ECONOMIC COMMENTARY

Number 2019-01
January 9, 2019

Asset Commonality in US Banks and Financial Stability†

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One potential threat to a stable financial system is the phenomenon of contagion, where a risk that is ordinarily small becomes a problem because of the way it spreads to other institutions. Researchers have investigated multiple channels through which contagion might occur. We look at two—banks borrowing from each other and banks holding similar types of assets—and argue that the latter is a potential source of systemic risk. We review recent data on asset concentrations and capitalization levels of the largest US banks and conclude that the overall risk from this particular contagion channel is at present likely limited.

To better prepare for the next financial crisis or prevent it outright, policymakers and regulators have invested significant resources in improving the analysis and measurement of risk in the banking system. A key target of their efforts has been to identify the possible contagion mechanisms that can explain how difficulties experienced in one part of the financial system could spread to others.

Understanding these mechanisms can be essential to an effective policy response: From a policy perspective it matters whether a risk arises from a large, broad-based shock affecting most or all institutions or instead from a more limited source that, by itself, would be too small to impact the system but when it spreads to other institutions poses a problem. In the second case, a policy targeted at shutting down the contagion mechanism may contain the spread and manage the risk to the system and the wider economy. Such a response is unlikely to be effective when the shocks are more broad-based.

Researchers have investigated multiple channels through which contagion could occur. One plausible mechanism works through the interconnections that arise among financial institutions when they borrow from each other. Another plausible mechanism works through the interconnections that arise among financial institutions when they hold similar types of assets.

This *Commentary* argues that asset-based contagion is a potential source of systemic risk. It then reviews some recent data on asset concentrations and capitalization levels of the largest US banks to gauge the current level of risk. At present, the overall risk from this particular contagion channel is likely limited.

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†On January 9, 2019, shortly after posting this *Economic Commentary*, the authors discovered an error in the code that generated some of their data. The *Commentary* was temporarily removed from our website while the authors reviewed and corrected the data. The revised *Commentary* was posted on January 16, 2019.

ISSN 0428-1276

Balance Sheet Contagion

One much discussed channel through which contagion might arise among financial institutions is through the direct exposures financial institutions have to each other on their balance sheets, that is, through their lending to each other. If a borrower institution runs into trouble, the lender is at risk of taking a loss as well. Arguably, the risk of this type of contagion was behind concerns over the possible failure of AIG in 2008 because the firm had written protection on subprime mortgages that were held by many other large financial institutions. Had AIG failed, financial institutions that it owed money to might have suffered losses, and those losses might have triggered further failures.

Researchers have studied the interbank contagion mechanism both theoretically and empirically using network tools that describe the direct exposures of banks to each other. A common result in these studies is that the degree of connectedness matters and that the networks most at risk of widespread contagion are those in which banks are connected to an intermediate degree.[1]

Empirical studies of the interbank contagion channel have struggled with limited data availability on the direct lending connections between banks. Even regulators often have not been able to observe bilateral exposures among banks at the required granularity. Many countries have started to collect suitable data for this purpose; however, such efforts are relatively recent. Despite the limited data, researchers have estimated networks of exposures in various financial systems and studied their vulnerability to balance sheet contagion, for example, in Austria and Germany.[2]

A common finding in the empirical studies is that real-world financial systems tend to be fairly robust to shocks through the interbank lending network. In addition, results from theoretical research also suggest that the shocks and bankruptcy costs that are required for the interbank lending channel to lead to systemwide contagion have to be very large.[3]

Contagion through Common Asset Holdings

The finding that financial systems are robust to contagion through interbank lending appears to contradict the systemwide effects observed during 2007 and 2008, such as the widespread market disruptions following the bankruptcy of Lehman Brothers.[4] This contradiction suggests that different mechanisms may be important in explaining contagion among banks. One candidate is the transmission of shocks between banks by way of common asset holdings.

The contagion mechanism through asset holdings would work in several steps. In the first instance, a financial institution takes a loss, for example, from the unexpected default of a loan or a failed bet on a certain asset type. This initial loss then leaves the affected institution with too many assets on its balance sheet, for example, relative to regulatory capital or liquidity requirements or leverage targets. To alleviate this pressure, the institution sells some of its assets to restore its target balance sheet. Depending on the type and volume of securities sold, the adjustment lowers the price of assets.[5] The repricing will be larger for relatively illiquid assets, while for more liquid securities such as US Treasury securities, there may be almost no price impact at all.[6]

A sufficiently large repricing then generates losses for all institutions that hold these assets on their books. Depending on accounting rules, regulations, and market pressures, institutions might have to recognize such losses on their balance sheets, and these losses could potentially trigger further sales, for example, if the repriced assets leave the institutions undercapitalized.[7] In this way, the initial shock could spread from a single institution that experiences difficulties to the financial system as a whole.

Depending on the size of the shock, the size of the sales response, and the assets involved, the mechanism might stop after one round of sales and price adjustments without further consequences for the viability of the financial system. It might, however, also lead to multiple rounds of sales and significant price adjustments that could even result in the failure of banks and other financial institutions. As such, the asset commonality mechanism holds the potential to substantially impact large parts of the financial system with consequences for the real economy, thereby presenting a potential source of significant systemic risk.

Several factors influence whether a shock to one institution becomes a systemic threat through the asset channel.

- First is the proximity of banks to any constraints, such as regulatory leverage limits, that could trigger sales. For example, when facing an adverse shock, a highly leveraged institution might be more worried about exceeding its leverage limit and thus more inclined to sell assets than a less leveraged one.
- Second is the price effect on the assets sold. Prices of more illiquid assets tend to move more in response to sales than those of liquid assets. With greater price movements, losses to asset holders and thus contagion from one institution to another are more likely.
- Third is overlap in asset holdings. If institutions hold unrelated assets, then asset sales even with significant price effects will not impact another institution. If institutions hold largely similar portfolios, then a drop in prices for one asset class could affect many institutions.
- Fourth is the solvency of financial institutions in the system. If institutions are sufficiently far from default, they might be able to absorb significant losses from their asset holdings. If, however, an institution is close to default, then even relatively small losses on its portfolio could push it over the line.

Compared to the number of studies that exist on the interbank lending channel, few empirical analyses of the asset commonality channel are available thus far. The

papers that are available seek to study the implications for the systemic risk of various factors that may facilitate contagion, including bank leverage, asset overlaps, liquidity, and solvency.

One of the first papers in this vein is Greenwood et al. (2015). They define a measure called "aggregate vulnerability" that describes the extent to which the financial system might be impacted by a shock that spreads from bank to bank through the asset commonality channel. A different measure called "systemicness" captures the extent to which a single institution contributes to the overall fragility of the financial system. "Indirect vulnerability" measures the vulnerability of an institution to a shock originating outside the firm. Greenwood et al. estimate their model on European bank data around the European sovereign debt crisis and find their measure of bank vulnerability correlates with the decline of bank equity during the crisis.

Duarte and Eisenbach (2015) extend the Greenwood et al. model and apply it to US data, estimating aggregate vulnerability from panel data for broker dealers between 2008 and 2014 and bank holding companies between 1996 and 2014. Their analysis also offers a decomposition of the aggregate vulnerability measure that stresses the role that illiquid assets play in contagion. They find that aggregate vulnerability among bank holding companies started increasing during the early 2000s as the banks accumulated large holdings of residential real estate assets, which not only increased the total amount of assets held in the banking system but also the similarity of bank portfolios.

Recently, Cont and Schaaning (2017) developed a more full-fledged model of the asset commonality contagion channel, capturing a number of additional features not included before and estimating it on European bank data. They show how the asset commonality mechanism can lead to substantial losses across the financial sector from initial shocks that are "large but not extreme."

Asset Holdings among the Largest US Bank Holding Companies

This section presents data for the US financial system on two of the factors that can affect the degree of the risk posed through the asset contagion channel: The first is the overlap of asset holdings among banks, that is, the extent to which different financial institutions hold similar groups of assets, and the second is the proximity to constraints such as regulatory minimum capital ratios.

Degree of Asset Overlap

Table 1 shows asset holdings for the largest US bank holding companies (BHCs) with total assets exceeding $250 billion for a set of 6 high-level asset classes.[8] We focus on the very largest set of banks as they hold the majority of assets in the banking system, which would make them the most likely source of contagion. The data are derived from publicly available regulatory filings (FR Y-9C).[9]

The asset classes that constitute the largest share of total assets are US Treasury and agency securities, agency mortgage-backed securities (MBS), and asset-backed securities (ABS) and other miscellaneous securities. These three asset classes account on average for around 5 percent to 10 percent of the total assets of the banks in the sample; however, there are notable differences in the proportions of asset holdings among the banks. For example, the foreign-

Table 1. Asset Holdings of the Largest US Bank Holding Companies (as a percent of their total assets)

Bank	US Treasury and agency securities	Municipal bonds	Agency MBS	Nonagency residential MBS	Nonagency commercial MBS	ABS and other
JPMorgan Chase	2.6	2.1	5.2	0.5	0.5	6.5
Bank of America	4.1	1.1	15.6	0.3	0.1	3.5
Wells Fargo	4.1	3.2	12.7	0.4	0.3	3.3
Citigroup	7.3	1.0	5.0	0.3	0.1	12.3
Goldman Sachs	5.0	0.1	3.2	0.2	0.1	6.7
Morgan Stanley	7.7	0.3	6.6	0.1	0.4	5.9
US Bancorp	5.7	1.3	17.1	0.0	0.0	0.3
PNC	4.0	1.2	11.6	0.9	1.1	2.5
Bank of New York Mellon	8.1	1.0	16.9	0.7	0.2	7.1
Capital One	1.5	0.0	16.3	0.7	0.5	0.5
TD Bank Group	10.3	0.0	7.0	1.7	2.5	12.5
HSBC	12.3	0.0	7.8	0.0	0.0	2.3

Less than 1 percent | 1 percent to less than 5 percent | 5 percent to less than 10 percent | 10 percent or greater

Note: BHCs are ranked by total assets from top to bottom.
Source: Authors' calculations based on bank regulatory filings for June 30, 2017, reported in FR Y-9C.

based BHCs, HSBC and TD Group, hold the largest share of assets in Treasury and agency securities among the banks in our sample but a lower share in agency MBS than some of the other banks in the sample. In addition, there are significant differences in the ABS and other asset class, with Citigroup and TD Group holding just over 12 percent of their total assets in that class, while the shares are around 7 percent or below for all other banks.

For agency MBS and Treasury and agency debt, the total holdings of the banks in our sample as a share of total assets outstanding in each class are around 15 percent and 4 percent, respectively.[10] These relatively small shares suggest that the price impact of sales in these asset categories by the banks in the sample may be limited. In contrast, ABS and other securities held by the banks in the sample account for over 50 percent of total ABS outstanding.[11] This suggests that significant sales in this category by banks in our sample might be expected to have a larger price impact than in other categories.

Proximity to Regulatory Constraints

Table 2 shows data on total asset holdings and capital and leverage ratios for the banks in the sample. The figures suggest that these BHCs are relatively far away from regulatory constraints; that is, their capital and leverage ratios exceed minimum requirements. Under Basel III, the minimum risk-weighted Tier 1 capital ratio is 6 percent and the minimum total leverage ratio is 4 percent.[12] All banks in the sample are well-capitalized relative to these limits. The numbers reflect the recapitalization of the US banking system that started in the aftermath of the 2007 financial crisis.

Overall, the data in this analysis suggest that the largest BHCs hold overlapping securities portfolios, in particular in agency MBS, Treasury and agency securities, and ABS and other. While agency MBS and Treasury and agency securities are fairly liquid and also widely held outside the banking system, prices for ABS and other types of securities are more likely to be affected by significant sales by the banks in our sample. However, this asset class is held mostly by two banks in the sample and thus any spillovers to other large banks may be limited. This, together with the relatively high capitalization ratios among the largest banks, suggests that the potential for systemic risk via contagion from the asset commonality channel is limited at present. However, the data presented here offer only a superficial impression. Regulators can use the highly detailed reports underlying the annual stress tests of the largest banks for a more careful analysis, for example, through simulations that can help both to assess the overall health of the system and to identify potential sources of risk.[13]

Conclusion

This *Commentary* has argued that asset-based contagion has the potential to be an important contributor to systemic risk. Studying this channel promises insights into the source of fragilities and may aid in the design of suitable policy responses. Compared to other approaches to measuring systemic risk it offers an explicit mechanism of how stress is transmitted between banks. Simulation analyses such as Cont and Schaaning (2017) using European bank data suggest that the channel is capable of generating significant systemwide challenges. It thus appears to be a suitable target for macroprudential regulation aiming to limit and manage systemic risk in the financial system. High-level

Table 2. Total Assets and Capital Ratios for the Largest US Bank Holding Companies

Bank	Total assets (millions of dollars)	Risk-weighted Tier 1 ratio (percent)	Leverage ratio (percent)
JPMorgan Chase	2,563,174	14.2	8.5
Bank of America	2,256,095	14.0	8.9
Wells Fargo	1,930,871	13.7	9.3
Citigroup	1,864,063	15.4	9.9
Goldman Sachs	906,536	15.9	9.3
Morgan Stanley	841,016	19.1	8.5
US Bancorp	463,844	11.1	9.1
PNC	372,357	11.6	9.9
Bank of New York Mellon	354,815	14.3	6.7
Capital One	350,593	12.2	10.3
TD Bank Group	348,630	15.3	8.3
HSBC	307,797	20.0	8.8

Source: Bank Y9-C regulatory filings for June 30, 2017.

data on the asset holdings of the largest BHCs in the United States suggest that as of June 2017 banks' portfolios overlap significantly in some categories; however, these assets tend to be relatively liquid and lower risk, which together with high capitalization rates currently limits the contagion risk in these banks' portfolios.

Finally, we note that existing studies of asset-based contagion, including those cited in this *Commentary*, model financial institutions as fairly passive in response to a developing crisis. For example, in these models banks simply sell enough assets to meet minimum capital requirements or reach a leverage target. Among other limitations, what this approach leaves out is the potential for accelerating effects arising from banks acting strategically and with foresight. For example, banks may respond to a perceived increase in counterparty risk or to new information about some assets that is signaled by the distress of a bank elsewhere. Arguably, around the failure of Lehman Brothers in 2008 many financial institutions adjusted their behavior in response to developments that suggested greater-than-expected difficulties in subprime mortgages and a lower likelihood of a bailout by the government. These adjustments can lead to responses such as a reduction in interbank lending or liquidity hoarding that are significantly stronger than the mechanistic asset sales posited in the studies noted above. Indeed, this could generate contagion without significant asset sales taking place. There is thus potential for further research, both theoretical and empirical, that takes account of systemic risk arising from these considerations.

Footnotes

1. At the extremes of connectivity—where the banks are either totally unconnected or fully connected with every other bank—there are mechanisms in place that slow contagion or fully prevent it. When banks are fully unconnected, there is no channel to transmit contagion. When banks are fully connected, this maximizes risk-sharing between them and thereby limits contagion. See, for example, the results in Allen and Gale (2000) and Freixas et al. (2000).

2. The research has been published in Elsinger, Lehar, and Summer (2006), Upper and Worms (2004), and Craig and von Peter (2014).

3. See Glasserman and Young (2015) and Summer (2013).

4. Helwege and Zhang (2015) study counterparty contagion during the Lehman episode and find that financial firms had very limited direct exposure to Lehman at the time of failure, with the typical exposure among financial firms being 0.2 percent of total assets and no commercial bank having an exposure of more than 1.5 percent of total assets.

5. One plausible model of such price effects works through fire sales as proposed by Shleifer and Vishny (1997).

6. Note that asset prices may move for reasons other than the sales pressure of individual banks. For example, it has been argued that the large price adjustments across many asset classes following the bankruptcy of Lehman Brothers are better understood as the result of a readjustment of expectations concerning the fundamentals of these assets rather than fire sales.

7. This further sell-off could come from having to explicitly recognize losses on assets held as "available for sale." But even if price movements affected mostly assets in the "held-to-maturity" category, investor pressure could force an institution to act on the losses. Banks report securities on their balance sheets in one of these two categories. Portfolios of institutions that act as broker dealers are wholly marked to market.

8. We focus on holdings of debt securities and therefore exclude loans held on bank balance sheets, as well as equity holdings, derivatives, and some other trading assets.

9. Available at https://www.chicagofed.org/banking/financial-institution-reports/bhc-data

10. Figures for total amounts outstanding in each category are for 2017:Q2 and are provided by the Securities Industry and Financial Markets Association. See SIFMA: https://www.sifma.org/resources/research

11. Figures for total amounts outstanding in each category are for 2017:Q2 and provided by SIFMA.

12. The Federal Reserve's annual CCAR exercise applies regulatory standards derived from Basel III in its stress tests.

13. See, for example, the approach in Cont and Schaaning (2017) and Duarte and Eisenbach (2015).

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