ratios by bank size categories. While all bank size categories have, on average, increased their equity to asset ratios since 2000, the 2020 ratios of the largest bank category are down over 1 percentage point from peak values. Similarly, the ratios of banks in the \$100-\$250 billion size category have declined 2.3 percentage points since 2014.

Risk-weighted capital ratios like the ratio of bank equity to risk-weighted assets are larger than bank equity to asset ratios, sometime much larger, because risk weighted assets are only a

fraction of balance sheet assets values. Chart 41 plots the ratio of bank risk-weighted assets to assets by bank size categories. Chart 41 shows that, by re-balancing their portfolios away from high risk weight assets like consumer and business loans and into zero- and low-risk weight assets like Federal Reserve deposits and federal government guaranteed loans, the largest banks have reduced the ratio of their risk-weighted assets to assets from 75 percent at the time Basel II was introduced, to 67 percent at year-end 2019.

Both bank equity and subordinated debt are available to shield depositors and the deposit insurance fund from loss should a bank fail. Chart 42 plots the evolution of the equity and subordinated debt to asset ratios for bank size categories. Given the reductions in the largest banks' use of subordinated debt, the total increase since 2000 in the equity and subordinated debt available to cushion depositors from loss is less than 1 percentage point of bank assets. Banks in the second-largest size category increased their cushion by a little over 1.3 percent of assets.





## VI. Bank revenues and expenses are impacted by post-crisis monetary policy

Chart 43 shows the three primary sources of revenue, interest income, noninterest income, and securities gains and losses, for banks in all five size categories. While interest income is the largest source of revenue for all bank size categories, its overall contribution to

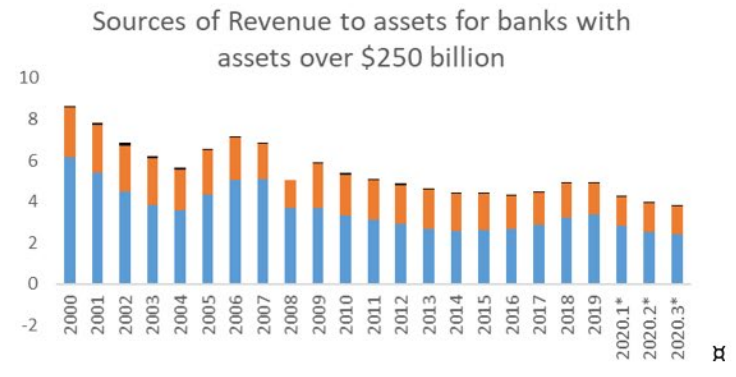
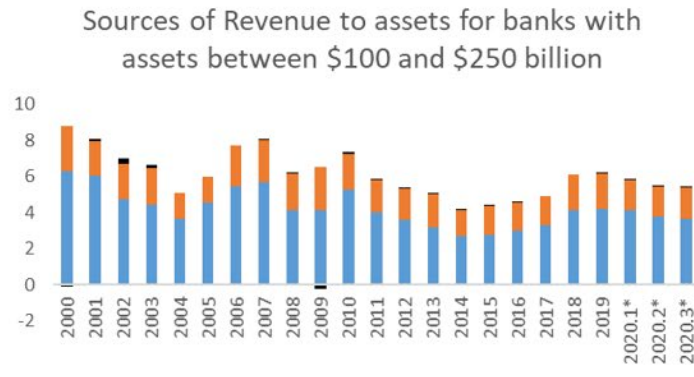
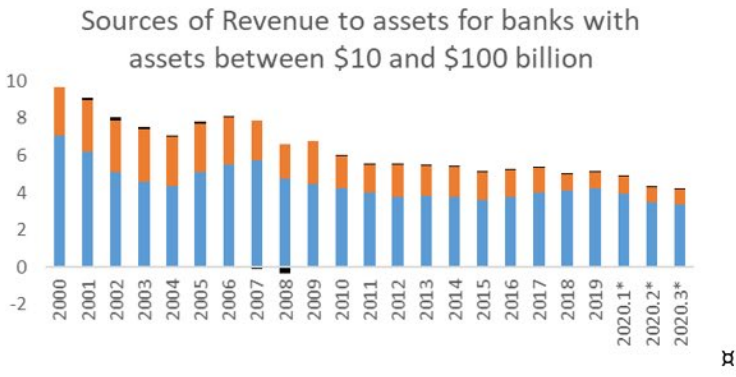
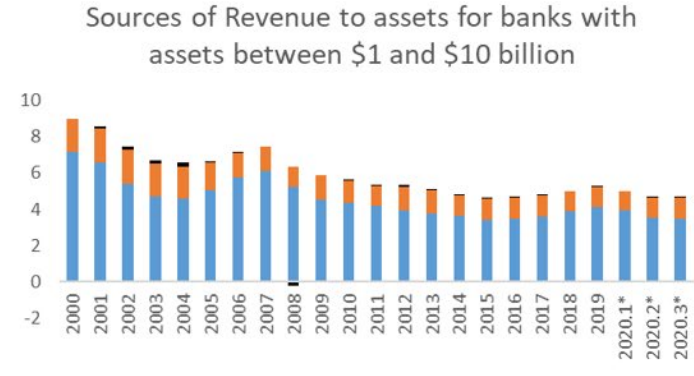
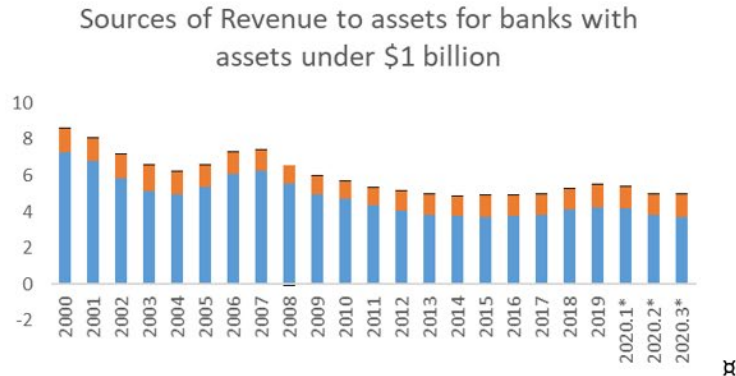
bank revenues is larger for smaller banks. Noninterest income accounts for 36.3 percent of revenues of the largest banks, up from 27.7 percent in the year 2000. Over time, noninterest income has grown in importance as a source of revenue for the smallest banks too. Noninterest income accounted for about 15 percent of revenues of banks with assets under \$1 billion in the year 2000; in 2021, the noninterest income component of revenues increased to 24.6 percent.

Chart 44 shows the primary sources of expense for banks in each size category. The low interest rate environment has translated in to sharply reduced bank interest expenses for all depository institutions. By 2020, noninterest expense was on average the largest component of expenses for banks in all size categories.

Chart 45 shows the ratio of bank interest income to assets. The chart shows this ratio declined on average for banks in all size categories. This 20-year declining trend follows movements in the federal funds rate, typically with a positive spread in favor of bank earning assets. The very largest banks exhibit the smallest interest rate spread over the federal funds rates in part because the largest banks invest a smaller share of their assets in higher-yielding assets like loans. Even though the smallest banks tend to have the highest proportion of their balance sheets invested in loans, their interest rate spread over federal funds is often the second smallest among the bank size categories.

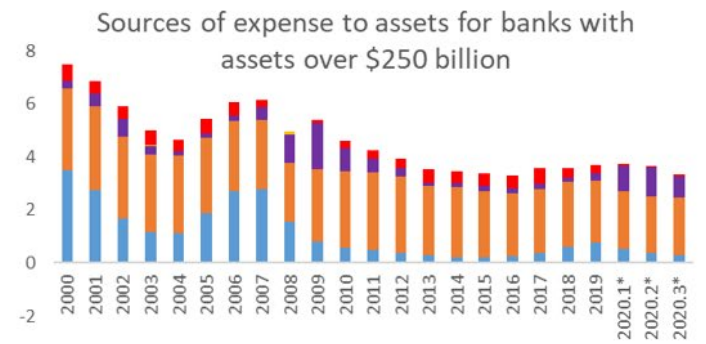
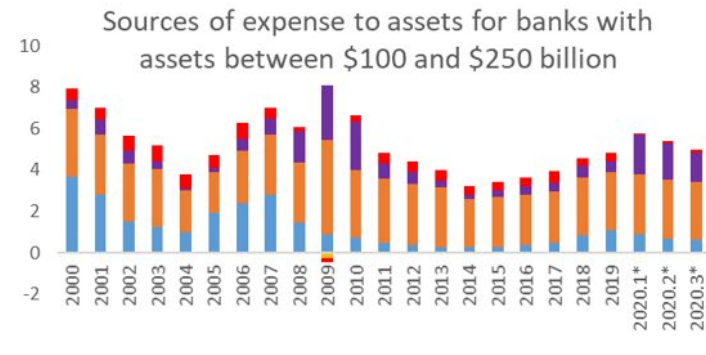
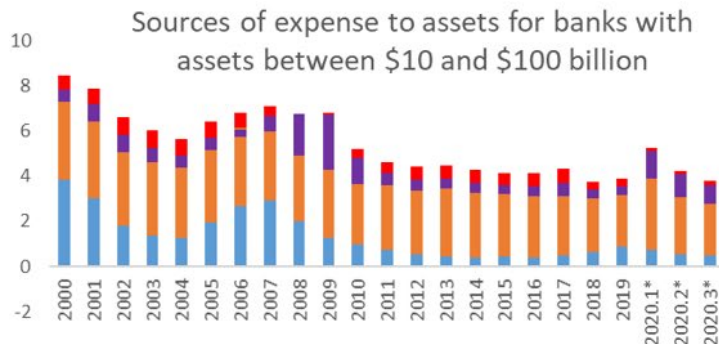
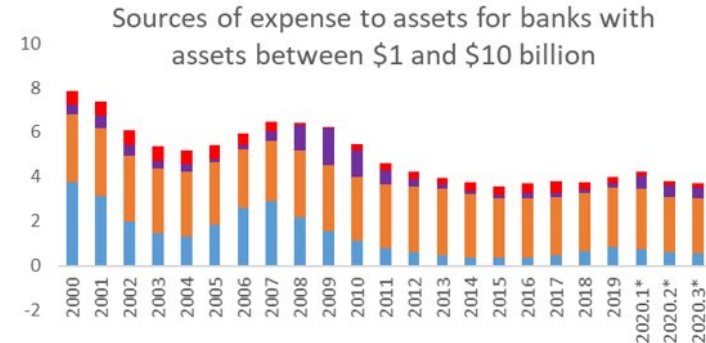
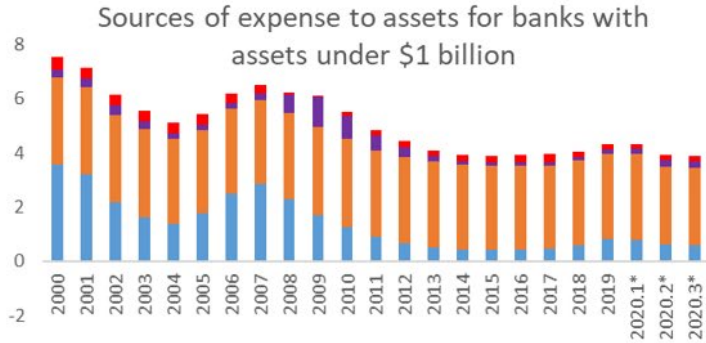
Chart 46 plots bank interest expense to assets by bank size categories. The interest expenses of banks in all size categories closely tracks the movements in the federal fund rate. While the ordering can sometimes change, larger banks typically have lower interest expense to asset ratios.

**Chart 43: Primary sources of bank revenue by bank size categories**



■ interest income  
 ■ noninterest income  
 ■ securities gains and losses

**Chart 44: Primary sources of bank expense by bank size categories**



- taxes
- extraordinary items
- provisions for loan and lease losses
- noninterest expense
- interest expense



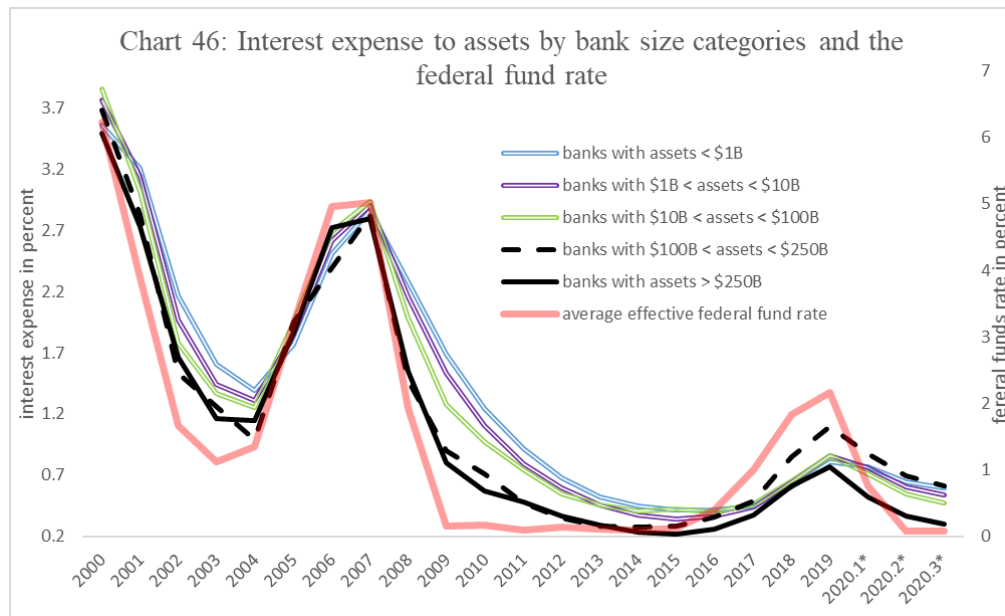
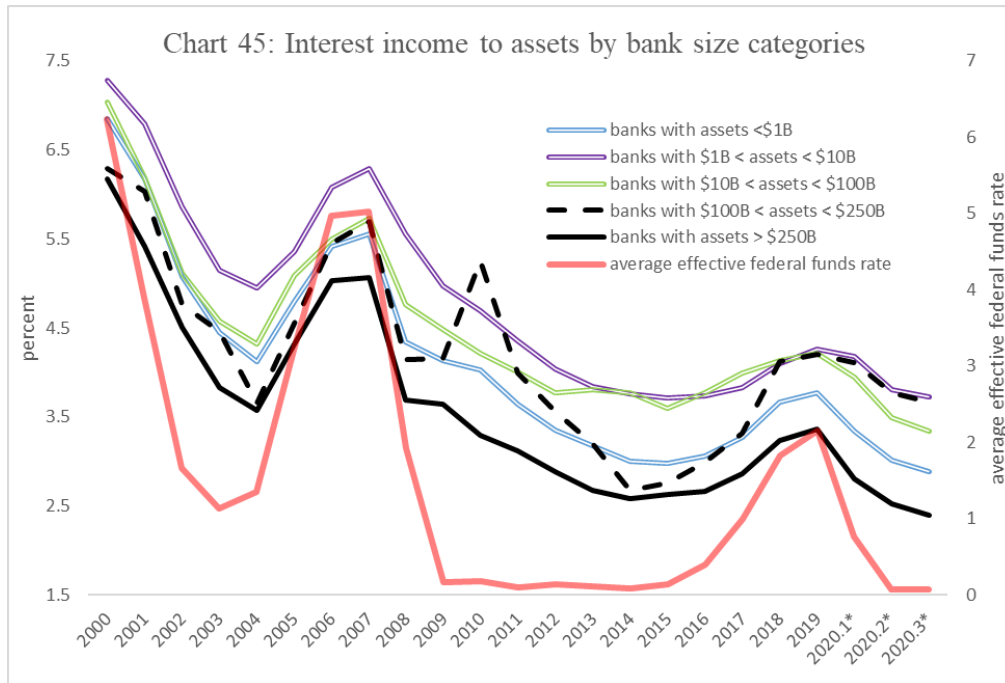
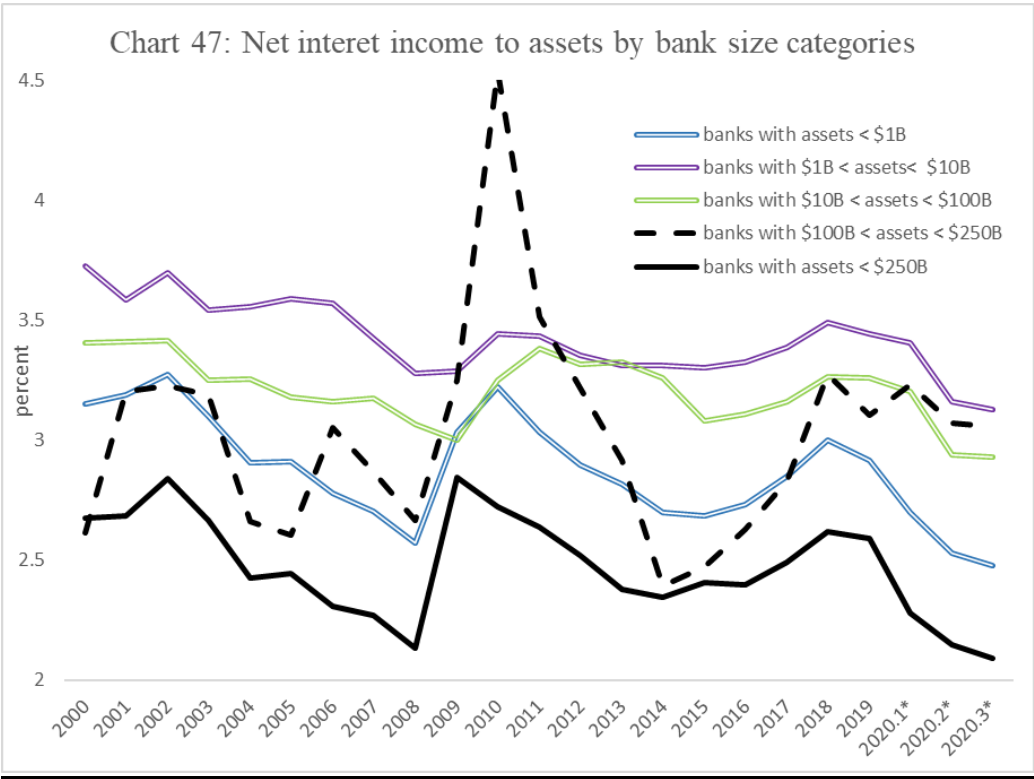
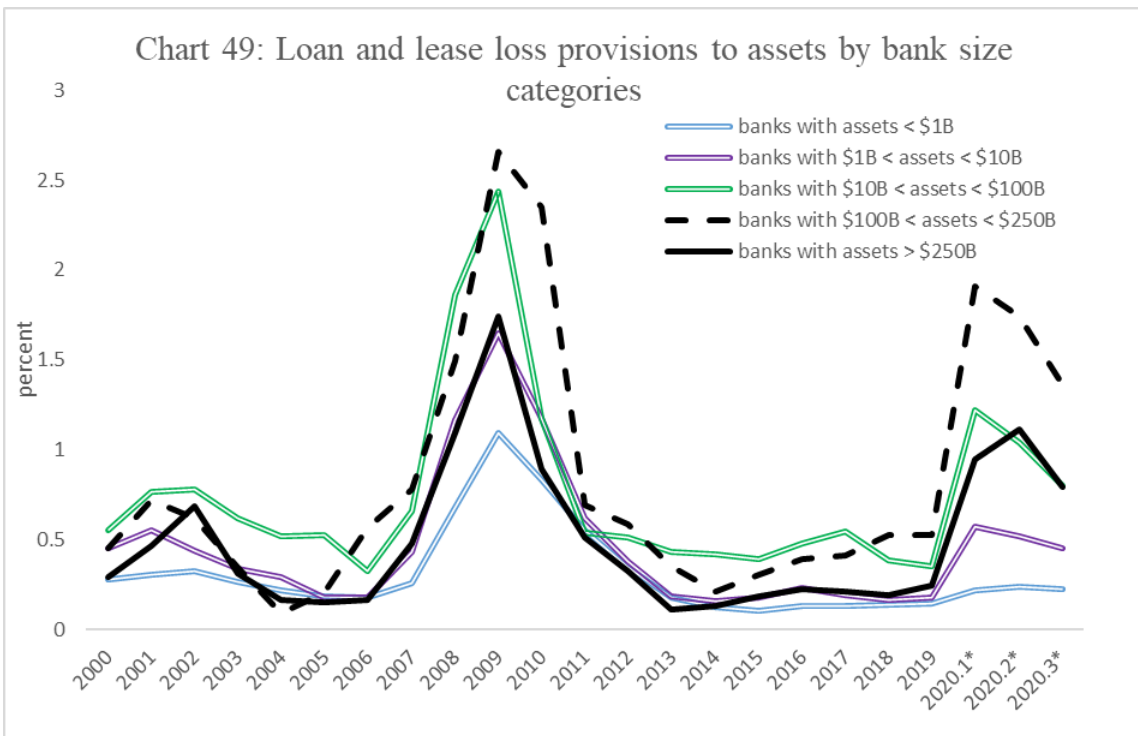
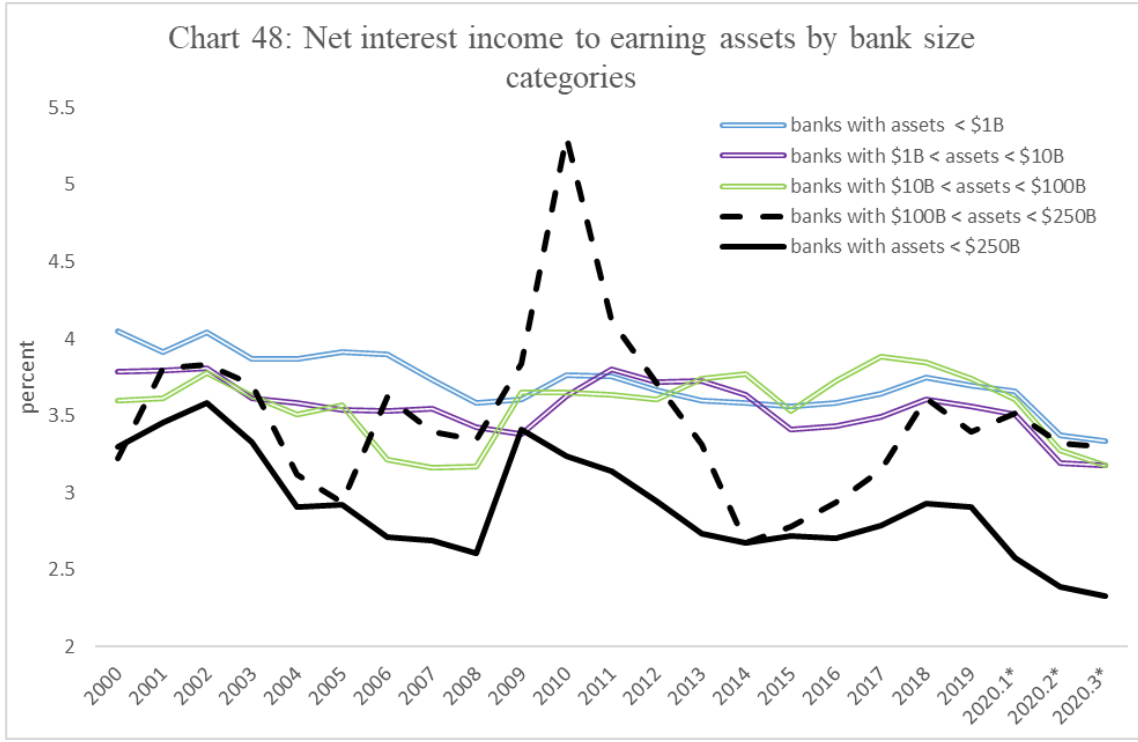


Chart 47 shows bank net interest income to assets by bank size categories where net interest income is interest income less interest expense. Chart 48 shows bank net interest income with respect to bank interest-earning assets instead of all assets. The ratio in Chart 48 is a measure of the average interest rate spread banks earn on their loans and interest-bearing debt securities. The interest rate spread earned by the largest banks has clearly trended down since the

financial crisis. The spread earned by the largest banks declined by 97 basis points over this 20-year period as banks in this size category rebalanced their portfolios away from loans and into lower-yielding Federal Reserve deposits and government-guaranteed securities. Banks in all size categories under \$100 billion in assets also experienced a decline in their net interest spreads. The decline was as small as 42 basis points for banks with assets between \$10 and \$100 billion and as large as 88 basis points for banks with less than \$1 billion in assets.



Charts 49 and 50 show bank loan and lease loss provisions to assets, and to gross loans and leases by bank size categories. Chart 49 shows how provision expenses contribute to banks’ overall return on assets while Chart 50 shows the percentage of gross loans and leases that are expensed each year to cover delinquencies and defaults. The impact on bank loan and lease loss provisions of the 2008 financial crisis and the more recent Covid-19 recession are clearly evident in the data for all bank categories.



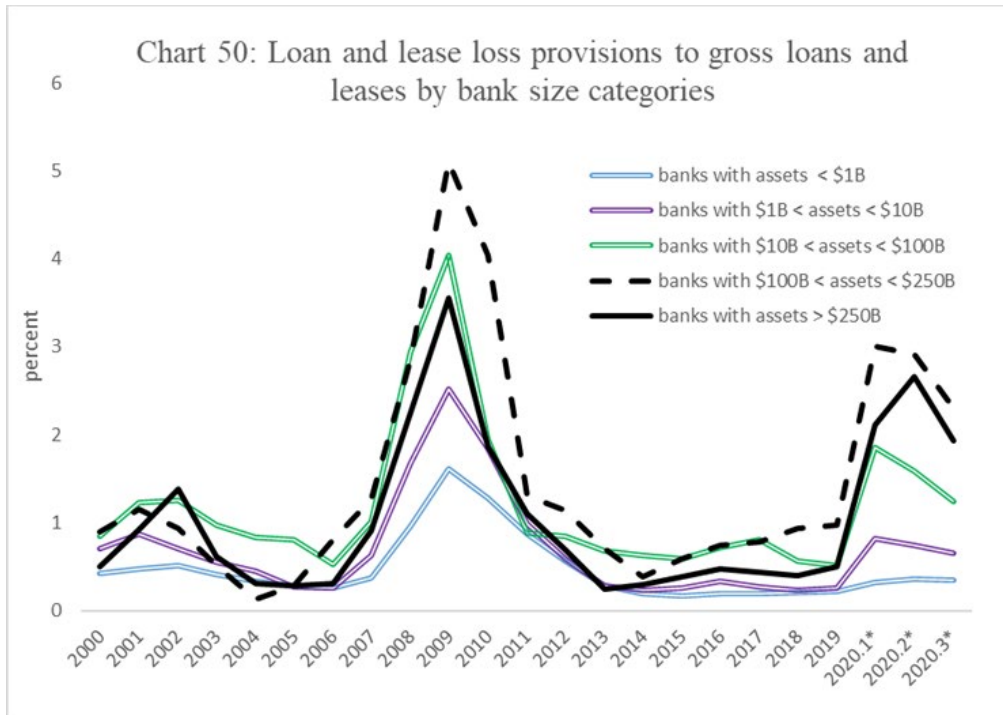
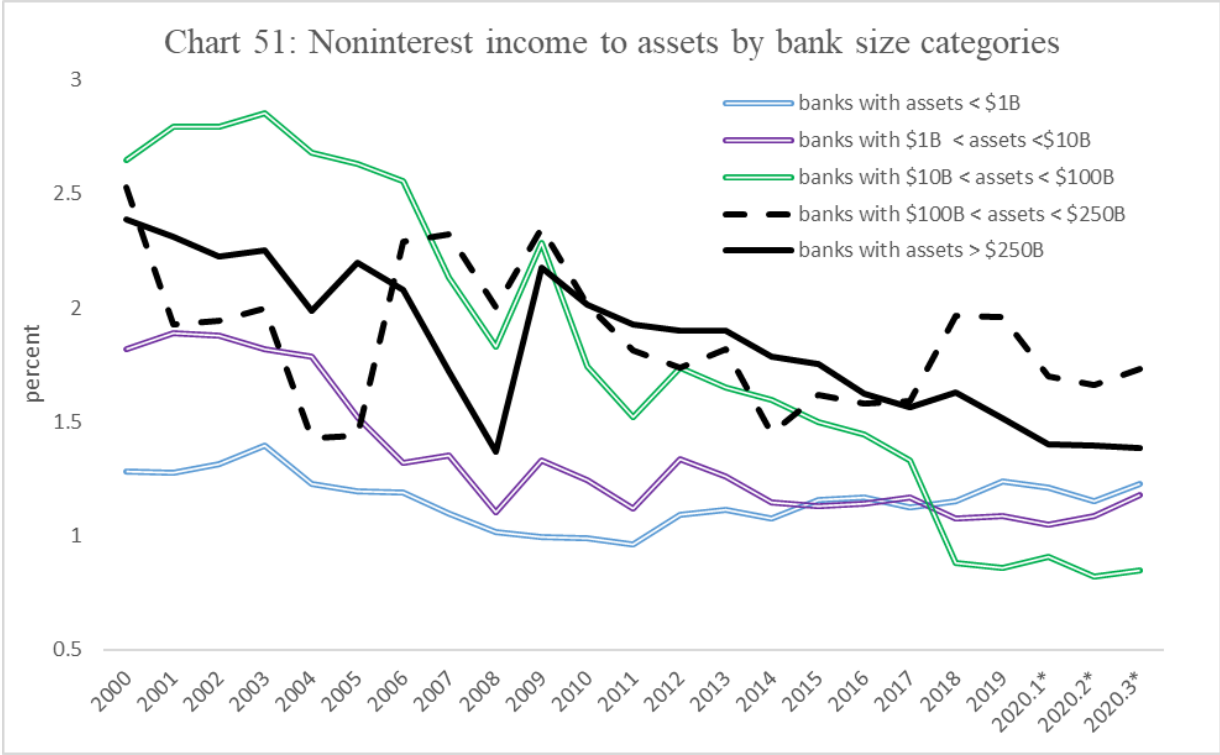


Chart 51 plots banks' noninterest income to assets by bank size categories. Noninterest income includes income derived from fiduciary activities, fees and service charges on domestic deposits, trading gains or losses and fees from foreign exchange transactions and other foreign transactions, and additional noninterest income. The latter category includes income derived from investment banking, advisory services, brokerage, underwriting venture capital, net servicing fee income, net securitization income, and net gains or losses on loan sales, the sale of real estate owned or other assets excluding securities and any other noninterest income generated from miscellaneous sources like bank safety deposit boxes, check sales and travelers' checks. Chart 51 shows that the noninterest income to assets ratio has declined for banks in all size categories. Banks in the \$10-\$100 billion asset range experienced the steepest drop, nearly 1.8 percentage points. The second largest decline, 1 percentage point, was recorded by banks in the largest size category. Banks in the \$100-\$250 billion size category experienced an 80 basis point

decline while banks in the \$1-\$10 billion range saw an erosion of 64 basis points. The smallest banks posted a 5 basis point decline.

Chart 52 plots the ratio of income generated by domestic bank deposit account fees to assets by bank size categories. Chart 53 shows this income measured as a percentage of bank domestic deposits. Chart 53 shows that the annual return per dollar of domestic customer deposits that banks earn by providing deposit account services has declined steadily over the last two decades for banks in all size categories. The data show that, on average, the largest banks consistently collect the highest annual service fee income per dollar of their domestic customer deposits.



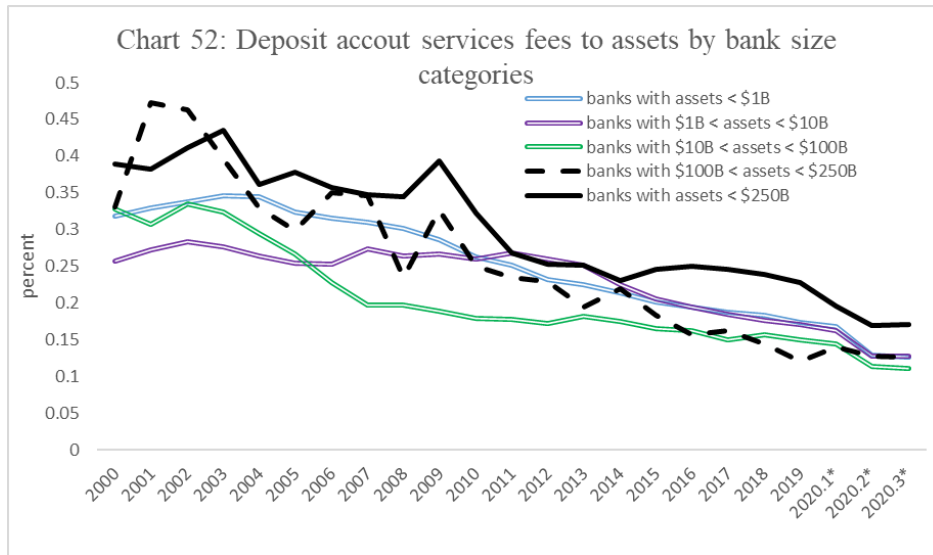
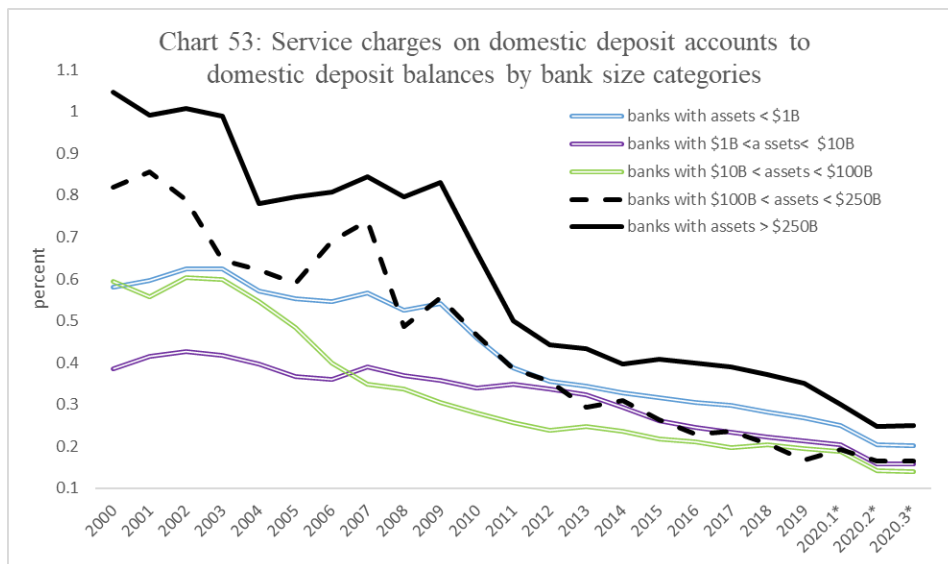


Chart 54 plots bank trust and fiduciary income to asset ratio by bank size categories. Banks in the \$10-\$100 billion asset category experienced a steady erosion in the share of noninterest income earned from trust and fiduciary services. Banks in the \$100-\$250 billion size category experienced significant volatility in the share of noninterest income earned from providing these services, but with an ending share within 2.5 basis points of the year-2000 ratio. The smallest banks are the only banks to record an increase in the share of their noninterest income earned from trust and fiduciary services, posting a 9 basis point gain over this period.



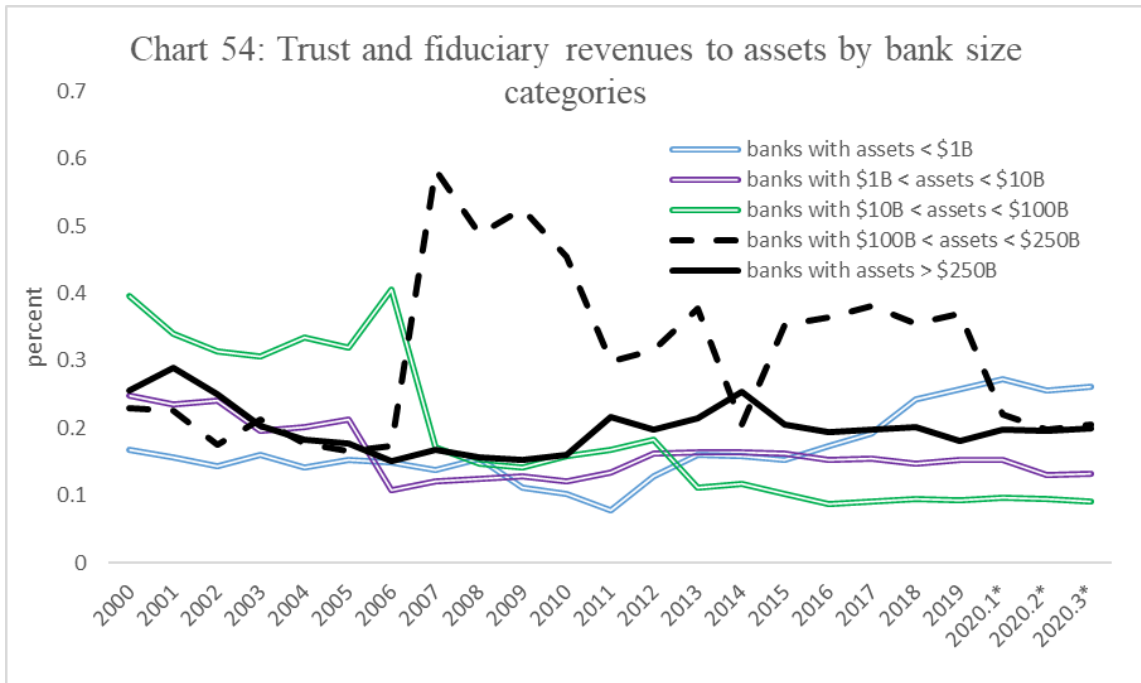


Chart 55 plots additional noninterest income to assets by bank size categories. All bank size categories, except banks with assets under \$1 billion experienced a decline in this source of noninterest income per dollar of banks assets. Banks in the \$10-\$100 size category posted the sharpest decline. From 2003, when this source of noninterest income per dollar of bank assets peaked, the income per dollar of assets dropped by 1.54 percentage points. Much of this decline can be attributed to the pre-financial crisis income this bank size category generated from investment banking services and gain-on-sale income associated with mortgage loan securitizations. This source of income evaporated with the onset of the financial crisis.

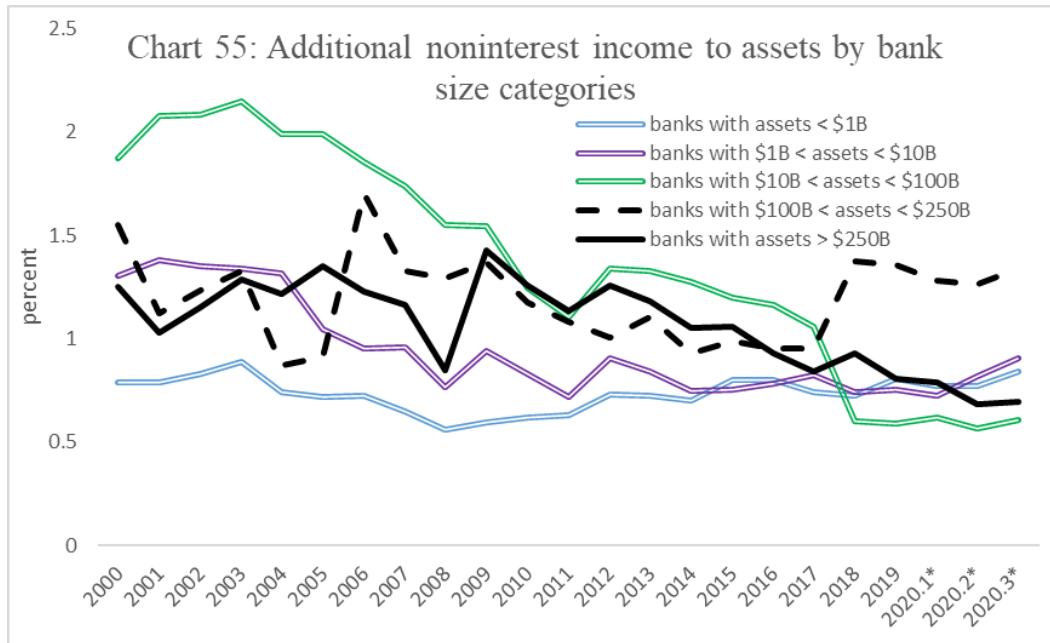


Chart 56 plots bank noninterest expense to assets by bank size categories. Noninterest expenses include salaries and employee benefits, expenses of premises and fixed assets, and other noninterest expenses like the costs of maintaining and disposing of bank-owned real estate. Noninterest expense per dollar of bank assets has declined over the past two decades for banks in all size categories. The 2008-2010 spike in this ratio for banks in the \$100-\$250 billion size category owes to the expenses of managing and selling foreclosed properties in the financial crisis.

Chart 57 shows that the contribution of salary and benefits to the noninterest expense ratio has fallen significantly over time for banks in the three largest size categories but risen slightly for banks smaller than \$10 billion. The ratio declined by 35 basis points for banks larger than \$250 billion; 33 basis points for banks between \$100-\$250 billion; and by 24 basis points for banks between \$10-\$100 billion. These reductions in salary and benefits expenses per dollar of assets are significant when you consider that the median annual ROA for banks in these size categories is roughly 100 basis points over this 20-year period.



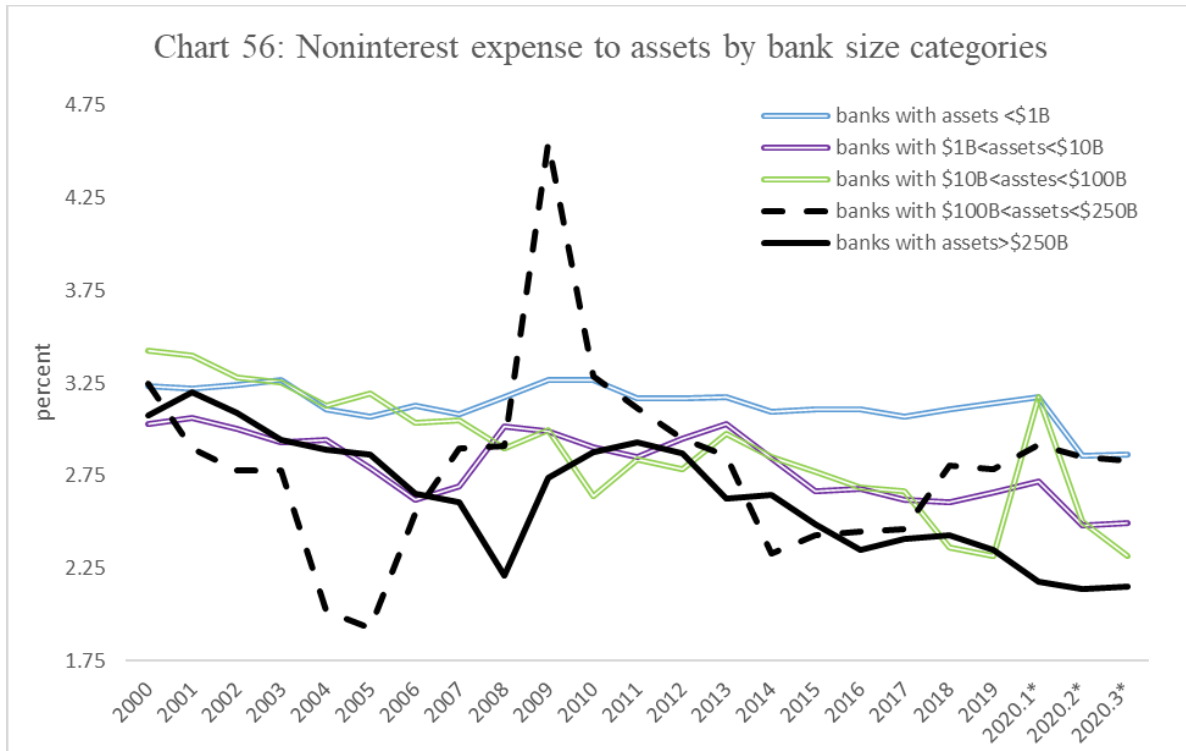


Chart 58 tracks the ratio of trading account gains and losses to bank assets for the three largest bank size categories. Trading account gains and losses are, on average, inconsequential for banks with assets under \$10 billion. The data suggest that the volatility of trading account gains and losses may have moderated after the imposition of stricter post-financial crisis regulations on bank trading activities, like higher minimum capital requirements for trading book positions and Volcker rule restrictions on proprietary trading.

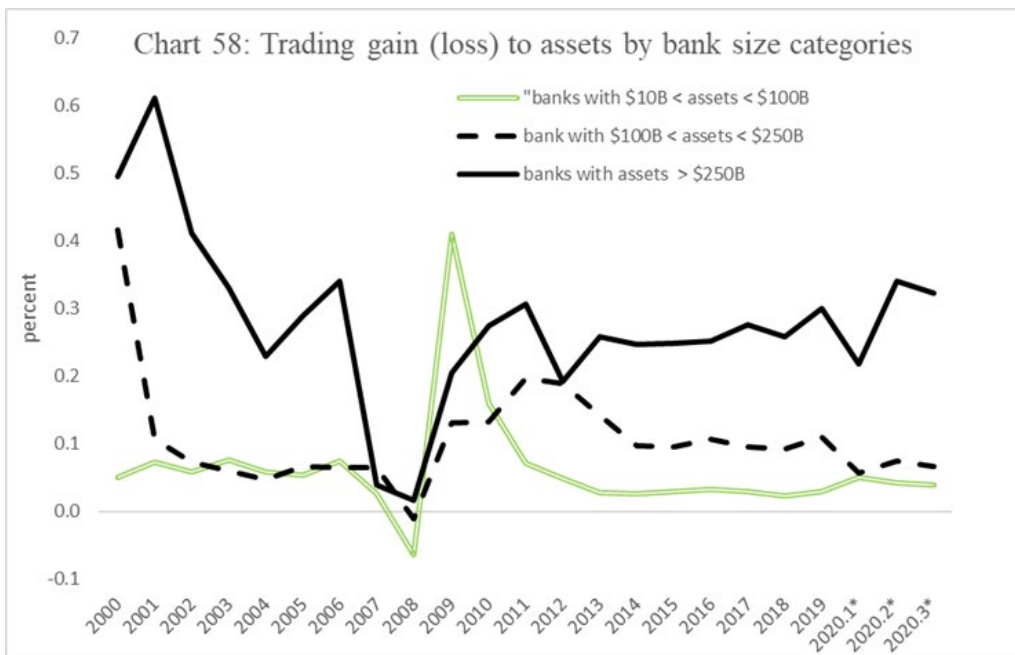
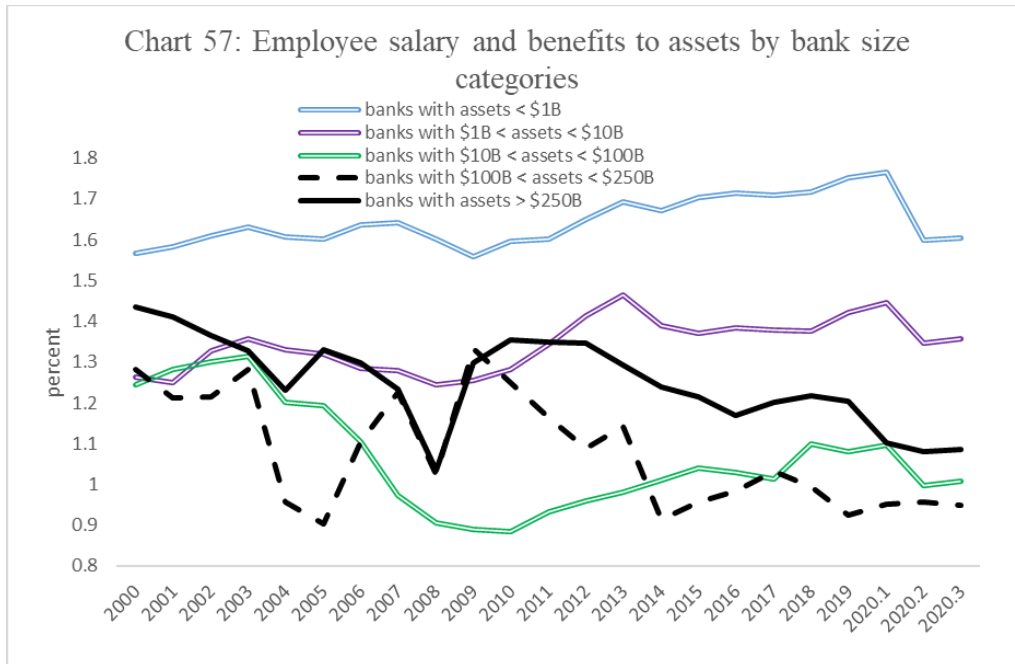


Chart 59 tracks the ratio of banks' net income after-tax and extraordinary items to assets (ROA) by bank asset size categories. Under non-recession economic conditions, the average ROAs for each bank size category are typically within a few basis points of 1 percent. Booming economic conditions push average category ROAs above 1 percent. The highest average annual ROA, 1.51 percent, was posted by banks with assets between \$10 and \$100 billion in 2003. The

worst average annual ROA recoded within this period, -1.86 percent, occurred in 2009 for banks with assets between \$100 and \$250 billion. Banks larger than \$250 billion exhibit the least volatility in their average annual ROAs, but they also have the lowest median average annual ROA over the entire period (92 basis points).

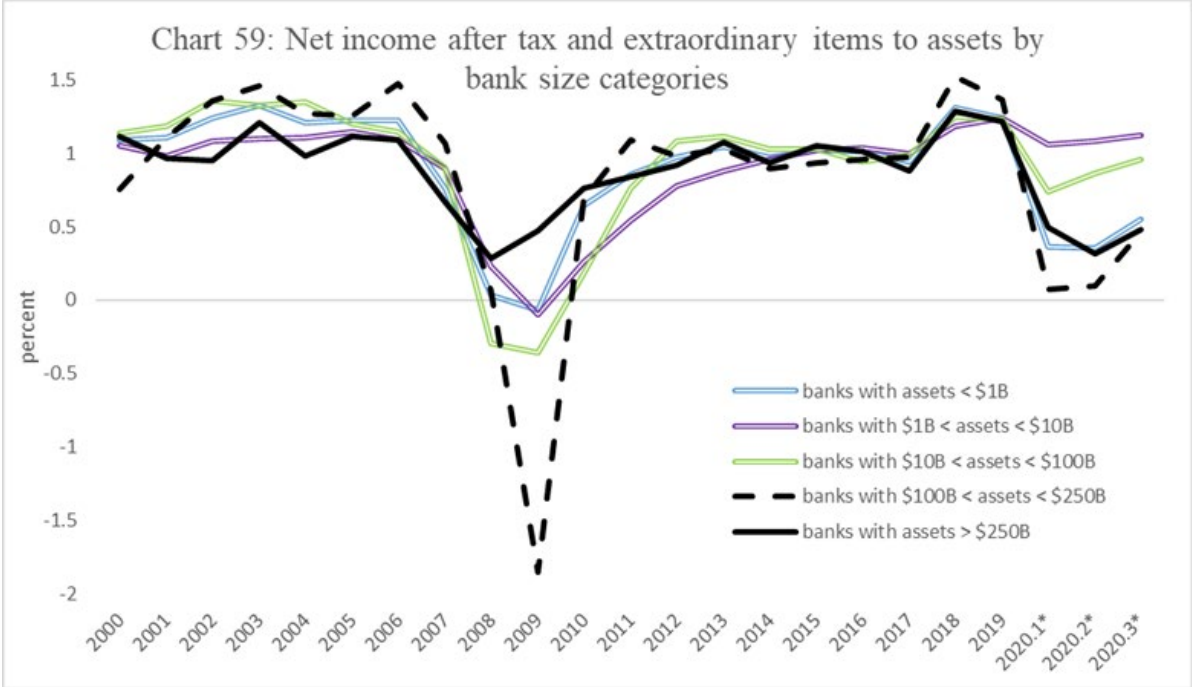
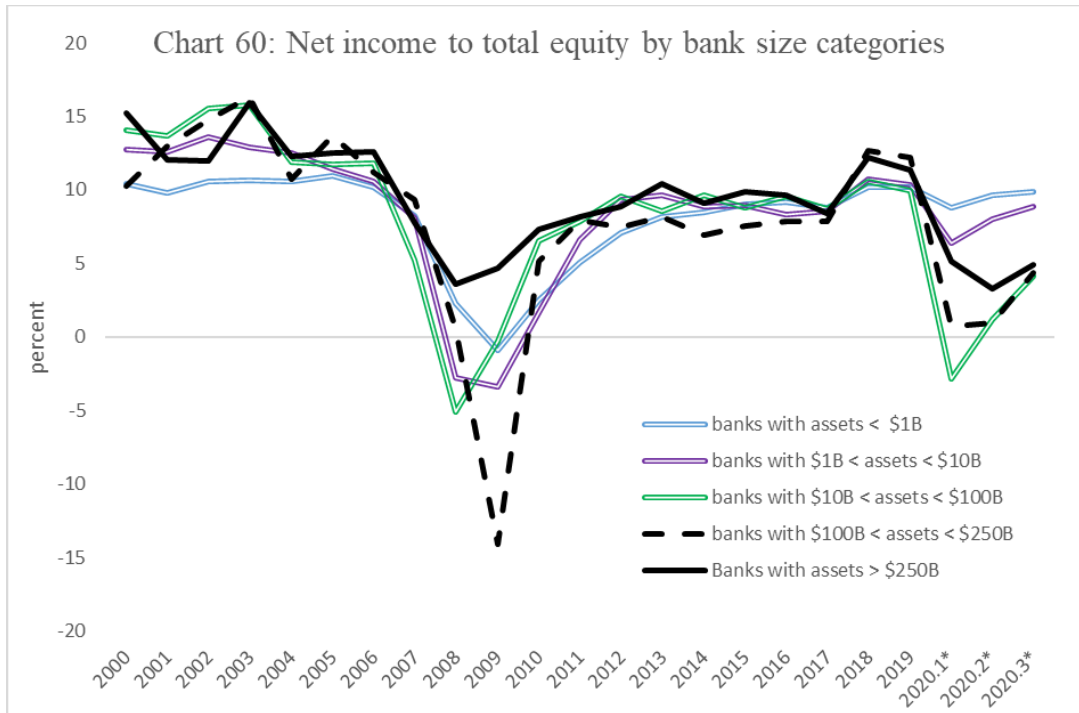


Chart 60 plots the ratio of net income after tax and extraordinary items to bank total equity (ROE) by bank size categories. This ratio measures banks’ annual return on the total balance sheet value of their equity. Under non-stressed economic conditions, the average ROEs of the various size categories over the period 2012-2019 appear to be reduced slightly from the average values recorded over the pre-crisis period 2000-2007. The ROEs of the largest bank category, banks with assets in excess of \$250 billion, exhibit the least volatility and have the largest median ROE (10.14 percent) of any bank size category over the 2000-2019 period.



## VII. Conclusions

The banking system has experienced some important changes over the last 20 years. Not only have the number of independent banks in operation been cut nearly in half, but the concentration of banking system assets in the largest banks, banks with assets in excess of \$250 billion, increased from 18 percent in 2000, to nearly 56 percent in 2020. The shift in banking system assets to large systemically important banks coincided with significant changes in the way the largest banks operated, especially in the assets these banks have decided to hold and the instruments they use to fund operations.

In response to post-crisis regulatory reforms and new Federal Reserve monetary policies, the largest banks increased their use of deposit funding. All large bank deposits are either explicitly insured by the federal government or implicitly insured as a consequence of FDIC resolution practices. Regulatory officials often measure the success of post-crisis enhanced

prudential standards by the impact these standards have had on the capital positions of the largest banks. Focusing on regulatory capital ignores the fact that these banks also increased their use insured deposit funding far more than they increased their equity. The share of assets funded by equity at the largest banks grew, on average, from 7.9 percent in 2008 to 9.7 percent in 2020, an increase of 1.8 percentage points. At these same institutions, the share of assets funded by bank deposits grew from 63.1 percent in 2008, to 80 percent in 2020, an increase of 16.9 percentage points. In 2008, the largest banks had 12.5 cents of equity for every dollar of deposits; in 2020, with post-crisis enhanced prudential standards, that ratio dropped to 12.1.

The decrease in the amount of equity per dollar of bank deposits need not indicate a higher risk of bank failure. The largest banks are owned by large bank holding companies which themselves have been subjected to heightened prudential standards and must by law serve as a source of strength to the depository institution they own should the need arise. In addition to raising the share of assets funded with equity, the largest banks satisfied their new more stringent risk-weighted capital standards by replacing high risk-weight assets with low risk-weight assets. The effect of these changes on the composition of the largest bank's asset holding is remarkable. The largest banks went from investing 57.5 percent of their assets in private sector loans and leases in the year 2000, to investing only 40 percent of their assets in loans and leases by the year 2020. Instead of investing in loans, the largest banks invested in interest bearing Federal Reserve Deposits, US Treasury Securities, and other securities backed by a federal government guarantee. In the year 2007, the largest banks held 6.9 percent of their assets in Federal Reserve deposits and federally-guaranteed securities. In 2020, these investments accounted for 30.2 percent of these banks balance sheets.

Whether on balance the changes in the investment and funding mix of the large systemically important depository institutions have made these institutions less susceptible to failure is an open issue. It is also unclear whether these changes are on balance beneficial for the economy at large. While the largest institutions appear to have responded to post-crisis heightened prudential standards by adopting a less risky mix of assets, this comes at the cost of reducing the share of their resources dedicated to providing credit to private sector businesses and consumers which ultimately restrains economic growth. And while these institutions have increased their equity, they have also dramatically increased their use of insured and implicitly insured deposit funding and used the proceeds to replace at-risk bank creditors who historically are the most active monitors of the issuing institution's financial condition.

In 2021, the US banking system is dominated by 13 large systemically important depository institutions whose operations are more dependent than ever on the federal government. Eighty percent of the largest banks' funding is implicitly guaranteed by the federal government. Thirty percent of these banks' assets are invested in assets that carry a federal government guarantee. And now, virtually all large bank monitoring is left to federal bank supervisory agencies as the private sector creditors who historically were the most active bank monitors are now no longer an important share of largest banks' funding mix. These findings do not imply that the largest banks are doing anything untoward. Large banks are merely responding to the incentives that have been created by Congress, Federal Reserve monetary policy and the heightened prudential standards adopted by federal banking regulators.