Economic Quarterly—Volume 100, Number 2—Second Quarter 2014—Pages 113–157

Large U.S. Bank Holding Companies During the 2007–09 Financial Crisis: An Overview of the Data

Peter S. Debbaut and Huberto M. Ennis

Large banking organizations were at the center of the recent financial crisis in the United States. For example, Wachovia Corporation, the fourth largest banking institution in the country at the time, experienced significant stress and its acquisition, by Wells Fargo, was announced in the first days of October 2008. JPMorgan Chase, also a top-five institution, acquired in late September 2008 the branch network of the largest thrift in the country, Washington Mutual, after that institution was declared unsound and then seized by the Federal Deposit Insurance Corporation (FDIC). As a response to the financial market turmoil that followed the collapse of Lehman Brothers, the Emergency Economic Stabilization Act of 2008 was signed into law on October 3, 2008. The Act established the Troubled Asset Relief Program (TARP), authorizing the U.S. Treasury Department to spend as much as $700 billion to prop up financial institutions in distress. Large banking organizations were the primary recipients of the transfers distributed through TARP programs. To gain some perspective on these and other events impacting large banking institutions during the crisis, we provide an overview of the evolution of the consolidated balance sheet and income statement of large U.S. bank holding companies between the beginning of 2005 and the end of 2011.

We would like to thank Marios Karabarbounis, Hoossam Malek, Roisin McCord, Ned Prescott, and John Walter for comments on a previous draft and the participants at the Banking Research Lunch for discussions during the early stages of this project. The views expressed in this article are those of the authors and do not necessarily represent the views of the Federal Reserve Bank of Richmond or the Federal Reserve System.

Commercial banks in the United States are usually just one part of a larger legal and economic entity, a bank holding company (BHC). While pure banking activities constitute a significant portion of what BHCs do (Avraham, Selvaggi, and Vickery 2012), most of these financial companies are relatively large and complex institutions with numerous subsidiaries that undertake a wide variety of financial and banking activities. When trying to understand the way banking is being conducted and its evolution over time, focusing on just the commercial bank subsidiaries of BHCs is bound to give a distorted view. While surely there is significant operational decentralization in these large companies, for those issues that have the most economic and financial impact the ultimate decision unit is effectively the BHC. In line with this logic, we will concentrate attention on data at the consolidated BHC level.

Our intention in this article is to provide a general overview of the main fluctuations and trends in the data characterizing the activities and performance of large U.S. BHCs in the recent past. We focus on companies with more than $10 billion in assets and use different ways (such as computing weighted means and splitting the sample using $50 billion in assets as a threshold) to try to gauge the extent to which company size is a factor in explaining the different experiences of companies during the turbulent seven years covered by our sample period. The role of large BHCs and how to regulate them has been the subject of active debate since the onset of the crisis. We think that the overview we provide here is useful to put in perspective the different explanations and proposals that have been offered—and are being offered—about the multiple issues surrounding these important players in the U.S. financial sector.

The analysis of data carried out in this article could be considered a first step in the process of answering a number of important questions about the recent behavior of large BHCs in the United States. Examples of these questions are: Have the largest BHCs become even larger as a result of the crisis? Did the composition of their portfolios of loans and securities change during the crisis? How about the composition of their liabilities? Do they rely less on repos and other borrowed money after the crisis, for example? We also analyze the capital position of BHCs to gauge the extent by which, on average, these large BHCs exited the crisis with more and better-quality capital. Furthermore, we provide an overview of the impact of the crisis on quarterly earnings for these companies and we assess whether their off-balance-sheet activities have changed in response to the dismal performance of those activities during the crisis.

The article is organized as follows. In the next section we discuss the data we use as well as some preliminary statistics. In Section 2 we present information about the evolution of balance sheet and off-balance-sheet activities. In Section 3 we study the income statements, and in Section 4 we conclude.

1. THE DATA

Our data come from SNL Financial, which collects and organizes the information coming from FR Y-9C reports filed by bank holding companies on a quarterly basis.[1] The FR Y-9C report contains "... basic financial data from a domestic bank holding company (BHC)... on a consolidated basis in the form of a balance sheet, an income statement, and detailed supporting schedules, including a schedule of off balance-sheet items."[2] Corporations that file form FR Y-9C as a BHC do so in accordance with the definitions provided in the Bank Holding Company Act of 1956 and its subsequent amendments and modifications.[3]

We focus on BHCs with more than $10 billion in assets, and we call this group "large BHCs." These institutions have received a great deal of attention during and after the financial crisis—for example, the Dodd-Frank Act establishes that all BHCs with more than $10 billion in assets are subject to annual stress tests. Also, since the banking industry in the United States is highly concentrated, changes in the activities of these companies are bound to have a significant impact on the financial system and the real economy. We use quarterly data from the beginning of 2005 to the end of 2011, in order to include the financial crisis and a period before and after.

To be in our data set for a given quarter, the BHC must have assets greater than $10 billion at the end of that quarter. Since many companies classified as BHCs are subsidiaries of another BHC, we keep only the ultimate parent institution to avoid double counting. We also restrict attention to domestic institutions and do not analyze BHCs that are part of a foreign corporation. While foreign banks are an

[1] There is a large amount of data on BHCs that is periodically collected for regulatory purposes. Form FR Y-9C is part of this data. An excellent source for understanding how the publicly available information fits together is Avraham, Selvaggi, and Vickery (2012).

[2] More detailed information about the reports is available at the Federal Reserve Board of Governors website at www.federalreserve.gov/apps/reportforms/.

[3] The Bank Holding Company Act defines a BHC as any company with control over any bank or over any company that is or becomes a BHC by virtue of the Act. In turn, a company has control over a bank or another company if it directly or indirectly owns, controls, or holds 25 percent of the voting rights on the other company. What constitutes control is also explicitly defined in the Act, which also addresses other various issues pertinent to this definition.

important segment of the U.S. financial system and played a significant role during the crisis (see Cetorelli and Goldberg [2012], for example), we limit our study this way so that we can study the behavior of entire corporations using only FR Y-9C data.

We are interested in describing the average behavior of the banking companies in our sample. In most cases, however, we also investigate if there are systematic differences between the average behavior of the largest companies and the rest. We use two alternative methods to conduct this comparison.

In some instances we divide the sample into two subsamples, those BHCs with $10 billion–$50 billion in assets, which we call "large-medium" size companies, and those with more than $50 billion in assets, which we call "large-large" BHCs. We then plot averages within each subsample. The subsamples are constructed on a quarter by quarter basis in the same way that we construct the sample of all large BHCs. We use the $50 billion threshold because it is commonly used (for example, in the Dodd-Frank Act) to identify companies that are most likely to pose a systemic risk to the economy. In principle, it would be interesting to study the behavior of the largest companies (say those with more than $500 billion in assets) separately. These companies are crucial to understand many issues concerning the U.S. banking system and often behave in a distinctive way relative to smaller ones. We hint at some of these differences in parts of this article but we leave a more detailed analysis of the behavior of these companies to future research.

Alternatively, in many cases, we use a more compact way of capturing systematic differences across companies of different size by comparing the standard mean with the weighted mean. By construction, the weighted mean is more representative of the behavior of the largest companies in the sample. To see this, denote by X_i a generic variable reported by the BHCs (say, for example, a balance sheet component like loans), let A_i be the total assets of BHC i in a particular quarter, and by N the number of BHCs in the sample (or subsample) under consideration. The two measures for the average (calculated quarterly) are the standard mean

$$\bar{X} = \frac{1}{N}\sum_{i=1}^{N}\frac{X_i}{A_i} = \sum_{i=1}^{N}\frac{1}{N}\frac{X_i}{A_i},$$

and the weighted mean

$$\hat{X} = \frac{\sum_{i=1}^{N} X_i}{\sum_{i=1}^{N} A_i} = \sum_{i=1}^{N} w_i \frac{X_i}{A_i},$$

where $w_i = A_i/A$ and A is the sum of the total assets of all the companies in our sample (or subsample) for the relevant quarter. It is clear from these formulas, then, that the weighted mean puts more emphasis on the behavior of larger institutions and, hence, by comparing the two measures we can get a sense of whether the largest institutions behave differently than the rest of the institutions in our sample.

Interestingly, note that the weighted mean is also the expression for the balance sheet component as a proportion of assets for the aggregated data (for the large BHCs as a group). In this way, if we want to think about the banks in the system as an aggregate (a common approach when using simple models of the macroeconomy) then the weighted mean is the variable of interest. This is another reason for including the weighted mean in some of our figures.

In some cases we express a particular variable of interest as a proportion of a more comprehensive variable, not necessarily total assets. For example, we may be interested in the proportion of loans that are real estate loans. As with the previous case, to investigate systematic differences across company size we may split the sample into large-large and large-medium companies or we may compute a weighted mean and compare it with the standard mean. To calculate the weighted mean we use the same asset-based weights that we use to compute $\hat{X}$. Hence, the expression for the weighted mean in this case is

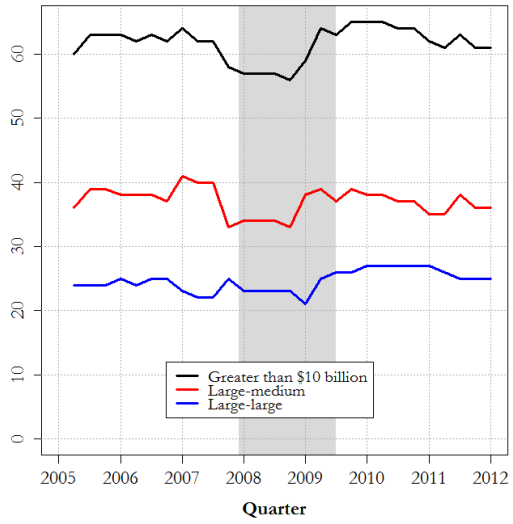
$$\tilde{X}_j = \sum_{i=1}^{N} w_i \frac{X_{ji}}{X_i},$$

where $X_i = \sum_{j=1}^{J} X_{ji}$ and $w_i = A_i/A$ as before. As an example, X_i could be total loans in company i and X_{ji} could be real estate loans in company i, where the subindex j would be the one corresponding to real estate loans, a component of total loans.

With respect to the size of our sample, Figure 1 shows the time series for the number of BHCs included in the sample; that is, all U.S. domestic ultimate parent BHCs with more than $10 billion in assets. Interestingly, while the number of institutions falls during the height of the crisis, it returns to the pre-crisis level and appears fairly constant during more normal times. This is also the case when we look at the subsamples, although perhaps in this case there is a slight shift toward a higher number of large-large BHCs after the crisis.[4]

[4] There is a large drop in the number of large-medium size BHCs during the third quarter of 2007. A total of seven BHCs exited this subsample in that quarter. Three of the BHCs became large-large (due to secular growth in assets that pushed them over the $50 billion threshold in the third quarter of 2007). One of the other four BHCs lost

Figure 1 Number of BHCs with more than $10 Billion in Assets



Notes: The black and blue lines represent the number of BHCs in our sample with more than $10 billion in assets and more than $50 billion in assets, respectively. The red line is the difference between these two numbers. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the National Bureau of Economic Research (NBER), from December 2007 to June 2009.

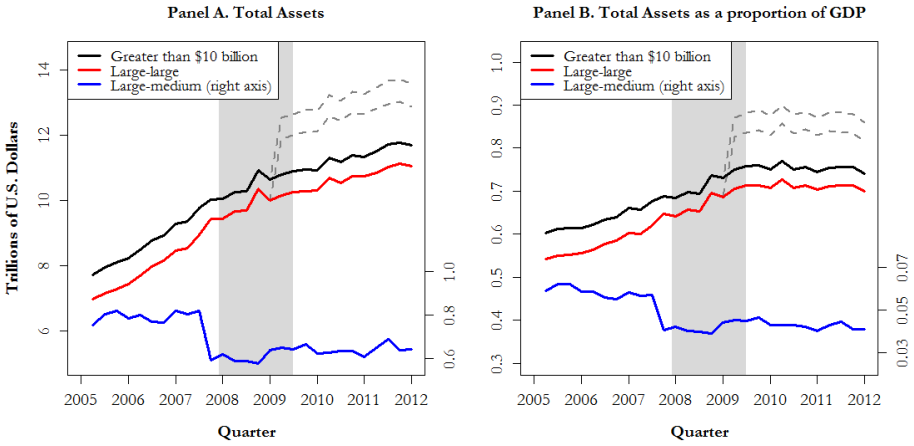
There is a significant increase in the number of institutions in our sample during the last quarter of 2008 and the first quarter of 2009. In the fourth quarter of 2008, five institutions that previously held less than $10 billion in assets crossed the $10 billion threshold.[5]

Four large companies that previously were not filing FR Y-9C reports began to do so in the first quarter of 2009. These companies are Goldman Sachs, Morgan Stanley, American Express, and CIT Group. All four converted to the BHC organizational form during the worst

assets and exited the sample while the remaining three were acquired by other BHCs, subsequently ending their reporting.

[5] There appears to be no clear common pattern explaining why these five institutions (Arvest Bank Group, Doral GP Ltd., PrivateBancorp, UMB Financial, and Wintrust Financial) increased their total assets during this period. In particular, it does not seem to be the case that these companies were bringing off-balance-sheet activity into their books.

Figure 2 Total Assets



Notes: Panel A presents total assets in trillions of U.S. dollars. Panel B presents total assets as a proportion of nominal GDP. The black, red, and blue lines represent BHCs with more than $10 billion in assets, more than $50 billion in assets, and between $10 billion and $50 billion in assets, respectively. The black and red lines are measured by the left axis while the blue line is measured by the right axis. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

weeks of the crisis: The investment banks Goldman Sachs and Morgan Stanley became BHCs in the fourth week of September 2008; American Express, in mid-November 2008; and CIT Group, in mid-December 2008. These four companies enter our sample with more than $50 billion in assets. They are primarily involved in credit card or investment banking and tend to have very different characteristics compared with traditional BHCs. For this reason, in parts of the article we will conduct the analysis with and without these companies in the sample and compare the results.[6]

In Panel A of Figure 2 we plot the time series of total assets held by the institutions in our sample. The gray dashed lines show total assets including the four companies that began filing FR Y-9Cs in the

[6] Aside from these four companies, in most cases we also exclude Franklin Resources, Inc. from the sample for similar reasons. Franklin is predominantly involved in asset management on behalf of private, professional, and institutional investors and entered our sample in the second quarter of 2010, as its balance-sheet assets crossed the $10 billion threshold.

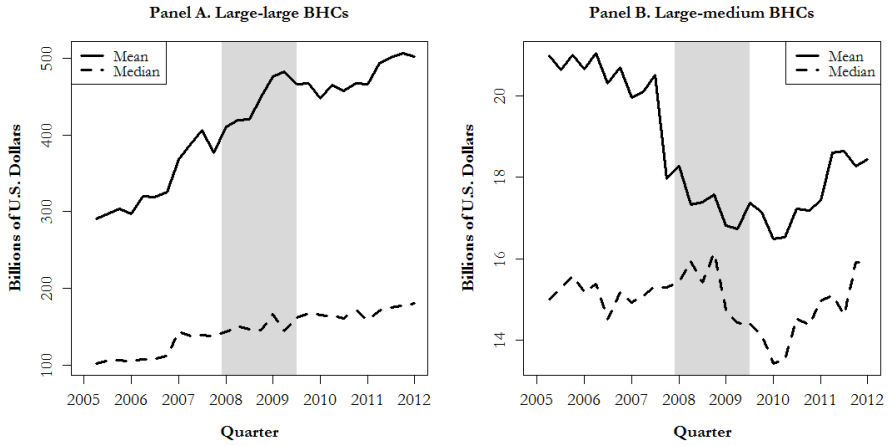
first quarter of 2009. The combined assets of BHCs with more than $10 billion in assets grew steadily during the period from 2005 until the end of 2011. However, when we disaggregate the data into the two subsamples, large-large and large-medium, we see that the bulk of the growth comes from the evolution of very large corporations.

From the second to the third quarter of 2008 there is a sharp increase in total assets that partially reverses itself in the following quarter. The banking sector experienced many changes during this period, corresponding to the deepening of the financial crisis. It is important to keep in mind that mergers between banks already in the sample would not be reflected in changes in the aggregate value of assets. However, some large transfers of assets did take place during this period between companies in the sample and outside the sample such as JPMorgan Chase's acquisition of Washington Mutual on September 25, 2008, for a value of $264 billion in targeted assets. State Street, Bank of New York Mellon, and JPMorgan Chase experienced noticeable increases in assets in the third quarter of 2008 that partially reverted back in the fourth quarter. The last two quarters of 2008 were also a period of significant stress in money markets, where these three banks play a critical role and, for this reason, it is not surprising to observe considerable volatility in the data originating with them (see also the discussion in Section 3). Finally, between the second and third quarters of 2008, there was a noticeable increase in bank lending that contributed to the increase in total bank assets observed at that time. We return to the data on lending in the next section.

To gain some perspective on the growth of total assets in large BHCs we divide total assets by nominal gross domestic product (seasonally adjusted annual rate) and plot it in Panel B of Figure 2. Relative to gross domestic product (GDP), large BHCs were becoming bigger before the crisis, but their growth appears to slow down after the crisis and stabilized at a level of roughly 75 percent of GDP. While the inclusion of the four new BHCs created toward the end of 2008 shifted the level to almost 90 percent of GDP (see gray dashed line in Panel B of Figure 2), this level also remains stable after the crisis.

We saw from Figure 1 that the number of large institutions was roughly constant over the period under consideration, as was the split between the large-large and the large-medium subsamples. Figure 2 showed an increase of total assets for large-large institutions, which together with Figure 1 suggests an increase in asset concentration at the top of the size distribution of firms. Figure 3 plots the mean and median size (measured by assets) for the BHCs in each subsample. We see that the mean size for large-large BHCs increased over the entire period, with perhaps some acceleration during the height of the crisis

Figure 3 Mean and Median Total Assets



Notes: Panel A presents the mean and median total assets of BHCs with over $50 billion in assets (large-large companies). Panel B presents the mean and median total assets of BHCs with $10 billion to $50 billion in assets (large-medium companies). Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

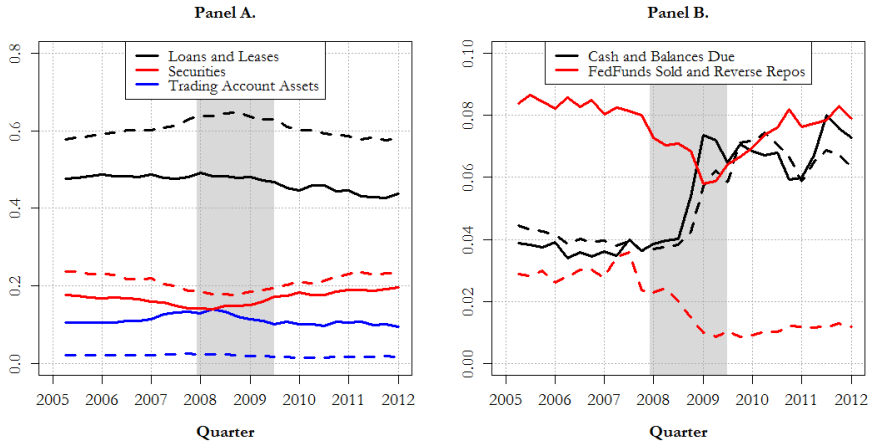
in 2008–09. The median size of these companies also increased but at a slower pace. Notice, however, that the median size of the large-medium subsample remained relatively constant over the entire period.[7]

2. BALANCE SHEET

In this section we examine the balance sheet of BHCs in our sample. For each institution, we express the main components of its balance sheet as a proportion of total assets for that institution. Size heterogeneity is very significant even among the subsample of large BHCs that we consider in this article. For this reason, normalizing values by total assets is an essential step in the process of producing meaningful comparisons across institutions or groups of institutions.

[7] The drop in the mean total assets for large-medium BHCs during the second half of 2007 (see Panel B of Figure 3) is a reflection of the transition of three relatively large BHCs from that group to the large-large group. Removing three of the largest companies in the group naturally reduces the mean. However, it is worth noticing that the change did not affect the median size (dashed line) in a significant way.

Figure 4 BHC Balance Sheets: Asset Components as a Proportion of Total Assets



Notes: The dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

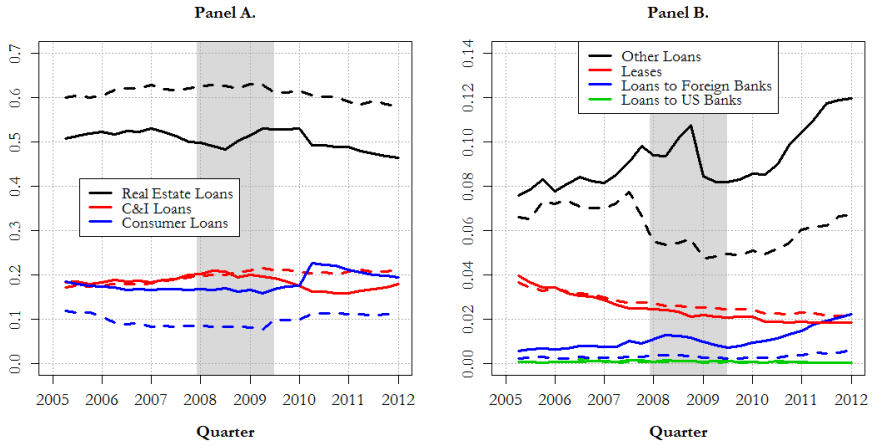
Assets

Figure 4 presents the components on the asset side of BHCs' balance sheets as a proportion of total assets. The solid lines are the weighted mean while the dashed lines are the standard mean. Loans and leases is the main component of assets, followed by securities and trading assets. Larger institutions tend to have fewer loans and fewer securities (as a proportion of assets) and more trading assets. Similarly, larger institutions appear to be relatively more active than the smaller ones on the supply side of the money market (that is, lending in the federal funds market and entering into reverse repurchase agreements).

Loans and Leases

Mean loans and leases as a proportion of total assets increased steadily between 2005 and the third quarter of 2008 (the dashed black line in Panel A of Figure 4). In fact, for many of these BHCs, loan growth actually accelerated in the third quarter of 2008 as the financial crisis deepened and firms drew down on their pre-committed lines of credit (Ivashina and Scharfstein 2010). This is barely noticeable in the figure in part because total bank assets also increase at that time (see Figure

Figure 5 Loan Categories as a Proportion of Total Loans



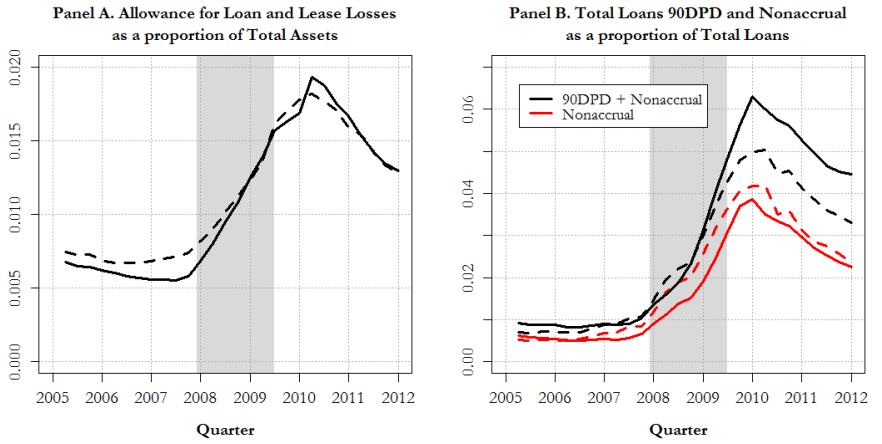
Notes: All quantities are expressed as a proportion of total loans. The black lines in Panel B plot loans to non-depository financial institutions and other loans as reported in the FR Y-9C. The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

2). Starting in the fourth quarter of 2008, and until the end of our sample period, however, average loans and leases as a proportion of assets decreased persistently.[8] In contrast to the standard mean, the weighted mean remained fairly flat until the crisis, suggesting that larger BHCs in our sample tended to have a constant, or even decreasing, proportion of loans to assets before the financial crisis.

Loans secured by real estate are the largest category of loans (see Panel A of Figure 5). Over half of the loans in large BHCs are of this type. Commercial and industrial loans (C&I loans) and consumer loans are the other two main categories. While size does not seem to significantly influence the proportion of loans that are C&I loans, larger companies appear to have a higher proportion of consumer loans

[8] It is interesting to note that JPMorgan Chase's acquisition of Washington Mutual at the end of the third quarter of 2008 does not impact the weighted mean in any noticeable way even though Washington Mutual (with a 0.77 ratio of loans to assets in the second quarter of 2008) had a higher ratio of loans to assets than the average BHC in our sample.

Figure 6 Allowances and Loan Performance



Notes: The black line in Panel B plots the proportion of total loans that are 90 days past due plus nonaccruals. The dashed and solid lines in both panels represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

and a lower proportion of real estate loans. A noticeable trend in the evolution of these loan categories is the decline in the proportion of C&I loans following the financial crisis. The proportion only starts to recover toward the end of our sample period in 2011.

The jump in consumer loans in the first quarter of 2010 (see Panel A of Figure 5) is the consequence of changes in accounting rules that stipulate how banks must treat loans in securitization pools (El-Ghazaly and Gopalan 2010). Since securitization was more common among larger banks, the jump is more noticeable in the weighted mean (the solid blue line) than in the standard mean (the dashed blue line).

The other loan categories are all relatively small (see Panel B of Figure 5). Leases are less than 4 percent of the total of loan and lease financing receivables in large BHCs' balance sheets and they have been trending down during the entire sample period. Perhaps one interesting fact worth noticing from Panel B of Figure 5 is the increase in loans to foreign banks by the largest domestic BHCs after the crisis.

Subtracting from loans and leases on the asset side of banks' balance sheets is the value of total allowances for loan and lease losses that

BHCs make as they update their assessment of the quality of their portfolio of loans. Panel A of Figure 6 plots these total allowances for loan and lease losses as a proportion of total assets. We see that there is a surge in allowances during the crisis that aligns well with the deterioration in loan performance as seen in Panel B of Figure 6. It is interesting to see in the figure that the proportion of non-performing loans started to increase toward the end of 2007. This is approximately the same time that allowances started to increase. Also worth noting is that the behavior of allowances does not appear systematically different across companies of different size: The standard mean (dashed line) and the weighted mean (solid line) are very close and move together during the entire sample period.

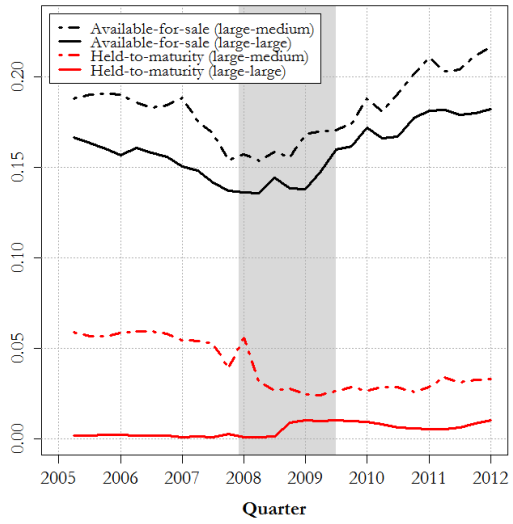
Securities

Large BHCs hold approximately 20 percent of their assets as securities, with larger companies holding, on average, fewer securities relative to assets (the solid red line in Panel A of Figure 4 is below the dashed red line). Securities are reported in two separate categories: held to maturity and available for sale. Held-to-maturity securities are those for which the institution has the intent and ability to hold until maturity. When an institution is holding securities without the explicit intent of trading them in the near term (that is, they are not considered trading assets) but, at the same time, the institution does not consider those securities part of the held-to-maturity category, then the securities are reported as available for sale. Following standard practice, we use amortized cost to value the portion of securities that is held to maturity and fair (market) value for available-for-sale securities. Figure 7 shows that most of the securities held by the institutions in our sample are categorized as available for sale. This is especially true for the large-large institutions that had almost no held-to-maturity securities before the crisis and only a very small amount after the crisis.

When looking at time trends of total securities as a proportion of total assets (Panel A of Figure 4), it is important to note that the total dollar value of securities (not plotted) remained mostly constant before 2008:Q2 (even increasing moderately before 2007). Thus, the observed gradual decline in the mean and weighted mean from 2005:Q1–2008:Q1 can be attributed entirely to the increase in total bank assets observed in Figure 2, rather than a decrease in the total value of securities held by these institutions. On the other hand, the secular increase in securities observed since mid-2008 stems from an increase in the dollar value of securities that more than compensates for the increase in total assets.

Overall, the proportion of total securities in large BHCs' balance sheets remained fairly stable during our sample period (see Panel A of

Figure 7 Composition of Securities as a Proportion of Total Assets

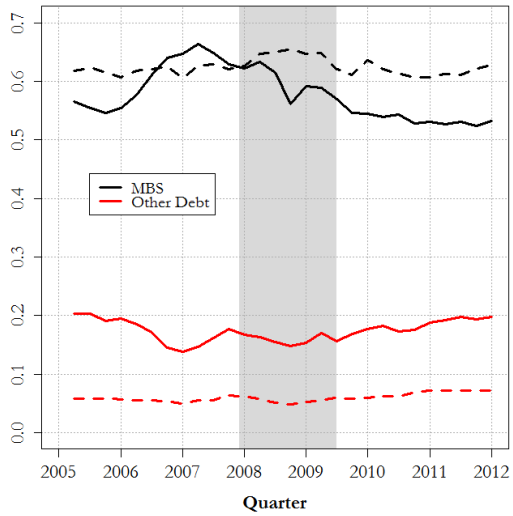


Notes: The solid lines refer to large-large BHCs (companies with over $50 billion in assets) and the dashed lines refer to large-medium BHCs (companies with $10 billion to $50 billion in assets). Both solid and dashed lines represent the weighted mean by asset size. For example, the dashed black line is the sum of all the available-for-sale securities held by large-medium BHCs divided by the total assets held by large-medium BHCs. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Figure 4). Figure 8 plots the main categories of securities, mortgage-backed and other debt securities, as a proportion of total securities. Comparing the standard means and the weighted means in Figure 8 suggests that in general the largest institutions hold fewer mortgage-backed securities on their balance sheets and more bonds and commercial paper issued by private corporations (which are the securities that account for most of what is labeled as "other debt securities"). However, the black solid line indicates that the largest companies in the sample actually increased their holdings of mortgage-backed securities in the period leading up to the crisis and then adjusted that proportion back down as the crisis progressed.

Interestingly, some of the smaller components of securities experienced more significant swings during our sample period. For example,

Figure 8 Components of Securities, as a Proportion of Total Securities (I)

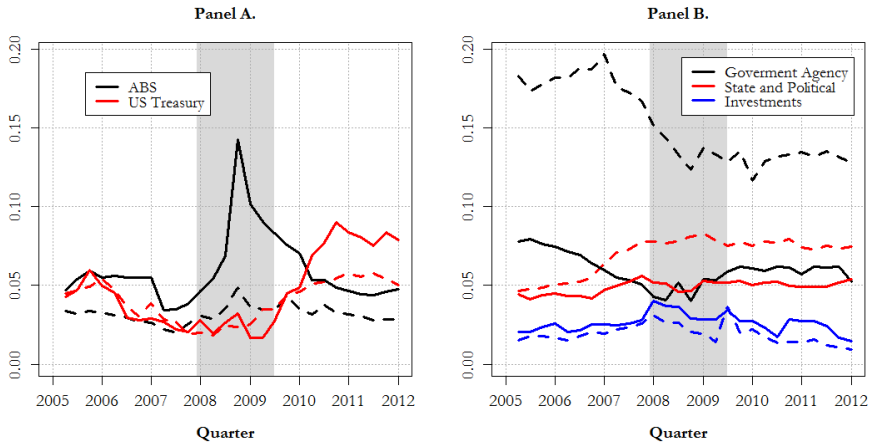


Notes: The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Panel A of Figure 9 shows that large BHCs, and in particular the largest ones, increased their holdings of U.S. Treasury securities after the crisis (red solid line). This increase is especially noteworthy since it coincides with a period when the Federal Reserve was purchasing large amounts of U.S. Treasury securities from the private sector to pursue its monetary policy objectives. In other words, both the Fed and large BHCs were increasing their holdings of U.S. Treasury securities simultaneously.

Panel B of Figure 9 shows that, on average, the largest companies tend to hold far fewer U.S. government agency obligations than the large-medium companies, and the holdings of these securities declined across the board leading up to the crisis. The decline is more abrupt for the large-medium institutions relative to the larger ones (as indicated by the steeper drop in the dashed black line relative to the solid black line).

Figure 9 Components of Securities, as a Proportion of Total Securities (II)



Notes: The black lines in Panel A correspond to asset-backed securities and structured financial products as reported in the FR Y-9C reports. The blue lines in Panel B correspond to investments in mutual funds and other equity securities with readily determinable fair values, also as reported in FR Y-9C reports, and the red lines are state and political subdivisions in the United States. The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Finally, the spike in asset-backed securities in late 2008 deserves some explanation. Looking at the behavior of individual companies, it seems that the event is mostly driven by spikes (a move up with an immediate reversal) in asset-backed securities at JPMorgan Chase and State Street. These are large organizations whose behavior can drive the weighted mean. The standard mean, in comparison, shows no significant spike. More generally, it is interesting to note that despite the problems in the market for asset-backed securities during the crisis, by the end of our sample period the proportion of securities that banks held in this form is approximately the same as that at the beginning of the sample period (i.e., before the crisis).

Trading Assets

Larger BHCs tend to hold a higher proportion of their assets for trading purposes (see the solid and dashed blue lines in Panel A of Figure 4).[9] Indeed, only companies with more than $50 billion in total assets (large-large) had more than 10 percent of their assets as trading assets at some point in our sample period. As an example, in the fourth quarter of 2011 only three companies in our sample held more than 10 percent of their assets in trading accounts, and all three of them were in the extreme right tail of the size distribution with more than $1.5 trillion in total assets. These companies were Bank of America (11 percent), Citigroup (16 percent), and JPMorgan Chase (19 percent).

It is also the case that most companies with more than $50 billion in assets (large-large) held some trading assets in their balance sheets at any point in time: The percentage of large-large companies with no trading assets was never higher than 12.5 percent during our sample period. Large-medium companies are less involved in asset trading: The percentage of large-medium companies with zero trading assets in a given quarter was never below 29.7 percent. Furthermore, for firms that engage in active asset trading, the presence of these assets in the firms' balance sheet tends to be more significant for large-large firms than for large-medium firms. Among the firms with positive trading assets, for example, the mean (median) proportion of trading assets to total assets in a given quarter is at least 3.4 percent (1.1 percent) for large-large firms and at most 1.6 percent (1.1 percent) for large-medium firms. However, the difference is largely driven by the high degree of skewness in the proportion of trading assets held by large-large firms (the mean proportion tends to be much larger than the median for large-large BHCs). Finally, it is also the case that large-large companies are more likely than large-medium companies to have significant trading assets (greater than 2 percent of total assets) on a consistent basis (i.e., for every quarter). In particular, 29 percent of the large-large companies present during our entire sample period had at least 2 percent of their assets as trading assets in every quarter. For large-medium companies, only 11 percent had at least 2 percent of assets as trading assets throughout our sample period.

The time series behavior of trading assets appears in Panel A of Figure 4. A more detailed examination of the data reveals that Citigroup and JPMorgan Chase significantly reduced the proportion of trading

[9] Trading assets are securities that are held for the purpose of selling them in the near term as part of the company's trading activities, which include active and frequent buying and selling of securities for the purpose of generating profits on short-term fluctuations in price.

assets in their balance sheets during the crisis, going from more than 25 percent of assets to less than 20 percent. In fact, adjustments by these two companies of their holdings of trading assets are the main driver of the behavior of the aggregate data displayed in the figure.

Cash and Balances Due

Starting in October 2008, the Federal Reserve significantly increased the amount of excess reserves outstanding in the banking system. Since our measure of cash and balances due from other depository institutions, including a Federal Reserve Bank, "cash" for short, displayed in black in Panel B of Figure 4 includes bank reserves, it is not surprising that there is a large increase in the proportion of cash relative to total assets late in 2008.

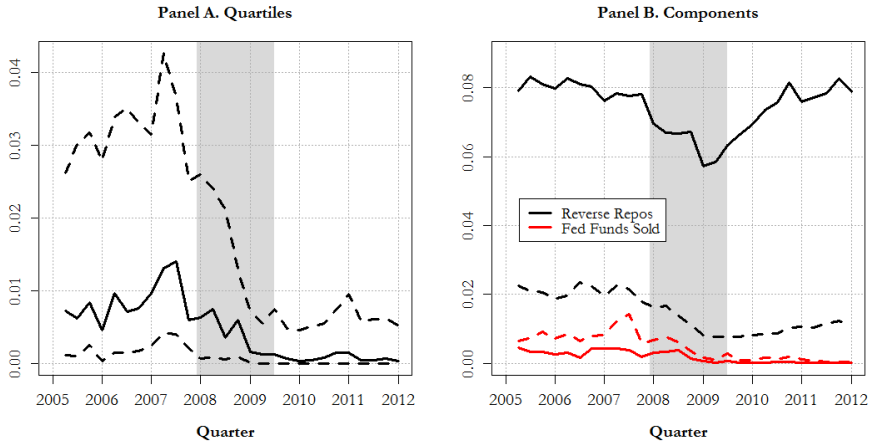
During the first half of 2011 the Fed further increased the level of aggregate reserves by a total of around $600 billion and, consistent with that, we see an increase in cash holdings for the firms in our sample. However, the dollar value of the increase in cash for these firms from the last quarter of 2010 to the second quarter of 2011 is equal to $259 billion, which is less than half of the total increase in reserves in the system over that period. This is not surprising given that we restrict attention to domestic institutions and it is well known that foreign-related institutions absorbed a significant proportion of the increase in reserves that occurred during 2011 (Ennis and Wolman 2015).

It is interesting to note that both the standard mean and the weighted mean of cash holdings as a proportion of assets are approximately at the same level and evolved similarly during our sample period. In other words, the proportion of cash holdings in total assets does not appear to be systematically influenced by the size of the institution, at least once the institution has reached a certain size (i.e., greater than $10 billion in assets, which is the cutoff for being in our sample). For a more detailed discussion of the evolution and distribution of reserves in the U.S. banking system during the period under consideration, see Ennis and Wolman (2015).

Federal Funds Sold and Reverse Repos

Events in both the federal funds market and the repo market played a significant role in the progression of the crisis. There are several articles in the literature documenting and studying the strained condition of these markets. For the federal funds market, two important examples are Taylor and Williams (2009) and Afonso, Kovner, and Schoar (2011) (see also the discussion in Ennis [2011]). Gorton and Metrick (2012) is the common reference in the case of the repo market. While the causes

Figure 10 Federal Funds Sold and Reverse Repos as a Proportion of Total Assets



Notes: Panel A presents the median (black solid line) and the 25th and 75th percentiles (black dashed lines) for the companies in our sample. In Panel B the dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

of stress in these markets are, to a large extent, a matter of controversy, it is evident that the level of activity of large BHCs in both the federal funds market and the repo market declined during the crisis and did not fully recover by the end of 2011 (see Panel B of Figure 4).

Two things are worth noticing about the behavior of the standard and weighted means for federal funds sold and reverse repos as a proportion of total assets displayed in Panel B of Figure 4. First, the fact that the weighted mean is significantly above the standard mean clearly indicates that the largest BHCs tend to be more active than the smaller BHCs on the lending side of the federal funds and repo markets (red lines in Figure 4). In fact, the more disaggregated data plotted in Panel B of Figure 10 shows that this is driven mostly by the repo activity of the largest BHCs. Second, the participation of this broad asset class in the balance sheets of large BHCs starts to decrease in mid-2007 and continues decreasing until the end of 2008.[10] In 2009,

[10] Another manifestation of this trend is the fact that the number of BHCs in our sample reporting no lending in these markets went from three in the second quarter of

once the worst part of the crisis had passed, large BHC participation in the federal funds and repo markets started to recover. However, it is clear from the disparity in behavior of the dashed and solid red lines in Panel B of Figure 4 that the recovery was mostly driven by the largest corporations. Again, Panel B of Figure 10 reveals that this recovery is concentrated in the repo activity of the largest BHCs in our sample. That federal funds activity does not recover is not surprising given the large amount of excess reserves in the system after 2008.

Panel A of Figure 10 shows quartiles of the distribution of federal funds sold plus reverse repos as a proportion of total assets across companies in our sample. We can see that, before the crisis, there was significant heterogeneity across large BHCs in terms of their intensity of participation in the supply side of the money market. After the second quarter of 2008, however, the dispersion drops considerably. It is clear from the figure that some of the companies that used to participate most in selling federal funds and entering reverse repurchase agreements noticeably reduced this participation during 2008 and, since then, the majority of these companies have remained concentrated around markedly lower levels of participation.

Intangible Assets

We did not plot intangible assets in Figure 4 because they are an insignificant portion of the balance sheet and moved very little over the sample period.[11] During the sample period, the mean value of this asset category stayed at around 3 percent of assets and the third quartile never went above 5 percent. Comparing standard and weighted means reveals that the largest companies tend to have higher intangible assets.

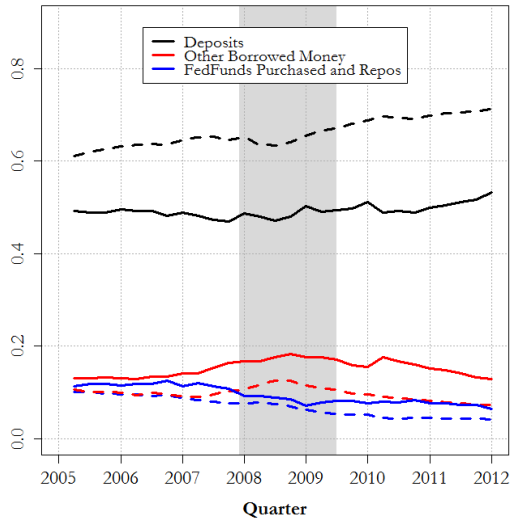
Liabilities

Figure 11 presents the liabilities of BHCs expressed as a proportion of total assets. Again, the solid lines are the weighted means and the dashed lines are the standard means. Deposits are the main category, with BHCs funding, on average, 50 percent of their assets with deposits. Comparing the standard and the weighted means shows that the largest companies tended to rely relatively less on deposits as a source of funding and more on other borrowed money. The proportion of other borrowed money started to trend down at the worst part

2007 to 18 in the first quarter of 2009. Similarly, 41 out of 52 BHCs in our sample decreased the amount of federal funds sold and reverse repos during that same period.

[11] Intangible assets include goodwill and other intangible assets that result from the acquisition of portions of another institution's business, such as the carrying value of mortgage servicing assets and purchased credit card relationships.

Figure 11 BHC Balance Sheets: Liabilities as a Proportion of Total Assets

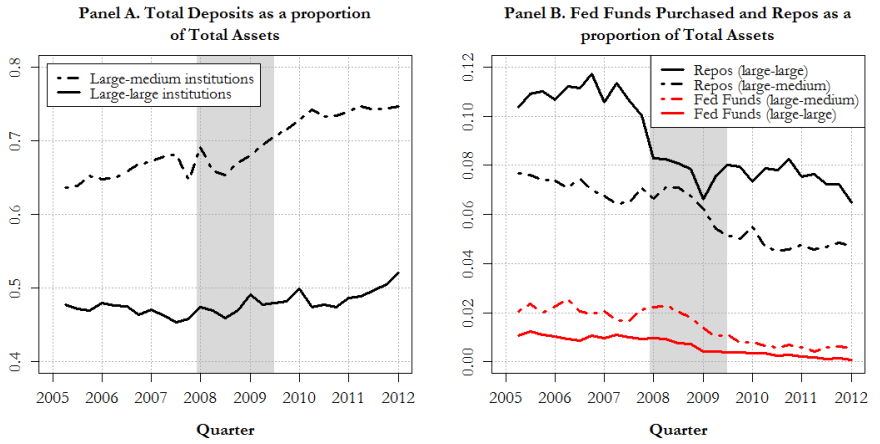


Notes: The dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

of the crisis in the fourth quarter of 2008. Overnight repo and federal funds borrowings amounts to about 10 percent of assets and also shows a downward trend that started earlier, at the beginning of 2007, and lasted until the end of our sample period.

The standard mean of deposits over assets trended upward after the crisis. Panel A of Figure 12 shows that the tendency to increase the reliance on deposits after the crisis was most prevalent among large-medium companies in our sample. Similarly, Panel B of Figure 12 shows a steep decline in repo borrowings at the largest institutions during the early stages of the crisis, with these repo borrowings not recovering after the crisis. Large-medium companies were relatively active borrowers in the federal funds market but noticeably reduced their participation after the crisis. A high level of excess reserves in the banking system (see Panel B of Figure 4) tends to reduce banks' need for short-term (overnight) borrowing. This is likely to be one of the main explanations for the overall decrease in banks' participation

Figure 12 Liability Composition and Bank Size



Notes: The solid lines refer to large-large BHCs (companies with more than $50 billion in assets) and the dashed lines refer to large-medium BHCs (companies with $10 billion to $50 billion in assets). Both solid and dashed lines represent the weighted mean by asset size. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

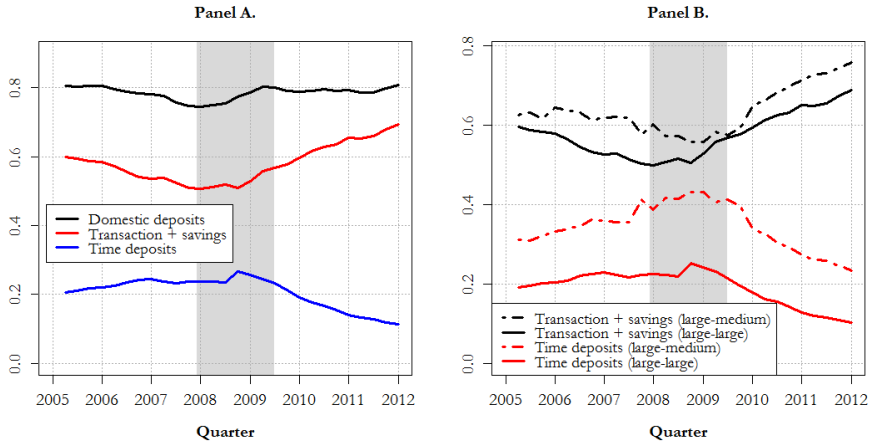
on the buying side of the interbank and repo markets reflected in the figure.

Deposits

To study changes in the composition of deposits during the crisis we create three subcategories that group deposits of similar characteristics. First, we aggregate domestic retail (less than $100,000) and jumbo (more than $100,000) certificate of deposits (CDs) into a category that we call "time deposits." Both retail and jumbo CDs behave similarly during the period of study and not much is lost from aggregating them.

The other main category of domestic deposits is an aggregate of demand, NOW, and savings accounts (including money market deposit accounts). We call this category transaction plus savings accounts. It is worth mentioning that in this period savings accounts are the main component of bank deposits with approximately 50 percent of the total. Finally, the third category consists of deposit accounts in foreign subsidiaries.

Figure 13 Deposits Composition and Bank Size

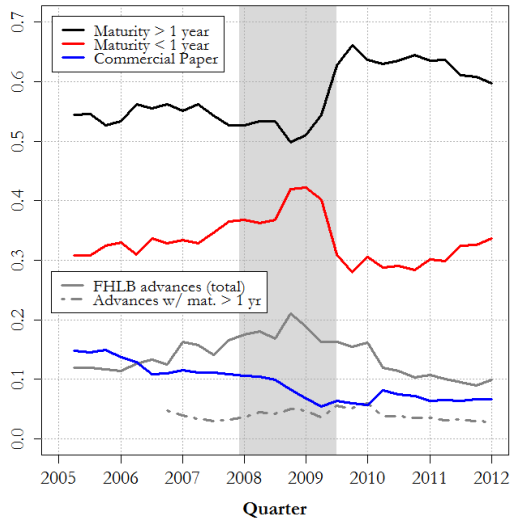


Notes: In Panel A, all quantities represent ratios of totals across all companies in the sample. For example, the black line is total domestic deposits divided by total deposits in our sample. In Panel B the solid lines refer to large-large BHCs (companies with more than $50 billion in assets) and the dashed lines to large-medium BHCs (companies with $10 billion to $50 billion in assets). Quantities are expressed as a proportion of total deposits within each subsample. For example, the solid red line is total time deposits in large-large BHCs divided by total deposits in large-large BHCs. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Panel A of Figure 13 presents the proportion of aggregate total deposits that are domestic deposits (black solid line), domestic transaction and savings deposits (red solid line), and domestic time deposits (blue solid line). We can see in the figure that, after the crisis, banks in our sample shifted away from domestic time deposits and into domestic transactions and savings deposits.[12] The growth in transaction and savings deposits (red solid line in Panel A of Figure 13) after the crisis is a combination of growth in savings and NOW accounts from the beginning of 2008 until the end of 2010 and a more pronounced growth in demand deposits during 2011 when the growth in savings accounts moderated significantly.

[12] As we can see in Figure 11, total deposits over assets (black solid line) are relatively stable over the sample period. Hence, the change in the composition of deposits shown in Panel A of Figure 13 is also representative of the changes in the different components of deposits when expressed as a proportion of total assets.

Figure 14 Components of Other Borrowed Money as a Proportion of Total Other Borrowed Money



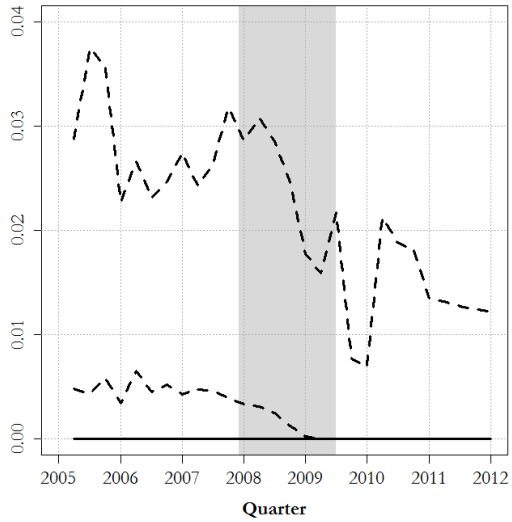
Notes: All quantities represent ratios of totals across all companies in the sample. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Panel B of Figure 13 shows that larger companies (large-large BHCs) tend to have a lower proportion of deposits as time deposits. The figure also shows that the trends in the composition of deposits are common for the two subsamples (large-large and large-medium BHCs).

Other Borrowed Money

The main components of other borrowed money are commercial paper, term federal funds (i.e., not overnight), certain term repos not involving securities, discount window borrowing, certain forms of unsecured and unsubordinated debt, and Federal Home Loan Bank (FHLB) advances. Figure 14 displays a decomposition of other borrowed money into commercial paper and other borrowed money with a maturity of less than and more than a year. We see that before the crisis, companies were gradually increasing their short-term borrowing. During the height of the crisis in late 2008 there is actually a brief surge in short-term borrowings that reverts back to pre-crisis levels during the first

Figure 15 Median, 75th, and 95th Percentiles of the Distribution of Commercial Paper over Assets



Notes: The black solid line is the median of the distribution of commercial paper over assets in our sample. The dashed lines are the 75th and the 95th percentiles. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

half of 2009 when large BHCs shifted their borrowing in a significant way toward longer maturities.

It is somewhat surprising that the proportion of borrowing that was done using commercial paper was trending down before the crisis. This decline actually accelerated during the crisis, which is consistent with the well-documented stresses in the commercial paper market (Kacperczyk and Schnabl 2010). Since mid-2009, however, the proportion of commercial paper in total borrowed money has remained fairly constant. Figure 15 shows that the median company in our sample has no commercial paper before and after the crisis. The 75th percentile actually drops to zero during the crisis and never recovers. The 95th percentile went from 3 percent of assets funded with commercial paper to less than 1.5 percent (only three or four companies in our sample are over the 95th percentile). The decline in commercial paper borrowing during the crisis is due to both intensive margin effects (firms that used commercial paper tended to use it less) and

extensive margin effects (firms that used commercial paper stopped using it). Before the crisis, more than 98 percent of the commercial paper issued by the companies in our sample was issued by companies in the large-large category. After the crisis, all commercial paper was issued by large-large companies.

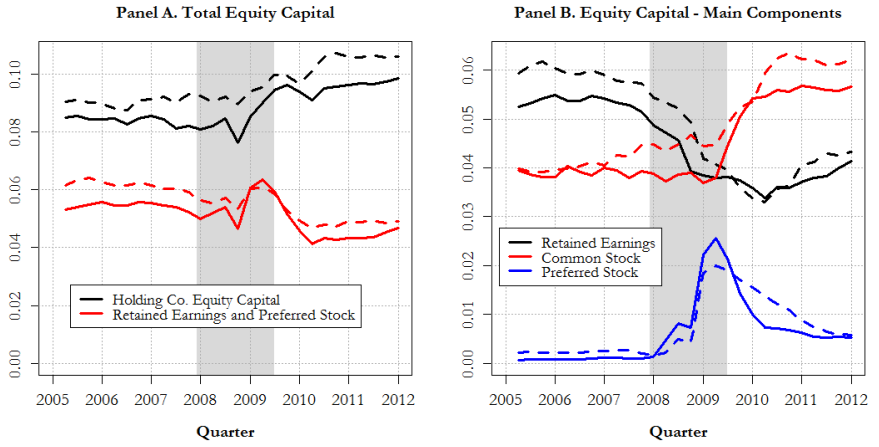
FHLB advances are a significant component of other borrowed money and its evolution during the crisis received some attention in the literature (see, for example, Ashcraft, Bech, and Frame [2010]). During the second half of 2007, bank borrowings from the FHLB system increased significantly. At the time, FHLBs were able to issue debt at relatively low rates and then lend to banks at more favorable rates than the ones that banks were able to obtain via other sources. As the crisis deepened, however, the funding advantage of FHLBs eroded and in the fourth quarter of 2008 total borrowing from FHLBs started to decrease (Ashcraft, Bech, and Frame 2010).

FHLB advances are included in the aggregates for other borrowed money with maturities less and more than a year as plotted in Figure 14. In principle, the changes in FHLB advances could be the main driver of the patterns observed in those aggregates during the crisis. To investigate this issue we complement our data with information from the Call Reports filed by depository institutions. We do this because BHCs do not report FHLB advances in the FR Y-9C reports. Conveniently, SNL Financial collects data on FHLB advances from the Call Reports and aggregates it at the holding company level. Using this source, we plot in Figure 14 total FHLB advances for the companies in our sample as a proportion of total borrowed money—the gray solid line. Roughly a third of the FHLB advances have a maturity greater than a year (the gray dashed line) and the rest have a maturity of less than a year. We see in the figure an upward trend in FHLB advances during 2006 and 2007 and a decline after 2008, but the patterns in the proportion of other borrowed money with a maturity of more and of less than a year seem more pronounced than what could be accounted for by movements in FHLB advances.

Bank Equity Capital

Even though large banks entered the crisis with what appeared to be acceptable levels of capital (Bernanke 2007), the accumulation of losses and the increasing turmoil in financial markets made bank capital an evident reason for concern as the crisis deepened. In fact, bank recapitalization played a significant role in the policy response to the crisis devised by the U.S. Treasury and other bank regulatory agencies. Here we provide an overview of how equity capital for large BHCs evolved

Figure 16 Equity Capital and its Main Components as a Proportion of Total Assets



Notes: The dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

during the period and highlight the abrupt shifts in its composition that occurred at different points in the crisis.

Figure 16 presents a time series of total equity capital (as a proportion of assets) for the BHCs in our sample. As before, the solid line corresponds to the weighted mean and the dashed line to the standard mean. We see that, in general, larger companies tend to have lower capital-to-asset ratios before and after the crisis (black lines in Panel A). It is also evident from the figure that the companies in our sample have, on average, increased their capital ratios after the crisis (relative to the average ratios before the crisis). The main component accounting for this increase is common stock. The figure in Panel B shows that common stock over total assets increased significantly after the crisis. Also, the red lines in Panel A show that changes in the sum of retained earnings and preferred stocks, the other two main components of equity capital, do not account for the higher capital ratios observed after the crisis (relative to those before the crisis).

It is interesting to see in Panel B of Figure 16 the significant drop in retained earnings during the crisis and the "compensating" surge in

preferred stock.[13] The Capital Purchase Program (CPP), one of the main TARP programs, went into effect in October 2008 and dedicated $250 billion to the purchase of senior preferred stock in financial institutions. Half of these funds were allocated to nine financial firms, six of which are part of our sample in the fourth quarter of 2008: Citigroup, JPMorgan Chase, Wells Fargo, Bank of America, BNY Mellon, and State Street received a total of $95 billion when the program began (Financial Crisis Inquiry Commission 2011). The three large investment banks, Merrill Lynch, Morgan Stanley, and Goldman Sachs, received the other initial $30 billion allocated through the program. The change in the level of total preferred stock in our sample between the third and the fourth quarter of 2008 is $156 billion, 61 percent of which can be accounted for by the TARP money dedicated to large BHCs in the initial days of the CPP program.

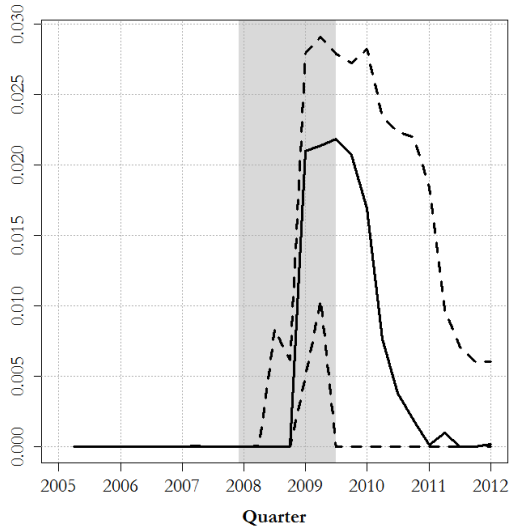
Aside from the initial allotment of CPP funds to the nine largest banks, many other banking organizations received capital injections as part of this program.[14] It is evident from Panel B of Figure 16 that both the dashed and solid lines corresponding to preferred stock experienced a comparable surge. However, we see that the largest banks initially increased their preferred stock relatively more (the solid line moving above the dashed line) while also reverting back more quickly to lower levels after the crisis. This rapid reversal may be explained by the fact that the CPP imposed restrictions on dividend distributions and executive compensation that gave banks (especially large banks) clear incentives to recover the preferred stock issued under the program.

By the end of our sample period, the majority of the companies in our sample that issued preferred stock during the crisis had reverted back to their pre-crisis strategy of not having preferred stock outstanding. To see this, in Figure 17 we plot the median amount (across companies in our sample) of preferred stock as a percentage of assets (solid line), and the first and third quartiles (the two dashed lines). We see that the median was zero before the crisis and increased to more than 2 percent of assets at the beginning of 2009. By 2011, however,

[13] One may think that the decline in retained earnings is the consequence of generous dividend policies that were not appropriately adjusted down as the symptoms of the crisis started to become visible. Hirtle (2014) studies the dividend and stock repurchase decisions of large BHCs during the crisis. She shows that many large companies were indeed slow at adjusting dividends down during the crisis. However, she also documents that, in response to the crisis, many companies *sharply* reduced their repurchase of stock.

[14] A total of 707 financial institutions received capital injections under the CPP. Of these, 646 were banks that received in total $193 billion. Relatively large, publicly traded banks (350 of them) account for $188 billion of this total. See Bayazitova and Shivdasani (2012) for more details.

Figure 17 Preferred Stock as a Proportion of Total Assets

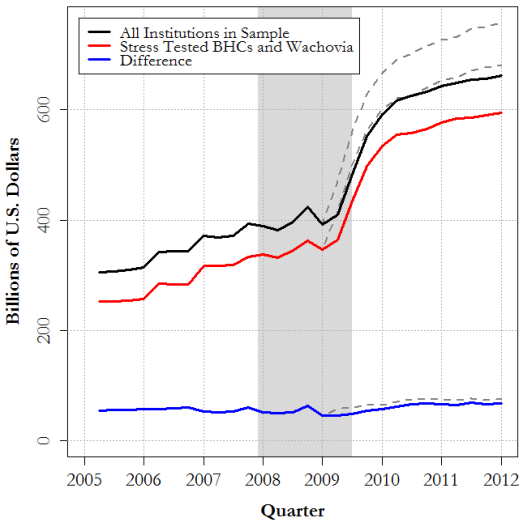


Notes: The solid line is the median of the distribution of preferred stock as a proportion of assets in our sample. The dashed lines are the 25th and 75th percentiles. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

it had gone back to close to zero. Yet it is also the case that the third quartile had not reverted back to its pre-crisis level. Some large BHCs were still relying on preferred stock as a source of capital by the end of our sample period.

The surge in common stock during 2009 (Panel B of Figure 16) is consistent with the change in approach adopted by policymakers to deal with banks' weak financial conditions as the crisis deepened. The second stage of TARP in February 2009 included the Capital Assistance Program (CAP), which required regulators to conduct stress tests for the 19 largest U.S. banks (greater than $100 billion in assets) and established that those banks for which the stress test revealed a shortfall of capital will be required to raise common equity within a period of a few months. As a result of the stress test, 10 large banks were required to increase their common equity for a total aggregate amount of $75 billion. Figure 18 plots the dollar value of common equity for all BHCs with assets greater than $10 billion (black line). It also plots in red the total dollar value of common equity for the 19 companies that were

Figure 18 Dollar Value of Common Stock

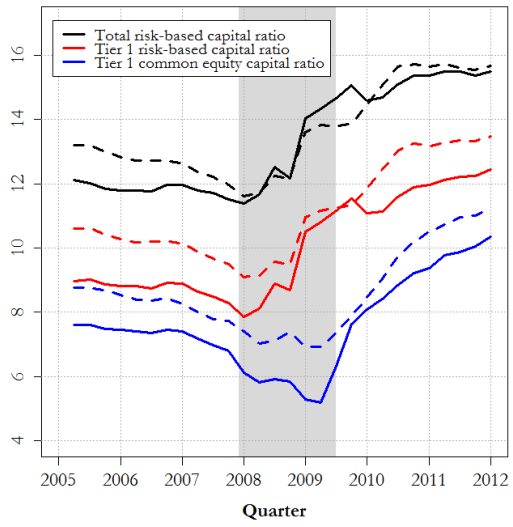


Notes: Each line is the total dollar value of common stock for the subsample described in the label of the figure. The dashed gray line includes the four large companies that started filing FR Y-9C reports in the first quarter of 2009. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

stress tested as part of CAP. We include Wachovia Co. in this partial aggregate for consistency since Wachovia was one of the largest banking organizations while it existed and was acquired in late 2008 by Wells Fargo (also one of the largest BHCs in the country). Not including Wachovia with the group of stress tested banks does not change the pattern that we intend to highlight here: Mainly, that we see the surge in common equity during 2009 as almost entirely accounted for by the behavior of the 19 largest institutions in the system that were subject to the stress tests imposed by CAP.[15] Note also that the increase in the red line during 2009 is close to $200 billion and, hence, a significantly higher amount than the CAP-required $75 billion.

[15] The gray dashed lines in Figure 18 are the result of including the four large institutions that started reporting as BHCs at the beginning of 2009; that is, Goldman Sachs, Morgan Stanley, American Express, and CIT Group. The first three of these companies were part of the group of 19 companies subjected to the stress test required by CAP.

Figure 19 Regulatory Capital Ratios



Notes: The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

Patterns similar to the ones in the previous figures arise when we plot the risk-based capital ratios for the banks in our sample (see Figure 19). These capital ratios are mainly used for regulatory purposes. Tier 1 capital includes the book value of equity (after deductions) and certain classes of preferred equity while tier 2 capital includes certain holdings of subordinated debt. Total risk-based capital includes both tier 1 and tier 2 capital. These ratios are calculated using risk-adjusted assets in the denominator. To calculate risk-adjusted assets, companies adjust the different categories of assets using risk weights that are provided by regulators. Risk-adjusted assets include a measure of the off-balance-sheet exposure of the bank. As for some of the previous figures, we compute a mean and a weighted mean across companies at each point in time. The weights to compute the weighted mean are the ratio of assets in the corresponding company and the sum of all the assets for the companies in our sample for that time period (we

take these weights as a crude way to account for the relative size of the companies).

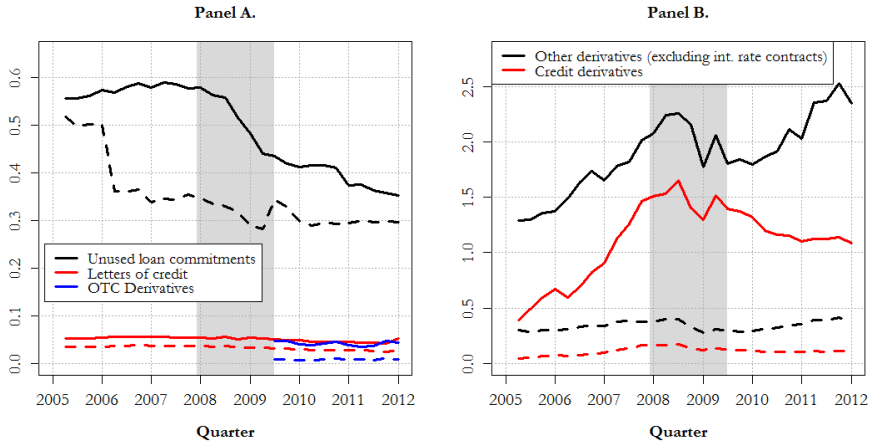
We see in Figure 19 that the largest companies tend to have lower tier 1 capital ratios (the red solid line is generally below the red dashed line). We also see in the figure that both the standard mean and the weighted mean of the tier 1 capital ratio were trending down before the crisis and rapidly increase with the onset of the crisis, remaining at relatively high levels since 2009. The increase in these ratios appears to occur a few quarters earlier than the increase in equity capital displayed in Figure 16. Furlong (2011) points out that the quality of tier 1 capital, measured by the proportion of it that is common equity, decreased significantly during the crisis. This is evident in Figure 19 as we see that common equity declines until the second quarter of 2009 while tier 1 capital starts increasing at the beginning of 2008 (this is consistent with the increase in preferred equity during the early stages of the crisis that we see in Panel B of Figure 16). Finally, the standard mean and the weighted mean for the total risk-based capital ratio behave similarly to the tier 1 ratios, except that there seems to be less of a systematic pattern across companies of different sizes (the black solid and dashed lines are very close and move together).

Off-Balance-Sheet Items

Large BHCs and their subsidiaries engage in significant amounts of off-balance-sheet activities, such as the provision of loan commitments, financial and performance guarantees, and various derivatives contracts. Conceptually, these activities create a contingent asset or liability for the firm, and in that sense they have implications for the financial condition of the firm, similar to those associated with more standard components of firms' balance sheets. Furthermore, off-balance-sheet activities can be a substantial source of fee income. For these reasons, it is important to assess their state and evolution.

Measuring off-balance-sheet activities is not straightforward. For example, the size of a position on a derivative contract is often accounted for by its notional amount. The notional amount is the base value used to calculate the payments associated with the derivative contract. This dollar amount (in general) does not change hands, and in that sense it is considered notional. For example, an interest rate swap could call for payment of the difference between a fixed interest rate and a market interest rate multiplied by a given notional amount (say, $1 million). While the actual payments are directly linked to the notional amount, payment amounts are typically only a fraction of

Figure 20 Off-Balance-Sheet Activity as a Proportion of Balance Sheet Assets



Notes: The blue lines in Panel A represent the net current credit exposure on OTC derivatives held by the companies in our sample. All other derivatives positions are reported in notional amounts. All quantities are expressed as a proportion of total balance sheet assets. The dashed and solid lines represent, respectively, the standard and weighted means across all companies in our sample. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

the notional amounts.[16] Alternatively, in some cases, firms report the fair value of their derivative contracts. The fair value is an estimate of the price of the contract that would prevail in an orderly transaction between market participants (not a forced liquidation or distressed sale) at the measurement date. The FR Y-9C form disaggregates derivative contracts according to the type of instrument (futures, forwards, swaps, etc.) using notional amounts. This is what we use in most of the figures in this section, except when plotting over-the-counter (OTC) derivatives for which we use net current credit exposure since notional amounts are not reported.[17]

[16] In the case of an interest rate swap, we can think of the notional amount as representing the size of the underlying position being hedged with the swap.

[17] The current credit exposure is the fair value of a derivative contract when that fair value is positive. The current credit exposure is zero when the fair value is negative or zero. For reporting OTC derivatives, companies are allowed to net out multiple positions with a given counterparty if certain conditions are satisfied.

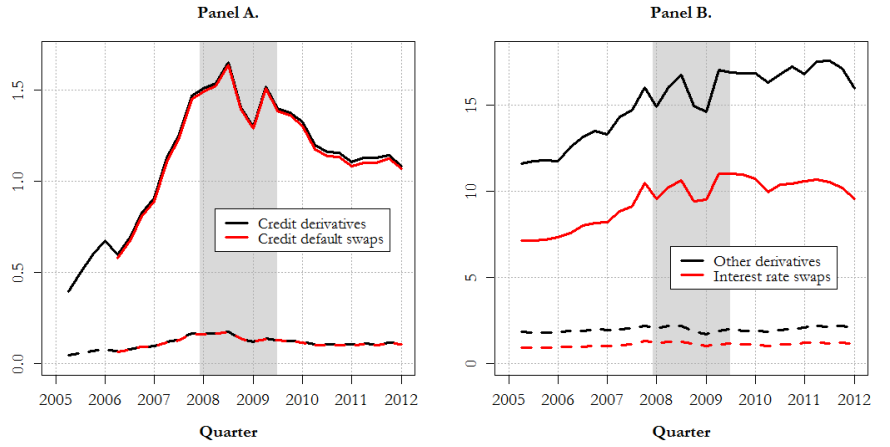
Figure 20 plots different off-balance-sheet activities undertaken by U.S. BHCs in our sample (expressed as a proportion of total balance sheet assets). Solid lines represent the weighted mean and dashed lines represent the standard mean. Panel A shows the values of unused loan commitments (credit lines) and letters of credit, and the current credit exposure on OTC derivatives (for which reporting started in mid-2009). Panel B shows the notional values of credit derivatives (including credit default swaps) and other derivatives, such as equity, foreign exchange, and commodity future, forward, swap, and option contracts but excluding interest rate contracts. We exclude interest rate contracts from the figure because their total notional amount is an order of magnitude larger than the total notional amount of other categories of derivatives (see Panel B of Figure 21).

We see in Figure 20 that larger companies tend to have (as a proportion of assets) more loan commitments and letters of credit (Panel A) and are counterparties in significantly more derivatives contracts (Panel B). Before the crisis, the largest companies were rapidly increasing their amount of derivative contracts, but this growth stopped during the crisis and we only see some renewed growth in other derivatives during 2010–11.

Credit lines are commitments to make a loan or perform some other transaction with a counterparty. Letters of credit are contracts where one party commits to the other, in exchange for a fee, to step in and undertake an obligation if a third party fails to perform. Boyd and Gertler (1993) attribute the growth in bank loan commitments during the 1980s to the rapid development of the commercial paper market since commercial paper issuers generally secured their loans with a backup line of credit from banks. In line with this idea, the secular decline in unused loan commitments that started in 2008 may, in part, be a consequence of the observed decline in activity in the commercial paper market that came about as a result of the crisis (Kacperczyk and Schnabl 2010). As we discussed earlier in this section when looking at the evolution of bank lending, another factor that can help explain the decline in outstanding loan commitments in 2008 (see Panel A of Figure 20) is the fact that many firms took loans from banks by drawing down their existing lines of credit during the crisis (Ivashina and Scharfstein 2010).

Credit derivatives are financial contracts that allow one party (the purchaser) to transfer the credit risk of a "reference" asset or entity to another party (the seller). If the referenced asset fails to deliver a promised payment, then the seller steps in and covers the shortfall. Panel A of Figure 21 shows that almost all the credit derivatives owned by the BHCs in our sample are credit default swaps (CDS). A CDS is

Figure 21 Credit Default and Interest Rate Swaps as a Proportion of Total Assets



Note: All quantities are notional amounts expressed as a proportion of total balance sheet assets. The dashed and solid lines represent, respectively, the standard and weighted means across all companies in our sample. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

a contract in which a protection seller, for a fee, agrees to reimburse a protection buyer for any losses that occur due to a credit event of a particular entity. If there is no credit default event (as defined by the derivative contract), then the protection seller makes no payments to the protection buyer and receives only the contract-specified fee. Under standard industry definitions, a credit event is normally defined to include bankruptcy, failure to pay, and restructuring.

We plotted other derivatives excluding interest rate contracts in Panel B of Figure 20. In Panel B of Figure 21 we plot other derivatives including interest rate contracts. The main category of interest rate contracts is interest rate swaps, which accounts for over 60 percent of the total of interest rate contracts during our sample period. We plot the notional amount of interest rate swaps as a proportion of assets in Panel B of Figure 21. Just like with CDS (Panel A of Figure 21), the holdings of interest rates swaps by the largest companies was growing in the years leading up to the crisis, but growth stalled with the crisis and did not recover during our sample period.

Table 1 Off-Balance-Sheet Items as a Proportion of Total Assets, Q4:2011

BHCs	Commitments	Letters of Credit	Derivatives		
			Credit	Other	OTC
Medium-Large	0.2174	0.0142	0.0004	0.1514	0.0015
Large-Large	0.3593	0.0548	1.1467	16.919	0.0453

Notes: OTC derivatives are the net current credit exposure on OTC derivatives held by the companies in our sample. All other derivatives positions are reported in notional amounts. All quantities are expressed as a proportion of total balance sheet assets.

To complement the picture of how the predominance of different off-balance-sheet activities varies with the size of companies, we split our sample in large-large and large-medium companies as before and compute subsample averages. For each of the main categories of off-balance-sheet items, Table 1 shows the total value reported by these companies in the last quarter of 2011, expressed as a proportion of total assets. We confirm with this table that BHCs with more than $50 billion in assets (the large-large subsample) have a much more active participation in off-balance-sheet activities than the large-medium companies for all off-balance-sheet categories.

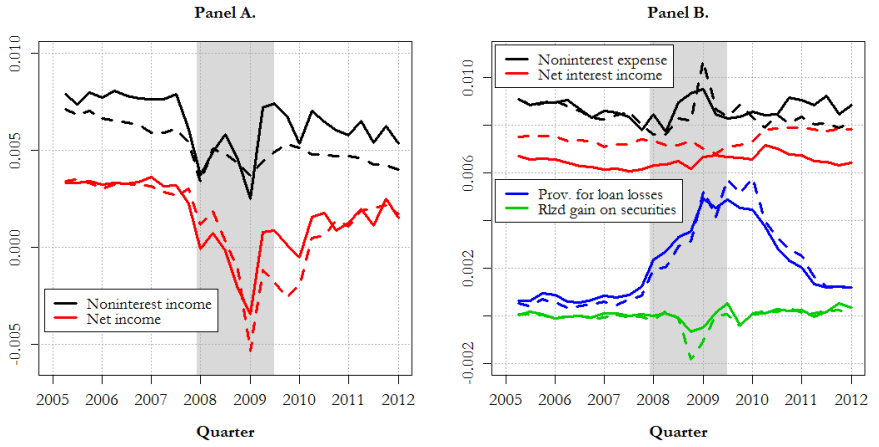
Off-balance-sheet activities also have an impact on the income statement as they are an important generator of fee income. Similarly, securitization and loan sales are two other common activities of these large BHCs that we have not yet discussed and are significant sources of noninterest income. We investigate this issue in the next section.

3. INCOME STATEMENT

In this section, we discuss the evolution of income for the BHCs in our sample. Panel A of Figure 22 presents the standard and weighted means of net income, as a proportion of assets (dashed and solid red lines, respectively). This measure of relative income is often called return on assets (ROA).[18] We see that ROA fell dramatically during

[18] In all the figures, we plot quarterly income as a proportion of assets at the end of the quarter. This way of presenting the data matters for the levels of some of these variables. For example, ROA is often reported on an annualized basis and it is calculated using average assets. We are mainly interested in the behavior of these variables over time and just use assets as a way to normalize the data across companies with very different sizes. For our purposes, then, the simpler ratio of values at the end of the quarter used in the figures suffices.

Figure 22 BHC Income Statement: Components as a Proportion of Total Assets



Notes: The blue lines in Panel B represent the item on the income statement named "Provision for loan and lease losses" and the green lines represent "Realized gains (losses) on held-to-maturity and available-for-sale securities." All quantities are expressed as a proportion of total assets. The dashed and solid lines represent the standard and weighted means, respectively. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

the crisis and was actually negative from mid-2008 until mid-2009. It is interesting to see that there appears to be no significant difference between the behavior of income in the largest companies and the rest. They all share a similar experience in terms of the evolution of their net income.

Figure 22 also presents some of the various components of bank income. We see from the figure that noninterest income and provision for loan and lease losses (which is subtracted from income) have been the main drivers of net income during the sample period. Noninterest income appears to be more volatile for the largest banks (as indicated by the solid and dashed black lines in Panel A). Interest income and noninterest expenses are fairly stable across time. The largest banks tend to have lower net interest income as a proportion of assets (the

solid red line in Panel B of Figure 22 is consistently lower than the dashed red line).[19]

Net interest income is the income that banks get from lending at higher rates than they borrow. In a sense, this is the kind of income associated more closely with traditional banking. Noninterest income is generated by other activities, such as asset trading, insurance, and financial services and advice. Importantly, most of the income originated in off-balance-sheet activities is considered noninterest income. Comparing the levels of noninterest income (black lines in Panel A) and net interest income (red lines in Panel B) for the period before the crisis, we see that the companies in our sample tend to have (on average) as much or higher noninterest income than net interest income. The BHCs we study are relatively large organizations (more than $10 billion in assets) with multiple business lines, far beyond the standard deposits-and-loans business associated with traditional banking. This relative comparison of net interest income and noninterest income is a reflection of that fact.[20]

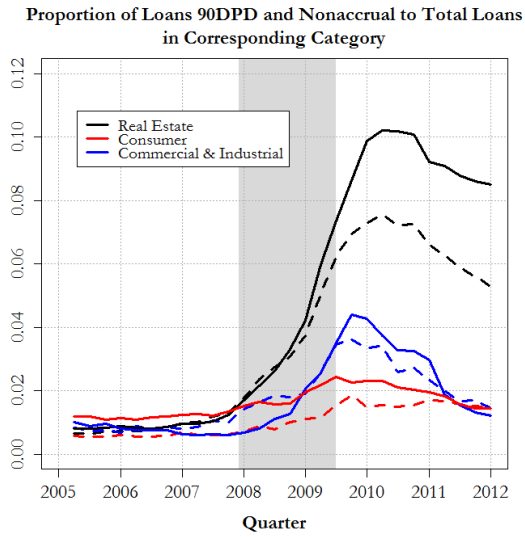
We saw in Figure 6 that allowance for loan losses (an item on the asset side of banks' balance sheets) increased significantly during the crisis period. The change in allowances is basically the result of provision for loan losses net of loan charge-offs and other write-downs. Consistent with the behavior of allowances, Panel B of Figure 22 shows the surge in provisions (blue lines) starting in mid-2007 and lasting for more than three years. This increase in provisions is another important factor that reduced banks' net income during the crisis years.

Presumably, companies started to provision for losses as they saw the prospects for loan deterioration increase. As a complement to Panel B of Figure 6, Figure 23 shows that the proportion of nonperforming loans started to increase in late 2007 driven mainly by real estate loans. Later in the sample period, during 2009, the rate of nonperforming loans in the commercial and industrial category increased significantly as well. The performance of real estate loans appears to be noticeably

[19] Note that noninterest expense includes general costs (such as salaries and employee benefits) not just associated with generating noninterest income; in particular, noninterest expense is the overhead cost of generating both net interest and noninterest income. For this reason, it does not really make sense to net out noninterest expense from noninterest income and we keep them separate in the figure.

[20] Copeland (2012) discusses the evolution of bank income for large BHCs in the period from 1994 to 2010 and shows that the largest BHCs have shifted away from the traditional sources of bank income—mainly, interest income—and toward noninterest income: in particular, income that comes from securitization activities and from sources of income related to capital markets, such as income from trading assets, investment banking, and insurance.

Figure 23 Loan Performance

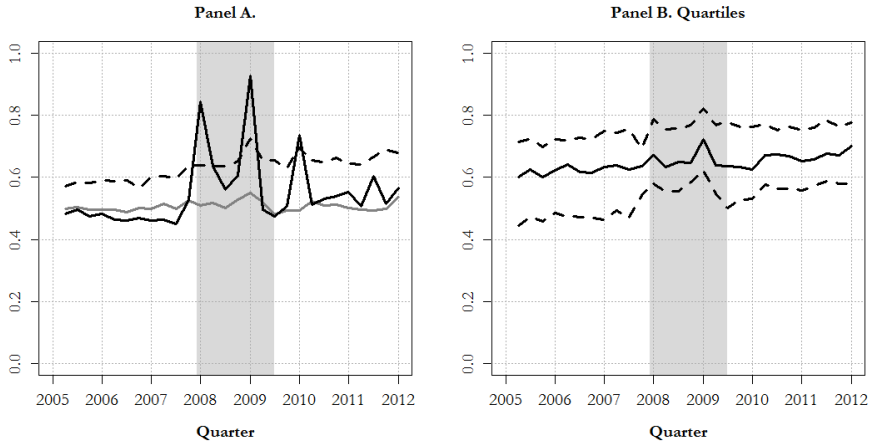


Notes: Each line shows averages across firms of the proportion of nonperforming loans over total loans in each category (real estate loans, consumer loans, and C&I loans). Nonperforming loans are loans that are 90 days past due or nonaccrual. The dashed and solid lines represent the standard and weighted means, respectively, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

worse in the largest companies (comparing the black solid and dashed lines), especially after mid-2009.

In Panel A of Figure 24 we plot net interest income as a proportion of total revenue, which we define as the sum of net interest income and noninterest income. The dashed line is the standard mean of this ratio for all companies in our sample. The solid line is the weighted mean, where the weights are calculated as the ratio of assets in the corresponding company and total assets in our sample for that period. We see in the figure that, in general, 50 percent to 60 percent of bank revenue originates from exploiting the spread between borrowing and lending rates. Consistent with Copeland (2012), we also see that the larger companies tend to rely more on noninterest income as a source of income (the dashed line is generally above the solid line).

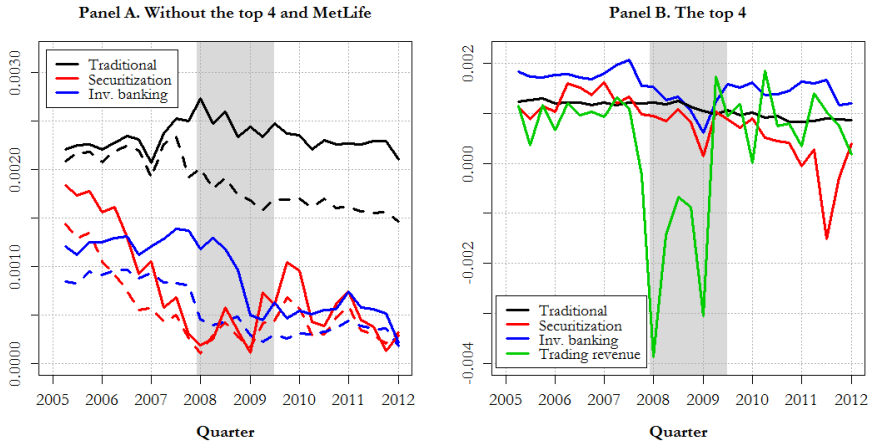
Figure 24 Net Interest Income as a Proportion of Total Income



Notes: The dashed and solid lines in Panel A represent the standard and weighted means, respectively, where the weights in the weighted mean are calculated as the ratio of assets in the corresponding company and total assets in our sample for each respective quarter. The gray line is the weighted mean excluding the four largest companies as of 2011. Panel B shows the median (black solid line) and the 25th and 75th percentiles (black dashed lines) of the distribution across firms in the sample of the ratio of net interest income and total income. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

The gray line in Panel A is the weighted mean excluding the four largest BHCs: JPMorgan Chase, Bank of America, Citi, and Wells Fargo. The spikes in the ratio, which are evident in the black solid line in Panel A, are the result of significant fluctuations in noninterest income at the four largest banks (see the behavior of noninterest income in Panel A of Figure 22). It is worth noticing, however, that to a certain extent the drop in the last quarter of 2008 in noninterest income relative to net interest income is still present in many of the other companies in our sample. Evidence of this is that both the standard mean and the median (the black solid line in Panel B of Figure 24) of the ratio both go up in the last quarter of 2008. Panel B of Figure 24 also plots the 25th and 75th percentiles of the distribution of this ratio at each point in time. While we see some variation across companies, we do not see

Figure 25 Main Components of Noninterest Income as a Proportion of Total Assets



Notes: All quantities are expressed as a proportion of total assets for each company. The dashed and solid lines represent the standard and weighted means, respectively. Panel A presents averages for all companies in our sample except the largest four according to assets and MetLife. Panel B plots the weighted average for the largest four companies. For a full description of traditional noninterest income, securitization income, income from investment banking activities, and trading revenue see text. Data are quarterly. The shaded area indicates the U.S. business cycle contraction, as defined by the NBER, from December 2007 to June 2009.

significant variation or trends in the level of heterogeneity in this ratio among the companies in our sample.[21]

Figure 25 presents a decomposition of noninterest income. For this purpose, we created four categories of income that allow us to summarize the most interesting developments. Traditional noninterest income includes service charges on deposit accounts and other income from fiduciary activities. Securitization income includes net securitization income, other servicing fees, and net gains from loan sales. Investment banking includes fees and commissions from securities brokerage, investment banking, underwriting, and venture capital revenue. Finally, trading revenue is exactly what is reported under that category in the FR Y-9C forms. More specifically, trading revenue is the net gain

[21] Copeland (2012) provides further evidence on the heterogeneity of income sources across large bank holding companies.

or loss from trading cash instruments and off-balance-sheet derivative contracts (including commodity contracts) that has been recognized during the calendar year-to-date. We do not plot trading revenue for the companies in Panel A as it is a very small number and fairly stable.

There are some sources of income that we choose to not report. For example, income from insurance activities is mainly driven by one company, MetLife.[22] After excluding MetLife, this item is quite small and nothing significant appears when plotting the series. The figure also does not include the category "other noninterest income," which contains income and fees from the printing and sale of checks and from ATMs, rents from safe deposit boxes, income from other real estate owned, debit and credit card interchange fees, and other small items. This category of income is also relatively small.

Some observed sharp fluctuations in the largest companies' components of noninterest income tend to dominate the weighted means of the full sample. This is especially noticeable when looking at trading revenue, but it also occurs, to a lesser degree, for other components. For this reason, in Panel A of Figure 25 we report the standard and the weighted means for all companies excluding JPMorgan Chase, Bank of America, Citi, and Wells Fargo. We also exclude MetLife from these averages as MetLife is an evident outlier in terms of receiving most of its noninterest income from insurance-related activities. In Panel B of Figure 25 we plot the weighted mean for the four largest BHCs that were not included in Panel A.

We see in Panel A that both income from securitization and investment banking dropped sharply with the crisis and remained low for the rest of the sample period. This is a fairly widespread phenomenon (as we see from both means experiencing similar behavior). In sharp contrast with the rest of the companies, fluctuations in trading revenue of the four largest companies tended to dominate the behavior of overall noninterest income during the crisis. Panel B of Figure 25 makes this evident. Finally, note that the largest companies share with the rest of our sample the decline in income from securitization and investment banking as sources of income after the crisis. These trends, however, seem moderate when compared with the swings in trading revenue.

[22] Note that the last report filed by MetLife, Inc. is from the third quarter of 2012, after the end of our sample period. The approval for the company to deregister as a BHC was announced on February 14, 2013.

4. CONCLUSION

Large U.S. bank holding companies are complex organizations. They played an important role in the recent financial crisis and many of them experienced significant financial turmoil during that period. We have attempted here to provide a comprehensive overview on the performance of these companies between the beginning of 2005 and the end of 2011, based on information provided in the FR Y-9C reports that these companies submit for regulatory purposes. The discussion in the article touched on many different aspects, too many to summarize in this concluding section. Instead, we will highlight a few of the most interesting facts.

First, the number of companies with more than $10 billion in assets and with more than $50 billion in assets has been fairly stable (at around 60 and 25, respectively). The total assets in companies with more than $50 billion was growing rapidly before the crisis but growth slowed at the beginning of 2009 and remained slow for the rest of the sample period. Of course, loan performance deteriorated significantly after the crisis, but in general the traditional business of banking—borrowing and lending—was a source of stability for these large companies. The most significant swings were observed in those variables that describe the BHCs' asset-markets activities, with noninterest income volatility being a leading example.

Large BHCs are crucial participants in both sides of the repo market. The total volume of both repos and reverse repos for these companies fell during the crisis, and while reverse repos recovered after the crisis—mainly for companies with more than $50 billion in assets—borrowing in the repo market by the companies in our sample remained at crisis levels by the end of our sample period in December 2011. This last fact is just one more manifestation of a general change in the way these companies are funded: After the crisis, the composition of deposits shifted away from time deposits and into transaction and savings accounts, the time-to-maturity of other borrowed money increased significantly, and the composition of bank capital changed to include a more significant proportion of common equity.

Our goal was to paint a broad picture of the evolution of large BHCs in the recent past. While obtaining a broad understanding of what happened is important, it required us to use a thick brush. We only discussed the main components of balance sheets, off-balance-sheet activities, and income statements. We also restricted ourselves, for the most part, to describing the time series of standard and weighted averages and aggregates for two subsamples: large-large and large-medium companies. There is much more detailed information in the FR Y-9C reports that could be interesting to analyze. Furthermore, there

is a large amount of cross-company heterogeneity hidden behind our reported averages. Digging deeper into the performance of these companies is likely to be a fruitful activity. For that investigation, the general perspective we have provided here could be a valuable starting point and a guiding reference.

REFERENCES

Afonso, Gara, Anna Kovner, and Antoinette Schoar. 2011. "Stressed, not Frozen: The Federal Funds Market in the Financial Crisis." *Journal of Finance* 66 (August): 1,109–39.

Ashcraft, Adam B., Morten L. Bech, and W. Scott Frame. 2010. "The Federal Home Loan Bank System: The Lender of Next-to-Last Resort?" *Journal of Money, Credit and Banking* 42 (June): 551–83.

Avraham, Dafna, Patricia Selvaggi, and James Vickery. 2012. "A Structural View of U.S. Bank Holding Companies." Federal Reserve Bank of New York *Economic Policy Review* (July): 65–81.

Bayazitova, Dinara, and Anil Shivdasani. 2012. "Assessing TARP." *Review of Financial Studies* 25 (2): 377–407.

Bernanke, Ben S. 2007. "The Recent Financial Turmoil and its Economic and Policy Consequences." New York, N.Y.: Speech at the Economic Club of New York (October 15).

Boyd, John H., and Mark Gertler. 1993. "U.S. Commercial Banking: Trends, Cycles, and Policy." *NBER Macroeconomics Annual* 8: 319–77.

Cetorelli, Nicola, and Linda S. Goldberg. 2012. "Follow the Money: Quantifying Domestic Effects of Foreign Bank Shocks in the Great Recession." *American Economic Review* 102 (May): 213–8.

Copeland, Adam. 2012. "Evolution and Heterogeneity among Larger Bank Holding Companies: 1994 to 2010." Federal Reserve Bank of New York *Economic Policy Review* (July): 83–93.

El-Ghazaly, Hoda, and Yadav Gopalan. 2010. "A Jump in Consumer Loans?" Federal Reserve Bank of St. Louis *Economic Synopses* 18 (July):1–2.

Ennis, Huberto M. 2011. "Discussion of Acharya and Skeie: A Model of Liquidity Hoarding and Term Premia in Inter-bank Markets." *Journal of Monetary Economics* 58 (July): 448–52.

Ennis, Huberto M., and Alexander L. Wolman. 2015. "Large Excess Reserves in the U.S.: A View from the Cross-Section of Banks." *International Journal of Central Banking* 11 (January): 251–88.

Financial Crisis Inquiry Commission. 2011. *The Financial Crisis Inquiry Report*. Available at fcic.law.stanford.edu/report (January).

Furlong, Fred. 2011. "Stress Testing and Bank Capital Supervision." Federal Reserve Bank of San Francisco *Economic Letter* (June 27).

Gorton, Gary, and Andrew Metrick. 2012. "Securitized Banking and the Run on Repo." *Journal of Financial Economics* 104 (3): 425–51.

Hirtle, Beverly. 2014. "Bank Holding Company Dividends and Repurchases during the Financial Crisis." Federal Reserve Bank of New York Staff Report No. 666 (March).

Ivashina, Victoria, and David Scharfstein. 2010. "Bank Lending During the Financial Crisis of 2008." *Journal of Financial Economics* 97 (September): 319–38.

Kacperczyk, Marcin, and Philipp Schnabl. 2010. "When Safe Proved Risky: Commercial Paper during the Financial Crisis of 2007–2009." *Journal of Economic Perspectives* 24 (Winter): 29–50.

Taylor, John B., and John C. Williams. 2009. "A Black Swan in the Money Market." *American Economic Journal: Macroeconomics* 1 (January): 58–83.