A Review of Bank Funding Cost Differentials*

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I. Introduction

The debate over the existence and extent of funding cost differentials between large and small banks is central to ongoing important discussions of financial regulatory reform related to perceptions of "too big to fail" government support. A substantial research literature exists that tries to address this issue empirically, and the results vary depending upon the time period, the sample, and the method. This paper attempts to provide an overview and analysis of different approaches that have been taken and to provide some suggestions for the most promising research designs going forward in order to clarify and advance our understanding of funding cost differentials.

Rather than attempt the impossible task of summarizing and assessing the dozens of papers in the literature individually, in the next section I provide a simple taxonomy of five basic approaches into which the existing literature can be categorized. While this does not do justice to the nuances of each paper, it will provide a tractable way to provide an overview of what has been done. In the following section, I then provide an analysis of general challenges that all of the approaches face, namely, the interpretation of funding costs differences between large and small banks, the choice of the relevant time period, the choice of the sample, and the significant differences in the funding structures of large and small banks. After that, in section IV, I focus on more specific challenges that three of the main approaches face and provide suggestions for the most promising methods for measuring funding cost differentials. I then provide a summary and conclusion in section V.

II. Overview and Taxonomy of Existing Approaches to Estimating Funding Cost Differentials

The many studies that have been undertaken on funding cost differentials for large versus small banks can be placed into five categories, focused on the data and methods they use. Of course, some studies are more comprehensive than others and may fall into more than one category. The main categories of existing studies are those focusing on: 1) Bond pricing and credit default swap (CDS) spreads; 2) Credit ratings; 3) Deposits; 4) Equity prices; and 5) Other. Figure 1 provides a brief summary.

[Insert Figure 1 here]

III. General Challenges for Empirical Studies of Funding Cost Differentials

In this section, I consider some general issues that all empirical studies trying to measure perceptions of government support must grapple with. This could be considered a "check list" in evaluating existing studies and in formulating the most effective methods going forward.

(1) Are differences between large and small banks due to perceptions of government support or due, at least in part, to size-related factors independent of perceptions of government support?

Generally, the funding cost studies attribute the differences between large and small banks to perceptions of government support for the large banks. The key issue in the empirical design is what economists call the "identification strategy," that is, formulating an approach that makes a convincing case that the measured difference between large and small banks is primarily due to perceptions of government support

and not due to other factors that might be associated with size but are unrelated to perceptions of government support.

It is, for example, important to check to see whether some of the measured differences for large banks may also arise in other industries without perceptions of government support for large firms. It is possible that there may be funding advantages that are simply associated with size, due to greater diversification, greater liquidity of debt issues, greater access to capital markets in times of stress, and more frequent issuance.[1] If this general size advantage is empirically relevant, the data would show funding cost advantages for the largest firms in many industries, not simply in banking. If so, it will be important to adjust for the general size advantage across many industries when estimating the funding cost differentials in banking in order to isolate and estimate the impact of perceptions of government support.

As a rough first pass to determine whether this issue merits further empirical investigation, we can compare the yields paid by large firms versus small firms in a variety of industries including banking. More specifically, we can compare the weighted average cost (WAC) of debt for the top ten firms by assets and the rest of the firms in a number of industries using industry categories and WAC data from Bloomberg. The difference between large and small firms ranges from 84 basis points for energy firms to 5 basis points for utilities. Banks are in the middle at 35 basis points. The average differential across these industries is 36 basis points.[2] These comparisons suggest that

[1] More historical data and greater market familiarity can lower the cost of, and the uncertainty involved in, modeling and monitoring the risks of the issuer. In other words, the willingness of analysts to invest in understanding a firm may be related to the frequency and size of its issues.
[2] The data are for the 3000 largest firms by market capitalization with the debt/equity ratios above the 10th percentile (to eliminate outliers). The WAC is calculated from the first quarter of 2007 to the second quarter of 2013. The top ten institutions are identified based on assets as of

funding cost differentials appear to exist generally between large and small firms in many industries, not simply in banking. In addition, since the magnitude of the differential in banking is at the center of the range found across the other industries, banking does not seem to be an outlier.[3]

Obviously, the next step would be to introduce controls for risk and other factors to determine whether this general size advantage remains. Araten and Turner (2013), for example, have introduced controls for risk in analyzing differences in Credit Default Swap (CDS) spreads between large and small firms in a variety of industries. They find that large firms generally do enjoy lower risk-adjusted CDS spreads than smaller firms in the same industry. In addition, they find that the size advantage tends to be lower in banking than in most other industries.[4] (For more on controlling for liquidity and other differences, see below section IV.3.)

Measuring and understanding the general size advantage that appears to exist across industries, independent of whether there may be perceptions of government support for large firms in that industry, has important implications for interpreting funding cost differences in banking. To the extent that such differentials are a general

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the end of the 2012. For ten broad industry categories in Bloomberg, the WAC differential in basis points between the top ten and other firms are: energy 84, consumer non-cyclicals 53, industrials 40, consumer cyclicals 39, banks 35, communications 30, non-bank financials 28, basic 28, technology 16, and utilities 5.

[3] Strongin et al (2013) examined the top ten firms by revenue across 17 industries and found similar results.

[4] Araten and Turner (2013) examine the same ten industries described in footnote two from the first quarter of 2002 to the first quarter of 2011. The "large" banks in their study (defined as Global Systemically Important Financial Institutions -- see section III.3 below) constitute approximately 60 percent of the market capitalization of all banks for which 5 Year CDS spreads are available. They use the same 60 percent share of market capitalization criterion to define large firms in other industries. They find a positive and statistically significant large-small difference in all of the industries except utilities. The estimated size advantage in each of the industries, except utilities, is greater than their estimate in banking (although they don't perform formal "difference in difference" statistical tests, discussed below).

phenomenon across many industries, one cannot simply conclude that a funding cost difference in banking is due to perceptions of government support. Some type of adjustment for the general size advantage would then be necessary to identify differentials attributable to perceptions of government support.

A "difference in difference" approach could provide a research design to address this issue. This approach would involve two steps: First, estimating large versus small firm cost differentials in many industries, including banking, and using controls for firm and market risks, liquidity, etc. and then, second, formally testing whether the differentials in banking are greater than the large-small difference in other industries. To the extent that such a differential is greater in banking than in other industries, then that additional amount could be attributed to perceptions of government support in banking. In other words, the estimate of the large-small difference in banking, *relative* to the large-small difference in industries without a perception of government support of large firms, would provide a measure of the advantage large banks would have from perceptions of government support. Much more work needs to be done studying this apparent general size advantage and adjusting for it when estimating the magnitude of funding cost reductions due to perceptions of government support. A difference in difference research design, thus, can provide an effective "identification strategy," and so is a fruitful direction for future research.

In addition, recent research suggests that there may be economies of scale in banking. Studies analyzing data from before the full implementation of intra-state and inter-state branching deregulation in the 1980s and 1990s had found little evidence of scale economies beyond a relatively small bank size, but newer studies suggest

otherwise.[5] Using data from the 2003, 2007, and 2010 and a technique that takes into account banks' risk choices and diversification, for example, Hughes and Mester (forthcoming) find positive scale economies for even the largest institutions. They also undertake robustness checks to see if perceptions of government support could account for the results for the biggest banks and do not find support for that hypothesis.[6] Thus, it is also valuable to check that results from funding cost differential studies are not due to potential scale economies in banking in order to identify the impact of perceptions of government support.

(2) *What is the appropriate time period to examine?*

Perceptions about government support in banking have varied considerably over time. Following the government support for Continental Illinois Bank in 1984 and the Comptroller of the Currency naming 11 large banks that would receive similar treatment if they were to experience distress, a number of studies found increases in funding cost differentials for the largest banks (e.g., O'Hara and Shaw 1990). As the regulators stepped back from such open-ended commitment in the following years and with the passage of the FDIC Improvement Act of 1991, however, these differentials appeared largely to disappear (Flannery and Sorescu 1996). Morgan and

[5] See Hughes, Lang, Mester, and Moon (1996 and 2000), Feng and Serletis (2010), and Wheelock and Wilson (2012). For a description and analysis of the impact of branching deregulation, see Kroszner and Strahan (1999). A variety of technological and financial innovations, such as the development of credit scoring techniques, also may have increased scale economies in banking (see Strahan forthcoming for an overview). Anderson and Joeveer (2012) use a different approach that relaxes the assumption of a competitive labor market for key bank employees and also find significant scale economies for the largest banks that they argue are not due to perceptions of government support.

[6] For example, Hughes and Mester (forthcoming) apply the funding costs that small banks face to the cost functions for the largest banks, and they still find significant scale economies for the largest banks. This would suggest that funding cost differentials are not driving their finding of scale economies for large banks.

Stiroh (2005) found a revival of these differentials in the 1990s. Recent studies looking at both deposit and bond data (e.g. Acharya et al 2013 and Jacewitz and Pogach 2013), find little difference in the years leading up to the financial crisis, and then larger differentials during and immediately after the crisis.[7]

Changes in Credit Default Swap (CDS) spreads since the mid-2000s provide a rough way to gauge markets' overall assessment of large bank risk. The CDS spreads will reflect both the likelihood that an individual bank might experience extreme financial distress and the probability that the institution would receive support in such a stress situation. If individual banks and the system overall are perceived as very low risk, then the CDS spread would be low, regardless of probability of government crisis support since the bank would be perceived as so unlikely to be in a position to require such support. As Figure 2 shows, the CDS spreads for the six largest US bank holding companies were very low, stable, and nearly identical prior to the second quarter of 2007. A perception of low risk for individual institutions and the system as a whole could account for this pattern.[8]

The CDS spreads for these institutions blow out during the crisis and vary significantly across the large banks. After the crisis, the CDS spreads fall from their 2008 and 2009 peaks but continue to be substantially higher and more differentiated than in the pre-crisis period. In addition, the CDS spreads vary much more over time in the

[7] See Strahan (forthcoming) for an overview of how perceptions of government support appear to have changed over time.

[8] Alternatively, a high probability of government support could also explain the low and undifferentiated CDS spreads for the largest banks in this period. One very rough way to examine this alternative would be to examine the CDS spreads for smaller banks relative to those of large banks. In this period, however, the CDS market is not very liquid beyond the largest firms so it may be challenging undertake a detailed empirical examination of alternative explanations of the pre-crisis period.

post-crisis period, for example, moving up and down as concerns about Europe wax and wane.

[Insert Figure 2 here]

These data suggest that markets began to differentiate among the risks of the largest banks during the crisis and that differentiation continues in the most recent data. In addition, the default risk on senior debt of the largest banks is perceived to be much greater today than prior to the crisis. These higher CDS spreads persist despite various changes that have generally should have improved bank resiliency, such as the doubling of common equity and increase in the liquidity buffers by the largest banks since the crisis (see Tarullo 2013)[9]. While the CDS spreads by themselves are not measures of perceptions of government support, the increased level and differentiation of these spreads for the largest banks is difficult to square with a significant increase in perceptions of government support.[10]

Given the actions during the crisis and the changes following the crisis, a key question in public policy debates about financial regulatory reform concerns the

[9] There has been a "doubling in the last four years of the common equity capital of the nation's 18 largest bank holding companies, which hold more than 70 percent of the total assets of all U.S. bank holding companies. The weighted tier 1 common equity ratio, which compares high-quality capital to risk-weighted assets, of these 18 firms rose from 5.6 percent at the end of 2008 to 11.3 percent in the fourth quarter of 2012, reflecting an increase in tier 1 common equity from $393 billion to $792 billion during the same period," (Tarullo 2013).

[10] Data on CDS spreads for smaller banks might help to shed further light on the issue. If, for example, the CDS on smaller banks were generally lower than for the largest banks, the market perception is that the senior debt of the largest banks is more likely to default than the senior debt of smaller banks. Comparing pre-crisis (2006) with post-crisis (2013), the U.S. Treasury (2013) finds that (a) the average spread has risen by 75 bps for six large banks but only 40 bps for four regional banks, and (b) the average level of the CDS spread is higher for the large banks. These results imply that the markets are pricing a greater increase in and greater level of the likelihood of default by large banks relative to small banks. These results thus again are difficult to square with a perception of a high or increased likelihood of government support for the largest institutions. Certainly, a more detailed study controlling for bank-specific risk factors would be needed to draw firm conclusions, and I discuss some studies below.

perceptions of the likelihood of government support in the current environment and in the future. Capital requirements for banks are now significantly higher than pre-crisis and, as noted above, actual equity capital of large US banks has doubled since 2007. Many other changes, both in terms of regulation and market practice, have occurred since the crisis. The Dodd-Frank Act of 2010[11], for example, has set in motion of number of regulatory reforms that have the potential to change market perceptions of government support, even if much work still needs to be done before conclusions can be drawn.[12]

Thus, studies focusing on crisis and pre-crisis data may be less relevant to assessing the magnitude of funding cost differentials today, either due to overall changes in market perception or expectations about how regulatory changes may affect the probability and extent of government support going forward. Estimates from historical data suggest that differences in funding cost differentials vary over time and that these estimates may vary with the perceptions of risk and changes in regulatory regime. The simple CDS data suggest that markets perceive significantly higher and more differentiated risks for the largest banks post-crisis than pre-crisis. Data from the post-crisis period, thus, would be most relevant for determining the impact of the perceptions government support in the current environment. Using data from the

[11] Schaefer et al. (2013), for example, undertake an event study of events related to the passage of Dodd-Frank that were sufficiently notable to receive front page coverage in the Financial Times. On a number of these events, they find negative market reactions for large bank stock prices and widening of CDS spreads for large banks.

[12] See below section IV.1 on warnings from the credit ratings agencies that they are (negatively) re-evaluating the likelihood of government support in light of the implementation of Dodd-Frank. In particular, they cite developments of provisions related to "orderly liquidation authority" are reducing the likelihood of government support for BHC debt. See also proposals for more "bail in" debt at the holding company level, e.g., http://www.ft.com/intl/cms/s/0/f5b56a22-13e8-11e3-9289-00144feabdc0.html?siteedition=intl#axzz2dhz5QpbS

recent period thus would seem to be the most relevant in analyses of funding cost differentials for addressing current policy debates about perceptions of "too big to fail" government support.

(3) What is the appropriate sample and comparison group?

There is no theoretically "correct" definition of what constitutes a "large" bank since there are no direct measures of which banks are perceived as most likely to receive support in a crisis. Different studies take a variety of approaches -- some based on size and others based on other indicators of potential support. A simple asset-size cut-off is used frequently. Common choices have been $500 billion, which would include six banks in the post-crisis period; $100 billion, which would include roughly 18 banks, and $50 billion, which would include roughly 36 banks and is the cut-off in the Dodd-Frank Act for enhanced supervision and regulation by the Fed. Some studies also have used the top ten banks or the top tenth percentile of banks.

Alternatively, many studies have used regulatory treatment to define "large." A common definition is to use the eight US banks designated as Global Systemically Important Banks (G-SIBs) by the Bank for International Settlements and G-20 and subject to stricter capital requirements and supervision. These include the six institutions over $500 billion in assets plus two banks heavily involved in custodial services, Bank of New York Mellon and State Street (see Figure 3). Others have defined large as the roughly 18 banks that have been included in the Fed's "stress tests," which are known more formally as the Comprehensive Capital Adequacy Reviews (CCAR).[13] In practice, the CCAR definition has been approximately the same as the above $100 billion cut-off,

[13] I am using the term "bank" here as a short-hand for bank holding company (BHC) because the regulatory designations are at the BHC level.

although future "stress tests" are scheduled to include banks above $50 billion in assets. In addition, some studies have used measures of "systemic importance" to determine which institutions should or should not be included as "large" (see Acharya et al 2013 and Adrian and Brunnermeier 2011).

[Insert Figure 3 here]

Since there is no "correct" definition, it is important to undertake robustness tests in any study to understand how the results might vary with the different definitions. For simplicity, I would lean towards using the regulatory treatment definitions, particularly G-SIBs. I think this would be likely to provide the cleanest "base case" for a few reasons. First, since the focus is to try to measure perceptions of different treatment of banks in a crisis, different regulatory treatment and public designation as a G-SIB seem to be most likely to be correlated with expectations about whether a bank would be perceived as too big/interconnected/important to fail.[14] The designations of banks as G-SIBs also have received a lot of press attention so it may be more widely known than whether a bank is or is not above a particular asset-size threshold. Second, this regulatory treatment definition is closely related to the $500 billion size cut-off, so size is not being ignored.

Of course, this relatively clean sample involves a relatively small number of firms so there is a trade-off with the number of observations. Using a cut-off of $100 billion in assets, which would then roughly include the banks in the original CCAR "stress tests,"

[14] In addition, the eight G-SIBs are the institutions that receive "with support" ratings from the credit rating agencies and so are treated differently than other banks (more on this in section IV.1 below).

would increase the number of banks and provide a useful robustness check on the G-SIB definition of "large" banks.

Two more questions about the appropriate sample arise: Should non-US institutions be included? Should non-bank financials be included?[15] Certainly, including non-US institutions and non-bank financials can increase the sample size, but they introduce important sources of heterogeneity that can complicate comparisons. The decision of whether to expand the sample depends on judgments about the trade-off between larger samples and greater heterogeneity.

Including non-US institutions, I would argue, involves an "apples to oranges" comparison since the rules and expectations concerning the potential for government support vary considerably across the globe. In the context of US policy debates, it seems best to focus on US institutions in order to measure the perceptions of US government support, which might be very different from perceptions of government support in other countries. In addition, unless there is reason to believe that including non-bank financials introduces very little heterogeneity, it seems cleaner to focus on banks. Otherwise, the interpretation of a cost differential becomes more difficult, since non-bank financials typically have very different funding structures and are subject to different regulatory regimes and, hence, to different perceptions of government support than are banks.

[15] A third question also arises: In the US, should the focus be on banks or bank holding companies (BHCs)? Given that the G-SIB designation is at the BHC level, that some data are more readily available on BHCs, and that much of the policy debate has been related to resolution regime for BHCs, the holding company level would seem to be the appropriate empirical focus.

(4) How should funding cost differentials be used in calculating the total dollar value of benefits?

Many studies of funding cost differentials use the measured spread between large and small banks to calculate a total dollar value of benefits to large banks. In doing so, it is important to take into account the heterogeneity in how large and small banks fund themselves and to apply the measured differences to the appropriate sources of funds.

Perhaps the most basic difference is that small banks rely much more heavily on deposits as a source of funds than large banks do. For the most recent four quarters, for example, domestic interest-bearing deposits are 65 percent of the total liabilities of small banks but are only 30 percent of the liabilities of large banks, defined as the G-SIBs (see Figure 4).[16] In contrast, large banks have greater access to the capital markets and rely much more heavily on both senior and subordinated debt as well as repurchase agreements and borrowing in the federal funds market: 37 percent of the funding for the G-SIBs come from these sources whereas they constitute only 15 percent of the funding for smaller banks (see Figure 4).

[Insert Figure 4 here]

The different sources of funds have very different costs associated with them. Deposits tend to have substantially lower interest costs than other liabilities.[17] As Figure 4 shows, the average cost of senior debt is roughly five times greater than deposits costs for the small banks and roughly nine times greater for large banks. These cost and

[16] If the $100 billion cut-off for large banks is used, the contrast is similar: 67 percent for smaller banks and 36 percent for large banks.
[17] Certainly, there may be "brick and mortar" as well as personnel costs associated with deposit gathering, although some internet banks have been successful in attracting deposits.

funding mix differences have a substantial impact on average overall funding costs for large versus small banks.[18] Given that small banks rely much more on the relatively low-interest-cost deposits as a source of funding, the overall average funding costs of large and small banks turns out to be quite similar. As Figure 5 illustrates, since 2007, the overall average funding cost difference has varied within a narrow range and has been virtually zero in the most recent quarters. The data in Figures 4 and 5 underscore the importance of taking account of the very different liability structures of large and small banks when applying estimates of funding cost differentials to calculate the total value of benefits of perceptions of government support.

[Insert Figure 5 here]

IV. Challenges for Specific Approaches to Estimating Funding Cost Differentials and Promising Directions for Future Research

In this section, I turn to considerations related to important issues that the specific approaches (outlined in section II) must grapple with.

1) Credit Ratings

One approach to assessing potential funding costs differentials for large versus small banks focuses on credit ratings. In particular, the major credit ratings agencies (Moody's, S&P, and Fitch) provide two types of credit ratings for bank holding companies (BHCs). The first rating is the traditional corporate credit rating for debt issued by the BHC. The agencies use their standard methods to measure the risks,

[18] Government deposit insurance plays a role in lowering the interest costs on insured deposits. To the extent that deposit insurance is underpriced, banks relying more upon this source of funds enjoy greater benefits from the safety net on their funding costs.

probability of default, etc. as they would for any private corporation in order to determine the credit rating. Certainly, the modeling takes into account risks that are unique to specific industries, but the resulting ratings are an attempt to provide some degree of comparability across firms. For BHCs, the traditional ratings are called the "standalone credit profiles" or "bank financial strength ratings."

For BHCs, the agencies provide a second type of rating that explicitly considers government support. Whereas the standalone ratings reflect the financial strengths and risks of each individual institution on its own, the so-called "with support" ratings take into account the rating agency's perception of the likelihood and extent of government intervention that may benefit the BHC's senior creditors in a crisis.[19] The difference between the "standalone" rating and the "with support" rating is called the ratings "uplift." Eight US banks receive an "uplift" from the credit rating agencies. These eight also happen to be institutions that have been designated as Global Systemically Important Banks (G-SIBs), as described above in section III.3.[20] The vast majority of rated banks, thus, do not receive a ratings uplift from the agencies.

Several studies use the number of "notches" of this rating uplift as a proxy for funding cost differentials for large versus small banks associated with perceptions of government support. In this approach, to convert the uplift into a cost differential, the

[19] For example, "Fitch's definition of support excludes elements such as routine access to central bank liquidity, as this is viewed as 'ordinary' support offered to banks….Rather Fitch considers measures which go beyond this to be 'extraordinary' support and generally involve infusions of capital into what would otherwise be a nonviable institutions to prevent default on senior obligations….[other forms of such support would include] government guaranteed debt issues, blanket deposit guarantees, asset protection schemes, orchestrated M&A, and regulatory forbearance…" (Fitch 2011, p. 3).

[20] Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JPMorgan Chase, Morgan Stanley, State Street, and Wells Fargo. Previously, Fitch included nine more institutions but dropped them in 2011 (see Fitch 2011).

studies translate the number of notches of uplift into the number of basis points savings on bond yields. They do this by estimating how much more a bank would pay on its debt if it enjoyed the higher "with support" rating rather than the "standalone" rating and apply this difference to the bank's liability structure.

To illustrate this method, consider a bank with $10 billion of debt with an *A*- standalone rating but an *A*+ rating with support, a difference of two notches. To translate this two-notch uplift into a yield spread, the next step would be to calculate the difference between average yields across *A*- debt issues and *A*+ debt issue during a particular period. Assume that this difference is 40 basis points. If one-quarter of the bank's activities are financed with these debt issues, for example, then this approach would imply a "too big to fail" funding advantage of $10 million for this bank. This method could then be applied to all large banks and an industry-wide funding cost advantage could be calculated. Haldane (2010 and 2012), Ueda and Mauro (2011), and Hoenig (2011) use this type of approach.

This method, however, relies crucially on the assumption that the "with support" ratings uplift reflects *actual* savings in debt costs in the marketplace. In the above example, the question would be: Do the markets price the debt of bank in the above example closer to *A*+ (with support) or *A*- (without)? If market participants do not find the rating agencies' judgments about government support informative about credit risk and price the debt closer to the rating without support, then this method would not provide a reliable or accurate way to determine funding cost differentials. In fact, it would significantly overstate the advantage.

A simple way to test the validity of this assumption is to compare market-based measures of risk with the two types of ratings that the banks receive. Using our example from above, one can calculate the typical CDS spread for a firm with *A*+ (with support) and *A*- (without) ratings and then see whether the actual CDS spread for the bank is closer to *A*+ or *A*-. Figure 6 compares the CDS spreads of the six large US banks with assets greater than $500 billion with the median CDS spread for all firms with the same "standalone" Moody's rating and the same "with support" Moody's rating. During the second half of 2012, for example, the CDS spreads for these banks is roughly the same as the CDS spreads for firms with the same "standalone" rating and substantially above (by about 69 basis points) the CDS spreads for firms with the same "with support" rating. In other words, during this period, the CDS markets were not pricing in any "uplift" in their assessment of the likelihood of default by the large banks. These data do not support the assumption that a ratings "uplift" automatically translates into lower borrowing costs, and hence calls into question the use of the "uplift" as a measure of funding cost differentials.[21]

[Insert Figure 6 here]

A more systematic analysis can be undertaken to investigate whether actual market pricing reflects the ratings uplift or not. Araten (2013), for example, investigates market-based bond spreads as well as CDS spreads and finds that for the largest banks (>$500 billion) these market based indicators more closely track the standalone rather

[21] In the first half of 2012, the markets were pricing a substantially greater probability of default by the large banks than by firms with the same "standalone" ratings (see Figure 6). In June, 2012, Moody's downgraded the large banks an average of roughly 1.5 ratings notches. The very high bank spreads relative spreads to firms with the comparable ratings in the first half of 2012 could be due to the market's anticipation of the downgrades of the banks.

than the with support ratings. These results again suggest that the uplifts are not reflected in the actual market pricing (see also Araten and Turner 2013).

The judgments on which the uplift are based, naturally, involve subjective assessments about the likelihood and extent of government intervention that are difficult to model. These assessments depend on the legal, regulatory, and political environment in which the banks operate. Thus, it is difficult to define the "with support" rating as precisely and systematically as the traditional credit rating and this may be part of the reason they are not reflected in market pricing.[22]

In addition, these judgments may be changing over time.[23] All three of the agencies, for example, cite progress on the FDIC's "orderly liquidation authority" from Dodd-Frank to explain why they have recently adopted a negative outlook on their "with support" ratings of the eight banks. Moody's placed a negative outlook on their BHCs with support ratings in June 2012, "reflecting the potential that we might lower our assumptions on the likelihood of government support of those firms" (Moody's 2013).[24] In June 2013, Standard and Poor's said: "we believe it is prudent to reflect in our outlooks on the ratings on the eight bank holding companies that we classify as SIFIs [Systemically Important Financial Institutions] the possibility that we may not continue to

[22] In addition, the older Fitch "with support"-type ratings were not comparable with the regular rating scale, so papers using them, such as Ueda and Mauro (2011), have the additional complication of trying to map the "uplifted" ratings into the regular rating scale. See Noss and Sowerbutts (2012).

[23] See section III.2 above on evidence of changing perceptions of government support over time. See also Schich and Byoung-Hwan (2012) which describes changes in "uplifts" by the credit rating agencies across OECD countries since the crisis.

[24] Moody's recently reiterated its view: "Believing that the government is now more likely to let large banks fail in a crisis, Moody's Investors Service threatened on Thursday to downgrade the credit ratings of several big financial firms," (Peter Eavis, "Moody's Threatens to Cut Credit Ratings of Banks, *New York Times*, August 23, 2013). http://dealbook.nytimes.com/2013/08/22/moodys-threatens-to-cut-credit-ratings-of-banks/?_r=0

factor support into the ratings in the future" (S&P 2013). Each agency would like greater clarity about the new resolution regime before reducing or eliminating the uplift but, as Fitch summarizes, changes so far suggest the "propensity for [government] support is diminishing" (Fitch 2011, p.1).

Given the weak empirical relationship between the ratings "uplift" and market pricing and the evolving judgments by the agencies about the likelihood and extent of government support, the credit ratings approach does not seem promising as an effective way to measure funding cost differences due to perception of government support.

2) Deposits

Another approach to assessing potential funding cost differentials for large versus small banks focuses on deposits. This approach typically looks for differences in interest rates paid on uninsured deposits across banks of different sizes. If there is a perception of government intervention to support large banks, large banks would then be able to offer lower rates to attract uninsured deposits than smaller banks.

The crucial assumption in this approach is that differences in deposit rates are not attributable to other factors. These other factors include (1) differences in the costs or availability of services associated with a deposit at a large versus small bank; (2) differences in the costs or availability of complementary services associated with being

an uninsured depositor, and (3) differences in risk not associated with the potential for government support in a crisis.[25]

Large banks, for example, may be able to provide cash management, transfer, and international services that small banks do not or do only at a higher cost. Both corporate and individual depositors who value those services more may then choose to hold their deposits at a larger institution even if they receive a lower interest rate because they are compensated through the availability and/or lower cost of these services. Individuals and organizations that have sufficient resources to be able to hold large uninsured deposits also may be more likely to have more demand for many of these services than small depositors. Unfortunately, few systematic studies of what criteria (besides distance/convenience) lead depositors to select banks (see Cvsa et al 2002). It would be valuable, even if difficult, to investigate the importance of implicit and complementary services in order to make "apples to apples" comparisons of deposit rates between large and small banks.

One of the most prominent deposit studies (Jacewitz and Pogach 2013) has tried to control for the factors noted above in three ways. First, they focus on a relatively homogenous type of deposit, Money Market Deposit Accounts (MMDAs). Second, they compare advertised interest rates for MMDAs above $100,000 and under $25,000 across branches of large versus small banks from 2005 to 2010. Before the increase in deposit insurance to $250,000 in late 2008, the MMDAs above $100,000 involved at least

[25] The three factors listed here relate to ensuring "apples to apples" comparisons from depositor's point of view. There also may be differences from the bank's point of view. A large bank may evaluate a depositor relationship differently than a small bank and follow a different strategy for attracting depositors. Large banks, for example, have greater access to capital markets so the costs of funding alternatives may affect the willingness of a large bank to compete for deposits relative to a small bank. As noted above in section III.4, large banks rely much less on deposits as a source of funding.

some fraction of uninsured deposits but those below were fully insured. By comparing the spreads across branches, rather than simply comparing interest rates on the uninsured deposits, the authors are trying to control for "other potential benefits of being large, (e.g., a larger branch network, a broader array of services" (p. 23) in order to try to isolate the difference in perception of risk between large versus small banks. Third, in their regression analysis, they include a variety of proxies for the riskiness of the bank.

They find a number of interesting results. First, prior to 2007, they don't find a statistically significant difference between the spreads for the large and small banks. This is consistent with a number of other studies that find little if any funding cost differences in the years just before the crisis.[26] Second, in their cross-sectional regressions, they find a statistically significant difference (at the 5 percent level) in large versus small banks spreads for only the first three quarters of 2007, not in Q4 of 2007 or the first three quarters of 2008, prior to the increase in deposit insurance to $250K.

They then run a panel regression that uses both the variation across banks and over the time period 2006 Q1 to 2008 Q2 to estimate the spread difference between large and small banks. Their benchmark large bank threshold is assets above $200 billion in 2005 dollars, and seven banks meet this criterion in their sample prior to the crisis. They find a 37 basis point difference that is statistically significant, and they interpret this as due to perceptions of lower risk due to government support.

The valuable robustness checks in this study, however, raise questions about this interpretation. First, after the increase in deposit insurance to $250K, the difference

[26] See section III.2 above for references.

between the large versus small bank spread should disappear, under their interpretation, since both the $100K and $25K MMDAs at all banks would now be FDIC-insured. When they run this regression for 2008 Q4 to 2010 Q2, however, they find large the bank spread is still a statistically significant 9 bps less than the small banks. That suggests that 9 bps of the difference in their baseline 37 bps result may not be attributable to perceived risk differences, since during this period all of the deposits are fully insured.

Second, they reduce the threshold for the definition of large bank to be only $10 billion, instead of $200 billion, but still find a statistically significant 21 bps lower spread for the $10 billion banks. As the authors note, this result "is more problematic to the interpretation of the estimate as the consequence of implicit government support. Historical precedent and common perception does [sic] not suggest that banks at this threshold would receive any extraordinary support" (p. 28). The banks smaller than $10 billion, for example, may not provide wealth management services (or only provide them at a higher cost) that the $10 billion banks provide for large MMDA deposit customers.[27] There may be a variety "preferred" services that large depositors at large banks receive that large depositors would not receive (or only receive at higher cost) at small banks. The results of this robustness check suggest that 21 bps of difference in their baseline 37 bps result may not be attributable to perceived risk differences. The robustness checks raise broader questions about whether this empirical method, which does include some important controls, can provide a foundation to draw firm conclusions about funding cost differences due to perceived government support.

[27] In an additional robustness check, the study includes fee income from investment banking and fiduciary investment activities but this may not be a good proxy for the availability or cost of wealth management services for large depositors.

More generally, these issues point to the difficult challenges in trying to isolate differences in deposit rates attributable to perceived government support.[28] A more promising approach using deposits to address these issues would be to look for "natural" experiments that arise from recent changes in deposit insurance coverage.

In fall of 2008, for example, the FDIC initiated the Transactions Account Guarantee (TAG) program that provided unlimited coverage for non-interest bearing transactions accounts that many businesses, hospitals, universities, charities, and municipalities use. This unlimited coverage, however, expired at the end of 2012, when the coverage fell to $250K.[29] These accounts typically are used for payroll and operating expenses so often involve very large balances, which was part of the original motivation for granting the unlimited coverage. More than $1 trillion dollars is held in these types of accounts. In late 2012, numerous concerns were raised that the expiration of this program would mean that these deposits would flow out of small banks and into large banks that were perceived to have government support. The concerns were sufficient that there was discussion in Congress about whether to postpone the expiration of the program, but no action was taken.

The expiration of the TAG program provides a way to gauge how important these depositors perceive the risk differences are between large and small banks. If these depositors perceived the risks to increase for accounts at small banks, then we would observe substantial flows of non-interest-bearing deposits out of small banks and into large banks. As Vice Chairman of the FDIC Tom Hoenig noted, despite many of

[28] As noted above, another issue is that banks may vary the rates they offer on deposits depending upon their demand for funding and the relative costs of other funding sources. The difference in availability and cost alternative sources of funding for large versus small banks may be reflected in systematically different behavior on deposit rates.
[29] See http://www.fdic.gov/deposit/deposits/changes.html

these types of concerns being voiced in 2012, the expiration did not lead to substantial flows.[30] As Figure 7 demonstrates, there is no evidence of switching from small to large banks around the time the TAG program ended. In fact, roughly the opposite occurred: small banks saw these types of deposits grow by roughly six percent from the quarter before to the quarter after the TAG expiration, whereas the largest banks saw little change.[31] The evidence thus does not support the hypothesis that these depositors perceived a significant difference in risk between large and small banks in this period. Looking for other "natural" experiments arising from changes in FDIC guarantees is a promising direction for future research.

[Insert Figure 7 here]

3) Bond Pricing and CDS Spreads

A third approach to assessing potential funding cost differentials for large versus small banks focuses on bond pricing. In particular, these studies compare the interest rates paid on large banks' bonds versus small banks' bonds, usually relative to a comparable Treasury security. This type of approach also can be applied to the CDS spreads for large versus small banks. A variety of controls are typically included, such as measures of a bank's risk and market-wide measures of risk. After including these controls, differences in the spreads between the large and small banks are interpreted

[30] Joe Adler, "TAG Expiration Had Little Impact: FDIC's Hoenig," *American Banker*, March 20, 2013.

[31] Since there could have been movement out of non-interest-bearing deposits into other forms of deposits, I also checked the change in total deposits over this period. The G-SIBs and the smallest banks saw nearly identical growth in their total deposits: 3.7 percent for the G-SIBs and 3.8 percent for the smallest banks. The "CCAR minus G-SIBs" group experienced deposit growth of 1.9 percent. Again, these data suggest that the small banks did not lose at the expense of the large banks when the TAG program expired.

as a measure of the funding differential that large banks enjoy due to perceptions of government support.

There are a number of crucial assumptions for this interpretation to hold. First, to attribute these differences as due to perceptions of government support, it is important that the estimated differences are not due to the general size advantage discussed above (section III.1). In this approach, adjusting for an average or median general size advantage across industries in which there is no perception of government support would be needed.[32] Careful estimation of and adjustment for the general size advantage, as through the "difference in difference" approach described in section III.1 above, would be extremely valuable for the interpretation of funding cost differentials in banking.

A second assumption is that that differences in liquidity have been taken into account.[33] The importance of liquidity in bond pricing has been well established (corporate bond markets are dramatically less liquid than equity markets), but the best proxies to adjust for liquidity differences are not as clear (see Chen et al. 2007). The liquidity differences for the bonds of large and small banks are substantial. For 2010 and 2011, for example, the median number of institutional trades (greater than $1 million) per month for the most actively traded bonds of the G-SIBs is 89, whereas it falls to only 18 for the banks above roughly $100 billion in assets (excluding the G-SIBs), and to just 1 for smaller US banks with bonds that traded during this period (see Figure 8).[34] The G-SIBs have dramatically more bonds outstanding, and the median size of their bond

[32] Also, controls should be included for economies of scale. See section III.1.
[33] Liquidity, of course, could be one aspect of the general size advantage.
[34] Using a different dataset and different method, Strongin et al (2013) also finds dramatic differences in trading frequency for bonds of the largest (>$500 billion) banks versus others.

issues is significantly greater than for other banks. In addition, even for a large bank, the liquidity across its bond issues can vary widely. Newer "on the run" issues tend to be substantially more liquid than older "off the run" issues (see Strongin et al 2013). Careful adjustment for and estimation of the liquidity differences, while challenging, would be a promising direction for future research on these questions (see Araten and Turner 2013 for steps in this direction).

[Insert Figure 8 here]

A third assumption is that the relevant risk factors, besides perceptions of support, have been taken into account. These factors might include (1) firm-specific risk measures of asset quality, returns, volatility, liquidity, capital, etc.; (2) theoretical measures of risk such as "distance to default" (Merton 1974), z-scores, KMV measures, etc.; (3) credit ratings; and (4) macro or market risk measures such as VIX, slope of the yield curve, etc. Acharya et al (2013) and Araten and Turner (2013) find explanatory power for these types of factors in bond pricing.[35] It is important to ensure the robustness of any result in this approach by carefully considering a wide variety of controls for different types of risk. Similarly, it is crucial to make sure that the bonds

[35] Acharya et al (2013) includes both banks and non-bank financials and the estimation ends in 2010. As noted in the section III.3, the heterogeneity of banks and non-banks complicate the interpretation of these results and more recent data would be valuable to assess funding differentials in the current environment. Acharya et al (2013) does an event study on one date in the Dodd-Frank legislative and do not find any impact on the large financials. They conclude that Dodd-Frank had no broader impact so that it isn't necessary to look at data post-Dodd-Frank. Schaefer et al. (2013), however, undertake a more extensive analysis of key dates in the Dodd-Frank legislation and find negative impacts on large bank equity returns and widening of large bank CDS spreads. Their results would suggest that perceptions of government support decreased with Dodd-Frank so that it would be important to examine post-Dodd Frank data to address current policy debates (see section III.2). Also, the credit rating agencies are discussing possible reductions in their "with support" ratings due to progress on Dodd-Frank implementation (see section IV.1).

being compared have similar covenants and embedded options (or are explicitly adjusted for) to ensure "apples to apples" comparisons.[36]

As noted above (section III.4), large banks have very different liability structures than small banks, because small banks rely much more heavily on deposits and large banks more on external borrowings. It is important to take into account these differences when calculating a total dollar value of benefits of funding cost differentials and applying the measured differentials to the appropriate parts of liability structure.

While there are many challenges to making "apples to apples" comparisons and interpreting funding cost differentials as due to perceptions of government support rather than a general size advantage, the bond and CDS spread approach holds promise for making progress on the issue. As described in section III.1, a very promising empirical approach would be a "difference in difference" analysis that controls for factors related to size in industries without perceptions of government support for the largest institutions. Controlling carefully for risks and liquidity differences also will be crucial, so checking robustness of results to the inclusion of different sets of control factors will be important in this approach.

V. Summary and Conclusions

An extensive literature exists analyzing funding cost differentials between large and small banks as a way to measure perceptions of government support for large

[36] Perhaps one way to adjust for bank-specific factors might be to compare bonds from the same bank that were and were not issued under the FDIC's Temporary Liquidity Guarantee Program (TLGP). A key question would be whether there are a sufficient number of comparable bonds with similar liquidity characteristics to be able to do a systematic comparison. Alternatively, comparing the government guaranteed TLGP bonds with similarly-dated Treasuries might provide a measure of liquidity premia.

banks in a crisis. Rather than attempt to summarize and assess dozens of papers individually, I have grouped the papers into five categories based on data and methods: 1) Bond prices and CDS spreads; 2) Credit ratings; 3) Deposits; 4) Equity prices; and 5) Other. I then discussed four challenges that all of the approaches face, examined challenges more specific to the first three approaches, and proposed promising approaches for measuring the differentials.

The challenges that all of the approaches face include:

Identification: First, the "identification" challenge is to ensure that measured funding cost differences between large and small banks are due to perceptions of government support and not to other factors that are related to size but are independent of perceptions of government support. In particular, it appears that funding cost differentials exist between large and small firms in most industries. Thus, it is important to adjust for this general size advantage in order to isolate the large versus small funding cost differentials attributable to perceptions of government support in banking. Given that recent studies suggest that there are scale economies in banking even for the largest group of banks, it also important to distinguish the effects of economies of scale from the impact of perceptions of government support.

Time period: The second challenge involves choosing the appropriate time period to study. Cost differentials and perceptions of government support have varied considerably over time. The CDS data suggest that, since the crisis, markets perceive higher and more differentiated risks among the largest banks than prior to the crisis. Data from the post-crisis period, thus, would be the most relevant to ongoing debates

about the impact of perceptions of government support on funding cost differentials in the current regulatory and market environment.

Definition of "large" bank: The third challenge concerns determining the appropriate definition of "large" and the appropriate comparison group. The eight banks designed as the Global Systemically Important Banks (G-SIBs) would seem to be a natural definition of "large" since they receive special regulatory treatment and are roughly the largest institutions by assets. The approximately 18 banks above $100 billion could be used as a robustness check. Although introducing non-financials and non-US institutions into the large bank or comparison group would increase the sample size, they introduce substantial heterogeneity, making the interpretation of the funding cost differentials more difficult.

Funding Mix: The fourth challenge is that large and small banks fund themselves very differently, with deposits being a much higher fraction of total liabilities for small banks relative to large banks. As a consequence of this different funding mix, since deposits are the lowest-interest-cost source of funding, the overall average cost of funding for large and small banks turns out to be roughly the same. When calculating the total dollar value of benefits to large banks, thus, it is important to apply the estimated funding costs differentials to the appropriate instruments in the liability structure, rather than across the board.

Turning to the challenges for specific approaches:

Credit Ratings: Studies based on credit ratings and the "uplift" given to the G-SIBs typically assume that the ratings uplift due to perceptions of government support translate directly into lower actual funding costs. It appears, however, that markets

price large bank debt closer to the "standalone" rating rather than the uplifted "with support" rating. Thus, the uplifted ratings do not appear to provide a good proxy for actual fund differentials. In addition, all three of the major credit rating agencies have their uplifted ratings on "negative watch" because regulatory changes, such as the implementation of orderly resolution authority of Dodd-Frank, are diminishing their perception of the likelihood of government support for large banks in a crisis. Given the lack of connection of the ratings uplift to actual funding costs and the "negative watch" on the uplifts, the credit ratings studies do not seem to hold promise as an effective approach to measuring funding cost differentials due to perceptions of government support in the current environment.

Deposits: Studies comparing interest rates on uninsured deposits at large and small banks rely on the assumption that the interest rate differences are not attributable to other factors besides perceptions of government support. Large banks, for instance, may be able to offer a wider variety of services and at lower costs than smaller banks, resulting in a lower observed interest rate paid by the large banks. Separating out or "identifying" whether such differences are due to perceptions of government support or to other services, thus, is quite difficult. Also, large banks have greater access to capital markets for funding so the costs of these alternative funding sources may affect interest rates offered by large banks differently than for small banks.

Bond Pricing and CDS Spreads: Comparing differentials in bond pricing and CDS spreads faces the key "identification" challenge of whether estimated differentials can be attributed primarily to perceptions of government support. In these approaches, it is crucial to adjust for the general size advantage that appears common across

industries, not just in banking. Liquidity plays a very important role in bond pricing, but carefully controlling for it is difficult, particularly given vast differences in the liquidity of large and small bank bonds. Ensuring "apples to apples" comparisons of bonds, given the variety of covenants and provisions, also is important in this approach.

While certainly no approach is flawless, I believe that there are specific ways to improve on the existing literature to provide better estimates of and more insights into the interpretation of funding cost differentials:

Difference in Difference: Since there appears to be a general size advantage across industries, it would be valuable to use a research design that adjusts in a statistically rigorous way for this to determine whether the large versus small differential is greater in banking. A "difference in difference" approach has the potential to do that. The first step of this procedure involves data from a wide variety of industries to estimate large versus small funding differences for bonds, for example, and includes sets of controls for individual firm risks, industry characteristics, market risks, liquidity, scale economies, time, etc. The second step involves formal statistical tests of the large versus small pricing differential in banking relative to that estimated for other industries. This approach thus can improve over existing studies by providing greater confidence that the funding cost "difference in difference" can be attributable to perceptions of "too big to fail" government support of large banks, rather than a host of alternative explanations related to size. This approach is one of the most promising research designs to answer this important public policy question going forward.

Natural Experiments: In addition, it is worth looking for changes in regulation, deposit insurance, etc. that provide a way to interpret and to examine the impact of

changes in perceptions of government support for large banks. As described above, the recent expiration of the unlimited deposit insurance guarantee on non-interest bearing transactions accounts (the TAG program) provides an "experiment" to gauge the importance of the perception of government support. If smaller banks are perceived to be less likely to receive support, the end of the TAG program would mean those deposits would be perceived as riskier and these deposits would flow to the large banks. Since that did not happen, this episode raises questions about how great the perceptions of government support are for the large banks. Looking for other such "natural experiments" is another promising direction for future research to better understand perceptions of government support.

To conclude, studying funding cost differentials between large and small banks is important for ongoing policy debates about banking and financial regulation. Sound empirical analyses are crucial for policy makers to be able to assess the magnitude of concerns they might have about perceptions of "too big to fail" government support and then to be able to weigh the costs and benefits of alternative reform proposals. By providing an overview of the key challenges for empirical analyses of estimating funding cost differentials between large and small banks and describing promising approaches to improve upon the existing literature, I hope that this paper can contribute to both clarifying debates about and advancing our understanding of key issues in banking and financial regulatory reform.

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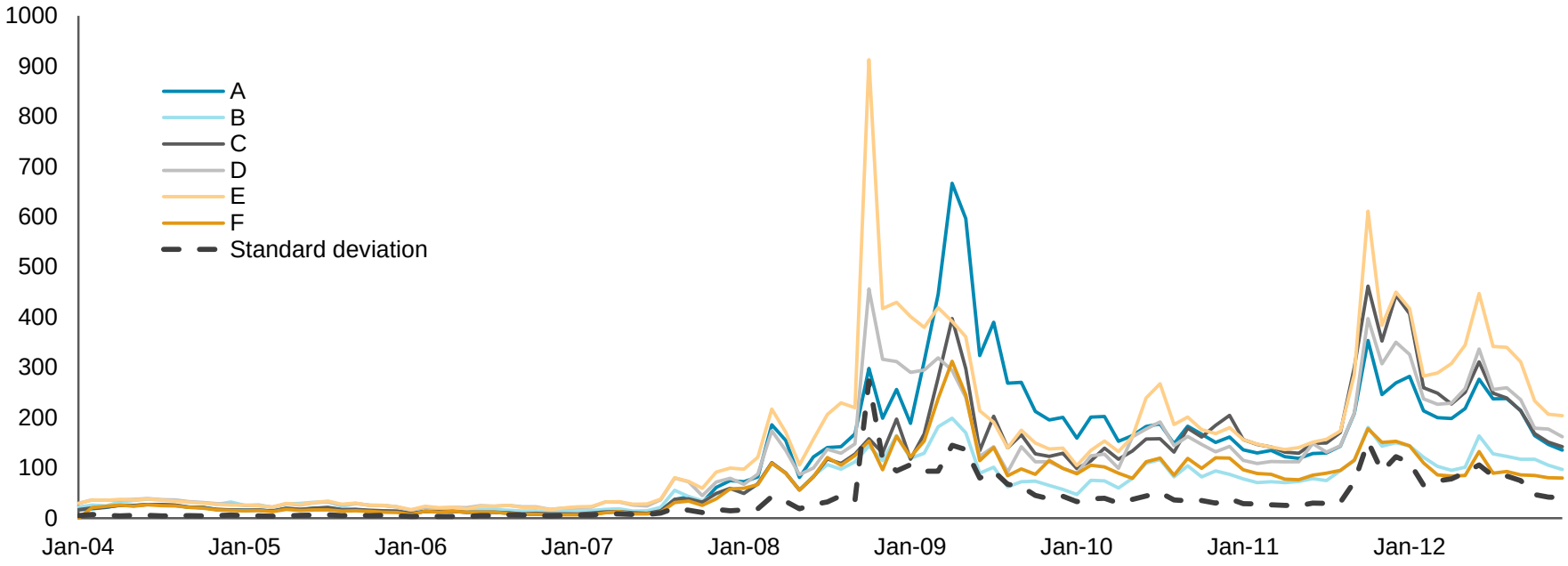
Figure 1: Overview of Existing Empirical Approaches to Measuring Funding Cost Differentials

	Focus of analysis	Description of Approach
1	**Bond and CDS spreads**	▪ Compare bond spreads for large BHCs and other issuers, controlling for macroeconomic, issuer, and issue-specific factors ▪ Examine CDS (Credit Default Swap) spreads for large BHCs and other issuers to determine how default expectations vary
2	**Credit ratings**	▪ Assess expected level of government support by comparing "standalone" vs. "with support" ratings ▪ Use historical relationships between credit ratings and funding costs
3	**Deposits**	▪ Compare risk premiums and interest rates paid on uninsured deposits, controlling for macroeconomic factors, bank risk factors, BHCs' support of banks, and value of associated deposit services ▪ "Natural experiments" that arise from changes in deposit insurance coverage
4	**Equity prices**	▪ Compare stock returns for large BHCs and other banks, both historically and in response to "events" that affect expectations of government support ▪ Identify the "purchase premium" that institutions are willing to pay to attain a certain level of size
5	**Other**	▪ Use structural/option pricing models, for example, to infer differences in perceived risks for large and small financial institutions to value implicit guarantees and perceptions of government support

Figure 2: Credit Default Swap (CDS) Spreads for Large Banks

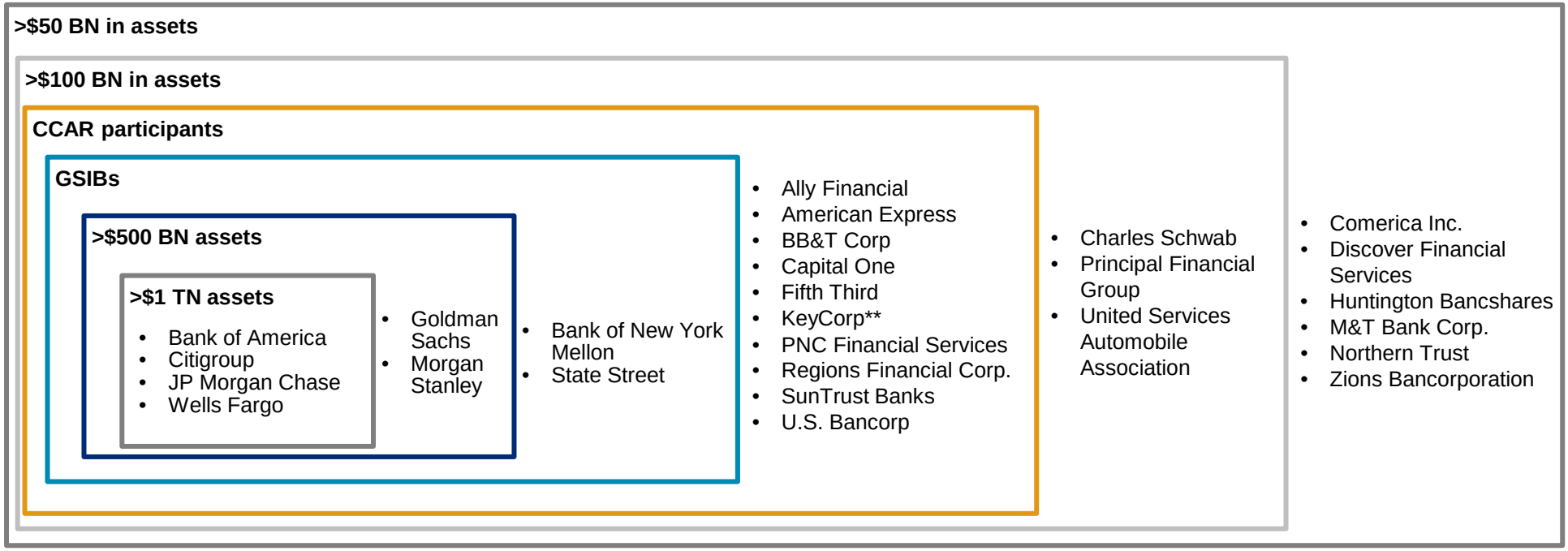
Credit default spreads for US BHCs with >$500 BN in assets[1]
5Y contract on senior debt, 2004-2012, bps[2]



1. Par spread mid is used for periods during which quote spread mid is unavailable; all restructuring types are included

Source: CMA

Figure 3: Largest US Banking and Financial Holding Companies

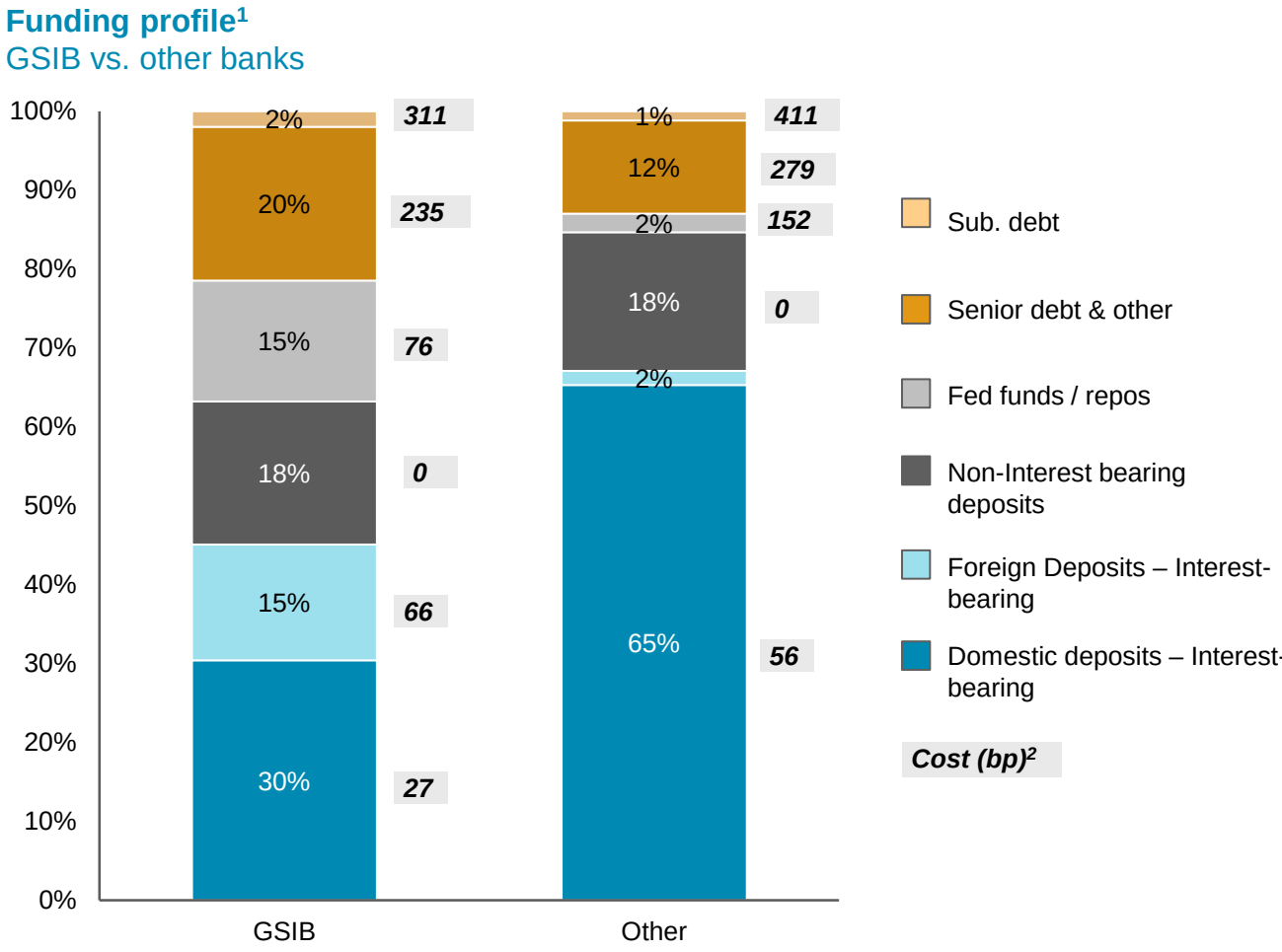


1. Based on 2013Q1 assets or current regulatory designation. Excludes foreign owned-banks that surpass the relevant size thresholds: BancWest, BBVA USA, Deutsche Bank Trust, HSBC NA, RBS Citizens, Santandar Holdings, TD Bank, UnionBanCal.

** KeyCorp designated as CCAR participant; however assets are <$100BN as of 2013Q1

Source: Public filings

Figure 4: Differences in Funding Mix and Costs for Large versus Small BHCs

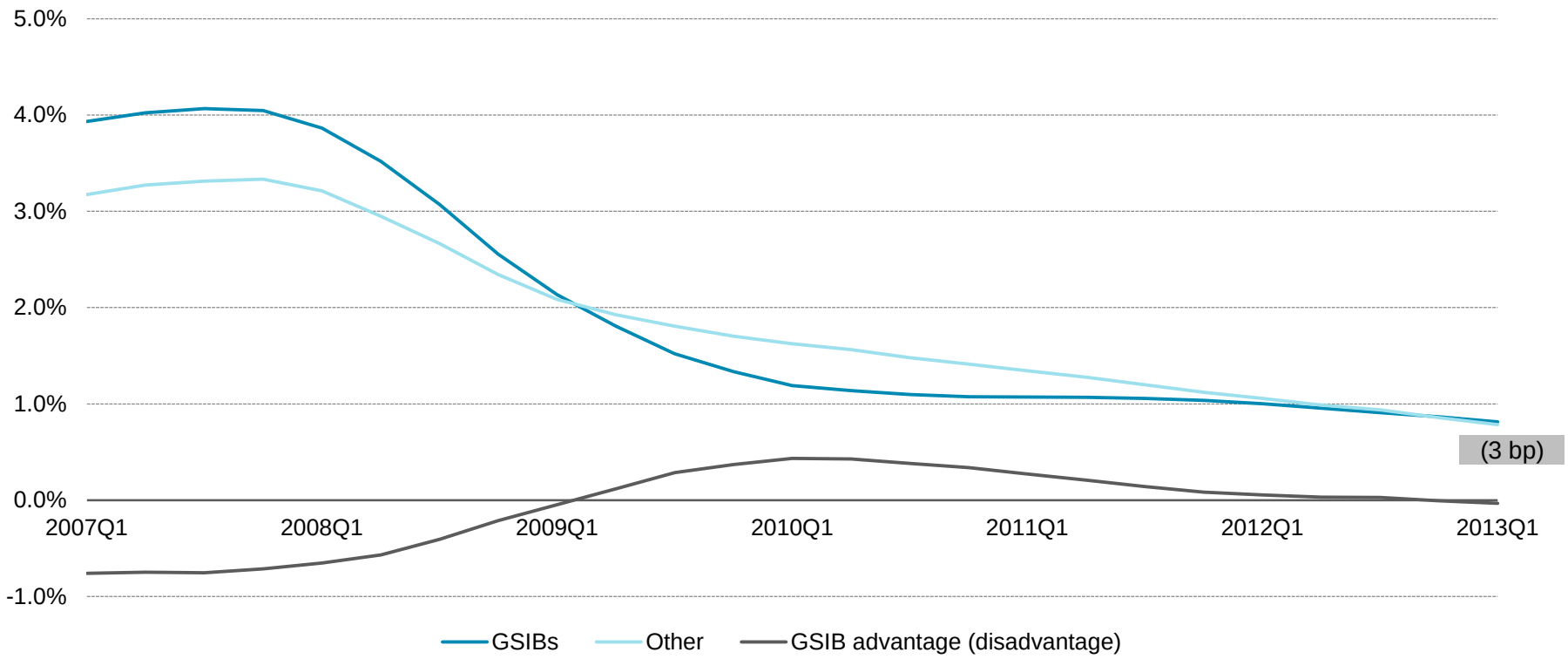


1. 4-quarter averages volumes, for 2012Q2 – 2013Q1
2. Calculated as rolling 4Q sum of interest expense / rolling 4Q average liability volumes for 2012Q2 – 2013Q1; interest expenses for foreign interest-bearing deposits excluded for smaller banks due to limited observations

Note: Includes data for domestic US bank holding companies, savings and loan holding companies and financial holding companies
Source: SNL

Figure 5: Average Funding Costs for Large and Small BHCs over Time

Aggregate funding costs (average cost of funds, 2007Q1 – 2013Q1) [1]
GSIB vs. others



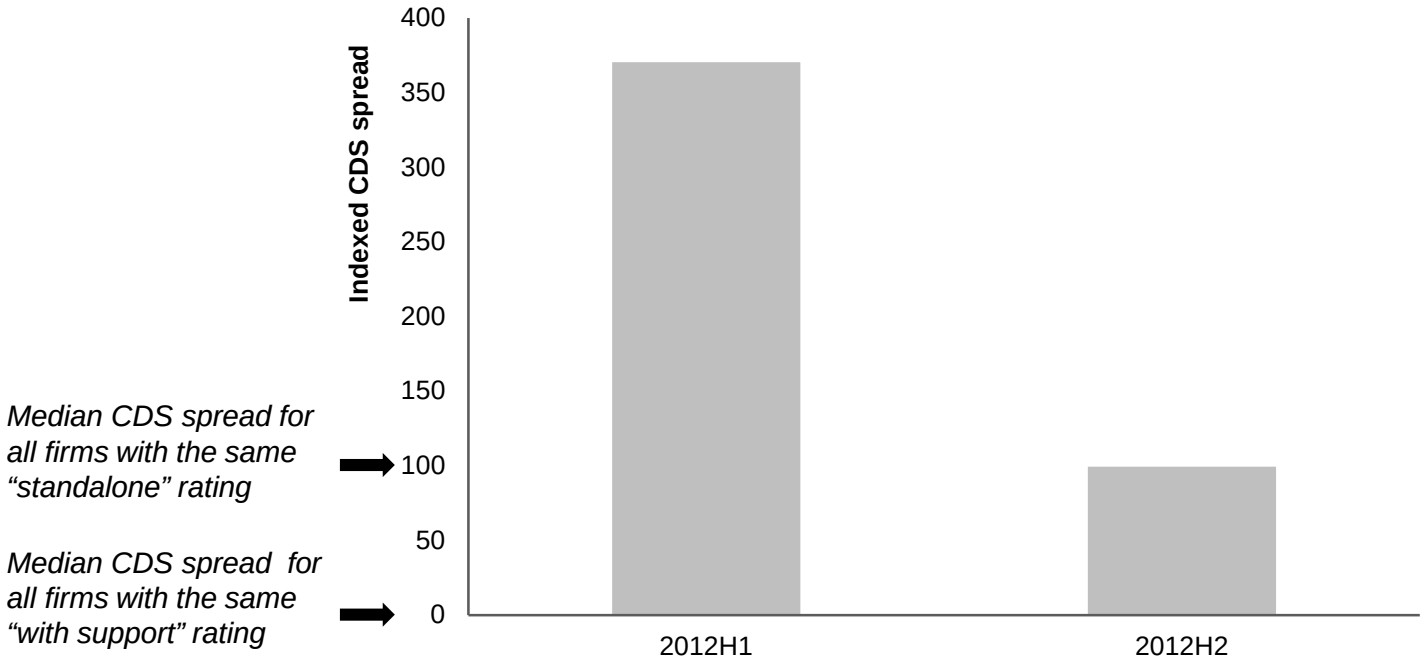
1. Calculated as rolling 4Q sum of interest expense / rolling 4Q average liability volumes

Note: Includes data for domestic US bank holding companies, savings and loan holding companies and financial holding companies. GSIB includes the banks that have been designated as Globally Systemically Important Banks. See Figure 3.

Source: SNL

Figure 6: Comparing CDS Spreads of Large BHCs with CDS Spreads for All Firms with the Same "Standalone" and "With Support" Credit Ratings

Comparison of US BHC CDS spreads to median CDS spread for all firms with the same credit rating[1]
For US BHCs with >$500BN in assets



Average difference between BHC CDS spread and median CDS spread for all firms with the BHC's same "with support" rating (in basis points)	**143**	**69**

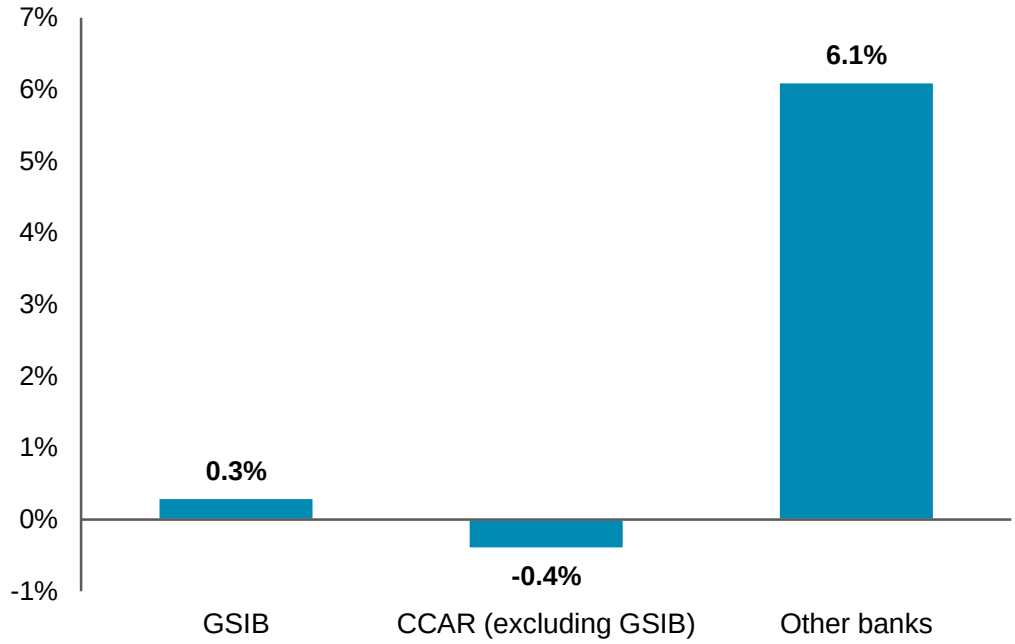
1. The CDS spread for each of the 6 US bank holding companies (BHCs) with assets >$500 BN are compared to the median CDS spread for all firms with a credit rating equal to the BHC's standalone rating ("median standalone spread") and BHC's with support rating ("median supported spread")
2. Index = (BHC CDS spread – median supported spread) / (median standalone spread – median supported spread); index = 0 indicates that CDS spreads are in line with median levels based on the "with support" ratings; index = 100 indicates that CDS spreads are in line with median levels based on "standalone" ratings; index >100 indicates that CDS spreads are higher than median "standalone" spread.

Source: Moody's, CMA

Figure 7: Changes in Non-interest-bearing Transactions Deposits with the Expiration of the Transactions Account Guarantee (TAG) Program for Large versus Small BHCs

Change in non-interest-bearing deposit volumes: End of quarter 2012Q3 to end of quarter 2013Q1[1]

% change



Change in volume ($BN)	**3.6**	**-1.3**	**26.4**

1. Analysis excludes some firms with limited data availability on non-interest bearing deposits. GSIB includes the banks that have been designated as Globally Systemically Important Banks. CCAR (excluding the GSIB) includes banks above roughly $100 billion in assets but excludes the GSIBs. See Figure 3.

Note: Includes data for domestic US bank holding companies, savings and loan holding companies and financial holding companies

Source: SNL

Figure 8: Differences in Bond Liquidity for Large versus Small BHCs

	Among banks in that category…		
Category of banking organization	**Median number of bonds in sample**	**Median size of single largest issue (Billion $)**	**Median number of institutional trades per month, for most actively traded single issue**
GSIBs	65	3.0	89
2012 CCAR banks (ex- GSIBs)	9	1.0	18
Other US bank issuers	1	0.2	1

Notes: Sample of traded bonds issued by 36 US banking organizations prior to January 1, 2010 and still outstanding as of January 1, 2013, that have trading data available in the TRACE database in 2010 and 2011 (the most recent period for which the TRACE data exists). Excludes equity-linked, Temporary Liquidity Guarantee Program issues, and private placements. Institutional trades are trades greater than $1 million. GSIBs include the banks that have been designated as Globally Systemically Important Banks. CCAR (ex-GSIBs) includes banks above roughly $100 billion in assets but excludes the GSIBs. See Figure 3.

Sources: FINRA's Trade Reporting and Compliance Engine (TRACE) database and SNL.