Economic Studies
at BROOKINGS

July 2014 (originally published July 18, 2014. Revised July 29, 2014)

Implicit Subsidies for Very Large Banks: A Primer

Douglas J. Elliott, The Brookings Institution

Summary

Should we break up, or heavily penalize, the largest banks? This depends strongly on whether they have a major competitive advantage over smaller banks due to lower costs stemming from preferential government treatment. In particular, many observers believe that these banks pay less for their funding because depositors, investors, and trading counterparties assume that taxpayers would rescue these banks in a crisis. Since this is an unstated guarantee, it is generally referred to as an "implicit subsidy."

The Government Accountability Office (GAO) will be issuing a report shortly, at the request of members of Congress, on the size of the implicit subsidy enjoyed by the largest banks. This primer attempts to aid readers of that report by explaining the key analytical questions that need to be addressed in deciding whether there is an overall competitive advantage for the biggest banks from preferential government treatment and in determining the size of that subsidy.

One key point to recognize up-front is that the GAO was asked to opine on a relatively narrow question that inflates the level of calculated subsidy by ignoring a number of countervailing factors. The GAO was asked to calculate the improvement in borrowing costs, but not to consider the magnitude of a number of additional regulatory requirements that have been put in place that handicap the largest banks. The net competitive advantage is the relevant figure for the most critical policy decisions.

This paper is organized around a series of questions:

- What are implicit subsidies?
- Why do we care about them?
- What theoretically determines their level?
- What do we know about them?
- Why are they hard to measure?
- What studies have measured the implicit subsidies?
- What are their strengths and weaknesses?
- What is left out of these studies?
- Why might the subsidy levels have changed over time?
- What could be done, if there are still net subsidies?

What are implicit subsidies?

As In this context, implicit subsidies refer to a reduction in the relative funding costs for very large banks, compared to smaller banks, as a result of a perceived probability of a full or partial government rescue in crisis periods. "Subsidies," in general, are usually cash grants, but the term is also used for other forms of economic value given by the government. In this case, the value to the banks of the government guarantee would be the lowered cost of doing business as a result of the support. This would mostly occur because of lower interest rates on deposits, bonds, and other debt securities issued by banks[1]. For simplicity, this primer will generally refer to these as "funding" and to those providing the money as "funders."

Cost are lowered because part of the return demanded by funders is to cover credit risk, which is virtually eliminated if there is a government guarantee, reducing the interest rate needed to lure investors. The subsidy must be calculated by estimating the difference in interest rate between what the bank pays in real life and what it might have to pay without the guarantee. This necessarily involves some judgment, since it requires an assumption about the state of the world without such a guarantee.

Since the U.S. government does not explicitly guarantee bank debt, there are two further analytical steps. Funders have to estimate (a) the likelihood of a rescue, which is not certain, and (b) the portion of the value of their securities that would be guaranteed, since it is possible that the government might allow some losses.

Why do we care about them?

Implicit subsidies are economically damaging for at least two reasons. First, they distort competitive dynamics, encouraging banks to be bigger than would otherwise make economic sense. This may introduce economic inefficiencies or create increased systemic risk, although both are hard to measure. Second, they erode market discipline on excessive risk-taking by the banks. In an efficient market without distortions, higher risk activities undertaken by banks would raise the cost of funding, discouraging managements from going too far. To the extent this market discipline is weakened, managers might raise their risk levels, either out of a conscious desire to swing for the fences or because their over-optimism is not checked by more realistic outside views. This potential to create excessive risk taking is a significant argument used by those who support breaking up the largest banks.

In both cases, the key policy problems stem from the largest banks holding a competitive advantage over smaller banks, which is why it is critical to look at the net implicit subsidy compared to smaller competitors. If a funding cost advantage were offset by other requirements or taxes, then there might be no incentive to be overly large or to take excessive risks.

What theoretically determines their levels?

All else equal, the gross subsidy for each class of deposit or security would be based on the multiplication of three factors.

- The probability of the need for a rescue
- The probability that the government would *actually* provide such a rescue, if needed
- The portion of the security's value that would be spared a loss by the rescue

A calculation of the net subsidy compared to smaller banks would require two further factors:

- The gross subsidy for the smaller banks, if any
- The net economic effect of other costs differentially imposed on the largest banks

As an example, an investor might think there was a 1% chance each year of a particular large bank's failure, absent rescue measures. He or she might further believe that a rescue in a crisis was 75% likely and that the loss would be 40%, absent a rescue (a fairly typical loss for a senior bondholder in bankruptcy), and zero with government intervention. Under these assumptions, it would be reasonable to expect the investor to lower their demanded annual interest rate by 0.30%, also known as 30 basis points (or bps). (This would be 1% times 75% times 40%.) For reference, a 1% annual probability of default is quite high for a bank and would generally be consistent with a junk credit rating, well below the average rating for the largest banks.

The *competitive* advantage or disadvantage of the largest banks would also depend on the other two factors, comparing their situation with that of smaller banks. First, smaller banks may receive some government credit support. This is most clearly the case with deposit insurance, which is available to all U.S. banks. This government-backed insurance leads depositors to lower

their demanded interest rate on amounts up to the coverage limits. Further, banks below the largest size received substantial government support in the recent crisis and in some past crises.

Second, as discussed in detail below, the government has explicitly added further regulatory burdens on the largest banks, such as higher capital requirements and various operating restrictions. These offset to some extent any expense advantage from lower borrowing costs.

This theoretical calculation yields several insights:

The funding cost advantage is tied to investor and depositor perceptions. At the extreme, if an investor simply did not believe a bank would default even without a government backstop, then the subsidy would be zero.

Measuring such perceptions is hard. As the rest of the paper shows, it is not a simple task to quantify these perceptions.

The subsidy varies over time. First, it is based on the perceived likelihood of a bank needing rescue during the term of the investment. This perception results in a low subsidy from funders during quiet times and a much higher subsidy in crisis times. Second, the probability and likely extent of a future government rescue varies due to legislative, regulatory, and political changes.

The subsidy varies across types of securities. Banks fund themselves through a multitude of instruments; the probability of rescue and the degree of benefit of rescue vary across these securities, yielding different subsidy rates. Deposits within the FDIC guarantee limits produce no net subsidy for the largest banks, since even the smallest banks have the same 100% FDIC guarantee. Traditional senior bank debt, on the other hand, could have a significant implicit subsidy, depending on investor perceptions. Common shares might have some implicit subsidy, but investors would almost certainly assume the potential for a high loss, based on the major hits that bank shareholders suffered during the recent financial crisis and past crises. (The government is virtually certain not to rescue bank shareholders *directly*, but a troubled bank might survive because funding remained available due to perceptions of a government rescue of the bondholders. Such survival could prevent a total loss for the shareholders, allowing a recovery over time.)

What do we know about them?

There are quite a number of analyses estimating the level of implicit subsidies, using a variety of methodologies, which are discussed in detail below. Although there is substantial variance in their findings, certain common themes are clear:

It is very difficult to measure the level of implicit subsidies. The reasons for this are described in the next section, but it means we cannot be sure of the level.

Subsidies for borrowing existed pre-crisis for the biggest banks, at modest levels. The studies are virtually unanimous that some level of implicit subsidies benefitted the largest banks prior to the onset of the financial crisis. This accords with overwhelming anecdotal evidence of a market belief that the government would not let the very largest banks go under, but would allow that to happen to smaller banks. At the same time, market participants viewed these banks as highly creditworthy in their own right and therefore did not price funding sharply differently based on the assumed support. This balance left the subsidy at a level large enough to matter, but not big enough to dominate bank credit pricing.

They got much bigger during the crisis years. Again, the empirical evidence makes sense. Implicit subsidies became much more certain, and even explicit, as the government, the Federal Reserve, and the FDIC responded to the crisis. This greater certainty increased the value of the subsidies. Even more important, the underlying creditworthiness of the largest banks was perceived to worsen markedly, with talk of insolvency for some, which very sharply increased the value of a government guarantee.

They have since declined to below pre-crisis levels. The most recent studies show a decline in the value of the subsidies, not only to sharply lower than during the crisis, but to levels less than existed prior to the crisis. There are few enough of these studies, and some questions about them, that we cannot be as sure of this conclusion. However, it accords well with the many actions taken to make a future government rescue much less likely and more painful for investors. Anecdotal evidence certainly suggests that market participants are much less certain that a future government rescue would occur, particularly one that prevented funders from incurring sizable losses.

They are not totally gone, narrowly defined as subsidies for borrowing. The most recent studies often find that borrowing remains cheaper for the largest banks than it would be if there were no hope of a government rescue. Again, this is common sense. It would take a brave analyst to be absolutely certain that the largest banks were not disproportionately likely to receive a future rescue. Some in the markets clearly think there is still such a safety net, although less certain and providing less protection for funders. This perception should translate to somewhat lower borrowing costs.

We do not, however, know if a net subsidy exists for the largest banks. As noted throughout this primer, the key point for analyzing the competitive position of the largest banks is not whether there is a subsidy for borrowing and deposits, but whether the total effect of government support and regulation is a positive or negative for the competitive position of these banks. None of the studies go very far in tackling this larger question. It is virtually certain that there was a net positive subsidy prior to the crisis, rising greatly in value during the crisis, since there was little to offset the funding benefit. But, many significant legislative and regulatory actions taken since the crisis have been aimed at least in part at hurting the competitive position of the largest banks. This is discussed further below.

They are much bigger in Europe and the rest of the world generally. Studies that look beyond the U.S., such as reviewed in IMF (2014), generally show much clearer, and larger, implicit subsidies. This is consistent with the historical practice in Europe, and most other nations, of stepping in to rescue the largest banks, indeed generally all banks. Again, these studies look at the gross level of implicit subsidies; we do not have data on the net level.

Why are they hard to measure?

A key underlying analytical problem is that the government guarantee is implicit and therefore uncertain both as to whether it will lead to a rescue and in the extent to which different funders will be protected. Therefore, all the studies attempt to measure market perceptions as they are crystallized in the required returns demanded by funders. These perceptions are seldom explicit and therefore require estimation.

The difficulties worsen because there are many other differences between the largest banks and other banks that also affect pricing variations, without reflecting potential government support. So, the analyst is left to determine how much of the pricing difference is due to implicit guarantees and how much is due to other factors. Some of these other factors are:

- **Differences in business models**. The largest banks do many things smaller banks do not. The business mix, and mode of operation, of the largest banks may be more or less risky than is true for smaller banks.
- **Economies of scale and scope**. Being big and operating across a range of related businesses most likely improves underlying profitability and therefore reduces the risk of insolvency.
- **Risk diversification from a wider range of activities at the biggest banks**. Being diverse most likely reduces the risk of insolvency, probably significantly, but there are observers who argue the largest banks are too big to manage and therefore riskier.
- **Litigation risks and other idiosyncratic factors**. In the wake of the financial crisis, the largest banks have faced very large litigation risks, as well as multi-billion dollar penalties. Smaller banks are generally much less exposed and therefore would be expected to borrow more cheaply, all else equal.
- **Differences in funding sources**. The largest banks generally have a different mix of funding sources than smaller banks, with a greater reliance on borrowings in the capital markets and funding through repurchase agreements. Aggregate measures of total funding costs would not directly capture these differences.
- **Differences in size and liquidity of borrowings**. All else equal, the largest banks can borrow more cheaply because each bond issuance is bigger and more liquid. These effects are important and occur in all industries, not just banking. Offsetting this, a bank may find that above a certain size, it has to pay a premium to sell a larger issue, since the marginal buyer determines the pricing for all buyers.
- **Deposit rates differ based on relationships and other services provided**. Measurements of differences in deposit rates paid by big and small banks have difficulty capturing the many reasons that customers keep deposits with a bank besides the rate on offer. For example, deposits are often part of an overall relationship whose profitability determines the willingness of a bank to make loans and provide other services to customers. Some customers may accept a lower deposit rate in the knowledge that keeping their deposits at that bank opens up other possibilities in the relationship.

What are the studies and what do they show? What are their strengths and weaknesses?[2]

Analysts have used a number of techniques to try to estimate the implicit subsidies enjoyed by the largest banks, including:

- Comparison of overall funding costs, or overall funding costs just for debt, between the largest banks and other banks.

- Comparison of spreads on bank credit default swaps, between the largest financial institutions and others.
- Detailed studies of interest rates on bonds of different banks.
- Comparison of the difference in deposit rates for insured and uninsured deposits within a bank, for the largest banks versus smaller ones
- Rating agency assessments of the effect on creditworthiness from government support

Kroszner (2013) provides a thorough literature review of the studies available at that point and offers significantly more detail than would fit into this primer.

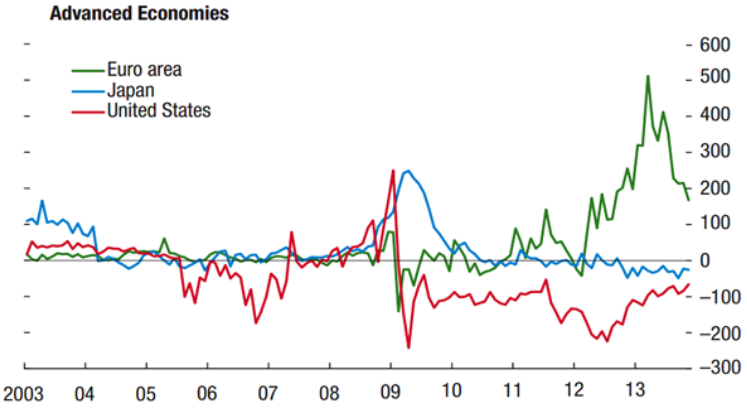
Comparison of overall funding costs or overall debt funding costs. The most straightforward approach is simply to see what the average funding cost is for the largest banks compared to smaller ones. This has the virtue of simplicity, but can be highly misleading, since there are so many other differences between the average very large bank and the average smaller one, including substantially different business models and a different mix of funding sources. The largest banks, for example, do much more securities and derivatives business and much more global business than do smaller banks. Further, Kroszner (2013) cites studies of other industries that show that larger firms across a wide range of industries benefit from substantially lower funding costs than smaller firms, without any implication of a government subsidy.

The International Monetary Fund (IMF) examined a wide range of techniques for estimating the implicit subsidy in its 2014 Global Financial Stability Report, from the very simplistic to the complex. The section started with an analysis of overall funding costs, part of which is presented in the chart below. This very simplistic approach finds a *negative* implicit subsidy in recent times for the U.S. banks, indicating that the largest banks actually pay more for their funds than do smaller banks. In contrast, Europe shows the substantial positive implicit subsidy that one would expect in its circumstances.

One way to improve the likely accuracy of estimates on this basis is to make an adjustment for the relevant differences between the largest banks and the smaller ones. IMF (2014) used a simple leverage ratio as a measure of the relative riskiness of banks, demonstrating that even a very simple adjustment could flip the results from those shown by the overall funding cost analysis. Since the largest banks had less capital for their size, they had a worse leverage ratio, and therefore should be expected, all else equal, to pay more for funding. IMF (2014) adjusted for this simple factor by comparing the largest banks only to the smaller banks with leverage ratios within one standard deviation of the large bank average. It found that the implicit subsidy was most recently about 100 bps. However, it is difficult to place much reliance on this extremely simple adjustment, both because its very simplicity means it fails to capture many differences between the banks and because some of the results are implausible.[3] Nor does IMF (2014) place much weight in its conclusions on the overall funding cost analysis or even the adjusted version, focusing instead on analyses using credit ratings and a contingent claims analysis.

Older studies of aggregate bond yields also found evidence of a government subsidy. Moreover, the subsidy appears to increase following bailout events. For example, Baker and McArthur (2009) find that there was an average cost advantage of 29 basis points for institutions with more than $100 billion in assets between 2000-2007. They found the subsidy increased to 78 basis points from Q4 2008 - Q2 2009 for the 18 banks with assets greater than $100 billion.

A study from Goldman Sachs using more recent data suggests a different picture. Strongin et al. (2013) examined a subset of bond-issuing U.S. banks from January 1999 to March 2013. They found that the largest



Sources: Moody's CreditEdge; and IMF staff estimates.
Note: The lines represent the funding cost advantage of systemically important banks (SIBs) relative to other banks. SIBs = systemically important banks, defined as G-SIBs plus the three largest banks by asset size in each country.

six banks enjoyed a modest funding advantage of 6 basis points on average between 1999 and 2007 on their debt. While the funding advantage substantially increased in late 2008 and 2009 (consistent with the other studies), it has since decreased and, as of 2013, was equivalent to a funding disadvantage of 10 basis points. They cite several reasons for the major differences between their findings and those of some others. In particular, they use only U.S. banks, as opposed to some studies that looked internationally, and they excluded non-bank financials, which they separately found had a funding cost advantage for large institutions that was two and half times that of actual banks, and therefore would significantly raise the average measure of funding cost advantage if included.

Comparison of spreads on bank credit default swaps (CDS). Another line of attack by analysts has been to look at the price of credit default swaps referencing various banks. CDS spreads directly measure credit risk and are considerably more standardized than are bond issues, easing comparisons. On the other hand, the CDS market can be thin and volatile, and does not exist for most banks, producing measurement risks of its own.

Li, Qu, and Zhang (2011) examine spreads on CDS referencing the 20 largest U.S. financial institutions (including non-banks), in comparison to the 63 other financial institutions that had CDS spread and other market information available. They found that CDS spreads were 23 points lower for the 20 largest institutions prior to the financial crisis and 56 points lower after the heart of the crisis had occurred. This study is at the aggregate level and does not attempt to control for the range of bank-specific factors that the detailed bond market studies described next have used. As such it is probably best viewed as broadly indicative, rather than a precise measurement of the implicit subsidy created by investor perceptions.

Detailed studies of bond market rates with many adjustments. Several studies have examined the interest rates on individual bank bonds and controlled for a large number of factors that affect pricing of such bonds. These factors include the size and liquidity of the bond issues and a number of measures of the riskiness of the banks issuing the bonds. Some recent and comprehensive studies are Acharya, Anginer and Warburton (2013) (AAW), Lester and Kumar (2014) and Santos (2014). These build on a longer history of studies including Flannery and Sorescu (1996) and Sironi (2003)[4].

AAW find that there was an annual cost advantage of 20 basis points from 1990-2010. They find that the subsidy peaked at 120 basis points in 2009.

Lester and Kumar (2014)[5] use a methodology similar to AAW and largely replicate their results for the period studied by AAW, through 2010. However, when they update the analysis, the implicit subsidy drops sharply and in 2013 is not different from zero with statistical significance. Further, they argue that even in the earlier periods, there is reason to believe, based on studies of other industries, that factors not captured in the analysis may explain the lower cost for larger institutions.

Santos (2014) takes a similar approach to AAW, with two major differences. On the one hand, it is considerably less detailed in its use of control variables to try to take out the effects of differences in bond characteristics, such as liquidity levels, and in bank characteristics, such as various measures of credit risk. On the other hand, it goes further than AAW by trying to compare the borrowing cost advantage of the very largest banks with the borrowing cost advantage of the very largest non-bank financials and the very largest non-financial corporations. It finds an implicit subsidy of 41 basis points when using controls only for the date of issuance, credit rating, bond size, and bond maturity. Santos then constructs a related, but somewhat different, methodology to find the size of the implicit subsidy for each of banks, non-banks, and non-financials using only data from bonds with the same rating, such as single-A[6]. This approach finds that the borrowing cost advantage of the largest banks is substantially bigger than that enjoyed by the largest non-bank financial institutions compared to smaller peers or the similar analysis for non-financial corporations[7].

Although there are many methodological issues that can be argued in regard to these studies, the technique of using detailed data on specific bonds, and on the banks issuing them, has considerably more promise for capturing market perceptions of implicit government guarantees than does the crude technique of looking only at overall funding costs.

Deposit rates for different size deposits at same banks. Jacewitz and Pogach (2012) examine the rates paid by individual banks on their large deposits as compared to their small deposits. The rates paid on deposits that are only partially insured, since they exceed the FDIC's guarantee limits, should be higher, all else equal, than the rates on fully insured deposits. The difference would reflect the credit risk of the bank compared to the government. If the largest banks show little or no difference in their rates between large and small deposits, it could be because depositors would expect a government rescue, making all deposits at that bank equivalently backed by the federal government.

The devil in the analysis is in the "all else equal" condition, since there are a number of reasons why rates might be lower on large deposits. In particular, large deposits may be business deposits or deposits from wealthy individuals where the deposits are maintained in substantial part to bolster the banking relationship or explicitly to qualify for other benefits from the bank, such as cheaper lending rates. The authors themselves point to an anomaly in their findings that suggest that such other factors are partially at work. They find that there are rate differences between deposits of two different size levels that are both fully insured, which cannot therefore reflect differences in assumed government support.

Kumar and Lester (2014)[8] attempted to update the Jacewitz et. al. results to use 2010-2012 data and to correct for what they believed were certain methodological flaws. The biggest of these purported flaws was in the treatment of the many banks that reported that the rates on large and small deposits were identical. The initial study discarded these data points as potentially inaccurate readings, while Kumar and Lester believe they should be treated as valid indicators that there was no rate difference. Overall, they concluded that the deposit rate advantages of the largest banks potentially due to government support had largely disappeared in the most recent periods, dropping to 4 bps. Further, they argue that a number of other factors could account for the differences and that it is inappropriate to assume this represents an implicit subsidy. Bolstering this argument is the point noted earlier that there were effects shown when comparing two different sizes of insured deposits, which by definition should not reflect a difference of implicit subsidy.

Rating agency assessments of government support. Several credit rating agencies have explicitly assigned higher credit ratings to banks because of the potential for government support. In doing so, they provided one set of ratings based solely on the bank's stand-alone creditworthiness and another that includes government support. This difference in rating provides some information on the likely level of implicit subsidy in two ways. First, it gives a sense of one expert judgment on the degree of credit support available from the government. Since credit ratings have a substantial correlation with perceived default likelihoods, it is possible to reverse engineer the credit rating uplift to estimate the probability of a rescue. Second, implicit subsidies are fundamentally about market perceptions and the resulting market pricing. To the extent that markets set the price for bonds based on ratings, these have a direct effect on the implicit subsidy.

Ueda and di Mauro (2012) examine the credit ratings of banks in major countries. They use Fitch ratings estimates of external support as a proxy for potential government intervention to support the institution. The authors then try to estimate the interest rate difference associated with that ratings uplift. They find that the largest banking organizations enjoyed a funding cost advantage of 60 basis points in 2007 and 80 basis points in 2009. It is not surprising that large implicit subsidies would have been found outside the U.S., since many foreign countries have been quick to provide support as necessary in the past. Nor is it surprising that measures of implicit subsidies during the financial crisis were high, when they would have been of most value and the potential for government intervention was high. However, it should also be noted that these would not be *net* implicit subsidies for the largest banks for those countries where even the smaller banks would also be rescued.

IMF (2014) also examined a credit ratings based approach. This technique showed a high subsidy rate during the crisis, which had fallen to about 15 bps in the US using data through 2013. Current implied subsidies were shown to be much higher in Europe and some other parts of the world.

Such studies are useful as another way of estimating the implicit subsidy, but they suffer from a serious weakness, which is that the bonds of large financial institutions often have pricing which is inconsistent with the average for their rating category. Some investors do factor credit ratings heavily into their pricing decisions, but this factor becomes considerably less important as the size of the issuer becomes larger and the frequency and liquidity of their issues goes up. This is because large institutional investors can cost-effectively do their own research on big issuers and therefore rely less on external ratings or research. The differential between the interest rate implied by the external credit ratings and the actual market interest rates for the largest financial institutions can easily exceed the likely implied subsidy, making it somewhat treacherous to estimate that subsidy from the rating uplift. Strongin et. al. (2013) found that market prices for the largest U.S. banks were consistent with ratings of 2 notches below the Moody's ratings at least 80% of the time in the recent past. This could indicate either a difference of opinion with Moody's about the standalone creditworthiness or about the value of potential government support.

To the extent that ratings are a good indicator of implicit subsidies, it is interesting that Moody's has effectively eliminated the uplift for government support for the largest banks, based at least in part on the view that regulatory and political changes make a taxpayer rescue

much less likely going forward. This occurred after the studies cited here. New studies of this type would therefore now show a zero implicit subsidy based on Moody's ratings.

Other Researchers have used a range of other techniques as well, but the complexity of their approaches do not lend themselves to review in a primer. That complexity also often makes it hard to rely heavily on their findings, since it usually requires a large number of assumptions whose validity in the real world is hard to evaluate. Overall, they do find that implicit subsidies existed historically, in line with the other studies.

Tsesmelidakis and Merton (2013) compared credit risk as implied by equity pricing to that contained in CDS spreads. IMF (2014) includes a Contingent Claims Analysis approach. Kane (2000) and Brewer and Jagtiani (2011) evaluate acquisition premiums in public mergers and acquisitions transactions among banks. Ghandi and Lustig (2013) evaluated equity price performance over time of large versus small banks.

What is left out of the studies?

All of the studies focus on a component of the comprehensive question of the net implicit subsidy for the largest banks in comparison to the smaller banks, because they leave out one or more of the following items.

Any implicit subsidy of borrowing costs will be offset in whole or part by higher regulatory costs now being faced by the larger banks, since policymakers are deliberately placing greater restraints and obligations on the largest banks. It is even possible that the implicit subsidy will be less than these higher costs going forward, effectively creating a negative implicit subsidy.

Governments and regulators are deliberately forcing the largest banks to take actions that make them safer and increase their costs. In the U.S., these include the following areas where the largest banks are subject to tougher requirements than other banks:

- Higher capital requirements.
- Higher deposit insurance premiums
- Potentially higher liquidity requirements
- Greater restrictions on credit exposure to counterparties
- Closer supervision

It is difficult to fully quantify these implicit charges to the profitability of the largest banks, but they are clearly significant, particularly as compared to the size of any implicit subsidy. For example, the largest banks are required to hold up to 2.5 points of additional capital as a percentage of their risk-weighted assets. This could raise their overall funding costs by about 14 basis points per year[9], although a portion of this would likely disappear over time as funding markets reflect the greater safety that higher capital gives to the bank[10]. This does not count the additional capital requirements that may be necessary for the largest banks as a result of being subject to the Fed's CCAR stress tests or the Supplementary Leverage Ratio.

Concerns have also been raised over the potential effects on profitability from stricter liquidity rules being put in place in accordance with Basel III. These rules favor deposit funding and penalize trading activities, thereby disproportionately affecting the largest banks. Further, in October 2013, the Federal Reserve Board proposed a new minimum liquidity requirement with more stringent standards than those set forth in the Basel III framework in regard to what may be considered high-quality liquid assets. Profitability may be impacted as banks look to achieve compliance by de-risking investment portfolios and moving towards lower-yielding short-term securities or more stable term-funding structures[11]. We do not have the information to quantify the impact on the largest banks, but it could be material to an analysis of subsidies.

New rules on deposit insurance fees also adversely impact the profitability of big banks. Section 331 of the Dodd-Frank Act redefines the assessment base used for calculating deposit insurance assessments. Previously, the assessment base was defined as domestic deposits less certain allowable exclusions, while under the new rule the base is defined as banks' average consolidated total assets minus average tangible equity. In general, the intent of Congress in changing the assessment base was to shift a greater percentage of overall total assessments away from community banks and toward the largest institutions, which rely less on domestic deposits for their funding than do smaller institutions. As a result of the rule's adoption by the FDIC in February 2011, the largest banks have been required to shoulder a greater share of the deposit insurance base and pay higher premiums. Standard and Poor's estimated the annual cost of the higher fees for the eight largest U.S. banks to be between $3.5 billion and $4.0 billion. This is equivalent to approximately 4 basis points on total assets.

Limitations on single-counterparty credit exposures (which are considerably tougher for the largest banks) and various qualitative restrictions on behavior also have costs that could be significant, although these are difficult to quantify. Further, a variety of derivatives that are traded over-the-counter are subject to new regulations, such as centralized clearing and strict reporting requirements, under Title VII of the Dodd-Frank

Act. Standard and Poor's estimated the annual cost of complying with the new OTC derivatives regulations to be between $4 billion and $4.5 billion for the eight largest banks. This is equivalent to approximately 4 basis points on total assets. Derivatives trading has been dominated by the largest banks and these changes would affect them significantly more than their competitors.

Adding up the estimates for just the more quantifiable of the new handicaps listed above suggests an impact equivalent to as much as 24 bps in funding costs, significantly greater than the gross implicit subsidy that many studies find today as a funding cost advantage. Thus, it is quite conceivable that the largest banks are at a competitive disadvantage to regional banks in terms of the net effect of potential government support in a crisis and the specific handicaps placed on them.

Finally, in comparing the competitive position of the very largest banks with smaller banks, one also needs to examine whether some of the implicit subsidies calculated for the very largest banks also apply to some or all of the other banks. Most clearly, if one's calculations of the implicit subsidy take account of the existence of federal deposit insurance, then this should be netted out, since it applies to all banks. Another issue would be whether those banks that are just a little smaller than the very largest also receive some advantage from a perception that they may receive a government rescue, even if that benefit is smaller than for the biggest banks. For that matter, the federal government or the Federal Reserve may take steps to ensure the continued viability of the entire banking system, aiding small banks as well as large. This clearly occurred in multiple and crucial ways during the recent financial crisis. (For instance, new bank borrowing was guaranteed for a period of time for all banks and bank holding companies, within certain constraints.) If one's methodology for estimating implicit subsidies captures this effect, then it should be netted out, to the extent that it would also apply to smaller banks.

Why might the subsidy levels have changed over time?

Since implicit subsidy levels do not stay constant over time, one needs to consider what factors might have altered the levels from the periods analyzed in the various studies. The most useful comparison is probably with the relatively static situation prior to the crisis. In that period, there appeared to be a very strong market presumption that the government would step in to prevent the failure of any of the very largest banks, especially if this occurred, as would be likely, in the context of a larger crisis. At the same time, the over-optimism of that period meant that markets viewed the standalone credit risk of the very largest banks as generally quite small, which reduced the subsidy. Since then:

Stand-alone credit risks have changed. The terrible crisis erased the over-optimism of the earlier period and damaged franchises, leading to the perception of substantially worsened stand-alone credit risks. On the other hand, banks have taken many actions to make themselves safer, partially counteracting these effects. Credit spreads and CDS spreads for the largest banks suggest the net effect has been to worsen views of the credit, although it is impossible to know how much of this is stand-alone and how much is due to reduced certainty of government support. If the underlying credits are worse, the implicit guarantee becomes more valuable.

The potential for government rescue has decreased. The strong backlash to the rescues of the crisis period has created risks to government action that were not perceived to exist in the pre-crisis period. There is a strong policy focus now on avoiding future "bailouts" and many politicians lost their jobs for supporting the rescue packages, swinging opinion among politicians strongly away from ever doing this again. In Title II of the Dodd-Frank Act, a mechanism was set up to provide temporary support for systemically important financial institutions in a severe crisis if that is required, but it is hedged about with many restrictions. Further, regulators are moving towards ensuring that at least some bondholders will be "bailed in" by being forced to bear losses in a future resolution of a troubled bank. On the whole, markets perceive, correctly I believe, that the certainty and extent of any future rescues is substantially lower now than under the old legal and regulatory regime. In line with this, the Moody's credit rating agency has essentially eliminated its presumption of government support for the very largest banks.

The very largest banks have many more regulatory handicaps now. Prior to the crisis period, the gross implicit subsidy and the net implicit subsidy would have been nearly equal, as there were few legislative and regulatory burdens that applied differentially to the largest banks. As described above, there are now a number of important burdens, including higher capital requirements, that provide a competitive handicap for them. This requires a focus on the net implicit subsidy to make the right policy decisions.

What are the policy implications, if there is still a net subsidy?

If a significant net subsidy still exists and is likely to remain, then there are three main ways to tackle the competitive distortion:

Change the underlying causes, such as by fixing resolution mechanisms. If the markets perceive an implied government guarantee for the largest banks, it may be because there is in fact the likelihood of such a rescue. The best answer to such a problem would be to find a way to eliminate the need for such a rescue or to greatly reduce its probability of being used or its scope. This could mean fixing potential problems in Title II of Dodd-Frank or introducing some other mechanism to handle distress at systemically important banks.

Change market perceptions, if they lag reality. Alternatively, the problem may be one of perceptions. Perhaps legislative and regulatory fixes have taken care of the Too Big to Fail problem, but markets do not recognize this. In that case, it becomes a communications problem and there may be ways to underline the change in regime. Of course, it may be impossible to completely correct such a misperception until there has been a future crisis and the government demonstrates that it will not rescue these banks, relying instead on the new resolution mechanisms.

Offset the subsidies with taxes or capital requirements or other measures. A third answer, possibly in combination with the other two, would be to raise taxes, capital requirements, or other regulatory burdens on the largest banks in order to offset the remaining net implicit subsidy. Capital requirements would have the advantage that they would also increase the safety of the banks, all else equal, at the same time as reducing any competitive distortion.

Endnotes

1. There are also other ways in which increased creditworthiness due to implied government support could reduce costs, such as an improvement in the terms available from trading counterparties or even suppliers of goods and services. However, the great bulk of the expense improvements would come from depositors and purchasers of debt securities issued by the banks.

2. The author would like to thank Peter Ryan and the Bipartisan Policy Center for research help on an early version of this section.

3. First, few, if any, other observers believe there is anything approaching a 100 bp implicit subsidy today in the US. Based on the underlying factors explained above, this would imply that, absent a potential federal guarantee, there is roughly a 4% chance of the largest banks failing each year, which seems very unlikely under current market conditions. Second, it seems quite improbable that the implicit subsidy for the largest banks was negative for much of 2010 and 2011 and then rose to 100 bps, as this simple calculation found. Virtually everything that happened in the intervening period should have reduced the value of the subsidy, rather than increasing it. Perceived bank credit risk declined and further steps were taken to implement an approach in the US that reduced the probability of a government rescue. The implausible pattern of changes over time strongly suggests that the risk adjustment measure is quite imprecise.

4. Flannery and Sorescu (1996) examine yield spreads on subordinated debt of U.S. banks from 1983-1991. They find that yield spreads were not risk sensitive in the early-to-mid 1980s, a period that was marked by the government bailout of Continental Illinois in 1984, but became significantly more so by the early 1990s, which was marked by debate over and passage of the FDIC Improvement Act (FDICIA) in 1991, which was intended to prevent future government rescues. Sironi (2003) produced similar findings in his study of yields on subordinated debt of European institutions; as monetary and budgetary constraints imposed by the European Union increased in the 1990s, potentially reducing the ability of some of the governments to mount a rescue, the subordinated debt spreads of large banks became more sensitive to risk.

5. Lester and Kumar work for Oliver Wyman, a consulting firm to the financial industry, and the study was funded by the Clearing House Association, an industry trade group. However, their work is careful and well documented and should not be dismissed on the basis of their affiliation.

6. This is actually the range of ratings from A+ to A-.

7. There are at least two methodological concerns worth noting on the comparisons of cost advantages across the industry types. First, it is a measure of the imprecision of the techniques that double-A banks are found to have a 121 basis point advantage while single-A banks are at 31 basis points. If the methodology is truly capturing implicit government support, it should show a larger advantage for the weaker single-A banks, not a much smaller one. Second, the comparison in each case is between the five largest institutions by assets and the rest. This makes sense for the banks, since the top five dominate the industry and, in fact, issue the majority of the bank bonds analyzed. For the non-financials, the top 5 are a small fraction of the total and issue only 2% of the bonds. It is likely that the top 5 non-financials are not very different from many of the other bond issuers in the category, which would much reduce the calculated borrowing cost advantage that comes from size. Studies such as Strongin et. al. (2013) that look at differences within specific industries find much larger effects.

8. See the preceding endnote for a discussion of Kumar and Lester's affiliations.

9. 2.5 points of risk-weighted assets would translate to 2 points on total assets, assuming a typical average U.S. risk weighting of 80%. If the after-tax cost of debt were about 3% and that of equity about 10%, this would raise the total cost of funding the assets by 14 basis points (7% times .02).

10. A rough estimate is that perhaps half of this would be offset in the long run by the greater safety benefits, although there is considerable argument as to what the pass-through is. See Elliott, Salloy, and Santos (2012), pp. 28-30 for a more detailed discussion. See also Elliott (2013).

11. Berg and Warlick, "Stricter U.S. Bank Liquidity Rules to Affect Profitability," Fitch Ratings, October 25, 2013.

References

Acharya, Viral V., Deniz Anginer, and A. Joseph Warburton. "The End of Market Discipline? Investor Expectations of Implicit State Guarantees." March 2013.

Baker, Dean and Travis McArthur. "The Value of the 'Too Big to Fail' Big Bank Subsidy." Center for Economic and Policy Research Issue Brief (September 2009).

Brewer, Elijah and Julapa Jagtiani. "How Much Did Banks Pay to Become Too-Big-To-Fail and to Become Systemically Important?" *Journal of Financial Services Research* 43 (2013).

Elliott, Douglas J. "Higher Bank Capital Would Come at a Price." The Brookings Institution (February 2013), available at http://www.brookings.edu/research/papers/2013/02/20-bank-capital-requirements-elliott .

Elliott, Douglas J., Suzanne Salloy, and Andre Oliveira Santos, "Assessing the Cost of Financial Regulation," International Monetary Fund, Working Paper 233, 2012.

Flannery, Mark J. and Sorin M. Sorescu. "Evidence of Bank Market Discipline in Subordinated Debenture Yields: 1983-1991." *The Journal of Finance* 51, no. 4 (1996).

Ghandi, Priyank and Hanno Lustig. "Size Anomalies in U.S. Bank Stock Returns: A Fiscal Explanation." *Journal of Finance* (forthcoming). 2013.

International Monetary Fund. "How Big is the Implicit Subsidy for Banks Considered Too Important to Fail?" In *IMF Global Financial Stability Report* (April 2014).

Jacewitz, Stefan and Jonathan Pogach. "Deposit Rate Advantages at the Largest Banks." Federal Deposit Insurance Corporation Working Paper, 2014.

Kane, Edward J. "Incentives for Banking Megamergers: What Motives Might Regulators Infer from Event-Study Evidence?," *Journal of Money, Credit, and Banking* 32 (2000).

Kroszner, Randall. "A Review of Bank Funding Cost Differentials." Working Paper, October 2013.

Kumar, Aditi and John Lester. "Do Deposit Rates Show Evidence of Too Big to Fail Effects? An updated look at the empirical evidence through 2012 among U.S. Banks." Oliver Wyman, March 2014.

Lester, John and Aditi Kumar. "Do Bond Spreads Show Evidence of Too Big to Fail Effects? Evidence from 2009-2013 Among U.S. Bank Holding Companies." Oliver Wyman, April 2014.

Li, Zan, Shisheng Qu, and Jing Zhang. "Quantifying the Value of Implicit Government Guarantees for Large Financial Institutions." Moody's Analytics Quantitative Research Group, January 2011.

Santos, Joao, "Evidence From the Bond Markets on 'Too Big to Fail' Subsidies," Economic Policy Review, Volume 20, No. 2, Federal Reserve Bank of New York, March 2014

Sironi, A. "Testing for Market Discipline in The European Banking Industry: Evidence from Subordinated Debt Issues." *Journal of Money, Credit, and Banking* 35, no. 3 (2003).

Strongin, Steve, Amanda Hindlian, Sandra Lawson, Jorge Murillo, Koby Sadan, and Balakrishna Subramanian. "Measuring the TBTF effect on bond pricing." Goldman Sachs Global Markets Institute, May 2013.

Tsesmelidakis, Zoe and Robert C. Merton. "The Value of Implicit Guarantees." Working paper, September 2012, presented at Federal Reserve of Minneapolis Conference, November 2013.