

How Has the Size Distribution of Banks Evolved Over the Last 30 Years?

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The FDIC issued a request for information (RFI) on March 25, 2022, seeking feedback about the effectiveness of existing policies governing the merger of insured depository institutions. The background section of the RFI presents an empirical analysis of the dynamics of the size distribution of banks over more than 30 years. The analysis purports to demonstrate a significant shift in the size distribution toward larger banks and suggests that bank mergers have been the dominant force driving this change.

In this note, we show that the FDIC analysis contains an important methodological flaw that results in a material overstatement of the increase in the number of large banks over the past 30 years. In addition, it demonstrates that the collapse of entry into banking has been an important driver of the decline in the number of smaller banks, a development the RFI does not mention.

The RFI analysis relies on fixed bank size thresholds based on current dollars to compare bank size groups across time. This assumption exaggerates the increase in the number of large banks because aggregate assets in the commercial banking sector rose fivefold during the 1990–2020 period. (Consolidation in the banking sector cannot be a driver of the increase in aggregate assets, because a merger does not cause assets in the banking sector to go up.) We show that controlling for economic growth and inflation, **the number of large banks has been stable since the mid-2000s**. In addition, **the share of assets and deposits of large regional banks has also been about the same over the past 15 years**.

Although the RFI assumes that a decrease in the number of small banks is attributable to mergers, our analysis in this note shows that **the collapse of entry into commercial banking explains approximately 60 percent of the decline in the number of banks post-2010**. Because most new banks start small, the lack of entry into commercial banking is a key driver of the decline in the number of smaller banks. Increased regulatory costs are one common explanation for the collapse of entry into commercial banking in the aftermath of the 2008 financial crisis.¹ Moreover, our simulations show that the number of smaller banks would stabilize if entry into commercial banking returned to the level that prevailed before the financial crisis.

Finally, our analysis also shows that **the role of bank mergers in explaining the decline in the number of small banks has diminished over time**. Indeed, we find that the number of bank exits due to a bank merger *fell* significantly starting around 2005 and thereafter largely stabilized, perhaps reflecting a more efficient and less fragmented banking sector relative to the earlier period.

¹ See [McCord and Prescott \(2014\)](#).

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NUMBER OF LARGE BANKS ESSENTIALLY UNCHANGED SINCE 2005

The empirical analysis in the FDIC's RFI calculates the size distribution of commercial banks (the note's data also include thrifts and savings and loans banks) and corresponding change in the number of large banking organizations in 1990, 2005 and 2020. The results show that there was one bank with assets greater than \$100 billion in 1990, 11 such banks in 2005 and 33 in 2020. The analysis asserts that consolidation in the banking industry was the main driver behind an increase in the number of large and systemically important banking organizations.

The main shortcoming of the empirical analysis in the RFI is that bank size is significantly influenced by factors unrelated to consolidation and systemic risk, such as general economic growth and inflation. Adjusting for economic growth and inflation shows a much less dramatic increase in bank size over time. For instance, we can show that the number of large banks has not materially increased since 2005. Earlier, regulatory changes were clearly a factor in the growth of large banks. Before the Riegle-Neal Act of 1994, banks were subject to substantial restrictions on interstate and, in some cases, intrastate branching. For example, out-of-state bank holding companies could not acquire in-state banks.² The lifting of those geographic restrictions in 1994, led to an increase in the number of large banks. According to several academic papers, including the work by [Jayaratne & Strahan \(1997\)](#), the increase in bank size led to significant efficiency gains through lower loan losses and operating costs and geographic limits acted as a "ceiling on the size of well-managed banks."

To facilitate the comparison of bank size over time, we adjust the size of banks in 1990 and 2005 relative to 2020 dollars. We follow [McCord and Prescott \(2014\)](#) and use the change in aggregate commercial banking sector assets between those years and 2020.³ Aggregate commercial bank assets in 1990 were approximately 20 percent of aggregate bank assets in 2020, so each bank's total assets in 1990 is five times larger relative to 2020 dollars. For example, a bank with \$20 billion in assets in 1990 would have \$100 billion in assets expressed in 2020 dollars. Similarly, applying the same approach, we find bank assets in 2005 are roughly 50 percent of bank assets in 2020, so we double the size of bank total assets in 2005 to make it comparable to total bank assets in 2020.

After adjusting bank size in this way for economic growth and inflation, we find that the number of banks above \$100 billion in assets rose between 1990 and 2005 but remained relatively unchanged after that. More precisely, Table 1 shows that there were 21 banks with assets above \$100 billion in 1990, 32 such banks in 2005 and 33 in 2020. The increase in the number of large banks between 1990 and 2005 most likely resulted from the passage of the Riegle-Neal Act of 1994, which eliminated legal and regulatory restrictions on bank size, allowed bank holding companies to acquire banks in different states and permitted interstate bank mergers. Those restrictions existed for most of the history of U.S. banking and led to a highly fragmented and less efficient industry.⁴

² For example, [Calomiris \(2009\)](#) showed that those restrictions destabilized the banking sector and subsidized small, poorly diversified banks that were more vulnerable to runs.

³ The analysis is done at the bank level, so it excludes the growing number of nonbank subsidiaries of bank holding companies. Also, as noted by McCord and Prescott (2014), adjusting bank size using the CPI would not be ideal, because the analysis is focused on measuring changes in the size of banks over time, not how much banks are charging for their services. An adjustment to bank size using the CPI adjustment would also not account for the increase in aggregate bank assets due to economic growth.

⁴ See [Jayaratne and Strahan \(1997\)](#).

Table 1. Number of Insured Depository Institutions by Asset Size

Asset Size (2020 dollars)	Year		
	1990	2005	2020
<\$10B	14819	8724	4899
\$10B–\$50B	300	132	102
\$50B–\$100B	28	28	16
>\$100B	21	32	33
Large Regional Banks	17	23	24
GSIBs	4	9	9

Source: S&P Global Market Intelligence.

After 2005, the number of large banks remained essentially unchanged, suggesting that factors other than merger activity have been at play during this next period. Above all, the 2007–2010 recession paused merger activity other than acquisitions of troubled banks, and important regulatory reforms (e.g., Basel III, stress tests, GSIB surcharge, liquidity regulation, resolution planning) implemented during that time act as an effective tax on bank size. Relatedly, the stability in the aggregate number of large banks after 2005 is also observed in banks owned by GSIBs and large regional banks. Namely, of the 33 banks with more than \$100 billion in total assets in 2020, nine were owned by the eight U.S. GSIBs, while the remaining 24 were owned by large regional banks (some of which were subsidiaries of a foreign GSIB). In 2005, the eight U.S. GSIBs owned nine banks with assets greater than \$100 billion in assets, while the remaining 23 were owned by large regional banks.⁵

Most of the empirical analysis in the FDIC’s RFI is focused on changes in the number of banks, but there is also a brief discussion on the percentage of assets and deposits held by banks across different size categories. The use of nominal asset thresholds to define large banks also exaggerates the increase in the percentage of assets and deposits held by those banks over the 30-year period. Focusing on the percentage of assets and deposits across banks also shows the importance of separating large regional banks from GSIBs to understand those trends.

⁵ The analysis assumes that Wachovia Corporation and Washington Mutual would not be considered GSIBs had the framework been in place in 2005.

Table 2. Percentage of Industry Assets and Deposits Held by Insured Depository Institutions

Asset Size (2020 Dollars)	Assets			Deposits		
	1990	2005	2020	1990	2005	2020
<\$10B	39.2	21.3	16.4	46.6	28.6	16.4
\$10B–\$50B	29.9	12.8	11.4	29.6	14.1	11.4
\$50B–\$100B	9.0	8.8	5.9	8.9	8.0	5.9
> \$100B	21.8	57.1	69.4	14.8	49.3	66.2
Large Regional Banks	15.4	23.7	23.9	10.9	24.9	25.6
GSIBs	6.4	33.4	45.5	3.9	24.4	40.7

Source: S&P Global Market Intelligence.

Although Table 2 shows an increase in the share of assets and deposits held by banks above \$100 billion in assets, the rise is less pronounced using size thresholds adjusted for economic growth. Moreover, the percentage of assets and deposits held by large regional banks remained roughly unchanged between 2005 and 2020. The increase in percentage of assets and deposits of banks above \$100 billion in assets is driven by banks owned by the eight U.S. GSIBs. The changes in composition of the GSIB sample are more complex, because GS and MS became bank holding companies in 2009 and therefore did not exist in our sample in 2005. Moreover, several GSIBs acquired large banks during the financial crisis but their percentage of assets declined slightly after the 2008 financial crisis. (Shown [here](#) on page 37).

To illustrate the lack of changes in the size distribution of large regional banks since 2005, Table 3 lists the 10 largest regional banks in 2005 and 2020. Several of the banks are the same in both lists, such as U.S. Bank, PNC, and HSBC, while SunTrust merged with BB&T in 2018 to form Truist. The top two banks in 2005, Wachovia and Washington Mutual, were bought by Wells Fargo and JPMorgan, respectively, in 2008. As we point out in the next section, it is highly unlikely that the largest regional banks will be acquired by GSIBs in a future financial crisis. Large regional banks are significantly more resilient in times of economic stress, because capital and liquidity levels are multiples of the levels held in 2005 and because interstate branching and mergers have allowed them to diversify geographically.

Table 3. Ten Largest Regional Banks, 2005 and 2020

Bank Name	2005 (\$B)	Bank Name	2020 (\$B)
Wachovia Bank, National Association	949	U.S. Bank National Association	545
Washington Mutual Bank	665	Truist Bank	499
U.S. Bank National Association	420	PNC Bank, National Association	463
SunTrust Bank	356	TD Bank, N.A.	402
HSBC Bank USA, National Association	303	Capital One, National Association	364
Wachovia Mortgage, FSB	250	Charles Schwab Bank, SSB	342
KeyBank National Association	179	Fifth Third Bank, National Association	203
PNC Bank, National Association	167	HSBC Bank USA, National Association	198
Regions Bank	163	Citizens Bank, National Association	183
BB&T	161	Ally Bank	172

Note: The size of the 10 largest regional banks is measured by total assets, expressed in 2020 dollars (see text for details).

Source: S&P Global Market Intelligence.

RESILIENCY OF ALL BANKS INCREASED SIGNIFICANTLY SINCE 2005

As noted in the previous paragraph, failures of large regional banks may have contributed to an increase in consolidation among banks owned by the U.S. GSIBs. In the aftermath of the 2008 financial crisis, the U.S. regulatory agencies introduced more stringent capital and liquidity standards on large banks which has reduced the probability of failure of large regional banks by a significant amount. For example, Basel III increased regulatory capital minimums and buffers, including a capital surcharge for systemically important banks. The Federal Reserve also started conducting annual stress tests for bank holding companies with more than \$100 billion in assets. As shown in Table 4, the common equity tier 1 ratio of large regional banks rose nearly 4½ percentage points between 2005 and 2020. The common equity tier 1 capital ratio of banks owned by GSIBs increased 6 percentage points because the bank holding company that owns the bank is subject to an additional capital surcharge.

Table 4. Common Equity Tier 1 Capital Ratio of Insured Depository Institutions by Asset Size

Asset Size (2020 Dollars)	Year (Percentage)	
	2005	2020
<\$10B	13.3	15.0
\$10B–\$50B	10.9	13.7
\$50B–\$100B	10.7	13.4
> \$100B	8.3	13.7
Large Regional Banks	8.3	12.7
GSIBs	8.3	14.4

Source: S&P Global Market Intelligence.

Table 5. Ratio of Liquid Assets to Total Assets of Insured Depository Institutions by Asset Size

Asset Size (2020 Dollars)	Year (Percentage)	
	2005	2020
<\$10B	14.1	10.3
\$10B–\$50B	12.8	17.0
\$50B–\$100B	8.7	20.9
> \$100B	9.3	28.4
Large Regional Banks	10.0	23.3
GSIBs	8.9	31.0

Source: S&P Global Market Intelligence.

Similarly, the Basel III reforms also introduced several liquidity requirements (the liquidity coverage ratio and the net stable funding ratio) for large banks. Those require banks to hold a larger percentage of their balance sheet in assets easily liquidated in a stress period, such as deposits at Federal Reserve Banks, U.S. Treasury securities, and Agency MBS (subject to a haircut). The introduction of liquidity requirements should also make default of large

banks less likely and avoid the need of fire sales. As shown in Table 5, the ratio of high-quality liquid assets to assets for large regional banks and GSIBs was 10 percent and 8.9 percent, respectively, in 2005, and 23.3 percent and 31 percent, respectively, in 2020.⁶

COLLAPSE OF ENTRY INTO COMMERCIAL BANKING AND DECLINE IN NUMBER OF BANKS

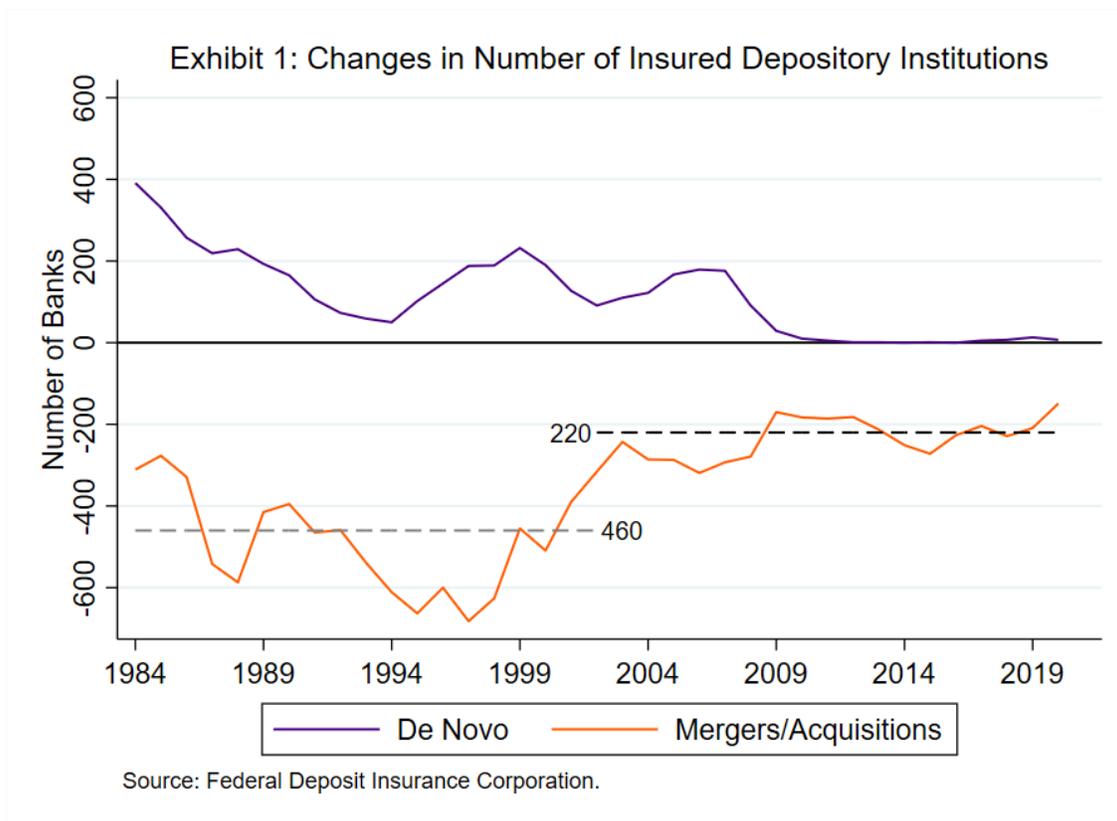
The empirical analysis in the FDIC's RFI overstates the impact of mergers on the decline in the number of small banks, a total that has declined significantly over time starting around 1978 and shows no sign of abating.⁷ As we discuss in more detail, the main driver of the decline in the number of small banks over the past decade is explained by the lack of entry into commercial banking, a phenomenon first noted by [McCord and Prescott \(2014\)](#) and [Adams and Gramlich \(2014\)](#).

The analysis in the FDIC RFI defines bank entry as including both new charters (or de novo banks) and the conversion of an existing institution to a commercial bank that has applied and received FDIC insurance.⁸ Bank exits include bank failures (both assisted mergers and those paid off by the FDIC), unassisted mergers and acquisitions and withdrawals from FDIC insurance for other reasons (e.g., voluntary liquidations, conversion to nonbanks). Exhibit 1 plots the time series of the main drivers of changes in the number of banks: entry of de novo institutions (purple line) and unassisted mergers (orange line) between 1984 and 2020. De novo banks are non-negative, because their entry results in more banks. Mergers and acquisitions are represented by negative values for the opposite reason.

⁶ Interestingly, the share of liquid assets at banks with less than \$10 billion in assets fell between 2005 and 2020. This could be a symptom of the community bank leverage ratio, which disincentivizes banks to hold safer assets.

⁷ See <https://banks.data.fdic.gov/explore/historical>.

⁸ The FDIC's definition for de novo banks include newly licensed institutions or those chartered by the Office of the Comptroller of the Currency or by state banking authorities (in which case the primary federal regulator is the Federal Reserve Board for "member" banks or the FDIC for "nonmember" banks). These include banking authorities in the U.S. territories or possessions. In addition, it also includes charters issued to take over a failing institution.



The most notable observation in Exhibit 1 is the collapse in the number of de novo banks after the 2008 financial crisis. Between 1984 and 2007, new entrants averaged close to 200 banks per year, a number that declined during the financial crisis. After 2011, the number of newly licensed banks collapses to five banks each year on average. Moreover, the number of exits due to a bank merger fell significantly in the mid-2000s. Before 2002, on average, about 460 banks exited because of mergers each year. After 2002, the number of deletions due to mergers dropped to about 220 banks per year.

Next, we quantify the importance of the collapse of entry into commercial banking in explaining the decline in the number of banks between 2012 and 2020. We ran a simple counterfactual analysis by computing the evolution in the number of banks, assuming entry in the post-crisis period reverted to the levels seen before the financial crisis. The difference between the number of banks obtained using the counterfactual and the actual number of banks allows us to infer the importance of bank entry in explaining the decline in the number of banks.

To conduct the counterfactual analysis, we need the distribution of banks by size categories at the end of 2011, the probability of moving across size buckets (i.e., a transition matrix), the number of new entrants and their corresponding size categories. Following McCord and Prescott, we split the number of banks at the end of 2011 into seven size categories. The transition matrix tallies how many banks in a given size category each year stayed in the same size category in the succeeding year, how many increased or decreased in size and finally how many exited the sample. We calculate the transition probabilities for each year between 2012 and 2020, and the analysis uses the average transition probabilities across that time.

Table 6. Annual Transition Probabilities Between Size Categories (Average Percentage, 2012–2020)

Size Class	Exit	<\$100m	\$100m–\$500m	\$500m–\$1B	\$1B–\$5B	\$5B–\$10B	\$10B–\$50B	> \$50B
< \$100m	5.5	91.0	3.5	0.0	0.0	0.0	0.0	0.0
\$100m–\$500m	4.1	1.8	92.0	2.1	0.0	0.0	0.0	0.0
\$500m–\$1B	4.0	0.0	4.4	86.4	5.2	0.0	0.0	0.0
\$1B–\$5B	4.2	0.0	0.0	2.4	91.4	2.0	0.0	0.0
\$5B–\$10B	4.0	0.0	0.1	0.0	3.1	84.7	8.1	0.0
\$10B–\$50B	3.1	0.0	0.0	0.1	0.2	3.0	91.6	2.0
> \$50B	1.6	0.0	0.0	0.0	0.0	0.0	2.1	96.3

Table 6 reports the average transition probabilities across bank size categories between 2012 and 2020. Each row represents the asset size in the current year, and each column the asset size in the following year. For example, for banks with less than \$100 million in assets in the current year, 5.5 percent left the sample in that year, 91 percent stayed in the same asset category, and 3.5 percent moved to the next highest size category. By construction, the probabilities in each row sum to 1.

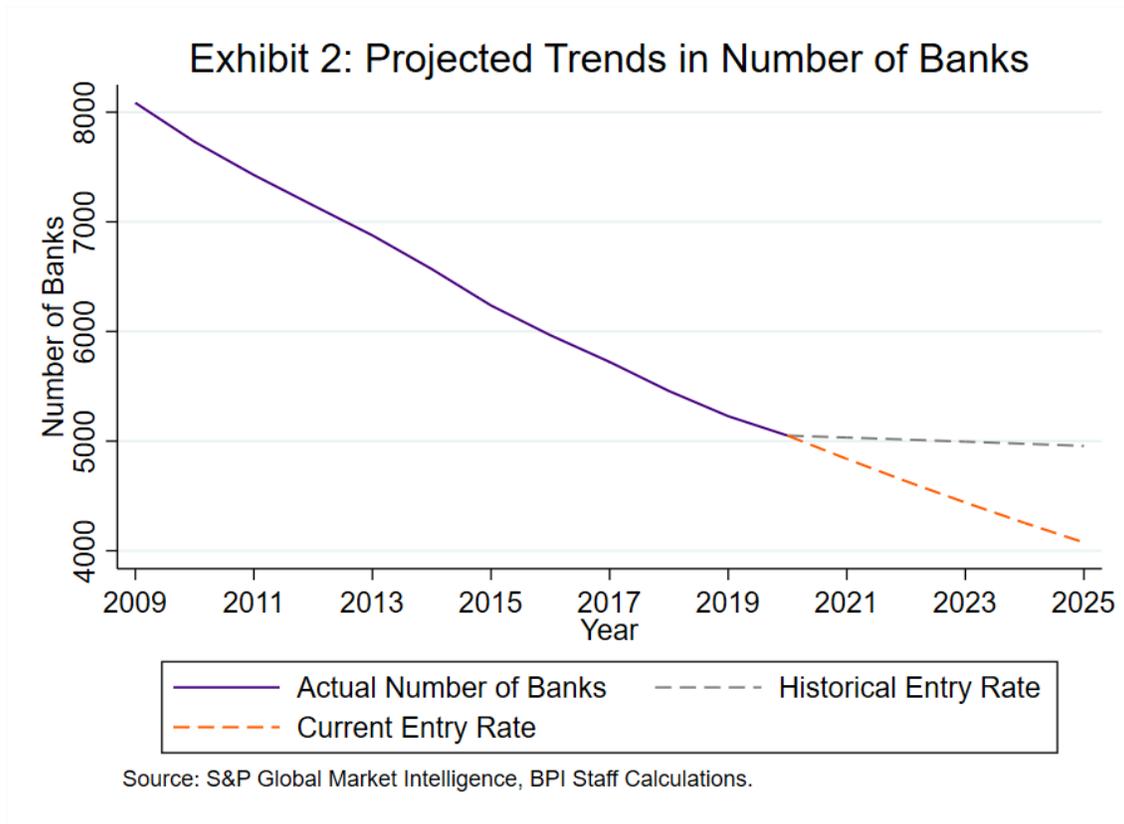
In terms of new bank formation, the counterfactual analysis assumes 200 new banks were chartered each year on average. This number corresponds to the average number of de novo banks between 1984 and 2007 in the FDIC data, excluding the years when the U.S. economy was in a recession. Finally, we use data from the entire sample to estimate the size distribution of new entrants. Newly chartered banks are small in terms of assets. Based on our sample, 73 percent of new banks had assets of less than \$100 million at the time of their founding, and the remaining 27 percent were in the \$100 million–\$500 million range.

Table 7. Results of Counterfactual Analysis on Number of Banks

Size Class	Actual 2020	Counterfactual 2020	Difference	% Difference
< \$100m	894	1856	962	107.6%
\$100m–\$500m	2391	2830	439	18.3%
\$500m–\$1B	771	767	–4	–0.5%
\$1B–\$5B	725	728	3	0.4%
\$5B–\$10B	107	120	13	12.1%
\$10B–\$50B	110	116	6	5.5%
> \$50B	52	50	–2	–3.6%
Total	5050	6467	1417	28.1%

Table 7 compares the actual number of banks in each size category against the number of banks based on our counterfactual exercise at the end of 2020. With an entry of 200 banks each year between 2012 and 2020, we estimate that there would be 6,467 banks in existence instead of 5,050 banks at the end of 2020. Because we had 7,427 banks at the end of 2011, the number of banks would have dropped by 960 (i.e., 7,427 – 6,467) instead of the actual 2,377. In percentage terms, the collapse of entry into commercial banking accounts for 60 percent (i.e., $(2,377 - 960)/2,377$) of the decline in the number of banks between 2012 and 2020.

If the lack of entry into commercial banking persists, it will continue to drive a decline in the number of small banks, assuming the transition probabilities stay consistent with those reported in Table 6. Exhibit 2 extends the analysis reported in Table 7 for another 5 years. The projection done using the current entry rate assumes 5 newly chartered banks each year, which corresponds to the average formation of new banks between 2012 and 2020. The historical entry rate sets the number of new entrants equal to 200. Based on the current entry rate, we project the number of banks will reach 4,075 by the end of 2025, representing a further decline of another 1,000 banks. By contrast, using the historical entry rate, we predict the number of banks would be essentially unchanged over the next 5 years.



SOME REASONS FOR LACK OF ENTRY INTO COMMERCIAL BANKING

Two common explanations for the collapse of entry into commercial banking are increased regulatory costs and low profitability. The former includes higher capital requirements, more stringent and burdensome regulatory compliance created by the Dodd-Frank Act, and new requirements for de novo banks seeking deposit insurance by the FDIC. Newly chartered banks incur three types of costs. First, new banks need to pay for filing fees for a new charter with the OCC or state banking authorities, though these are generally small costs. Second, new banks are subject to capital requirements that may depend on the state in which the new bank is formed and the type of charter. And third, newly chartered banks must apply for participation in the Deposit Insurance Fund (DIF) with the FDIC. To receive deposit insurance, a new bank needs to submit information on their business plan, and the FDIC requires banks to follow this plan for a certain period.

According to McCord and Prescott, the intensity of the supervision of de novo banks increased in the aftermath of the 2008 financial crisis. For instance, the FDIC expanded the period during which FDIC-supervised de novo entities are subject to higher capital requirements and more frequent examinations from three to seven years. In addition, the FDIC requires those banks to ask for approval regarding changes in their business plans during the seven-year period.

Another potentially important reason is the level of interest rates. The main source of revenue for newly chartered banks comes from interest income because these banks are small. For most of the post-crisis period, interest rates were near zero, since the economy was still recovering from the 2008 financial crisis. However, there are a few challenges to this explanation. First, the level of interest rates increased in late 2018, and still there was no

meaningful increase in the number of de novo banks. Second, in recent years there have been many start-ups offering consumer and small business loans, payments, and other types of services not subject to bank regulatory rules. This suggests that entry into bank-like activities remains attractive, but regulatory costs have become prohibitively expensive.

Other explanations include lack of scale economies for smaller banks. Recent studies show that economies of scale are far more extensive for larger banks (e.g., [Wheelock and Wilson 2012](#) and [Kovner, Vickery and Zhou 2014](#)). The investment in new technologies necessary to remain competitive with other banks requires large upfront investments that are now much more difficult for smaller banks to absorb. Those elevated fixed costs due to new technologies, combined with increased regulatory compliance costs, have likely resulted in a lack of entry into commercial banking.

CONCLUSIONS

Our empirical analysis shows that assertions about the effect of mergers on the size of U.S. banks are overly simplistic and miss two important facts.

First, after adjusting for economic growth and inflation, the number of large banks has not increased since the 2008 financial crisis. In addition, large regional banks hold 3 times more common equity tier 1 capital, the most loss-absorbing capital instrument, and 5 times more high-quality liquid assets relative to the levels that prevailed at the onset of the financial crisis. In practice, this implies that the likelihood that a large regional bank will fail has declined substantially. Also, the size of large regional banks, accounting for economic growth and inflation, remains relatively unchanged.

Second, the RFI omits a key driver of the decline in small banks over the past decade, namely the collapse of entry into commercial banking. To understand the decline in the number of small banks and its impact on smaller communities, it is important to understand the regulatory factors that account for the lack of bank entry.