

**EXAMINING THE GAO REPORT ON
EXPECTATIONS OF GOVERNMENT SUPPORT
FOR BANK HOLDING COMPANIES**

HEARING

BEFORE THE

SUBCOMMITTEE ON
FINANCIAL INSTITUTIONS AND CONSUMER
PROTECTION

OF THE

COMMITTEE ON
BANKING, HOUSING, AND URBAN AFFAIRS
UNITED STATES SENATE

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ON

EXAMINING WHETHER THE ERA OF TOO BIG TO FAIL IS FINALLY OVER

JULY 31, 2014

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THURSDAY, JULY 31, 2014

U.S. SENATE,
SUBCOMMITTEE ON FINANCIAL INSTITUTIONS AND CONSUMER
PROTECTION
COMMITTEE ON BANKING, HOUSING, AND URBAN AFFAIRS
Washington, DC.

The Subcommittee met at 2:02 p.m., in room 538, Dirksen Senate Office Building, Senator Sherrod Brown, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF CHAIRMAN SHERROD BROWN

Chairman BROWN. The Subcommittee will come to order.

Thank you, Senator Toomey, for working with us on so many issues, including your cooperation in this hearing. Thank you.

Thank you, Senator Vitter, for joining us.

There will be other Members here, too.

And thanks to the witnesses whom I will introduce in a moment.

Too big to fail is the Government policy that ensures that certain financial institutions cannot be allowed to fail because their failures would cause too much damage to our Nation's financial system and our Nation's economy.

This is the Subcommittee's sixth hearing since 2011 on the issue of too-big-to-fail banks. We are here to ask again whether too big to fail is finally over.

Some Wall Street institutions and their paid consultants and lobbyists argue that no bank is too big to fail.

Upton Sinclair, the American writer, once said, "It is difficult to get a man to understand something, when his salary depends on his not understanding it."

But most objective observers agree with Federal Reserve Chair Janet Yellen who said that "Our work is not finished." When the four largest U.S. banks are 25 percent larger today than they were in 2007, before the implosion of the economy, it is hard to disagree with her statement.

Yesterday, Christy Romero, the Special Inspector General for TARP, released a report in which she concluded the six largest U.S. bank holding companies "remain interconnected to each other in 2013 as they were in 2008." She agreed we have more to do.

Too big to fail distorts incentives and encourages excessive growth and leverage and complexity.

Today we are here to examine one effect of too-big-to-fail policies—the financial benefits enjoyed by the largest banks. The GAO report shows that megabanks’ funding advantage varies based upon how one measures it. Unfortunately, this estimate contains many limitations and is clouded by both extraordinary interest rate policies and a number of subsidies that are difficult to quantify.

But this report has some valuable lessons about too big to fail and shows that right now the subsidy may have been reduced but could be about 50 basis points. GAO also says the subsidy may have been reduced not because we ended too big to fail but because of, their words, “improvements in banks’ holding companies’ financial conditions.”

Unfortunately, market perceptions of financial conditions change quickly. For example, banks’ credit default swap spreads increased suddenly and not until well into 2008.

Secretary Lew told this Committee last month that the only real moment when you know for sure is when there is a crisis.

We rarely have the foresight to know when a financial crisis is about to happen. GAO’s report, though, gives us a glimpse of the next crisis. It estimates that the funding advantage would return to levels similar to those in 2008 as investors and depositors flock—and that word, flock, is exactly right—as depositors and investors flock to the megabanks because they believe the U.S. Government will rescue them.

In another crisis, the biggest banks’ advantages potentially rise to as much as 500 basis points. Taking an estimate from one of the most conservative models of this scenario, the 6 largest banks would get an annual subsidy of about \$13 billion in all of their liabilities. Using some of the higher estimates, it could be 10 times that.

This suggests that under Secretary Lew’s test, the largest banks are still too big to fail; taxpayers are still supplying them with an implicit guarantee.

Whether you view the Government support as a form of catastrophic insurance or a stock option or a nontransparent contingent liability for the Federal budget, we know that taxpayers really, in the end, never receive full value for it.

The first GAO report issued in November, when Dr. Evans joined us before, showed that Government programs underprice support during a crisis.

As a second report shows, we have not taken the necessary steps to ensure that we will not have to prop up the largest banks again.

Unless you think that we can eliminate financial crises forever, the GAO report is another reminder we have more work to do to eliminate too-big-to-fail policies and the advantages and the distortions which they create.

When we think about the costs and benefits of too-big-to-fail policies, industry wants us to think only about their costs.

Steel companies dump waste into a river. They then argue it will be costly to clean it up, but it has a higher human cost to the miners and the children who get sick from the pollution. It passes more health care costs onto our society. The same with damage done by policies on too big to fail.

Those who believe in a society with rules understand that auto safety might cost car companies to install seatbelts and airbags, but those protections save lives.

And financial rules might cost bank executives a little smaller bonuses, somewhat smaller dividends perhaps, but they will help prevent a repeat of what we had 5 years ago with millions of foreclosures and millions of lost jobs.

Senator Toomey, thank you.

STATEMENT OF SENATOR PATRICK J. TOOMEY

Senator TOOMEY. Thank you very much, Chairman Brown, and thanks for having this hearing.

I want to also thank Senator Vitter for requesting the GAO report and thank the GAO for their contribution to this discussion.

It seems to me the GAO report on whether or not big banks get a subsidy is inconclusive, but in any case the real work that we ought to be focused on, the real issue here, is the extent to which Dodd-Frank has codified too big to fail.

The way I see it, what Dodd-Frank does is it looks at banks, designates them as SIFIs and then attempts to micromanage them so massively and so completely that failure is, theoretically, not possible. I think that is the basic mentality of Dodd-Frank.

Well, there are some problems with this approach.

One is we have institutions designated as SIFIs who absolutely are not systemically important, and we have had hearings where we have had that discussion. There is no question in my mind about that.

We also have the massive direct and indirect costs of complying with the overregulation and the micromanagement, which I would suggest goes well beyond a slightly diminished dividend to shareholders. It means there is less credit available, and the credit that is available is available at higher prices. So that is a problem for our entire economy.

I would also suggest that the premise that regulators, as long as they have enough power, will make it impossible for an institution to fail; that is based on the mistaken notion that these regulators are omniscient, or have greater wisdom or intuition than they did before 2008, because there was no absence of regulators at the time that the financial crisis hit.

Finally, I would simply argue that failure has to be an option. In a market-based economy, in a capitalist system, in a free society, you have to be free to fail. And that is without a taxpayer bailout.

And so that is what we ought to be looking to achieve—a system where we can have a failure that is not catastrophic and that does not involve taxpayers being forced to make a bailout.

So my suggestion is that what we ought to do—and I am open and looking forward to having your support on my legislation, Mr. Chairman—is let's repeal Title II. To the extent that anybody thinks there is a subsidy or there is a codification of too big to fail, it must reside in Title II, which is where the orderly liquidation authority is.

And rather than have this subjective process, which is what Title II is, where there is no option for restructuring, there is no cer-

tainty about creditor rights and there is an explicit mechanism for taxpayers to come in and be forced to make a bailout, rather than all of that, why not do this in bankruptcy, which is what bankruptcy is supposed to be all about?

If you have a properly designed bankruptcy code, which I think does require some modifications, creditors would be on the hook for losses, not taxpayers; you could allow for either a liquidation or a reorganization, whichever makes sense; creditors of equal standing would be treated equally rather than the subjective treatment that Title II of Dodd-Frank contemplates; and you have a bridge bank mechanism that would allow for a resolution to occur without systemic problems.

So I think that too big to fail is a real concern. I think the real solution is to go to the heart of where the problem is. The problem is in Dodd-Frank, and so I hope we will be able at some point to address that.

Again, I thank you for having this hearing, Mr. Chairman.

Chairman BROWN. Thanks, Senator Toomey.

Senator Warren? No opening statement.

Senator Vitter.

STATEMENT OF SENATOR DAVID VITTER

Senator VITTER. Thank you, Chairman Brown, for holding this hearing today and for partnering with me in requesting the study from the GAO that was released today on the expectation of Government support for megabanks-large bank holding companies.

Chairman Brown and I started our work together based on a shared belief that Dodd-Frank had not ended too big to fail. We began by writing the regulators in 2012, urging them to use their statutory authority to deal with the too-big-to-fail problem and end bailouts once and for all. Unfortunately, they were not as aggressive as they needed to be.

We then introduced our legislation requiring prior capital standards, and in January 2013, we asked the GAO to study and report to Congress on the perks of a megabank being considered too big to fail.

I guess I disagree somewhat with my colleague, Senator Toomey, that this report is completely inconclusive. I think it is very helpful, and I think it moves the debate significantly.

Not long ago, a lot of folks led by the megabanks were denying any funding advantage, any too-big-to-fail subsidy. Now I think that debate is over. Everyone agrees it exists, and we are debating how big it is and for what reasons it is here or here or wherever.

I think that is a significant shift in the debate and we are approaching a consensus on this. From this report, I think it supports that consensus.

Let me just point to a couple of quotes.

“Remaining market assumptions about Government support can give rise to advantages for the largest bank holding companies in three broad categories to the extent these assumptions affect decisions by investors, counterparties and customers of these firms. Those categories are funding costs, financial contracts that reference ratings and an ability to attract customers.”

And then in addition, out of this GAO report, it says that if today's megabanks had the same environment and credit risk as in 2008 the market would expect bailouts and their funding advantage would increase to between 102 and 495 basis points. So that is significant.

Finally, let me point to one other key metric that I am very concerned about. It is outside of this report, but it is a key metric that is unassailable, and that is the accelerating pace since the crisis of consolidation.

The megabanks have gotten much bigger. Smaller community banks have gotten far fewer in number. That was a preexisting trend, but that trend has been put on steroids through the crisis and Dodd-Frank. That trend is unassailable, beyond debate.

And I think that is very worrisome for our banking system and sadly ironic, given that on the private side—Government was certainly responsible for the crisis in terms of many policies, but on the private side it was very large institutions, not smaller community banks. They have essentially benefited in terms of where they are in the market, benefited through the crisis and, in light, benefited by our response in terms of Dodd-Frank.

Those smaller institutions that had nothing to do with the crisis have receded and in a much more vulnerable position than they were before the crisis and the legislative response.

I look forward to our witnesses today and to an informed discussion based on what they have to say.

Thank you.

Chairman BROWN. Thank you, Senator Vitter. Thank you for your work on requesting this report and as Senator Toomey said, too.

Dr. Lawrance Evans is a Director in the Financial Markets team at the GAO, where he has also served as an economist and led engagements in the GAO's International Affairs and Trade Team. Prior to his service there, Dr. Evans was a research fellow at Amherst College and a research assistant at the Center for Economic Policy and Analysis.

Welcome back, Dr. Evans.

Mr. EVANS. Thank you.

Chairman BROWN. Dr. Deniz Anginer is an assistant professor of finance at Virginia Tech's Pamplin School of Business and is currently on leave from the position as a financial economist with the Development Research Group at the World Bank. Prior to joining the World Bank, Dr. Anginer worked as a risk and finance consultant at Oliver Wyman.

Dr. Edward Kane is a research professor of finance at Boston College. In addition to his more than 50-year career in banking and economic teaching and research, Professor Kane served as a consultant to private companies and Government agencies including the Office of the Comptroller of the Currency, the General Accounting Office and the Federal Reserve Banks of Boston and Chicago. He currently serves as a research associate at the National Bureau of Economic Research and is a member of the Shadow Financial Regulatory Committee.

Welcome.

Dr. Anat Admati is the George Parker Professor of Finance and Economics at Stanford University's Graduate School of Business. Professor Admati spent more than 30 years studying and teaching finance and economics and has written extensively about the function and regulation of financial markets.

Thank you, Dr. Admati, for being here.

Douglas Holtz-Eakin is President of the American Action Forum. Dr. Eakin was a member of the Financial Crisis Inquiry Commission and served as Director of the Congressional Budget Office and Chief Economist of the President's Council of Economic Advisors. In addition to his appointments across multiple Administrations, Dr. Holtz-Eakin was a senior fellow at the Peterson Institute for International Economics, Director of the Maurice Greenberg Center for Geoeconomic Studies and the Volcker Chair of International Economics at the Council on Foreign Relations.

Welcome back to one of your many times to testify, Dr. Holtz-Eakin.

Dr. Evans, if you would begin.

STATEMENT OF LAWRENCE EVANS, DIRECTOR, FINANCIAL MARKETS AND COMMUNITY INVESTMENT, GOVERNMENT ACCOUNTABILITY OFFICE

Mr. EVANS. Thank you. Chairman Brown, Ranking Member Toomey, and Members of the Subcommittee, it is my pleasure to appear before you today to discuss the existence of any funding advantages the largest banks may have received due to perceived Government support.

The report we released today reflects GAO's extensive work on this issue. When I appeared before the Subcommittee in January, I noted that the question of whether or not banks receive benefits because of investor expectations of loss protection was largely an empirical one. As a result, my remarks today will focus on our original quantitative analysis.

It is important to note up front that this was a difficult task, particularly because measuring investor perceptions is complicated. The very nature of our exercise necessitated a number of methodological choices and raised a number of issues over which reasonable people may disagree.

Consumers of this research should know that precise and firm conclusions likely reflect key assumptions and confident decisions on difficult methodological issues that would benefit from professional skepticism and full disclosure. As a result, our report carries a heavy dose of caution and nuance and reflects the uncertainty underpinning our modeling effort.

There are many funding sources one could analyze. We selected senior unsecured bonds.

Bond yield spreads are a direct measure of what actual investors charge banks to borrow money in the market and are sensitive to credit risk and, thus, investor expectations. Senior unsecured debt is among the most important sources of nondeposit funding and intended to absorb losses under FDIC's resolution authority.

While there are many approaches to examining potential funding cost advantages, we chose an econometric methodology. This allows us to examine the relationship between size and bond funding costs

and take into account other factors that might drive funding cost differences, like credit risk and bond liquidity.

Specifically, our model allows the funding cost-risk relationship to be influenced by bank holding company size and for that influence to change from year to year.

Our time period covers 2006 to 2013, which captures many important changes in the regulatory environment and any impact this may have had on market expectations.

Because uncertainty is inherent in modeling, it is best practice to analyze and report its effects. We directly incorporate sensitivity analysis into our findings by estimating 42 models for each year. The multiple model specifications reflect the various defensible ways to incorporate credit risk, bond liquidity and size into the analysis.

For example, there is no agreement in the literature on which institutions may be considered too big to fail. Therefore, we capture systemic importance using different measures, including total assets and indicators for banks designated as G-SIBs and those designated as SIFIs by Dodd-Frank.

Our analysis suggests a funding cost advantage for large banks during the financial crisis but provides mixed evidence of such advantages in recent years. For example, most models in 2013 suggest that funding cost advantages have declined or reversed, but there were a few models that found lower funding costs for large banks.

Because we are agnostic about which models are the right ones, GAO remains cautious against strong conclusions. The weight of the evidence, though, suggests progress has been made, but it is still too soon to declare victory as funding cost advantages might resurface should crisis conditions reemerge.

This is an important possibility to consider because changes over time in our estimates of the funding cost-size relationship may reflect changes in investors' belief about, one, the likelihood that a bank will fail, two, the likelihood that it will be rescued by the Government if it fails, and three, the size of the losses the Government may impose on investors if it rescues the bank. However, we cannot precisely identify the influence of each of these factors.

In a hypothetical scenario, when we assume credit risk returned to financial crisis levels in 2013, most of our models suggest, again, lower funding costs for larger banks.

The hypothetical scenarios we examined did not provide the same overwhelming type of evidence of advantages we found in 2008 and 2009, and Dodd-Frank and other financial reforms could make financial crisis risk scenarios less likely.

But the outcome of these scenarios suggests that in addition to changes in expectations of Government support some of what we see is likely related to balance sheet repair and, therefore, a lower probability of failure.

To be frank, it may take another crisis to truly test the effectiveness of financial reforms.

We detail important limitations associated with our econometric analysis in the written statement and full report. Suffice to say here that our work is not perfect, and we have not exhausted the many ways one might investigate funding cost advantages. Users

of the report should give our cautionary notes serious attention before moving from our findings to public policy.

Now we understand that stakeholders are invested on both sides of this issue. We encourage interested parties to base their examination of our work on an objective and thorough reading of the actual report.

Shortly, you will hear from Professor Kane, who likely only had a limited time to review our report. Professor Kane's written testimony contains a number of statements that are either inaccurate, mischaracterize our methodology or result from the application of inappropriate criteria to assess the validity of our study.

GAO will welcome an opportunity to respond as we believe we have made an important contribution to the literature and the public policy debate.

Chairman Brown, Ranking Member Toomey, and Members of the Subcommittee, this concludes my prepared statement. I look forward to any questions you might have.

Chairman BROWN. Thank you, Dr. Evans.

Dr. Anginer.

STATEMENT OF DENIZ ANGINER, ASSISTANT PROFESSOR OF FINANCE, PAMPLIN SCHOOL OF BUSINESS, VIRGINIA TECH

Mr. ANGINER. Mr. Chairman and the distinguished Members of the Subcommittee, thank you for convening today's hearing and inviting me to testify.

My name is Deniz Anginer. I am an assistant professor at Pamplin Business School and Virginia Tech.

Along with my colleagues, Viral Acharya and Joe Warburton, I have examined market expectations of implicit Government guarantees to so-called too-big-to-fail institutions. Most of my testimony is based on this research.

The too-big-to-fail doctrine holds that the Government will not allow large financial institutions to fail if their failure would cause significant disruption to the financial system and to economic activity.

In our research, we find that large financial institutions and their investors expect the Government to back the debts of these institutions should they encounter financial difficulty. These expectations of Government support are embedded in the price of bonds issued by major financial firms, allowing them to borrow at lower rates.

Expectation of Government support by the market also results in a distortion in how risk is reflected in the debt prices of large financial institutions.

An explicit Government guarantee dulls market discipline by reducing investors' incentives to monitor and to price the risk-taking of large financial firms.

In our analysis, we show that while a positive relationship exists between risk and cost of debt for medium- and small-sized institutions, this relationship is 75 percent weaker for the largest institutions. Changes in leverage and capital ratios are likewise less sensitive to changes in risk for these large financial firms.

Because they pay a lower price for risk than other financial institutions, the perceived guarantee provides too-big-to-fail firms with

a funding advantage. We estimate a funding cost advantage of approximately 30 basis points over the years 1990 to 2012, peaking at more than 100 basis points in 2009.

The total value of the subsidy amounted to about \$30 billion per year on average over the same time period, topping at \$150 billion in 2009.

We also examined nonfinancial firms. If bond investors believe that all of the largest firms, both financial and nonfinancial, are too big to fail, then large nonfinancial firms should enjoy subsidies similar to that of large financial firms. However, we find that this is not the case, suggesting that the difference is likely due to an expectation of an implicit Government guarantee.

Compared to the GAO study, we find lower implicit subsidy values for the years 2007 to 2011 and slightly higher numbers in 2012. We have not examined the year 2013, the year in which the GAO finds the greatest decline.

Although most of the attention will be paid to the analyses that try to quantify the dollar values of the subsidy and its changes over time, it is important to note that it is very difficult to directly relate these changes to the introduction of Dodd-Frank and other regulations.

It is very hard to separate out changes in the probability of large financial firms experiencing distress from the probability that they will be bailed out. As the GAO report points out, this is especially true as the risk premium in the market has declined in recent years and large financial firms have seen significant improvements in their balance sheets and capital ratios, reducing their probability of experiencing financial distress.

Although it is very difficult to establish a direct link between regulations and changes in subsidy over time, examining these changes in subsidy using alternative methods over a short time window would be more helpful in analyzing the impact of Dodd-Frank and other regulations.

In our study, we examined changes in risk sensitivities of cost of debt after the introduction of Dodd-Frank. We examined changes in subsidies accruing to large financial firms compared to nonfinancial firms. We also examined the cost of implicitly guaranteed debt to explicitly guaranteed debt issued by the same firm under the FDIC's Temporary Liquidity Guarantee Program.

Using these alternative approaches, we find that Dodd-Frank did not significantly alter investors' expectations that the Government will bail out too-big-to-fail financial firms should they falter.

Despite its no-bailout pledge, Dodd-Frank leaves open many avenues for future rescues. For instance, the Federal Reserve can offer a broad-based lending facility to a group of financial institutions in order to provide a disguised bailout to the industry or a single firm.

In addition, Congress can sidestep Dodd-Frank by amending or repealing it or by allowing regulators to interpret their authority in ways that protect creditors and support large institutions.

Finally, it is also important to note that the analysis conducted by us and the GAO only measured the direct subsidy that may accrue to too-big-to-fail firms. There may be other indirect effects such as misallocation of capital or excessive and correlated risk-

taking to exploit the implicit guarantees that are not captured by the analysis.

To conclude, Governments are generally not required to make any apparent financial commitment or outlay or request funds from the legislatures or taxpayers when they implicitly guarantee too-big-to-fail institutions. Implicit guarantees lack the transparency and accountability that accompany explicit policy decisions.

Taxpayers' interests could be better served by estimating on an ongoing basis, both in good times and in bad times, the accumulated value of the subsidy. Public accounting of accumulated too-big-to-fail costs might restrain those Government actions and policies that encourage too-big-to-fail expectations.

Thank you.

Chairman BROWN. Thank you, Dr. Anginer.

Dr. Kane, welcome.

**STATEMENT OF EDWARD KANE, PROFESSOR OF FINANCE,
BOSTON COLLEGE**

Mr. KANE. Thank you, Mr. Chairman, for inviting me to testify today. I want to congratulate you and the rest of the Committee for continuing to battle against too big to fail in the face industry efforts to tell us it has gone away. Finally, I also want to thank Mr. Evans for making you more eager to hear what I have to say.

[Laughter.]

Mr. KANE. What I have to say is that GAO bungled the assignment you gave it. The GAO goes wrong at the outset in how it defines too big to fail.

The definition of too big to fail offered in the report's first sentence is incomplete. It describes too big to fail (TBTF) as an active policy of intervention when the most important part of TBTF is a passive policy of forbearance, which allows institutions that are insolvent to continue to roll over, and even expand, their debt.

Deeply insolvent banks are what I term zombie institutions. They can only prevail because they are backed by the black magic of Government implicit guarantees.

The GAO also misunderstands the character of the funding advantages that your Committee asked them to study. The GAO treats these guarantees as if they are merely a form of bond insurance on outstanding bonds.

The character of too-big-to-fail guarantees is richer than insurance on outstanding bonds because, as long as regulators forbear from resolving its insolvency, a truly too-big-to-fail firm can extract further guarantees by issuing endless amounts of additional debt.

So what is funding cost? Funding cost is the cost of the funding mix. Being too big to fail lowers both the cost of debt, which GAO studied, and the cost of equity, which it did not.

too big to fail guarantees lower the risk that flows through to holders of both kinds of securities. It chops off their losses at a certain point and directs the flow of further losses to taxpayers.

This means that, period by period, the incremental reduction in interest payments on outstanding bonds, deposits and repos is only part of the subsidy that the stockholders enjoy. The missing part is the increase in stock prices that comes from having investors dis-

count the firm's current and future cash-flows at an artificially low rate of return on equity.

Limitless guarantees shift the risk of the deepest possible losses away from creditors and stockholders. It is as if the profit flow move through a pipeline with a Y in it. Once a TBTF becomes insolvent, further losses go to the taxpayers until the economy recovers.

So the issue is not whether things are better today. The economy is better; so the banks will be better.

The issue is whether we continue to encourage them to take on too much tail risk.

The value of these incentives is the greatest part of what the GAO missed. We must recognize that guarantee contracts have two components. The first allows the guarantee party to put responsibility for covering losses that exceed the value of the assets of the bank holding company to the guarantor. No guarantor wants to expose itself to unlimited losses on this put.

For this reason, all guarantee contracts incorporate a stop-loss provision that gives the guarantor a call on the assets of the firm. Ordinarily, the stop-loss kicks in just as insolvency is approached or breached.

In the FDIC Improvement Act of 1991, efforts to exercise the Government's call is termed prompt corrective action. We did not see prompt corrective action in 2008 for TBTF institutes.

By definition, the Government's right to take over a firm's assets will never be exercised in a financial institution that is truly too big to fail. Nonexercise means that the Government has effectively ceded the value of its loss-stopping rights to the too-big-to-fail BHC's stockholders. The value that forbearance gives away is what the GAO's measure ignores.

I offer a picture, Figure 2, in my testimony that graphs the behavior of AIG's stock price before, during and after the 2008 crisis. The only time AIG's stock price approached zero—and it did so twice—was when the notion of a Government takeover was seriously under discussion so that the probability of stockholders' continued rescue was falling. As soon as this course of action was tabled, the stock price surged again because, TBTF policies were turning the stop-loss back to the stockholders.

Also, the designation of systemically important financial institutions is really not a binary condition; that is, it is wrong to say that a BHC either is TBTF or it is not. TBTF does not start at a particular size; it lies on a continuum and is influenced by several variables. Any firm's access to Senators and Congresspersons grows with its geographic footprint—this is part of the problem caused by the ongoing consolidation among the biggest BHCs—and with the number of employees that can be persuaded to contribute to reelection campaigns.

To do a proper investigation, one cannot just look at bond markets. One should be looking also the stock market.

I present in Figure 3 some work that Hovakimian, Luc Laeven, and I have done to estimate average dividend that taxpayers ought to have been paid by large banking firms from 1974 to 2010. We can see the cyclical pattern that we have been talking about. But

we can also see secular learning about and growing exploration of the value of these guarantees.

Prior to each new recession, at the peak, more benefit has been extracted by too-big-to-fail institutions. I fear what is apt to happen in the next crisis.

In deciding to ignore studies that use the contingent-claim approach to evaluate TBTF subsidies, the GAO fell into the trap of thinking of bailout expenditures as either loans or insurance. It is important that we understand the difference between guarantees, insurance, and loan contracts.

An insurance company does not double and redouble the coverage of drivers it knows to be reckless.

Similarly, lifelines provided to an underwater firm cannot be thought of as low-interest loans. Loans are just not available to firms that are in dire straits.

The ability to extract implicit guarantees on new debt and the hugely below-market character of bailout programs means the repayment of funds that were actually advanced—i.e., just the funds that were actually advanced—does not show that a bailout program is a good deal for taxpayers.

I believe that the politicians who have made that claim are embarrassing everyone in Government. They are causing the public, who does understand this, to lose confidence in the policymaking.

So what should we do to sanction reckless pursuit of TBTF subsidies? That is the second part of my statement: How can we sanction the exploitation of too-big-to-fail quantities?

I have stressed that in principle the risks in backstopping these firms cannot be calculated and priced in the straightforward way that the risks of bonds or insurance contracts can.

Now I want to convince you to characterize bailout support as equity funding, as loss-absorbing equity funding, provided to a zombie firm when no one else will give it a nickel. We have got to see that managers who adopt risk management strategies that will fully conceal and abuse taxpayers' equity stake are sanctioned explicitly by corporate and criminal law rather than excused by insurance law as inevitable moral hazard.

I believe the way we frame problems is critically important in making policy.

If we think of bailout support as a loan, if recipients pay it back, it is a good loan.

If we think of it as insurance, we would suppose that actuaries have been able to somehow figure out the risks and that the Government should be able to price and control its exposure to moral hazard.

I am saying—

Chairman BROWN. Please wrap up.

Mr. KANE. OK. Recklessly pursuing tail risk is an ethical violation.

Regulatory capture has actually infiltrated the bureaucratic system that is supposed to limit risk-taking and sewn loopholes into the rules. Capital requirements in particular have gone very, very awry.

I believe that genuine reform would compel the Department of Justice to prosecute megabank holding companies that engaged in

easy-to-document securities fraud. There is value in documenting the violations and prosecuting these crimes in open court.

I know that Senator Warren has been pushing a bill that would make settlement deals much more transparent. We need to underscore how managers benefit when the fines fall only on the shareholders.

But BHC managers that have committed theft by safety net from taxpayers are individuals. If we do not set up sanctions that punish individuals, we are going to get even more theft in the future.

Chairman BROWN. OK. I am going to cut you off. Thank you, Dr. Kane.

Dr. Admati, thank you.

STATEMENT OF ANAT ADMATI, GEORGE G.C. PARKER PROFESSOR OF FINANCE AND ECONOMICS, GRADUATE SCHOOL OF BUSINESS, STANFORD UNIVERSITY

Ms. ADMATI. Chairman Brown, Ranking Member Toomey, and Subcommittee Members, I am very grateful for the opportunity to speak to you today.

too big to fail is primarily about the collateral damage from the failure of some very large and complex companies.

The global financial system is highly interconnected, opaque and fragile, like a set of dominos near one another. The systemic dominos are particularly large and central. If one of them fails, or if people fear that it might be unable to fulfill some of its many promises, the system may collapse. And the same is true is multiple banks are in trouble at the same time even if they are not so big.

The trends are not encouraging on this despite the Dodd-Frank Act, and I can elaborate on that later if you would like.

In this scenario, the Government and the Fed must choose whether to let the natural process of failure play out or to intervene and, if so, how.

When Lehman Brothers, a medium-sized investment bank that did not take deposits, filed for bankruptcy almost 6 years, the experience was traumatic. Massive interventions supported numerous other institutions. Some of the largest ones were among big-time recipients.

Here are some questions:

Is this fragile system the best system we can have?

Must we live with it like we must live with the risk of an earthquake?

Was the financial crisis the 100-year flood, and it is not cost-beneficial to build an expensive dam just for the rare event?

Would making the system safer entail sacrificing its benefits?

Is the problem just that they are too big and, therefore, breaking them up would solve the problems?

Is finding a way to make them fail the solution?

The answer to all these questions is no.

We first must diagnose the problems and see which ones are most solvable and at reasonable cost. This does not happen, unfortunately. We are still living in a sick system, and we keep missing the most effective and straightforward medicines, and we can do something about this.

Let me say, briefly, the failed scenarios are all bad, and even changing the bankruptcy law will not help that. Bankruptcy certainly, as it is, is not going to work without collateral damage. So we can commit to something, but we have to bear the results of what we decide to do.

I hope the Fed does not need too many iterations with its living wills to admit this obviously reality. I am glad Senator Warren pushed Chair Yellen about this recently.

I have further questions to ask, and I did in my statement.

Title I of Dodd-Frank gives the Fed perfect authority to act not only once it admits that bankruptcy is not a viable option without harm but, right now, while it is still iterating. Instead, the Fed is failing the public.

Title II, orderly liquidation authority, is not really liquidation. It can maintain the firm's infected intents, too.

The FDIC is doing the best it can. This option is better than bankruptcy right now, certainly, but Title II is also not the solution of too big to fail, and it is especially not a solution to the inefficiencies and distortions in the system.

Harm starts much before the fail is reached. In fact, the system is inefficient and distorted every single day, and much more can be done to improve it.

This hearing is about implicit supports, and we heard something about it. I have a lot to say on that, and in fact, some of the documents that I submitted elaborate a little bit more on some of what Dr. Kane said over here and more about what these insidious subsidies really are.

Implicit supports that the banks do not pay for do create a subsidy. Measuring the size of this subsidy is really complicated. A lot of assumptions are made, and often bad assumptions are made.

But it is also besides the point is what I want to say. Even if you charge the companies every penny of the monetary cost of this subsidy, even if you did, and that would be difficult, this is a very bad system.

I cite some papers in my statement that the GAO report and industry studies do not cite.

And the bottom line is very clear; the subsidies are real, and they are very large.

The main problem with the guarantees is that they reinforce an already distorted set of incentives and exacerbate the inefficiencies of the system. They create perverse incentives, and they enable excessive growth and other bad decisions. They intensify the conflict of interest between the banks and the rest of society.

We are not getting what we want for these subsidies. We are maintaining a sick system.

The key to the fragility of this system is the fragility of the institutions in it. This is not about the risk they take or about micro-managing them. This is about how they fund their investment.

This is the most immediately fixable disease; banks simply use too little equity and too much debt. The tough regulations allow them to fund with 95 percent debt. This is unheard of anywhere without regulation, and there is nothing good about it.

Citigroup would have satisfied these requirements in December 2007. These requirements are outrageously inappropriate.

At the current levels, this level of indebtedness magnifies the risk in the system and creates fragility without doing anything useful for us at all. It works only for those in the system. The rest of us got talked into allowing it and living with the bad consequences.

If you care about access to credit, we are not getting it. We are getting distorted credit. We get too little for some things that we want funded and too much elsewhere; that is wasteful.

The key reason is that the lenders themselves have too much debt. They behave like distressed or zombie borrowers all the time.

The people in the system are compensated to take risk, and the regulations are so bad; they distort the incentives further through a use of a risk weights that favor some investments over others and are manipulatable and distorted.

We want risk to be taken with the right funding so that when things go wrong and do not work out there is no collateral damage.

You may also believe that regulations are automatically bad and costly, but that is false. Some regulations are essential and good. Forcing banks to use more equity and less debt, if done effectively, brings only benefit.

It acts to correct the distortions. It is a correction to what otherwise is crony capitalism. This is an area where the markets are not working, and only regulations or laws can correct this.

We are doing a little bit of it, and they will tell you that we are doing a lot more. But we are doing it bad and insufficiently and ineffectively.

The analogy I give is having speed limits that are entirely inappropriate. The fail is like ambulances and hospitals. We are not going to allow trucks to drive at 95 miles an hour through a residential neighborhood and take the chance that they implode and they burn the engine meanwhile. This is not a safe speed, and it is not hard to see that.

Similarly, no corporation must live on 95 percent debt. Nobody does except in banking. Nobody can live like the banks except for the way they are allowed to and get away with. And that is without regulating it.

I urge you to engage on these issues and to do what you can to improve this part of the regulation. The public should own this place, and the public is not served. Flawed claims that seem to have outside impact on this important debate are having that impact and should not.

I look forward to a further discussion.

Chairman BROWN. Thank you, Dr. Admati.

Dr. Holtz-Eakin.

**STATEMENT OF DOUGLAS HOLTZ-EAKIN, PRESIDENT,
AMERICAN ACTION FORUM**

Mr. HOLTZ-EAKIN. Thank you, Chairman Brown, Ranking Member Toomey, and Members of the Committee, for the privilege of being here today.

I am going to make four brief points in my oral remarks, each of which is elaborated on in the written testimony that I submitted.

Point number one is that any expectation of support for a bank holding company is, at its root, the result of discretionary policy actions taken, and the problem begins with policymakers and ends

with policymakers. It is not something that the banks did. It is not something that the creditors did.

It is something that the policymakers, in a discretionary fashion, did. And creditors took it into account, charged too little in their loans to banks. Banks correctly responded to those incentives and expanded their portfolios inappropriately.

It is a very simple identification of the problem. It is a policy-making problem.

The second point is that the history of such interventions in a discretionary fashion is very erratic. It has consisted of interventions on behalf of large firms and on behalf of some very small firms. It has been interventions on behalf of financial firms and nonfinancial firms. Even in the most recent crisis, we saw both large and small banks receive some intervention, and we saw auto companies receive intervention.

The nature of the intervention has changed. In some cases, it is to preserve the financial stake of bondholders. In other cases, they have been wiped out.

And so it was unsurprising to me, having written my testimony before I read the GAO report, that when I read the GAO report they said there was a wide range of expectations among market participants and monitors about the nature of a potential Government intervention. Given the history, that range of expectations is utterly unsurprising to me and something the GAO should have found.

The third point is that econometric attempts to pull out of differences in bond yields anything like quantifiable too-big-to-fail subsidy is a really elusive quest. It is well established that there are borrowing differentials between large and small entities in lots of industry, and indeed, financial services does not stand out as an especially large differential in the data.

There are good reasons why markets might reward diversified firms, firms that have greater liquidity, and reward them even disproportionately in a crisis when liquidity and being able to move your financial assets is especially important.

As a result, taking apart the differences in those bond yields is going to be highly sensitive to the nature of the specification, the nature of the estimation.

And I think what you see in the GAO report is a stark tribute to exactly that—that we are going to get a different answer depending on how we do this analysis and you are unlikely to find a single sign or a single number on which to hang the analysis.

And the last point is that given that this is an issue that comes from policymaker interventions it is hardly surprising that any too-big-to-fail expectation would change over time. We have seen radically important changes in the policymaking environment since the most recent financial crisis—Dodd-Frank, the Federal Reserve's activities, you know, look across all the regulators, the existence of the FSOC, the activities of the FSOC.

One would expect this to change. Indeed, the GAO had found that it had diminished somewhat.

If you want to eliminate it, you have to eliminate the problem, which is discretion.

And in that regard I am quite sympathetic with the notion of Senator Toomey and his coauthors, that what you want to do is eliminate the discretion, put a fixed set of rules in the hands of a bankruptcy judge, design the rules so that you can deal with the admitted problem that illiquid financial institutions can become insolvent in a rapid fashion. So you have to build the system around that.

But the solution to this is not to be found in changing the behavior of the creditors or the banks. It is changing the opportunity for behavior on the part of the policymakers.

And I think the bankruptcy route and things like that are the most promising way for eliminating this problem in the future.

Thank you, and I look forward to the chance to answer your questions.

Chairman BROWN. Thank you, Dr. Holtz-Eakin.

I want to start by observing that the GAO used three industry-funded studies to design this report, and the GAO arranged meetings with corporate treasurers of companies suggested exclusively—I believe exclusively—by the U.S. Chamber of Commerce, the same organization that sent a letter to the Subcommittee, sort of extolling the virtues of the largest banks in the country. So, just that observation.

I want to start with Dr. Anginer and then work my way across the table, about the study.

The GAO said the subsidy may have been reduced because of “improvements in banks’ holding companies’ financial conditions.”

One of the witnesses at our last hearing said that banks are in the business of taking prudent risks.

Tom Hoenig estimates that the 8 U.S. globally, systemically important banks, the G-SIBs, have a 6.5 percent leverage ratio under U.S. accounting rules and a 4.62 percent ratio under international accounting rules. By comparison, the 10 largest banks in this country, under \$1 billion, have a 9.25 percent leverage ratio under both measures.

So my question is—and starting with you, Mr. Anginer, and working across—how do we encourage institutions to engage in prudent risks useful to our economy, prudent risks without incenting the kind of reckless behavior that leads to bailouts?

If you would answer that, and then Dr. Kane and Dr. Admati and Dr. Holtz-Eakin.

Mr. ANGINER. I think market discipline is very important. So the type of policies that encourage greater market discipline would be very useful in that regard.

One of the things that we show in our analysis is that one of the effects of this too-big-to-fail doctrine is that it dulls market discipline. It reduces investors’ incentives to monitor the risk-taking of these financial institutions.

So, to the extent that these policies reduce those incentives, you would expect greater risk-taking and not only greater risk-taking but a certain type of risk-taking as well.

So, if you are a bank and you fail and none of the other banks are failing, you will most likely not get a bailout. If you fail when everybody else is failing, then you will get a bailout.

So this sort of incentivizes banks to take on a correlated risk, or similar risk, to all the other banks. This is also another important aspect that is often overlooked.

And what we showed in our analysis is that this is usually penalized in other industries. So, if you are a company and you take on risk similar to other companies in the industry, the market will actually penalize you whereas in the financial sector we do not see this; they actually get a benefit.

So market discipline is very important toward this type of perverse incentives.

Chairman BROWN. Dr. Kane.

Mr. KANE. What I see is a failure of the rule of law. Corporate and property law needs to recognize that the taxpayer is given an equity stake in these firms. And by thinking of the safety net as insurance, we excuse it as moral hazard and say it is regulators' problem to stop it, even though they do not have the tools to stop it.

Individual managers are paid to take potentially ruinous tail risks and rewarded and promoted on the basis of the value they extract by taking tail risks.

Congress needs to enact offsetting personal and corporate penalties for willful efforts to pursue risks that recklessly abuse taxpayers' equity stake and visit problems on nonfinancial and household sectors in the economy. Corporate penalties could include forced sales of some or all kinds of business.

I think it is useful to think of the taxpayers' stake in each too-big-to-fail firm as if it were a trust fund and conceive of Government officials as fiduciaries responsible for managing that fund.

The reforms I propose seek to give regulators and managers and directors of too-big-to-fail firms an explicit and codified fiduciary duty to measure, disclose and service taxpayers' stakeholding fairly and competently.

We have to rework bureaucratic and private incentives to make this happen. That means regulatory agency and corporate mission statements must explicitly define, embrace and enforce fiduciary duties of loyalty, competence, and care to taxpayers—to taxpayers—who are implicit shareholders and are being treated unfairly relative to the explicit shareholders.

Chairman BROWN. Dr. Admati.

Ms. ADMATI. Well, corporate governance is broken in banks, mostly because most of the money they invest is creditors' money, but the creditors are not really there in the governance.

And what I am proposing and what is being proposed before is very complicated to do, but the first thing we have to do is bring the risk back to the investors. And the investors that should take the risk are the shareholders, and there should be more of their money.

It is as if you increase their liability, but instead, you just have more of them with limited liability because that is what corporations are.

So partnerships have more liability. Banks should have more responsibility and liability on their balance sheets. And the way to do that is not through triggers and through imposing it on creditors because of the collateral damage of doing that.

That is why the natural place is the way other companies do it, and the way they do it in other companies is because the creditors start telling them that they will not stand for it anymore unless they write incredibly punishing covenants and conditions and increase the costs.

So if you have more shareholders, then you get more discipline from them.

If banks were sent to the equity markets, they would be told by equity investors that they are too opaque. That is what they are saying. Listen to equity investors say that they cannot understand the disclosures, that they are uninvestable.

And if they do not give them a high price for their equity, then we need to know that and we need to know why. And that is the price of their worth because maybe their balance sheets are too inflated.

So the point is if they cannot raise equity then—at any price, then they fail a market stress test, and that is a stress test much better than the stress test that the Fed wants.

Chairman BROWN. Dr. Holtz-Eakin. Mr. Holtz-Eakin. I will echo at the outset some of those remarks in that you want creditors doing their job, which is monitoring the risks that are embedded in the activities of a bank.

And in addition to that you want the shareholders keenly aware that their money is at risk and that if, in fact, the bank is not well-run they will lose it and that it will go away.

If they do that, if the external forces convey appropriate appreciation of the risks, something very important will happen.

One of the things I learned on the Financial Crisis Commission is that many of these institutions had remarkably bad internal risk assessment during the course of this period. I was stunned, but it was really very surprising.

If the outside creditors and shareholders are telling you, do not worry about risk, you do not devote anything in your corporate management to controlling those risks. And it conveys all through these organizations.

So we would get better risk management, not through the regulatory approach, but just from the outside incentives permeating the culture of the firm.

Now, to do that, you have to take off the table the assistance, or expectation of assistance, by the Government in bad times. And that is the hardest thing because, honestly, when things go bad policymakers become very risk-averse, infinitely risk-averse.

And, you know, they have asked many times, is there any chance this could happen?

You say, well, there is a two-tenths of a billionth of a probability that something very bad is going to happen.

And they say, OK, well, then let's pull whatever leverage we have got.

You have to take those levers away to get this to work, and that should be the focus of the Committee—finding ways to establish rules that will reorganize or liquidate these entities. Then the outside forces will do their job.

Chairman BROWN. Thank you.

Senator Toomey.

Senator TOOMEY. Thank you, Mr. Chairman.

Senator MORAN. Would the Senator yield just for a second?

Senator TOOMEY. I would be happy to yield to the Senator from Kansas.

Senator MORAN. Mr. Chairman I am leaving to speak on the floor. I appreciate the Senator from Pennsylvania allowing me just a minute of his time, and I hope to return to ask substantive questions.

But it is troublesome to me that in reading the testimony and hearing the testimony of the witnesses at least some of them appear to have known what was in the GAO report before the GAO report became public.

And I tried recently, yesterday, to see if I could get a copy of the GAO report so I could be more intelligent in my asking questions, without success. I do not know whether something happened here that is inappropriate, but it does seem to me that there may be a double standard in who has information about their testimony and who did not.

Senator TOOMEY. Thank you.

Dr. Holtz-Eakin, I want to follow up.

I think you make a very, very important point here about where the expectations for bailout come from, which one of the things you have stressed is previous policy decisions, right?

Mr. HOLTZ-EAKIN. Yes.

Senator TOOMEY. So if, in fact, the Government comes along and bails out institutions, then there is obviously some level of expectation that the Government will do this again in the future.

But would you agree that in Title II of Dodd-Frank there is an explicit mechanism by which the regulators are empowered at their discretion to tap into taxpayer funding and execute a bailout of sorts.

And so it would seem to me that the codification of that mechanism also contributes perhaps very significantly to the expectation that it might, in fact, get used.

Could you comment on that?

Mr. HOLTZ-EAKIN. Yes, I am quite sympathetic to that point of view.

I mean, you can think of this in many ways as codifying what has been our experience with Fannie Mae and Freddie Mac, who we put on taxpayer funds, kept alive for a long time, have not fundamentally resolved in any way, and now you hear lots of agitation for them to be simply returned to the private sector.

There is no discipline then, right? They get bailed out, and they survive.

Senator TOOMEY. So is it your view that if we repeal Title II, which is the bailout mechanism of Dodd-Frank, and we made the reforms necessary for there to be a credible bankruptcy resolution that would actually be orderly and which would follow the ordinary rules of bankruptcy to the extent that we can—and I think you need to make some modifications to the current code to get there—would that at least diminish the likely expectations that there would be a taxpayer-funded bailout?

Mr. HOLTZ-EAKIN. I think so, yes. My reading of the broad amount of research—and it is not specifically the GAO report—is

that we have already seen a diminishment. That expectation has dropped dramatically, postcrisis.

This would further diminish it. So I do not think it would impose a great shock on financial markets.

I do think it would be a step toward sounder policymaking. It is a sensible thing to do.

Senator TOOMEY. Would there be—if that were to be the case, if we had that policy change and the expectations of a bailout correspondingly diminished, would you be able to comment on any benefits for taxpayers, for markets, for allocation of credit? Are there other benefits that come about?

Mr. HOLTZ-EAKIN. Certainly, you would have less of a need for an elaborate supervisory regime, which is quite costly and raises the cost of credit and diminishes access to credit for consumers. I think that would be a tremendous benefit.

You would have the benefit of a set of rules that all market participants understood rather than guesses at the discretionary actions of policymakers in a crisis.

And all of those things produce better outcomes.

Senator TOOMEY. Dr. Kane, if I understood your comment, I thought at one point you said that your recommendation is for the Government to impose penalties on the people who would take excessive risks because the taxpayers are the involuntary shareholders, effectively.

Mr. KANE. Absolutely.

Senator TOOMEY. Well, that, of course, supposes that the Government knows what is excessive, knows what the penalty ought to be for what somebody decides is excessive.

And I wonder if a better approach is simply to make sure that the taxpayer is not an involuntary shareholder in the institution in the first place so that creditors can enforce behavior by virtue of their decisions on pricing and allocation of credit.

Mr. KANE. Well, I think the best is often an enemy of the good; that is, we would like to make sure that authorities did not make bad policy, but the stresses of a crisis make bailouts so much easier than resolutions.

We see bailout behavior all around the world. Along with some colleagues at the World Bank and the IMF, I have studied what happened to the safety net in 196 countries during this last crisis.

In country after country, if they did not have deposit insurance, they created it. If they had deposit insurance, they extended the coverage and even guaranteed other kinds of debt of TBTF organizations. It is just so much easier to extend guarantees than running the risk of disorganizing the system in crisis circumstances.

To get them to do hard things, we have to change the incentives of the bankers who play this risky game, and not just blame the authorities.

What is the purpose of Section II? It responds to the excuse for inaction that authorities gave. This excuse was: "Oh, we did not have the powers to resolve TBTF firms."

So DFA gave regulators more powers, but power is not the true problem.

The problem is incentives. Top officials are risking their careers and reputations, if they try to allocate losses. It resembles the

issues in exercising tough love. It is very hard for parents to show tough love when their child is caught, say, smoking marijuana or worse. Instead, they hire a lawyer to save them from the consequences of their bad behavior.

On the other hand, the goal is not to send hordes of managers to prison. What we want to do is to build a system where the people who have been abusing the safety net have better incentives in the future.

Senator TOOMEY. I think Dr. Admati has something she would like to add to this.

Ms. ADMATI. All the benefits that were just mentioned here to having a bankruptcy code—which, by the way, in the modification of the bankruptcy code that you would need to have all the big institutions fail under bankruptcy, and good luck to all of us in that scenario—you would also need some kind of backstop.

You yourself said you were going to need some liquidity support.

It would look—and I heard the FDIC discuss this with bankruptcy experts. It would look very much like Title II. So where bankruptcy would change, it would change in the direction of where Title II is right now. I think the distinctions there are very minor.

The point is that all the benefits to credit and less micromanaging are going to happen with more equity. Then there would be more money if banks retain their earnings, more money to make loans and better incentives.

And so there is nothing about correcting that distortion that goes against anything that we want in this system. Nothing.

Senator TOOMEY. Well, I see my time is expired, but Mr. Chairman—

Chairman BROWN. If you want to continue with Dr. Anginer, if you want to.

Senator TOOMEY. Fine.

Mr. ANGINER. Just on the point of whether Dodd-Frank might have codified too big to fail, actually, there is some empirical support for that. We looked at risk sensitivity of cost of debt for these large financial institutions that are deemed to be too big to fail by Dodd-Frank, and there is actually a decline in risk sensitivity.

So the cost of debt has become less sensitive to risk after the introduction, again, suggesting that this too big to fail might have been codified.

Senator TOOMEY. Thank you, Mr. Chairman.

Chairman BROWN. Senator Reed.

Senator REED. Well, thank you very much.

This has been a very informative panel. Thank you all.

Dr. Admati, I think you made the point, and you made several good points, that the size issue is sort of irrelevant in many respects, that there is no perfect size, right size, that it goes really more to capital that the company has, the equity and the leverage ratios.

But a lot of times we have to take very simple approaches, and there has been a lot of discussion about not letting institutions grow beyond \$250 billion. That seems, to me, to be treating a symptom and not effective.

Ms. ADMATI. I am glad you asked about that because about the size, the size is very large, and you have to wonder why. My answer to that is because the funding is too easy.

And we saw conglomerates break up on their own weight, on their own inefficiency.

If the funding gets straightened out, then we might begin to see it. For example, if it was beginning, if you were beginning to pass more and more of the down side to the shareholders, they might begin to see how inefficient these corporations are, and we might see a natural breakups that just make more nimble, better pieces of it.

Yes, I think that some of the crude measures of size at some point by Government, et cetera, at some point, it really becomes just outsized by any measure at all. And so I can see that some of the crude rules that say, OK, enough is enough for size.

These corporations are the largest in the economy by asset size. The amount that is controlled, sprawling across the globe, is unfathomable. Every study of governance shows a total breakdown, and all the repeated scandals are reinforcing that. This is a reckless industry.

Senator REED. But we could sort of exclude the larger ones with the hope that that would solve the problem, but that would not necessarily help those that sort of get underneath the limit if they are insufficiently capitalized or overleveraged.

Ms. ADMATI. Well, you can have a system with tiny, little pieces all failing at the same time, all interconnected, and it is not—that is why just size is not going to do it.

Senator REED. I understand.

And you raised some other issues. It is not just size. It is two others, which makes this a very challenging problem.

It is management—the inability, because they are so large, to effectively manage even if the intention is to manage it well.

And then, the interconnection to other institutions that might be poorly managed or led, or that take business approaches that compel the others to follow.

And let me add a third dimension, which is we are in a global system, and what we do is affected by what other countries do.

And, in fact, frankly, you have heard it before. One of the reasons these banks are so big is because they are global and their global competitors are just as big.

And, oh, by the way and you might comment on this—they have a too-big-to-fail regime overseas, which is a competitive advantage that they have.

Can you comment on that?

Ms. ADMATI. Yes. And, again, I am very thankful for the question.

That other countries might do worse than us is not a reason to follow them.

So a huge problem in Europe, in fact, which is misdiagnosed because the Germans like to protect their banks, and so do the French, is that they have a sicker banking system than we do, and very bloated.

And so, yes, we are not here to support a particular industry on our back. We are not allowing pollution when other countries allow

it, and we should not allow excessive risk even if other countries allow it.

We should protect our citizens. The foreign banks that are here, we control what they can do here.

We should worry about what we can worry about and lead the world as opposed to follow to the lowest common denominator.

Senator REED. But let me ask Dr. Kane, too, to comment because Dr. Kane suggested—and I think your testimony together sort of is sympathetic—in that there are two paths.

One is regulatory forbearance—of not being tough on capital, on equity, on management skills and things like that, and the other is the implicit subsidy for debt and for equity. And those are the two paths.

For the first path there has to be very active regulation by the Federal Reserve particularly because I must say I do not think we are in a position to, on a daily basis, pass legislation to fix this.

And then the second path is a much more structural path about just the public perception—equity perceptions.

So I have just been very general.

Dr. Kane, do you want to comment on this discussion we have had?

Mr. KANE. Yes.

First, when you ask why are U.S. firms so active globally, I would point out two disturbing phenomena.

In the futures markets, we see parent firms “de-guaranteeing” their foreign subsidiaries stripping formal guarantees from foreign affiliates. This lets the parent search out markets that can least well discipline their risk-taking. This is exposing the U.S. safety net because distressed subs are going to be supported by the parent in a pinch and by U.S. taxpayers in the next crisis.

Second, we are observing what is called “inversion,” where, say, a company like Morgan Chase could merge with a small foreign firm, move the headquarters abroad and not pay corporate taxes here. In fact, the CEO claimed the right to do this.

To me, this behavior is an ethical scandal. I am appalled by the ethical environment of an industry that would thumb its nose at the Government that rescued it a mere 5 years ago.

I mean, again, in ordinary human relations we would sock somebody like that in the nose.

You know, it just—

Senator REED. You must be from Boston.

Mr. KANE. Well, I spent a lot of time there.

No, I am from Northeast Washington, DC. We did a lot of that, here, too.

[Laughter.]

Senator REED. I just—may I have one?

Chairman BROWN. Sure, go ahead.

Senator REED. I think this has been terribly useful. And I will ask, at least, are we better off than we were in 2008 with some of the provisions we have adopted in Dodd-Frank like those on derivatives, and the fact that we have actually put emphasis on higher capital levels?

I think there is a sense like nothing has changed at all, and my sense is some things have changed, maybe not enough, but some things have changed.

Mr. KANE. Again, yes, some things have changed, but cross-country swaps regulation is currently a complete disaster.

In the U.S., we have the SEC and the CFTC trying to divide responsibility. Swaps and other derivatives are very protean types of instruments. There are futures now on swaps trading on exchanges. There is a problem with the capitalization of central clearing parties. They have taken on much more risk than before, but none of them has increased its reserve funds to support that, and no one is compelling them to do so.

So one could say we are not in the same position in the sense that the details are different, but U.S. taxpayers are still very exposed. The next crisis threatens to be worse than the last one.

Ms. ADMATI. I would say that some of the things that were done in Dodd-Frank are essential, and they gave authority that can be used well.

The problem is the implementation. A few of the things that got written were written in such a way that makes implementation very difficult, like Volcker. And so in the end of all of that, you are not sure whether the thousand pages of rules are really going to do as much as was hoped. So that is one.

And then Title VII is very important. So this is critical because the modernization act was an absolute disaster, and we know that.

So the ability to regulate derivatives is there. However, CFTC is not getting budgets to do it. And Gensler did a mighty job of it except, you know, could not.

So in the end the lesson that was learned was that the ones that did the bailouts extolled them, and the people learned that there will be more bailouts.

So whether we can try to commit to not do them, it is very difficult. We should try to prevent it.

Why are we having ambulances when we have speed limits so dangerous? That is the question we have to first ask.

Senator REED. Thank you.

Thank you, Mr. Chairman. You are very kind. Thank you.

Chairman BROWN. Thanks, Senator Reed.

Senator VITTER.

Senator VITTER. Thank you, again, to all of our panelists.

Let me start with sort of the biggest bottom-line question. Do any of you think that too big to fail as policy and market perception has ended, and if so, why?

Anybody?

Ms. ADMATI. The answer is no.

Senator VITTER. OK. Do you—

Mr. KANE. No, for me, too.

Senator VITTER. OK.

Mr. HOLTZ-EAKIN. Greatly diminished, however. I mean, not gone but greatly diminished.

Mr. EVANS. And, clearly, we show that there is a variation over time across models, and it may depend on credit risk conditions. So we would say, no.

Senator VITTER. OK. And do any of you think that firms perceived as too big to fail do not have a market advantage because of that?

Mr. KANE. No.

Ms. ADMATI. They do have a funding advantage.

Mr. HOLTZ-EAKIN. That is not so obvious, I would say, at this point, honestly.

There would be a funding advantage, but these are also the same entities that are subject to an enhanced supervisory regime. They have a much bigger regulatory cost. They have capital charges. And on balance it is not obvious they have a competitive advantage against smaller banks.

Senator VITTER. OK.

Mr. ANGINER. And just to clarify, I mean, losses to the taxpayer will depend on two things. One is the probability that these institutions will fail, as Dr. Evans pointed out, as well as the likelihood that they will be bailed out.

Senator VITTER. Right.

Mr. ANGINER. So some of the regulations actually increase some of the—made the banks in a much better position than they were five, 6 years ago.

So the likelihood of failure has come down, but a likelihood of a bailout still remains. It is good to make that distinction.

Senator VITTER. So my second question, does anyone else think—Dr. Holtz-Eakin says it is questionable.

Does anyone else think that a too big to fail does not have a market advantage as a result?

Mr. KANE. Could I add something? This increased regulatory burden is scalable, so that it has actually helped big banks. They can assign someone to fill out all the forms, while managers of very small banks find this burdening. Smaller banks are going to have to get bigger in order to spread the costs of filling out the paperwork.

Senator VITTER. Right. Well, I would certainly agree with that, and that sort of goes to Dr. Holtz-Eakin's point.

I think the overall new regulatory environment is an advantage for big firms, not small firms, even though the burden is bigger for big firms.

But, anyway, I want to use my time efficiently.

Mr. Evans, do you have any response to the criticism that you all studied too-big-to-fail funding advantage in an overly narrow way by looking at bond debt?

Dr. Kane talked about the entire equity side. In addition, a lot of people think that much of the advantage is in short-term funding of money market liabilities, which you did not look at. Do you have a response to that broad set of criticisms?

Mr. EVANS. Right. Certainly, we did not exhaust the various ways institutions might benefit from perceptions of being too big to fail, but we used the dominant methodology in the literature, which is to study one particular slice of the liability stack.

We think bonds are extremely important. You can learn a lot about bonds. It tells you a lot about what happens below it.

So, if we are talking about trends—and, remember, we did not try to quantify a subsidy. We are talking about what happens over

time. And if it happens in bonds, it is quite likely that in places where there is a lower priority you are seeing it as well.

Now Dr. Kane, when he says equity, he is really referring to some of these option pricing modeling approaches, which are highly theoretical. In fact, if I know leverage, if I know volatility, I can mechanically produce a result, and there is no room for investor expectation.

So our model was strongly informed by Professor Anginer's work—

Senator VITTER. OK.

Mr. EVANS. —and an independent review by some highly respected scholars.

Senator VITTER. OK. And, finally, Dr. Admati, in your testimony you particularly focus on the significance and perhaps the potency of capital as a tool to dramatically lessen risk. Why is that, and can you expand on that a little bit?

Ms. ADMATI. Well, equity is the most natural loss absorber. Equity gets the upside. Why should anybody but equity bear more of the downside?

The fact of the matter is equity bears a downside for most corporations, first and foremost, and there is no corporation that has so much debt.

And the banks do not have to have so much debt. They are not in the right range of equity levels that are reasonable for corporations. Without regulation, the markets tell them.

And this is related to the point about what do supervisors need to do. The way to think about that, in my view, is not that the supervisors and the regulators are like equity holders. They take the place of the breakdown of credit markets for these precisely because the banks' ability to borrow comes with not enough strings attached that usual creditors do. And that includes insolvency.

Most companies could not live like the banks.

If you erase the labels from the banks and you gave them—of course, you would have to erase a few zeroes so they are not recognizable as such, and gave their balance sheets to the banks, they would—with the disclosures that they have, they would not be able to borrow.

My hypothetical funding costs for them? Very large, if they really lived on their own.

In a hypothetical that they really are on their own, if we surely believe that with all the covenants and the prioritization that you have to think about, creditors will not come.

What happens in the banks in reality—and it is easy to understand. Start with deposits. Start especially with deposits. Depositors are the most passive creditors. They do not even know they are creditors. They do not even think of themselves as creditors. That is where the problem starts.

A bank CEO could say, I have a lot of deposits; therefore, I do not have a lot of debt.

Right there is the problem. The fact that the bank CEO can momentarily forget that he owes the deposit shows you the problem right there.

From that time on—and deposits are unsecured—they can go and borrow more with the assets they buy with deposits, and the

creditors will let them do it. And then the next creditor will let them do it.

Companies cannot live like that in the real world, and the banks should not be allowed to.

So what the regulators are doing is only coming in instead of the usual credit or covenants that would normally happen to a company that look like this. They should not live like this.

That is what we have to do. The missing piece of it is that there is no credit discipline, and there will not be, and it is not the most effective way to get the discipline.

First, push the rest of the balance sheet. Then there is obviously corporate governance that has to care about risk management.

First, it has to be their own money.

Senator VITTER. Thank you.

Chairman BROWN. Thank you, Senator Vitter, and thank you for your assistance on this.

Mr. KANE. May I just say one thing?

Chairman BROWN. Dr. Kane, certainly.

Mr. KANE. Mr. Evans said that the GAO used the “dominant methodology.”

There are at least two broad methodologies. I believe the other one is actually dominant because we must be concerned about the taxpayer put—the ability to put losses to the taxpayer when they exceed stockholder equity. Equity is the natural loss-absorbing mechanism. To not look at taxpayer exposure as an option is conceptually inferior.

The GAO methodology has a lot of people working on it who do not thoroughly understand option pricing.

Chairman BROWN. Dr. Evans, if you would like to speak to that.

Mr. EVANS. Just to quickly say, you would use that approach if you thought you were sure a subsidy exists and you just wanted to know how large it is.

I mean, Merton, of Black-Scholes and Merton, used it in a deposit insurance context where it is most appropriate.

Again, this is a highly theoretical model and makes some strong and extreme assumptions, and again, there is no room for investor expectations.

Mr. KANE. Well, that is not true. It is changes in expectations that cause movements in the stock price that others use to pull estimates of the option out.

So I am saying you do not quite understand the mechanism and are downplaying the role of assumptions in other economic research.

Chairman BROWN. Dr. Anginer, conclude on that discussion, referee for a moment, and then let me move on.

Mr. ANGINER. Sure, just a point on the methodology. It reminds me of the old joke about looking for a lost key under a lightpost because that is where the light is, not where the key is lost.

And the reason we study bonds is that is where the data are available and makes the analysis much easier.

But having said that, it is likely that we are underestimating risk for a number of reasons.

One is that we are using equity prices.

Also, bonds, publicly traded bonds, are the first ones that are going to get hit on the balance sheet structure, on the debt structure, when there is a failure.

So there is good reason to think that most likely we are underestimating; so these subsidy numbers would be larger.

Chairman BROWN. OK. Thank you.

Dr. Admati, you said that we should compare banks' funding with and without Government support rather than compare bank by larger banks and smaller banks, if I recall.

One way to do this is to incorporate ratings uplift that big banks get as a result of that implied support, actually, that regional community banks do not get.

The GAO report does not do that. They say it is an indirect measure of the funding advantage.

How important—and feel free, all of you, to comment on this, too, but it is directed first to you, Dr. Admati.

How important is including or excluding this uplift in measuring financial benefits for the too-big-to-fail institutions?

Ms. ADMATI. Well, I think the credibility of credit rating agencies, of course, is somewhat diminished after the crisis. So we should be always skeptical of what they say.

However, they are capturing something real, which is that investors perceive—and the credit rating agencies know—that in the hypothetical if the banks are really on their own their funding costs would be a whole lot higher.

And it has not just the interest rate. It has the whole conditions that come with it.

Most of what scares companies from becoming highly indebted is that the creditors will write such restrictive conditions that will not allow them to move.

And the banks get credit under incredibly comfortable, easy burdens that are different from other companies.

Credit uplifts are trying to get at the way to do this, which is not to compare to other companies but to compare the company as it is to the hypothetical company without support.

That is what we are after, conceptually. The problem is it is a hypothetical that is counterfactual, that we do not have.

That is why I said in my hypothetical, with really no—with knowing that the depositor can come in the bank, that other short-term creditors can come and dilute you as a junior creditor, the banks will have a very hard time borrowing. And some of the small banks have a hard time and, in fact, do not have bonds. So, already, you are biasing the whole discussion.

The point is the banks are funding at an unreal world that they feel entitled to, that is completely outside the normal markets.

So I think the credit rating—it is too bad that it was not included. Some of the studies that include it are informative, I would say.

Chairman BROWN. Dr. Holtz-Eakin, do you have something on that?

I would just note—and someone can correct me if I am wrong—recently, most, if not all, the major credit rating agencies have removed the credit uplifts. So you could not do that now. If you care

about too big to fail now, in 2013 and '14, it is gone from that perspective.

Chairman BROWN. Dr. Anginer and then Dr. Evans.

Mr. ANGINER. So just on that, we actually examined the effect of these ratings on the pricing of debt.

So some rating agencies issue two types of ratings. One is called a standalone rating, just incorporating the risk of an institution on its own, without any Government support, and another rating that incorporates the Government support.

So, if you look at how these two types of ratings are priced, it is really the Government support that is being priced, not the standalone rest.

So it is true that some of the rating agencies have recently downgraded some of the Government support, but we do not know what the pricing implications of those are.

Chairman BROWN. Dr. Evans.

Mr. EVANS. And I would say rating agencies are a less direct measure. In fact, they are indirect. If you can go straight to the market and study actual investors that participate in the market, you are going to get a much cleaner answer.

Now we have interviewed a number of investment firms. Some of them do their own credit rating analysis. So it is not necessarily the case that you can go from credit ratings to actual bond spreads.

Chairman BROWN. OK. Dr. Kane, and then I want to move on to a last question, and then we will wrap up.

Mr. KANE. I do not see why you do not use all the data possible. Why would you look in just one place when you lost your keys in your house?

Chairman BROWN. Fair enough question.

Mr. EVANS. And that would apply to the option pricing approach, too, which is, again, highly theoretical.

And if the option pricing model is a hammer and the world is a nail, you will always look there.

But I will point out, in Dr. Kane's written testimony, Figure 3—which, again, you would expect to see this trend because volatility is lower, leverage is lower—looks a lot like the graphics from GAO's report.

Chairman BROWN. OK. Dr. Anginer touched on an issue. I want to ask one question, and all of you feel free to weigh in here.

A lot of the talk is about whether too big to fail overfocuses on what would happen if one institution got into trouble and needed to be resolved.

When you look at the last terrible financial crisis and you look to the future, it seems more likely—I mean it does not seem so likely that one large institution will fail, and only one. Large, universal banks, by and large, conduct the same activities, have the same kind of portfolios, making it unlikely that there will only be one getting into trouble at a time.

So two questions, and I guess I will start with you, Dr. Anginer, since you touched on it earlier, and I just want you to expand.

How does the universal nature of the largest banks affect too big to fail, initially?

And then what sort of risk-taking—because, ultimately, this hearing is about what too big to fail leads to, and that is incenting

risk-taking among these large banks and paying little price for it, except the price the public pays.

What sort of risk-taking does that sort of universal nature of the largest banks incent, and does it make it more likely we have a systemic event rather than just isolated and just an isolated failure?

So, Dr. Anginer and then anybody else that wants to weigh in.

Mr. ANGINER. Sure. I think large financial institutions are incentivized to take these type of correlated risks.

As I mentioned before, again, if you are a large financial institution and you fail when nobody else is failing, you are less likely to get bailed out. This incentivizes you to take on—do activities that others are doing.

And just to—

Chairman BROWN. So you are saying that if you are a CEO of a large bank and you understand what you just said, that means that you are going to want to act like the others. You want to mimic the other banks; they want to mimic you.

Mr. ANGINER. Exactly, exactly.

Chairman BROWN. OK, for sort of safety in numbers. So you are all bailed out because one of you would not be—

Mr. ANGINER. Exactly.

Chairman BROWN. —if it were solely one. OK.

Mr. ANGINER. Exactly. And we actually do see this in the data as well.

So, if you are in another industry and you do what everybody else is doing, taking on similar risk, the investors in the market actually penalize you.

Why? Because they want to be diversified. They do not want their company to fail when everybody else is failing because they are going to suffer greater losses.

We see the opposite effect in the financial sector. They actually get a benefit when they take on similar risk.

So, again, that is because we have these perverse incentives, that because of this too-many-to-fail effect, this universal banking model that you mentioned. And it leads to all sorts of perverse incentives, actually increasing systemic fragility.

Chairman BROWN. Dr. Admati, next.

Ms. ADMATI. Yes. I did not talk too much about the report and did not get into the details, but my commentary goes to a number of other issues that did not come up here.

And I just want to say—and it is related to your question—this is something incredibly interconnected. That means the bailouts are interconnected. When AIG is bailed out, the banks are bailed out. When you bail out Greece, the German banks get bailed out. That is why you cannot even look exactly at one company and isolate these costs.

It is much more complicated because it is not just that they do the same thing; it is that most of their activities are with each other. Actually, a small fraction of them come out to the rest of the economy. There is just so much intersystem activity in those balance sheets.

And so the bailout issues are very, very complicated. In terms of measuring the subsidy, a lot of issues come.

I want to say as well that I mentioned at least one op-ed, and it was specifically about this study here, that says that that study is underestimated.

And I mentioned studies that are not cited in the GAO report that go to the return on the equity, not options, but a study by Kelly, et al., that you did not use, and Lustig and all of those that were not there, some of which was not options. And it showed directly that the banks benefit from all kinds of—in all kinds of ways.

So the subsidy is underrated.

On volatility is low now, credit ratings took the uplift, all of those things—I want to remind everybody; 2006 was a great year. Volatility was very, very low. Everybody was making record profits. OK.

So let's just remember the good times can stop very quickly, and the euphoria of those good times and the low volatilities of these good times can change dramatically. Within less than a year or two, or starting mid-2007, volatilities have shifted from 10 percent on the VIX sort of index to 70 percent.

And I was teaching through that time, so I could see it.

Chairman BROWN. Thank you.

Dr. Holtz-Eakin.

Mr. HOLTZ-EAKIN. So there is an important difference between interconnectedness and suffering a common shock. And what we saw in the last crisis was a worldwide credit and housing bubble that, when it broke, was a common shock across all financial institutions.

Institutions that rely on short-term funding and are heavily leveraged are the recipe for financial problems in those circumstances, and it is appropriate then to worry about an enhanced supervisory regime for those big institutions. And we have that now, and I think that is a sensible thing.

And you should not somehow believe that they are all going to fall apart in the same instance. Indeed, I believe if you go back and just reread the history of the evolution of the 2007–2008 crisis, everyone's remembrance of those awful days when Lehman went down, AIG, Fannie, Freddie, in close order. But the lead-up time was well over a year before that, a year and a half.

I mean, we had early indicators of problems and stresses and policies that accommodated them, and the importance of the policy being better could have cut that off at the beginning.

Now we are going to debate forever whether we should have let Bear Stearns go down along with Lehman or saved them both, but saving one and not the other was a disaster. That is inconsistent discretionary policymaking, and that is the problem.

Ms. ADMATI. I would characterize the problem differently. The problem is one of forbearance and of not prompt corrective action. Fail is not a good option. That is the difficulty here.

You can put all your eggs in the fail option, but we do not have to. That is why we have supervision that would interfere before.

And I agree; the signs were there. But the fail allowed dividends out—dividends that would then have to be plugged in, or were plugged in, by top money that was actually debt and not equity,

that they did not lend, that they just wanted to return so they could pay bonuses again.

Chairman BROWN. Dr. Kane.

Mr. KANE. I would just like to emphasize the political side of being interconnected and being subject to common shocks. It is very hard in our system to say we are going to close, say, Bank of America and not Citi. That choice would just bring a tremendous amount of problems.

Mr. HOLTZ-EAKIN. That is why you should not give them a choice.

Mr. KANE. Well, the—

Ms. ADMATI. Well, some were not that big, by the way.

Mr. KANE. Yeah, but my point is that if most BHCs are failing whatever test you run, or if they all are subject to a common shock, the situation requires choices to be made. The Government will not have the people in place to sort things out.

Even with the slower processing of insolvency in 2008–2009, the FDIC brought people out of retirement to come back to work to help them. They did not have enough experienced personnel.

Chairman BROWN. Thank you all. This was a very helpful discussion. Thank you.

And you saw a lot of interest from my colleagues. Some, I assume, will have questions. Some Members of the Subcommittee perhaps or the full Committee, too, may have questions. If you would get answers to those within a week, it would be very helpful.

Special thanks to Graham Steele and Megan Cheney in my office and Travis Johnson in Senator Vitter's office for the work they have done for a year leading up to this.

We have done a lot of Subcommittee hearings in this Subcommittee. This is one of the most important because it is the one that has such effect on our financial system. And the input from all of you was quite valuable.

So the Subcommittee is adjourned and thank you.

[Whereupon, at 3:38 p.m., the hearing was adjourned.]

[Prepared statements, responses to written questions, and additional material supplied for the record follow:]

PREPARED STATEMENT OF LAWRENCE EVANS
DIRECTOR, FINANCIAL MARKETS AND COMMUNITY INVESTMENT, GOVERNMENT
ACCOUNTABILITY OFFICE

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United States Government Accountability Office



Testimony
Before the Subcommittee on Financial
Institutions and Consumer Protection,
Committee on Banking, Housing and
Urban Affairs, U.S. Senate

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**LARGE BANK HOLDING
COMPANIES**

**Expectations of
Government Support**

Statement of Lawrence L. Evans, Jr., PhD, Director
Financial Markets and Community Investment

Chairman Brown, Ranking Member Toomey, and Members of the Subcommittee:

I am pleased to be here today to discuss the results of our report on expectations of government support for large bank holding companies. As you know, “too big to fail” is the term commonly used to refer to a market notion that the federal government would intervene to prevent the failure of a large, interconnected financial institution to avoid harm to the economy. Market expectations of government rescues can distort the incentives of investors and counterparties to properly price and restrain the risks of firms they believe to be too big to fail, potentially giving rise to funding cost and other advantages for these firms relative to smaller competitors. For example, creditors may be willing to accept lower interest rates on debt issued by these firms if they believe the possibility of a government rescue reduces the likelihood that they could suffer losses. If creditors and other counterparties do not fully charge a firm for the risks it is taking, that firm may have incentives to take on greater risks in the pursuit of higher returns. Excessive risk-taking in response to such incentives can increase the likelihood that such a firm could become distressed and disrupt financial markets.

My remarks today are based on our report, released at this hearing, entitled *Large Bank Holding Companies: Expectations of Government Support*.¹ As you know, this is the second of two reports we are issuing on the topic of economic benefits that the largest bank holding companies (those with more than \$500 billion in total consolidated assets) have received as a result of actual or perceived government support.² Accordingly, this testimony discusses (1) what is known about how financial reforms have altered market expectations of government rescues and the relative advantages or disadvantages of being a large

¹GAO, *Large Bank Holding Companies: Expectations of Government Support*, [GAO-14-621](#) (Washington, D.C.: July 31, 2014).

²In November 2013, we issued the first report, which examined (1) actual government support for banks and bank holding companies during the financial crisis and (2) recent statutory and regulatory changes related to government support for banks and bank holding companies. See GAO, *Government Support for Bank Holding Companies: Statutory Changes to Limit Future Support Are Not Yet Fully Implemented*, [GAO-14-18](#) (Washington, D.C.: Nov. 14, 2013). At a January 2014 hearing, we provided testimony based on this report. See GAO, *Government Support for Bank Holding Companies: Statutory Changes to Limit Future Support Are Not Yet Fully Implemented*, [GAO-14-174T](#) (Washington, D.C.: Jan. 8, 2014).

bank holding company and (2) the extent to which the largest bank holding companies have received funding cost advantages as a result of perceptions that the government would not allow them to fail.

To conduct this work, we reviewed relevant statutes and rules and interviewed regulators, bank holding companies, rating agencies, investment firms, and corporate customers of banks. We also reviewed relevant studies and interviewed authors of these studies. Finally, we conducted quantitative analyses to assess potential "too-big-to-fail" funding cost advantages. Our work for the report on which this statement is based was conducted in accordance with generally accepted government auditing standards. Further details on our scope and methodology are included in the report.

In summary, we found that while views varied among market participants with whom we spoke, many believed that recent regulatory reforms have reduced but not eliminated the likelihood the federal government would prevent the failure of one of the largest bank holding companies. Our analysis suggests that large bank holding companies had lower funding costs than smaller ones during the financial crisis but provides mixed evidence of such advantages in recent years. While there were notable exceptions, most models suggest that such advantages may have declined or reversed. For example, most models we estimated suggest that large bank holding companies had higher bond funding costs than smaller bank holding companies in 2013. However, the outcomes of our econometric models varied with the choice of variables we used to capture size, credit risk, and bond liquidity, and some still predicted a funding cost advantage for larger banks in 2013. Moreover, in hypothetical scenarios in which the level of credit risk in every year from 2010 through 2013 is assumed to be as high as it was in 2008 during the crisis, most of our models suggest that bond funding costs for larger bank holding companies would have been lower than those for smaller bank holding companies in most years during this period. Given the nature of this analysis and associated limitations, our results should be interpreted with caution. Changes over time in our estimates of the relationship between bond funding costs and size may reflect changes in investors' beliefs about the likelihood that a bank holding company will fail, the likelihood that it will be rescued by the government if it fails, and the size of the losses that the government may impose on investors if it rescues the bank holding company. However, we cannot precisely identify the influence of each of these factors. In addition, our estimates may also reflect differences in the characteristics of bank holding companies that

do and do not issue bonds or factors we have not captured in our model. Finally, our estimates are not indicative of future trends.

Views of Key Market Observers on Recent Regulatory Reforms

U.S. federal financial regulators have made progress in implementing provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) and related reforms to restrict future government support and reduce the likelihood and impacts of the failure of a systemically important financial institution (SIFI).³ These reforms can be grouped into four general categories: (1) restrictions on regulators' emergency authorities to provide assistance to financial institutions; (2) new tools and authorities for regulators to resolve a failing SIFI outside of bankruptcy if its failure would have serious adverse effects on the U.S. financial system; (3) enhanced regulatory standards for SIFIs related to capital, liquidity, and risk management; and (4) other reforms intended to reduce the potential disruptions to the financial system that could result from a SIFI's failure.

We found that while views varied among market participants with whom we spoke, many believed that recent regulatory reforms have reduced but not eliminated the likelihood the federal government would prevent the failure of one of the largest bank holding companies. Citing recent reforms, two of the three largest credit rating agencies reduced or eliminated "uplift"—an increase in the credit rating—they had assigned to the credit ratings of eight of the largest bank holding companies due to their assumptions of government support for these firms. Credit rating agencies and large investors cited the new Orderly Liquidation Authority, which gives the Federal Deposit Insurance Corporation new authority to resolve large financial firms outside of the bankruptcy process, as a key factor influencing their views. While several large investors viewed the resolution process as credible, others cited potential challenges, such as the risk that multiple failures of large firms could destabilize markets.

³Pub. L. No. 111-203, 124 Stat. 1376 (2010). While the Dodd-Frank Act does not use the term "systemically important financial institution," this term is commonly used by academics and other experts to refer to bank holding companies with \$50 billion or more in total consolidated assets and nonbank financial companies designated by the Financial Stability Oversight Council for Federal Reserve supervision and enhanced prudential standards.

Remaining market expectations of government support can benefit large bank holding companies to the extent that these expectations affect decisions by investors, counterparties, and customers of these firms. For example, market beliefs about government support could benefit a firm by lowering its funding costs to the extent that providers of funds—such as depositors, bond investors, and stockholders—rely on credit ratings that assume government support or incorporate their own expectations of government support into their decisions to provide funds. Second, higher credit ratings from assumed government support can benefit firms through private contracts that reference credit ratings such as derivative contracts that tie collateral requirements to a firm's credit rating. Finally, expectations of government support can affect a firm's ability to attract customers to varying degrees.

New and higher fees imposed by the Dodd-Frank Act, stricter regulatory standards, and other reforms could increase costs for the largest bank holding companies relative to smaller competitors.⁴ Officials from the Financial Stability Oversight Council (FSOC) and its member agencies have stated that financial reforms have not completely removed too-big-to-fail perceptions but have made significant progress toward doing so. According to Department of the Treasury (Treasury) officials, key areas that require continued progress include education of market participants on reforms and international coordination on regulatory reform efforts, such as creating a viable process for resolving a failing financial institution with significant cross-border activities.

⁴In our report, we did not attempt to quantify the extent to which such higher costs for the largest firms could offset benefits they receive as a result of expectations of government support. For example, we did not attempt to determine the differential impacts of various Dodd-Frank Act provisions on bank holding companies of different sizes. Implementation of some Dodd-Frank Act provisions specifically targets only SIFIs, while other provisions affect both SIFIs and non-SIFIs. Representatives of community banks and other non-SIFIs have noted that while some Dodd-Frank Act provisions—such as the Volcker rule, which prohibits proprietary trading by insured depository institutions and their affiliates and restricts sponsorship or investment in hedge and private equity funds—were intended to target activities at the largest bank holding companies, smaller banks can still face burdens associated with ensuring they comply with these rules. Federal financial regulators have acknowledged the importance of minimizing regulatory burdens for financial institutions and particularly for smaller banks, whose fixed costs arising from regulatory compliance must be spread over a smaller base of revenues.

Analysis of Funding Cost Differences between Large and Small Banks

We analyzed the relationship between a bank holding company's size and its funding costs, taking into account a broad set of other factors that can influence funding costs. To inform this analysis and to understand the breadth of methodological approaches and results, we reviewed selected studies that estimated funding cost differences between large and small financial institutions that could be associated with the perception that some institutions are too big to fail. Studies we reviewed generally found that the largest financial institutions had lower funding costs during the 2007-2009 financial crisis but that the difference between the funding costs of the largest and smaller institutions has since declined. However, these empirical analyses contain a number of limitations that could reduce their validity or applicability to U.S. bank holding companies. For example, some studies used credit ratings, which provide only an indirect measure of funding costs. In addition, studies that pooled a large number of countries in their analysis have results that may not be applicable to U.S. bank holding companies and studies that did not include data past 2011 have results that may not reflect recent changes in the regulatory environment.

Our analysis, which addresses some limitations of these studies, suggests that large bank holding companies had lower funding costs than smaller ones during the financial crisis but provides mixed evidence of such advantages in recent years. However, most models suggest that such advantages may have declined or reversed.

To conduct our analysis, we developed a series of econometric models—models that use statistical techniques to estimate the relationships between quantitative economic and financial variables—based on our assessment of relevant studies and expert views. These models estimate the relationship between bank holding companies' bond funding costs and their size, while also controlling for other drivers of bond funding costs, such as bank holding company credit risk. Key features of our approach include the following:

- **U.S. bank holding companies.** To better understand the relationship between bank holding company funding costs and size in the context of the U.S. economic and regulatory environment, we only analyzed U.S. bank holding companies. In contrast, some of the literature we reviewed analyzed nonbank financial companies and foreign companies.
- **2006-2013 time period.** To better understand the relationship between bank holding company funding costs and size in the context

of the current economic and regulatory environment, we analyzed the period from 2006 through 2013, which includes the recent financial crisis as well as years before the crisis and following the enactment of the Dodd-Frank Act. In contrast, some of the literature we reviewed did not analyze data in the years after the financial crisis.

- **Bond funding costs.** We used bond yield spreads—the difference between the yield or rate of return on a bond and the yield on a Treasury bond of comparable maturity—as our measure of bank holding company funding costs because they are a direct measure of what investors charge bank holding companies to borrow money and because they are sensitive to credit risk and hence expected government support. This indicator of funding costs has distinct advantages over certain other indicators used in studies we reviewed, including credit ratings, which do not directly measure funding costs, and total interest expense, which mixes the costs of funding from multiple sources.
- **Alternative measures of size.** Size or systemic importance can be measured in multiple ways, as reflected in our review of the literature. Based on that review and the comments we received from external reviewers, we used four different measures of size or systemic importance: total assets, total assets and the square of total assets, whether or not a bank holding company was designated a global systemically important bank by the Financial Stability Board in November 2013, and whether or not a bank holding company had assets of \$50 billion or more.
- **Extensive controls for bond liquidity, credit risk, and other key factors.** To account for the many factors that could influence funding costs, we controlled for credit risk, bond liquidity, and other key factors in our models. We included a number of variables that are associated with the risk of default, including measures of capital adequacy, asset quality, earnings, and volatility. We also included a number of variables that can be used to measure bond liquidity. Finally, we included variables that measure other key characteristics of bonds, such as time to maturity, and key characteristics of bank holding companies, such as operating expenses. Our models include a broader set of controls for credit risk and bond liquidity than some studies we reviewed and we directly assess the sensitivity of our results to using alternative controls on our estimates of funding costs.
- **Multiple model specifications.** In order to assess the sensitivity of our results to using alternative measures of size, bond liquidity, and

credit risk, we estimated multiple different model specifications. We developed models using four alternative measures of size, two alternative sets of measures of capital adequacy, six alternative measures of volatility, and three alternative measures of bond liquidity. In contrast, some of the studies we reviewed estimated a more limited number of model specifications.

- **Link between size and credit risk.** To account for the possibility that investors' beliefs about government rescues affect their responsiveness to credit risk, our models allow the relationships between bank holding company funding costs and credit risk to depend on size.

Altogether, we estimated 42 different models for each year from 2006 through 2013 and then used those models to compare bond yield spreads—our measure of bond funding costs—for bank holding companies of different sizes but with the same level of credit risk.⁵ Figure 1 shows our models' comparisons of bond funding costs for bank holding companies with \$1 trillion in assets and average credit risk and bond funding costs for similar bank holding companies with \$10 billion in assets, for each model and for each year.⁶ Each circle and dash in figure 1 shows the comparison for a different model. Circles show model-estimated differences that were statistically significant at the 10 percent level, while dashes represent differences that were not statistically significant at that level.⁷ Circles and dashes below zero correspond to models suggesting that bank holding companies with \$1 trillion in assets have lower bond funding costs than bank holding companies with \$10 billion in assets, and vice versa. For example, for 2013, a total of 18

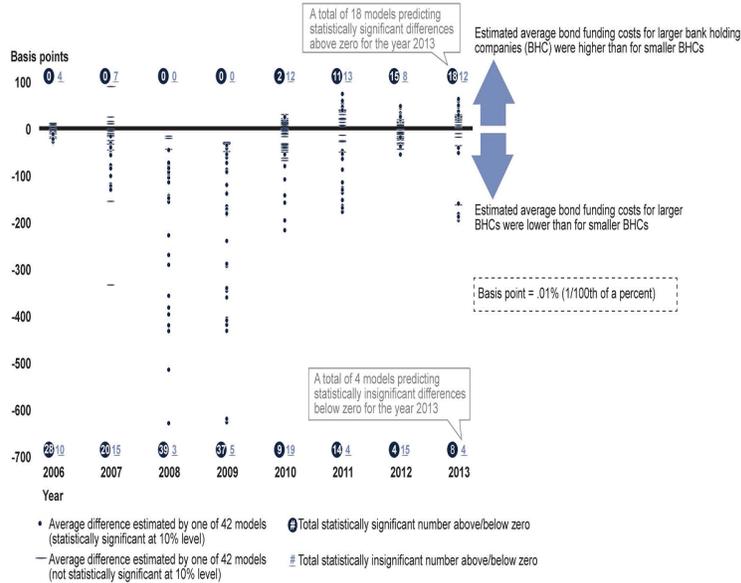
⁵Our models allow the size of a bank holding company to influence its bond funding costs directly and also indirectly through the interaction between size and credit risk. As a result, no single parameter is sufficient to describe the relationship between bond funding costs and size. To summarize the overall relationship between bond funding costs and size reflected in each specification, we calculated bond funding costs for bank holding companies of different sizes and credit risk levels using our estimates of the parameters for each specification for each year. See appendix I of [GAO-14-621](#) for more details on these calculations.

⁶We also compared funding costs for bank holding companies with \$50 billion, \$100 billion, \$250 billion, and \$500 billion in assets to bank holding companies with \$10 billion in assets. See appendix I of [GAO-14-621](#).

⁷Many of the estimates that were statistically significant at the 10 percent level were also statistically significant at the 5 percent or 1 percent level. See table 5 in appendix I of [GAO-14-621](#).

models predicted statistically significant differences above zero and a total of eight models predicted statistically significant differences below zero.

Figure 1: Estimates from 42 Models of Average Bond Funding Cost Differences between Bank Holding Companies with \$1 Trillion and \$10 Billion in Assets, 2006-2013



Source: GAO analysis of data from Bloomberg and the Financial Stability Board. | GAO-14-621

Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated 42 models for each year from 2006 through 2013 to assess the sensitivity of estimated funding cost differences to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance. We used the models to compare bond funding costs for bank holding companies of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. This figure compares bond funding costs for bank holding companies with \$1 trillion and \$10 billion in assets, for each model and for each year, with average levels of credit risk. Each circle and dash shows the comparison for a different model, where points below zero suggest bank holding companies with \$1 trillion in assets have lower bond funding costs than bank holding companies with \$10 billion in assets, and vice versa.

Our analysis provides evidence that the largest bank holding companies had lower funding costs during the 2007-2009 financial crisis but that

these differences may have declined or reversed in recent years. However, we found that the outcomes of our econometric models varied with the various controls we used to capture size, credit risk, and bond liquidity. This variation indicates that uncertainty related to how to model funding costs has an important impact on estimated funding cost differences between large and small bank holding companies. As figure 1 shows, most models found that larger bank holding companies had lower bond funding costs than smaller bank holding companies during the 2007-2009 financial crisis, but the magnitude of the difference varied widely across models, as indicated by the range of results for each year. For example, for 2008, our models suggest that bond funding costs for bank holding companies with \$1 trillion in assets and average credit risk were from 17 to 630 basis points lower than bond funding costs for similar bank holding companies with \$10 billion in assets.

Our models' comparisons of bond funding costs for different-sized bank holding companies for 2010 through 2013 also vary widely. For bank holding companies with average credit risk, more than half of our models suggest that larger bank holding companies had higher bond funding costs than smaller bank holding companies from 2011 through 2013, but many models suggest that larger bank holding companies still had lower bond funding costs than smaller ones during this period. For example, for 2013, our models suggest that bond funding costs for average credit risk bank holding companies with \$1 trillion in assets ranged from 196 basis points lower to 63 basis points higher than bond funding costs for similar bank holding companies with \$10 billion in assets (see fig. 1). For 2013, 30 of our models suggest that the larger banks had higher funding costs, and 12 of our models suggest that the larger banks had lower funding costs.

To assess how investors' beliefs that the government will support failing bank holding companies have changed over time, we compared bond funding costs for bank holding companies of various sizes while holding the level of credit risk constant over time at the average for 2008—a relatively high level of credit risk that prevailed during the financial crisis. In these hypothetical scenarios, most models suggest that bond funding costs for larger bank holding companies would have been lower than bond funding costs for smaller bank holding companies in most years from 2010 to 2013. For example, most models for 2013 predict that bond funding costs for larger bank holding companies would be higher than for smaller bank holding companies at the average level of credit risk in that year, but would be lower at financial crisis levels of credit risk (see fig. 2). These results suggest that changes over time in funding cost differences

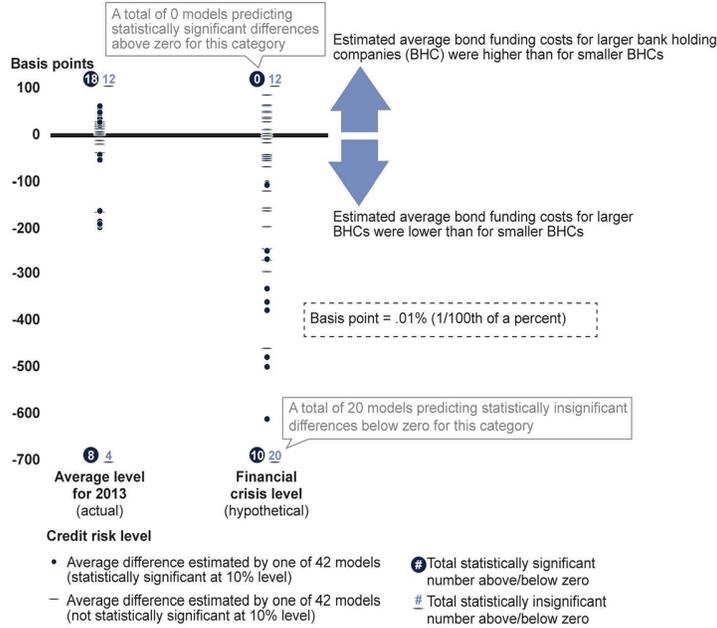
we estimated (depicted in fig. 1) have been driven at least in part by improvements in the financial condition of bank holding companies.⁸ At the same time, more models predict lower bond funding costs for larger bank holding companies in 2008 than in 2013 when we assume that financial crisis levels of credit risk prevailed in both years, which suggests that investors' expectations of government support have changed over time.⁹ However, it is important to note that the relationships between variables estimated by our models could be sensitive to the average level of credit risk among bank holding companies, making these estimates of the potential impact of the level of credit risk from 2008 in the current environment even more uncertain.¹⁰ Moreover, Dodd-Frank Act reforms discussed earlier in this statement, such as enhanced regulatory standards for capital and liquidity, could enhance the stability of the U.S. financial system and make such a credit risk scenario less likely.

⁸As discussed earlier in this testimony, many investment firm representatives with whom we spoke credited enhanced regulatory standards with improving the safety and soundness of the largest bank holding companies and reducing the likelihood that they would experience distress that could result in failure or government support.

⁹To see this, compare the 2008 estimates in figure 1 to the "financial-crisis level" estimates for 2013 in figure 2. Both sets of estimates are derived assuming that the level of credit risk is equal to the average for 2008.

¹⁰The average values of the credit risk variables for 2008 were less than the maximum values of the credit risk variables for 2013, with the exceptions of the variables measuring equity price volatility, option implied volatility, equity return volatility, and excess equity return volatility.

Figure 2: Difference in Estimated Bond Funding Costs for Bank Holding Companies with \$1 Trillion versus \$10 Billion in Assets by Level of Credit Risk, 2013



Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated 42 models for each year from 2006 through 2013 to assess the sensitivity of estimated funding cost differences to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance. We used the models to compare bond funding costs for bank holding companies of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. This figure compares bond funding costs for bank holding companies with \$1 trillion and \$10 billion in assets, for each model for 2013, with the average level of credit risk in 2013 and the average level of credit risk in 2008 during the financial crisis. Each circle and dash shows the comparison for a different model, where circles and dashes below zero suggest bank holding companies with \$1 trillion in assets have lower bond funding costs than bank holding companies with \$10 billion in assets, and vice versa.

This analysis builds on certain aspects of prior studies, but our estimates of the relationship between the size of a bank holding company and the yield spreads on its bonds are limited by several factors and should be interpreted with caution. Our estimates of differences in funding costs

reflect a combination of several factors, including investors' beliefs about the likelihood that a bank holding company will fail, the likelihood that it will be rescued by the government if it fails, and the size of the losses that the government may impose on investors if it rescues the bank holding company. Like the methodologies used in the literature we reviewed, our methodology does not allow us to precisely identify the influence of each of these components. As a result, changes over time in our estimates of the relationship between bond funding costs and size may reflect changes in one or more of these components, but we cannot identify which with certainty. In addition, these estimates may reflect factors other than investors' beliefs about the likelihood of government support and may also reflect differences in the characteristics of bank holding companies that do and do not issue bonds. If a factor that we have not taken into account is associated with size, then our results may reflect the relationship between bond funding costs and this omitted factor instead of, or in addition to, the relationship between bond funding costs and bank holding company size. Finally, our estimates are not indicative of future trends.

After reviewing the draft report, Treasury provided general comments and Treasury, FDIC, the Federal Reserve Board, and OCC provided technical comments. In its written comments, Treasury commented that our draft report represents a meaningful contribution to the literature and that our results reflect increased market recognition that the Dodd-Frank Act ended "too big to fail" as a matter of law. While our results do suggest bond funding cost differences between large and smaller bank holding companies may have declined or reversed since the 2007-2009 financial crisis, we also found that a higher credit risk environment could be associated with lower bond funding costs for large bank holding companies than for small ones. Furthermore, as we have noted, many market participants we spoke with believe that recent regulatory reforms have reduced but not eliminated the perception of "too big to fail" and both they and Treasury officials indicated that additional steps were required to address "too big to fail." As discussed, changes over time in our estimates of the relationship between bond funding costs and size may reflect changes in one or more components of investors' beliefs about government support—such as their views on the likelihood that a bank holding company will fail and the likelihood it will be rescued if it fails—but we cannot precisely identify the influence of each factor with certainty. In addition, Treasury and other agencies provided via email technical comments related to the draft report's analysis of funding cost differences between large and small bank holding companies. We incorporated these comments into the report, as appropriate. A complete

discussion of the agencies' comments and our evaluation are provided in the report.

Chairman Brown, Ranking Member Toomey, and Members of the Subcommittee, this concludes my prepared remarks. I would be happy to answer any questions that you or other Members of the Subcommittee may have.

GAO Contacts

For future contacts regarding this statement, please contact Lawrence L. Evans, Jr. at (202) 512-4802 or at evansl@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. Other GAO staff who made significant contributions to this statement and the report it is based on include: Karen Tremba, Assistant Director; John Fisher (Analyst-in-Charge); Bethany Benitez; Michael Hoffman; Risto Laboski; Courtney LaFountain; Rob Letzler; Marc Molino; Jason Wildhagen; and Jennifer Schwartz. Other assistance was provided by Abigail Brown; Rudy Chatlos; Stephanie Cheng; and José R. Peña.

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PREPARED STATEMENT OF DENIZ ANGINER

ASSISTANT PROFESSOR OF FINANCE, PAMPLIN SCHOOL OF BUSINESS, VIRGINIA TECH

JULY 31, 2014

Mr. Chairman and the distinguished Members of the Subcommittee, thank you for convening today's hearing, and inviting me to testify. My name is Deniz Anginer. I am an assistant Professor at the Pamplin Business School at Virginia Tech. Along with my colleagues, Viral Acharya and Joe Warburton, I have examined market expectations of implicit Government guarantees to so called "too-big-to-fail" institutions.¹ Most of my testimony is based on this research.

The too-big-to-fail (TBTf) doctrine holds that the Government will not allow large financial institutions to fail if their failure would cause significant disruption to the financial system and economic activity. In our research, we find that large financial institutions and their investors expect the Government to back the debts of these institutions should they encounter financial difficulty. These expectations of Government support are embedded in the prices of bonds issued by major financial institutions, allowing them to borrow at lower rates.

Expectation of Government support by the market also results in a distortion in how risk is reflected in the debt prices of large financial institutions. An implicit Government guarantee dulls market discipline by reducing investors' incentives to monitor and price the risk taking of large financial institutions. In our analyses, we show that while a positive relationship exists between risk and cost of debt for medium- and small-sized institutions, this relationship is 75 percent weaker for the largest institutions. Changes in leverage and capital ratios are, likewise, less sensitive to changes in risk for these large institutions.²

Because they pay a lower price for risk than other financial institutions, the perceived guarantee provides TBTf institutions with a funding advantage. We find that the implicit subsidy has provided these institutions an average funding cost advantage of approximately 30 basis points per year over the 1990–2012 period, peaking at more than 100 basis points in 2009. The total value of the subsidy amounted to about \$30 billion per year on average over the 1990–2012 period, topping \$150 billion in 2009. We have also examined nonfinancial firms. If bond investors believe that all of the largest firms (both financial and nonfinancial) are too big to fail, then large nonfinancial firms should enjoy a size subsidy similar to that of large financial institutions. However, we find this is not the case.

Compared to the GAO study, we find lower implicit subsidy values for the years 2007 to 2011 and slightly higher numbers in 2012. We have not examined 2013, the year in which the GAO finds the greatest decline. Although most of the attention will be paid to the analyses that try to quantify the dollar values of the subsidy and its changes over time, it is important to note that it is very difficult to directly relate these changes to the introduction of Dodd-Frank and other regulations.

It is very hard to separate out changes in probabilities of large financial institutions experiencing distress from the probability that they will be bailed out. As the GAO report points out, this is especially true as the risk premium has declined in recent years and the large financial institutions have seen significant improvements in their balance sheets and capital ratios reducing their probability of experiencing financial distress.

Although it is very difficult to establish a direct link between regulations and changes in subsidy over time, examining these changes using alternative methods over a short time window would be more helpful in analyzing the impact of Dodd-Frank and other regulations. For instance, in our study we examined changes in risk sensitivities of cost of debt after the introduction of Dodd-Frank. We examined changes in subsidies accruing to large financial firms compared to nonfinancial firms. We also examined the cost of implicitly guaranteed debt to explicitly guaranteed debt issued by the same firm under FDIC's Temporary Liquidity Guarantee Program.

Using these alternative approaches, we find that Dodd-Frank did not significantly alter investors' expectations that the Government will bail out TBTf financial institutions should they falter. Despite its no-bailout pledge, Dodd-Frank leaves open many avenues for future TBTf rescues. For instance, the Federal Reserve can offer a broad-based lending facility to a group of financial institutions in order to provide a disguised bailout to the industry or a single firm. In addition, Congress can side-

¹Viral V. Acharya, Deniz Anginer, and A. Joseph Warburton, "The End of Market Discipline? Investor Expectations of Implicit Government Guarantees" (available at: <http://ssrn.com/abstract=1961656>).

²Acharya, Anginer, and Warburton (2014).

step Dodd-Frank by amending or repealing it or by allowing regulators to interpret their authority in ways that protect creditors and support large institutions.³ As former Kansas City Fed President, Thomas Hoening, noted: “The final decision on solvency is not market driven but rests with different regulatory agencies and finally with the Secretary of the Treasury, which will bring political considerations into what should be a financial determination.”

Finally, it is also important to note that the analyses conducted by us and the GAO only measure the direct subsidy that may accrue to TBTF institutions. There may be other indirect effects such as misallocation of capital or excessive and correlated risk-taking (to exploit the implicit guarantee) that are not captured by the analyses.

Governments are generally not required to make any apparent financial commitment or outlay, or request funds from legislatures or taxpayers, when they implicitly guarantee TBTF institutions. Implicit guarantees lack the transparency and accountability that accompany explicit policy decisions. Taxpayer interests could be better served, in both good times and bad, by estimating on an ongoing basis the accumulated value of this subsidy. Public accounting of accumulated TBTF costs might restrain those Government actions and policies that encourage TBTF expectations.

Thank you for your time.

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³See, e.g., David Skeel, “The New Financial Deal: Understanding the Dodd-Frank Act and Its (Unintended) Consequences” (2011); Arthur E. Wilmarth, “The Dodd-Frank Act: A Flawed and Inadequate Response to the Too-Big-To-Fail Problem”, 89 *Oregon Law Review* 951 (2011); Standard & Poor’s, “The U.S. Government Says Support for Banks Will Be Different ‘Next Time’—But Will It?”, (July 12, 2011). One aspect of the recent regulations, that our analyses suggest had a mild impact in reducing market expectations of support, is the release of the specifics of the FDIC’s Single Point-of-Entry approach to resolving financial institutions under OLA. This is consistent with the GAO interviews with large investors who point to the SPOE approach as affecting their expectations of future Government support.

The End of Market Discipline?

Investor Expectations of Implicit Government Guarantees⁴

Viral V. Acharya⁵

NYU-Stern, CEPR and NBER

Deniz Anginer⁶

World Bank and Virginia Tech

A. Joseph Warburton⁷

Syracuse University

June, 2014

Abstract

We find that bondholders of major financial institutions have an expectation that the government will shield them from large financial losses and, as a result, they do not accurately price risk. Using bonds traded in the U.S. between 1990 and 2012, and using alternative approaches to address endogeneity, we find that bond credit spreads are sensitive to risk for most financial institutions, but not for the largest institutions. This expectation of government support constitutes a subsidy to large financial institutions, allowing them to borrow at lower rates. Recent financial regulations that seek to address too-big-to-fail have not had a significant impact in eliminating expectations of government support.

JEL Classifications: G21, G24, G28.

Keywords: Too big to fail, financial crisis, Dodd-Frank, bailout, implicit guarantee, moral hazard, systemic risk.

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⁵ C V Starr Professor of Economics, Department of Finance, New York University Stern School of Business, New York NY 10012, E-mail: vacharya@stern.nyu.edu.

⁶ Assistant Professor of Finance, Pamplin College of Business, Virginia Tech, Falls Church VA 22043, E-mail: danginer@vt.edu.

⁷ Associate Professor of Law & Finance, Whitman School of Management & College of Law, Syracuse University, Syracuse NY 13244, E-mail: warburto@syr.edu.

I. Introduction

“If the crisis has taught a single lesson, it is that the too-big-to-fail problem must be resolved,” declared U.S. Federal Reserve Chairman Ben Bernanke in 2010 when testifying before the U.S. Financial Crisis Inquiry Commission. We find that, despite efforts to end too-big-to-fail, the financial markets believe that the government will bail out major financial institutions should they falter. This results in a distortion in how risk is priced by investors in the market and an implicit subsidy that allows these institutions to borrow at favorable rates.

The too-big-to-fail (TBTf) doctrine holds that the government will not allow large financial institutions to fail if their failure would cause significant disruption to the financial system and economic activity. It is commonly claimed that large financial institutions and their investors expect the government to back the debts of these institutions should they encounter financial difficulty. This expectation that the government will provide a bailout is referred to as an implicit guarantee; implicit because the government does not have any explicit, ex ante commitment to intervene.

Although it is often assumed that investors expect government bailouts for large financial institutions, few studies have attempted to provide evidence of that expectation, or to measure the funding subsidy that implicit government protection is alleged to offer. In this paper, we show that the implicit guarantee is priced by investors, which results in a distortion in how risk is reflected in the debt prices of large financial institutions. In the absence of an implicit government guarantee, market participants would evaluate a bank's financial condition and incorporate those assessments into securities' prices, demanding higher yields on uninsured debt in response to greater risk taking by the bank. However, for the market to discipline banks in this manner, debtholders must believe that they will bear the cost of a bank becoming insolvent or financially distressed. An implicit government guarantee dulls market discipline by reducing investors' incentives to monitor and price the risk taking of potential TBTf candidates. Anticipation of government support for major financial institutions could enable the institutions to borrow at costs that do not reflect the risks otherwise inherent in their operations.

On the other hand, some claim that investors do not expect the government to actually implement TBTf policies, as there is no formal obligation to do so. The possibility of a bailout may exist in theory but not reliably in practice, and as a result, market participants do not price implicit

guarantees. The U.S. government's long-standing policy of "constructive ambiguity" (Freixas 1999; Mishkin 1999) is designed to encourage that uncertainty. To prevent investors from pricing implicit support, authorities do not typically announce their willingness to support institutions they consider too big to fail. Rather, they prefer to be ambiguous about which troubled institutions, if any, would receive support. Ever since the U.S. Comptroller of the Currency named eleven banks "too big to fail" in 1984, authorities have walked a thin line between supporting large institutions and declaring that support was neither guaranteed nor to be expected, permitting institutions to fail when possible to emphasize the point. This has led authorities to take a seemingly random approach to intervention, for instance by saving AIG but not Lehman Brothers, in order to make it difficult for investors to rely on a government bailout.⁸ Some also claim that the introduction of new financial regulations, like the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank), may have eliminated TBTF expectations. Hence, it is an empirical question whether the implicit guarantee is considered credible by market participants and is therefore priced.

In this paper, we examine the relationship between the risk profiles of U.S. financial institutions and the credit spreads on their bonds. We find that expectations of government support are embedded in the credit spreads on bonds issued by major financial institutions. Using a number of alternative methods to address potential endogeneity, we show that while a positive relationship exists between risk and credit spreads for medium and small institutions, the risk-to-spread relationship is significantly weaker for the largest institutions. Because they pay a lower price for risk than other financial institutions, the perceived guarantee provides TBTF institutions with a funding advantage.

The funding advantage does not arise because large institutions are necessarily safer than smaller ones. We address potential endogeneity in the relationship between institution size and spreads by showing that large institutions are not less risky than smaller ones. Our findings contradict the "charter value" hypothesis put forth by Bliss (2001, 2004) and others. In addition, we examine the effectiveness of outside discipline on the risk-taking behavior of financial institutions. While we find that the risk of a financial institution, on average, is responsive to various measures of outside discipline (e.g., Duan, Moreau and Sealy 1992), this is not the case for the largest financial institutions. We examine the sensitivity of leverage to changes in firm risk (as measured by asset volatility), and find that this relationship breaks down for large financial institutions. We also examine the fair value of insuring

⁸ In a press briefing the day Lehman Brothers filed for bankruptcy, U.S. Treasury Secretary Henry Paulson said: "Moral hazard is something I don't take lightly."

firm liabilities in order to study the incentive of financial institutions to shift risk onto taxpayers. We find that large financial institutions have a greater ability to shift risk than their smaller counterparts.

To further alleviate endogeneity concerns, we carry out four additional analyses. First, we examine investor expectations of implicit support for non-financial companies. If bond investors believe that all of the largest firms (both financial and non-financial) are too-big-to-fail, then large non-financial firms should enjoy a size subsidy similar to that of large financial institutions. However, we find this is not the case. Using a difference-in-differences approach, we compare the differences in credit spreads of large and small financial institutions to differences in credit spreads of large and small companies in the non-financial sector. We find that a substantial size subsidy exists for financial institutions even after controlling for the effect of size on credit spreads for non-financial institutions. We also use the difference-in-differences approach in examining the sensitivity of credit spreads to changes in risk. We find that the risk sensitivity of spreads is substantially weaker for large financial institutions than for large non-financial institutions.

Second, we examine credit rating agencies' expectations of government support. Certain rating agencies (such as Fitch) estimate a financial institution's stand-alone financial condition separate from its likelihood of receiving external support. Using these third-party estimates of risk and support, we find that investors price the institution's likelihood of receiving government support.

Third, we conduct an event study to examine shocks to investor expectations of support. We find that, following the collapse of Lehman Brothers, larger financial institutions experienced greater increases in their credit spreads than smaller institutions experienced. The spreads of large financial institutions also became more risk sensitive after the collapse of Lehman. Following the government's rescue of Bear Stearns and the adoption of the Troubled Asset Relief Program (TARP) and other liquidity and equity support programs, larger financial institutions experienced greater reductions in credit spreads than smaller institutions experienced. The spreads of large financial institutions also became less risk sensitive after these events. We also find that passage of Dodd-Frank did not have a significant impact on eliminating expectations of future government support. These event study results continue to hold when we use a triple-differencing approach and use non-financial firms as controls.

Finally, we compare *implicitly* guaranteed bonds to *explicitly* guaranteed bonds issued by the same firm. We examine within-firm variation of the effect of potential implicit support by examining the bonds of firms that have been explicitly guaranteed under the Federal Deposit Insurance Corporation's

(FDIC) Temporary Liquidity Guarantee Program. The results confirm our main findings: despite the adoption of Dodd-Frank, investors continue to expect the government to bail out TBTF financial institutions should they falter.

In addition to showing that investors in major financial institutions expect government support should the institution run into severe financial difficulty, we also estimate the value of that expectation. That is, we provide an estimate of the reduction in funding costs for TBTF financial institutions as a result of implied government support. While the direct costs of government bailouts are relatively straightforward to identify and quantify, the indirect costs arising from implicit government guarantees are more challenging to compute and have received less attention. We find that the implicit subsidy has provided TBTF institutions an average funding cost advantage of approximately 30 basis points per year over the 1990-2012 period, peaking at more than 100 basis points in 2009. The total value of the subsidy amounted to about \$30 billion per year on average over the 1990-2012 period, topping \$150 billion in 2009. Internalizing this cost would better align risk with return for implicitly guaranteed institutions, producing a more stable and efficient financial system.

In the next section, we discuss the related literature. In Section III, we describe the data and methodology. Our main results are described in Section IV. Section V contains robustness tests. In Section VI, we discuss policy implications, and we conclude in Section VII.

II. Related Literature

A large literature examines whether the market can provide discipline against bank risk taking (DeYoung et al. 2001; Jagtiani, Kaufman and Lemieux 2002; Jagtiani and Lemieux 2001; Allen, Jagtiani and Moser 2001; Morgan and Stiroh 2000 and 2001; Calomiris 1999; Levonian 2000; Hancock and Kwast 2001; Covitz, Hancock and Kwast 2004; and Flannery 1998). This literature examines whether there is a relationship between a bank's funding cost and its risk. Studies present some evidence that subordinated debt spreads reflect the issuing bank's financial condition and consequently propose that banks be mandated to issue subordinated debt. While these studies find that a bank's risk profile has some effect on credit spreads, the existence of risk-sensitive pricing does not necessarily mean that investors are not also pricing an implicit guarantee. These studies do not consider potential price distortions arising from conjectural government support. For large institutions, the spread-to-risk

relationship might diminish or break down if implicit guarantees are factored into market prices. In other words, these studies do not address TBTF.

In contrast to the extensive literature studying the spread-to-risk relationship in banking, a much smaller literature focuses on the role of implicit government guarantees in that relationship. Kroszner (2013) and Strahan (2013) provide reviews and discussions of this literature. These studies examine how the spread-to-risk relationship changes as investor perceptions of implicit government support changes. Their premise is that investors will price bank-specific risk to a lesser extent during periods of perceived liberal application of TBTF policies, and will price bank-specific risk to a greater extent during periods of perceived restricted application of TBTF policies. The empirical results, however, have been mixed.

Flannery and Sorescu (1996) examine yield spreads on subordinated debt of U.S. banks over the 1983-1991 period. They believe that the perceived likelihood of a government guarantee declined over that period, which began with the public rescue of Continental Illinois in 1984 and ended with the passage of the FDIC Improvement Act (FDICIA) in 1991. They find that yield spreads were not risk sensitive at the start of the period, but came to reflect the specific risks of individual issuing banks at the end of the period, as conjectural government guarantees weakened. Sironi (2003) reaches a similar conclusion in his study of European banks during the 1991-2001 period. During this period, Sironi argues, implicit public guarantees diminished due to the loss of monetary policy by national central banks and budget constraints imposed by the European Union. Sironi uses yield spreads on subordinated debt at issuance to measure the cost of debt and finds that spreads became relatively more sensitive to bank risk in the second part of the 1990s, as the perception of government guarantees diminished. In other words, these studies argue that as the implicit guarantee was diminished through policy and legislative changes, debt holders came to realize that they were no longer protected from losses and responded by more accurately pricing risk.

Other studies, however, reach different conclusions about the spread-risk relationship. These studies focus on the banks declared "too big to fail" by the Comptroller of the Currency in 1984, in order to differentiate TBTF banks from non-TBTF banks. Morgan and Stiroh (2005) determine that the spread-risk relationship was flatter for the named TBTF banks than it was for other banks. They find that this flat relationship for the TBTF banks existed during the 1984 bailout of Continental Illinois and persisted into the 1990s, even after the passage of FDICIA, contrary to the findings of Flannery and Sorescu (1996). Similarly, Balasubramnian and Cyree (2011) suggest that the spread-risk relationship flattened

for TBTF banks following the rescue of Long-Term Capital Management in 1998. In these studies, however, the TBTF definition (one of the eleven banks named “too big to fail” by the Comptroller) is one originating in 1984. Not only do these studies focus on a short list of banks from 1984, they also examine a limited period of time. In contrast, we identify TBTF institutions by employing multiple measures of bank size and systemic risk contribution. Our TBTF definition captures time variation and is a more relevant definition in today’s environment. While their definition of TBTF may suit the time period they analyze (the 1980s and 1990s), we analyze a longer period of time (1990-2012), including the recent financial crisis. We also undertake a more detailed analysis of the role TBTF status plays in the spread-risk relationship. In addition, and more importantly, we address endogeneity issues by performing multiple robustness tests.

Despite the magnitude of the implicit subsidy, few studies in the existing literature have attempted to quantify it. Since the recent financial crisis, however, there has been renewed interest in the subject. Recent attempts generally fall into three broad categories based on the approach taken: credit ratings, deposits, and bond yield spreads.

Credit rating studies focus on the rating “uplift” that a financial institution receives from a rating agency as a result of expectations of government support. This approach uses the ratings uplift to proxy for funding costs. The uplift in ratings is translated into a basis point savings in bond yields (Haldane 2010, 2012; Ueda and Mauro 2011; Rime 2005; Soussa 2000). These studies, however, measure reductions in funding costs only indirectly, by studying differences in credit ratings, not directly as we do using market price data. Market prices reflect the expectations of actual investors in the market and, for many institutions, are available almost continuously. As a result, while these studies might support the notion that an implicit guarantee exists, they do not provide a precise measure of it.⁹

The deposit studies focus on differences in interest rates paid on uninsured deposits for banks of different sizes (e.g., Jacewitz and Pogach 2013). This approach, however, relies on the assumption that the interest rate differentials are attributable to expectations of government support. Other factors could affect uninsured deposit rates, such as the wider variety of services that large banks can

⁹ In addition, these studies use limited controls for differences in bank characteristics and risk. They also examine limited time periods. For instance, Ueda and di Mauro (2011) examine only two cross sections (year-end 2007 and year-end 2009) while Rime (2005) examines only the 1999-2003 period. And they generally do not focus on the U.S. but rather examine a selection of banks worldwide.

offer relative to those offered by small banks, and the lower cost at which they can provide those services, as well as large banks' ability to access alternative funding sources.

A third approach to measuring funding costs, which we employ, uses bond prices to examine funding cost differentials for TBTF and non-TBTF financial institutions. The difference in bond spreads between TBTF and non-TBTF institutions, after controlling for risk and other factors, is interpreted as a measure of the funding subsidy TBTF institutions receive from expectations of government support. Several contemporaneous papers take this approach (Santos 2014; Araten and Turner 2013; Baker and McArthur 2009). Our study employs more numerous controls, and examines a longer period of time, than these papers, which generally use limited controls, examine shorter time periods and do not capture the time-varying effects of TBTF status. We also exploit natural experiments to assess changes in investors' TBTF expectations over time. We also include results from a difference-in-differences approach throughout our paper to confirm that the large versus small differential is greater in the finance industry than in non-financial industries.¹⁰

Although most research on implicit government guarantees has examined debt prices, some studies have investigated equity prices. These papers provide indirect evidence of a funding subsidy arising from implicit government support. While the immediate and most-valued beneficiaries of TBTF policies will be the debtholders, equity studies conjecture that implicit support will impact a TBTF bank's stock price by reducing its cost of funds, thereby increasing profitability. Studies find a positive relationship between bank size and equity prices. O'Hara and Shaw (1990) find that positive wealth effects accrued to shareholders of the eleven banks named TBTF by the Comptroller in 1984. Others suggest that shareholders benefit from mergers and acquisitions that result in a bank achieving TBTF status. Studies report that mergers undertaken by the largest banks increase market value for shareholders, while this is not the case for smaller banks, suggesting market prices reflect safety net subsidies for TBTF banks (e.g., Kane 2000). Hence, studies have focused on premiums paid in bank M&A activity, finding that greater premiums are paid in larger transactions, reflecting the benefits of safety net subsidies (Brewer and Jagtiani 2007; Molyneux, Schaeck and Zhou 2010). Penas and Unal (2004) show that bond spreads also tend to decline after a bank merger, and that the declines are greatest when the size of the resulting entity exceeds a threshold of 2% of all banking assets.

¹⁰ We improve upon these papers in other respects as well. For instance, we use a variety of alternative proxies to identify TBTF financial institutions (some size-based and some systemic risk-based) and employ a host of robustness checks to address potential endogeneity. Moreover, while some studies examine CDS data, bond spread data are available for a greater number of firms and over a longer time period.

Our paper is also related to a literature that examines implicit guarantees and risk taking by banks. Although we focus on investors, implicit guarantees can also affect bank managers. The empirical literature on moral hazard generally concludes that banks increase their risk taking in the presence of government guarantees, as the guarantee provides protection against losses (Duchin and Sosyura 2012; Gropp, Hakenes and Schnabel 2010; Gropp, Gruendl and Guettler 2010; De Nicoló 2000; Hovakimian and Kane 2000; Boyd and Runkle 1993; Boyd and Gertler 1994; Demircuc-Kunt and Detragiache 2002, 2006). However, the evidence is far from unambiguous and some studies find that guarantees reduce risk taking (Kacperczyk and Schnabl 2011; Gropp and Vesala 2004; Cordella and Yeyati 2003), possibly resulting from increased charter values (Bliss 2001 and 2004; Keeley 1990) or greater regulatory oversight.

III. Data and Methodology

We collect data for financial firms and non-financial firms that have bonds traded during the 1990 to 2012 period. Financial firms are classified using Standard Industrial Classification (SIC) codes of 60 to 64 (banks, broker-dealers, exchanges, and insurance companies), and 67 (other financial firms). We exclude debt issued by government agencies and government-sponsored enterprises. Firm-level accounting and stock price information are obtained from COMPUSTAT and CRSP for the 1990–2012 period. Bond data come from three separate databases: the Lehman Brothers Fixed Income Database (Lehman) for the 1990-1998 period, the National Association of Insurance Commissioners Database (NAIC) for the 1998-2006 period, and the Trade Reporting and Compliance Engine (TRACE) system dataset for the 2006-2012 period. We also use the Fixed Income Securities Database (FISD) for bond descriptions. Although the bond dataset starts in 1980, it has significantly greater coverage starting in 1990. In this paper, we focus on the 1990-2012 period.

Our sample includes all bonds issued in the U.S. by firms in the above datasets that satisfy selection criteria commonly used in the corporate bond literature (e.g., Anginer and Yildizhan 2010; Anginer and Warburton 2014). We exclude all bonds that are matrix-priced (rather than market-priced). We remove all bonds with equity or derivative features (i.e., callable, puttable, and convertible bonds), bonds with warrants, and bonds with floating interest rates. Finally, we eliminate all bonds that have less than one year to maturity. There are a number of extreme observations for the variables constructed from the bond datasets. To ensure that statistical results are not heavily influenced by

outliers, we set all observations higher than the 99th percentile value of a given variable to the 99th percentile value. There is no potential survivorship bias in our sample, as we do not exclude bonds issued by firms that have gone bankrupt or bonds that have matured. In total, we have over 300 unique financial institutions with 45,000 observations, and about 1,000 non-financial firms with 75,000 observations, that have corresponding credit spread and total asset information (Table 1).

For each firm, we compute the end-of-month credit spread on its bonds (*spread*), defined as the difference between the yield on its bonds and that of the corresponding maturity-matched Treasury bond. We are interested in systemically important financial institutions, as these firms will be the beneficiaries of potential TBTF interventions. While we focus on large institutions, we recognize that factors other than size may cause an institution to be systemically important. For instance, a large firm with a simple, transparent structure (such as a manager of a family of mutual funds) might fail without imposing significant consequences on the financial system, while a relatively small entity (such as a mortgage insurer) that fails might cause substantial stress to build up within the system (Rajan 2010). Characteristics that tend to make an institution “too systemic to fail” include interconnectedness, number of different lines of business, transparency and complexity of operations. But these characteristics tend to be highly correlated with the size of a financial institution’s balance sheet. Adrian and Brunnermeier (2011), for instance, show that the systemic risk contribution of a given financial institution is driven significantly by the relative size of its assets. Dodd-Frank also emphasizes size in defining systemically important financial institutions. Large size even without significant interconnectedness may carry political influence (Johnson and Kwak 2010). We employ multiple measures of firm size. One is the size (log of assets) of a financial institution (*size*) in a given year. A second is whether a financial institution is in the top 90th percentile of financial institutions ranked by assets in a given year (*size90*), and a third is whether a financial institution is one of the ten largest institutions in terms of size in a given year (*size_top_10*).¹¹ These latter two measures are meant to capture very large institutions, which are likely to benefit most from TBTF policies. As mentioned earlier, although systemic importance and size are likely to be highly related, there could be areas of differences. Hence, for robustness, we also examine too-big-to-fail in relation to systemic importance by using two commonly-utilized measures of systemic importance: the Adrian and Brunnermeier (2011)

¹¹ For non-financial firms, we compute a similar measure. Since financials make up close to 40% of the sample, we group all non-financial firms together when we rank these firms by size and assign a dummy variable if they are in the top 90th percentile in terms of size. We found similar results grouping non-financial firms into 5 or 10 Fama-French industry groups and then ranking them by size.

Covar measure (*covar*), and the Acharya, Engle and Richardson (2012) and Acharya et al. (2010a) systemic risk measure (*srisk*). The computation of these systemic importance measures is in Appendix A.

A number of different measures of credit risk have been used in the literature. We use Merton's distance-to-default (*mertondd*) as our primary risk measure (*Risk*). Distance-to-default is based on Merton's (1974) structural credit risk model. In his model, the equity value of a firm is modeled as a call option on the firm's assets, which is used to compute asset values and asset volatility. Distance-to-default is the difference between the asset value of the firm and the face value of its debt, scaled by the standard deviation of the firm's asset value.¹² We follow Campbell, Hilscher and Szilagyi (2008) and Hillegeist et al. (2004) in calculating Merton's distance-to-default. The details of the calculation are in Appendix A. A higher distance-to-default number signals a lower probability of insolvency.

Implicit guarantees might affect equity values resulting in underestimation of risk using the Merton (1974) distance-to-default model. To address this concern, we verify our results using alternative measures of risk. We use z-score (*zscore*), an accounting-based measure of risk, computed as the sum of return on assets and equity ratio (ratio of book equity to total assets), averaged over four years, divided by the standard deviation of return on assets over four years (Roy 1952). The z-score measures the number of standard deviations that a financial institution's rate of return on assets can fall in a single period before it becomes insolvent. A higher z-score signals a lower probability of insolvency. A z-score is calculated only if we have accounting information for at least four years. We also compute an adjusted distance-to-default measure, by scaling the standard deviation of equity returns of large banks to be equal to those of smaller banks. Each month, we compute the ratio of average standard deviations of banks in the top 90th percentile in terms of size, to all other banks. We then scale the standard deviations of banks in the 90th percentile by the computed ratio each month, such that the average standard deviations of large and small banks are equal. We use the scaled standard deviations to compute an adjusted distance-to-default measure (*adj-mertondd*). To make sure that the results are not sensitive to a particular specification, we also create a second alternative measure of distance-to-default, which places more weight on recent equity returns in computing standard deviations. We use the exponential moving average method (EWMA) to compute standard deviations, which are then used

¹² The Merton distance-to-default measure has been shown to be a good predictor of defaults, outperforming accounting-based models (Campbell, Hilscher and Szilagyi 2008; Hillegeist et al. 2004). Although the Merton distance-to-default measure is more commonly used in bankruptcy prediction in the corporate sector, Merton (1977) points out the applicability of the contingent claims approach to pricing deposit insurance in the banking context. Anginer and Demircug-Kunt (2011), Bongini, Laeven, and Majnoni (2002), Bartram, Brown and Hundt (2008) and others have used the Merton model to measure the default probabilities of commercial banks.

to construct this alternative distance-to-default measure (*ewma-mertonda*). We also use equity return volatility (*volatility*), without imposing any structural form, as a risk measure.¹³ Volatility is computed using daily data over the past 12 months. Finally, we use credit risk beta, *dd-beta*, to capture exposure to systematic credit risk shocks. It is obtained by regressing a firm's monthly changes of distance-to-default on the monthly changes of value-weighted average distance-to-default of all other firms using past 36 months of past data.

Following Flannery and Sorescu (1996) and Sironi (2003), our firm-level controls include leverage, return on assets, market-to-book ratio and maturity mismatch. Our bond-level controls include time to maturity and seniority of the bonds. For the firm-level controls, leverage (*leverage*) is the ratio of total liabilities to total assets. Return on assets (*roa*) is the ratio of annual net income to year-end total assets. Market-to-book ratio (*mb*) is the ratio of the market value of total equity to the book value. Maturity mismatch (*mismatch*) is the ratio of short-term debt minus cash to total debt. Bond level controls include time to maturity (*ttm*) in years and a dummy variable that indicates whether the bond is senior (*seniority*). We also include three macro factors: the market risk premium (*mkt*), the yield spread between long-term (10-year) Treasury bonds and the short-term (three-month) Treasuries (*term*) as a proxy for unexpected changes in the term structure, and the BAA-AAA corporate bond spread (*def*) as a proxy for default risk. The construction of the variables is in Appendix A.

Summary statistics are reported in Table 1. Panel A reports summary statistics for financial firms and Panel B reports summary statistics for non-financial firms. Although it is larger financial institutions that issue public debt, we see significant dispersion in asset size.

Following the empirical model in Campbell and Taksler (2003) and Gopalan, Song and Yerramilli (2012), we estimate the following regression using a panel with one observation for each bond-month pair:

$$\begin{aligned} Spread_{i,b,t} = & \alpha + \beta^1 TBTFF_{i,t-1} + \beta^2 Risk_{i,t-1} + \beta^3 Bond\ Controls_{i,b,t} \\ & + \beta^4 Firm\ Controls_{i,t-1} + \beta^5 Macro\ Controls_t + Firm\ FE + Year\ FE \quad (1) \\ & + \varepsilon_{i,b,t} \end{aligned}$$

¹³ Atkeson, Eisfeldt and Weill (2014) show theoretically that one can approximate a firm's distance to insolvency using data on the inverse of the volatility of that firm's equity returns.

In equation (1), the subscripts i , b , and t indicate the firm, the bond, and the time (month), respectively, and FE denotes fixed effects. The dependent variable ($spread$) is the credit spread. To measure the systemic importance of an institution ($TBTF$), we use multiple measures of an institution's size and systemic risk contribution, as discussed above.

IV. Results

In this section, we examine whether bondholders of major financial institutions have an expectation of government support by investigating the relationship between an institution's systemic importance and its credit spreads, after controlling for risk and other variables. We also examine the impact of an institution's size on the credit spread-to-risk relationship. We then examine the effectiveness of outside discipline on the risk-taking behavior of financial institutions. Finally, we quantify the value of the funding subsidy TBTF institutions received on a yearly basis over the 1990-2012 period.

1. Expectations of Government Support

To determine whether bondholders of major financial institutions expect government support, we estimate how the size of a financial institution affects the credit spread on its bonds, using equation (1). The results appear in Table 2. The table shows a significant inverse relationship between credit spreads and systemic importance. First, we use asset size ($size$) to identify systemic importance. In column 1, we see that $size$ has a significant negative effect on $spread$, with larger institutions having lower spreads. In column 2, we control for time-invariant firm heterogeneity by including firm fixed effects and $size$ remains significant. Next, we identify systemic importance as a financial institution in the top 90th percentile in terms of size ($size90$) (column 3). The coefficient on the $size90$ dummy variable is significant and negative, indicating that very large institutions have lower spreads. In column 4, we define a systemically important institution as one of the ten largest institutions in terms of size in a given year ($size_top_10$). Results again show that TBTF status has a significant negative effect on spreads.

We also look at whether the size-spread relationship varies by type of financial institution. We interact $size$ with a dummy variable indicating whether the financial institution is a bank, insurance company or broker-dealer (based on its SIC code). The results appear in column 5 of Table 2. The effect

of size on spreads is most significant for the banks. Size does not reduce spreads as much when the financial institution is an insurance company or a broker-dealer.

There may be advantages associated with size that are not fully captured by the control variables. For instance, larger firms may have lower funding costs due to greater diversification, larger economies of scale, or better access to capital markets and liquidity in times of financial turmoil. Such general size advantages are likely to affect the cost of funding for large firms in industries beyond just the financial sector. It is, therefore, important to adjust for this general size advantage when estimating investor expectations of government support. We use a difference-in-differences approach and compare differences in spreads of large and small financial institutions to differences in spreads of large and small companies in the non-financial sector. If investors expect government support only for financial firms, then the estimate of the large-small difference in the financial sector compared to the large-small difference in the non-financial sector (without an expectation of government support of large firms) would provide a measure of the advantage large financial firms have from expectations of government support.¹⁴ Therefore, for robustness, we include non-financial companies (column 6 of Table 2) as controls. A dummy variable (*financial*) is set equal to one for a financial firm and zero for a non-financial firm. We are interested in the term interacting *financial* with *size90*¹⁵. This interaction term captures the differential effect size has on spreads for financial firms compared to non-financial firms. The estimated coefficient is negative and statistically and economically significant, which indicates that the effect of size on spreads is larger for financial firms than for non-financial firms.

In addition to indicating a relationship between credit spreads and the size of a financial institution, Table 2 also shows that there is a significant relationship between credit spreads and the risk of a financial institution. The coefficient on distance-to-default (*mertondd*) is significant and negative in Table 2. This result indicates that less-risky financial institutions (those with a greater distance-to-default) generally have lower spreads on their bonds.

Does a financial institution's size affect this relationship between credit spreads and risk? To answer that question, we interact the size and risk variables. The results are in Table 3 (Panel A). There is a significant and positive coefficient on the term interacting *size90* and *mertondd* (column 1). This indicates that the spread-to-risk relationship diminishes with TBTF status. For institutions that achieve

¹⁴ If there is an expectation of government support for non-financial firms [such as General Motors; see Anginer and Warburton (2014)], then we would be underestimating the funding advantage to large financial institutions.

¹⁵ *Size90* indicates a firm in the top 90th percentile of its size distribution.

systemically-important status, spreads are less sensitive to risk. This result is consistent with investors pricing an implicit government guarantee for the largest financial institutions. In column 2, we add dummy variables indicating an institution between the 60th and 90th percentiles (*size60*) and between the 30th and 60th percentiles (*size30*). We interact all the size dummy variables with *mertondd*. The interaction coefficients on *size60* and *size30* lack significance. These results indicate that the effect of size on the spread-to-risk relationship comes from the very large financial institutions. Moreover, the result is robust to different measures of risk. In place of *mertondd*, we employ z-score (*zscore*) in column 3 and volatility (*volatility*) in column 4. In each specification, the coefficient on the interaction term is significant and offsets the coefficient on the risk variable, indicating that the spread-to-risk relationship diminishes for the largest institutions.

These relationships can be seen in Figures 1 and 2. Figure 1 shows the relationship between the size of a financial institution and the credit spread on its bonds. It shows a negative relationship between size and spreads: larger institutions have lower spreads. Why do larger institutions have lower spreads? Are they less risky than smaller ones? Figure 2 plots the size of a financial institution against its risk (distance-to-default). There does not appear to be any observable relationship between size and risk. That is, Figure 2 indicates that larger institutions do not offer lower risk of large losses than smaller institutions. Hence, together the two figures provide evidence supporting the supposition that large institutions enjoy lower spreads because of implicit government support, not because of their underlying risk profiles.

We construct two alternative measures of distance-to-default to address potential issues with our specific model. As mentioned earlier, implicit guarantees might affect equity values resulting in underestimation of risk using Merton's (1974) distance-to-default model. First, we compute an adjusted distance-to-default measure, *adj-mertondd*, by scaling the standard deviation of equity returns of large banks to be equal to those of smaller banks. We replicate the risk sensitivity analyses using *adj-mertondd* as our measure of risk. The results in column 5 of Table 3 are consistent with those in column 1 using the unadjusted distance-to-default measure, *mertondd*. The second alternative measure of distance-to-default employs standard deviations computed using the exponential moving average method (EWMA), *ewma-mertondd*.¹⁶ Following Longestaey et al. (1996), we use a weighting coefficient

¹⁶ Exponentially weighted moving average standard deviations are computed as: $\sigma_{it}^2 = \lambda \sigma_{it-1}^2 + (1 - \lambda) \varepsilon_{it-1}^2$.

of 0.94. This approach places more weight on recent equity returns in computing standard deviations. The results in column 6 are consistent with those in column 1.

Instead of distance-to-default, we also use credit risk beta, *dd-beta*, as our measure of risk. It is obtained by regressing a firm's monthly changes of distance-to-default on the monthly changes of value-weighted average distance-to-default of all other firms using 36 months of past data.¹⁷ If the implicit guarantee takes effect only if banks fail at the same time, then they will have incentives to take on correlated risks (Acharya, Engle and Richardson 2012; Acharya and Yorulmazer 2007) so as to increase the value of the implicit guarantee. Investors will then price in idiosyncratic but not systematic risk, since the guarantee will only take effect if a bank fails when others are failing at the same time. If the guarantee applies only to large banks, systematic risk would be priced negatively for larger banks and positively for smaller banks. Kelly, Lustig and Nieuwerburgh (2012), using options on individual banks and on a financial sector index, show evidence of a collective guarantee on the financial sector. They also show that larger financial institutions benefit relatively more than smaller ones do from implicit guarantees. The interaction results using *dd-beta*, reported in column 7 of Table 3, support this notion. *dd-beta* is positive for smaller banks but turns negative for the largest financial institutions.

As before, we also compare financial institutions to non-financial institutions when examining the impact of risk on spreads. The results are reported in Panel B of Table 3. For brevity, we do not report coefficients on the control variables. We are interested in the $financial_{i,t-1} \times Risk_{i,t-1} \times size90_{i,t-1}$ variable. This triple interaction term captures the risk sensitivity of credit spreads of large financial institutions compared to that of large non-financials. We use the same six risk variables we used in Panel A: *mertondd*, *z-score*, *volatility*, *adj-mertondd*, *ewma-mertondd*, and *dd-beta*. We find that risk sensitivity declines more for large financial institutions than for large non-financial institutions. In other words, when we add non-financial institutions as controls, we find the same reduction in risk sensitivity for large financials that we found in Panel A.

Finally, we examine the effectiveness of outside discipline on the risk-taking behavior of financial institutions. We use two methods to examine outside discipline's effect on risk. The first method is based on the concept that capital should increase with risk. We examine the sensitivity of leverage to changes in bank risk. We follow Duan, Moreau and Sealey (1992) and Hovakamian and Kane (2000) and assume a linear relationship between changes in market leverage and changes in risk as

¹⁷ In computing the *dd-beta*, we require the company to have at least 24 non-missing monthly changes in distance-to-default over the previous 36 months.

measured by changes in asset volatility. Since we are interested in cross-bank differences, we also interact change in asset volatility with our *TBTF* measure. In particular, we estimate the following empirical model:

$$\Delta D/V_{i,t} = \alpha + \beta^1 \Delta s_{A_{i,t}} + \beta^2 TBTF_{i,t} + \beta^3 TBTF_{i,t} \times \Delta s_{A_{i,t}} + Year FE + \varepsilon_{i,t} \quad (2)$$

where D is the book value of debt, V is the market value of assets, and s_A is the volatility of market value of assets. V and s_A are computed using the structural model of Merton (1974) described in Appendix A. In equation (2), a negative coefficient on asset volatility ($\beta^1 < 0$) would indicate a moderating effect of market discipline in response to changes in risk. As risk increases, financial institutions are pressured to reduce their leverage. Similar to the sensitivity of spreads to risk, weaker market discipline would imply that leverage is less sensitive to changes in risk. That is, a positive coefficient on the interaction of asset volatility and our *TBTF* measure ($\beta^3 > 0$) would imply that the leverage of larger financial institutions is less responsive to changes in risk.

The results are reported in Table 4. Consistent with Duan, Moreau and Sealey (1992), we find evidence of discipline. An increase in risk reduces leverage (column 1). We use *size* and *size90* as our measures of *TBTF*. The results from interacting these measures with asset volatility are reported in columns 2 and 3, respectively. The coefficients on both interaction terms are positive, indicating that *TBTF* status impedes outside discipline and reduces the sensitivity of leverage to changes in asset volatility. Finally, following our prior approach, we use large non-financial firms as controls in examining the impact of size on the relationship between leverage and risk. We interact the *size90* variable with asset volatility and the *financial* dummy. The results from the triple interaction regression are reported in column 4. The coefficient on the triple interaction term is positive (but not statistically significant) suggesting that the discipline effect is weaker for large financial firms compared to large non-financial firms.

The second method is based on the deposit insurance pricing model of Merton (1977). This approach compares the restraining effect of outside discipline to the strength of financial institutions' incentives to take on risk. In particular, the model can be used to assess the risk-shifting behavior of financial institutions – whether they can increase risk without adequately compensating taxpayers by

increasing their capital ratios or by paying higher premiums for government guarantees. Merton (1977) shows that the value of a government guarantee to the shareholders of a bank increases with asset risk and leverage. Holding the premium on a government guarantee fixed, bank shareholders can extract value from the government by increasing asset risk or leverage. To examine this relationship empirically, we follow Duan, Moreau and Sealey (1992) and use the following reduced-form specification:

$$\Delta IPP_{i,t} = \alpha + \gamma^1 \Delta s_{A_{i,t}} + \gamma^2 TBTF_{i,t} + \gamma^3 TBTF_{i,t} \times \Delta s_{A_{i,t}} + Year FE + \varepsilon_{i,t} \quad (3)$$

where IPP is the fair insurance premium per dollar of liabilities. The coefficient γ^1 captures two offsetting effects: the risk-shifting incentives of financial institutions and outside discipline. To derive this relationship, we assume a linear approximation for the value of the liabilities put option, $IPP_{i,t} = \alpha + \theta^1 D/V_{i,t} + \theta^2 s_{A_{i,t}}$, and plug in the value of $D/V_{i,t} = \alpha + \beta^1 \Delta s_{A_{i,t}}$ from the relationship discussed above. After substitution, $\gamma^1 = \frac{\partial IPP}{\partial s_A} + \frac{\partial IPP}{\partial D/V} \beta^1$. The first term captures the incentives of financial institutions to increase risk, while the second term captures the offsetting effect of outside discipline (given $\beta^1 < 0$) in moderating risk taking. A positive γ^1 is consistent with the ability of financial institutions to risk-shift, since the disciplining effect does not completely neutralize incentives to increase risk. As before, we interact asset volatility with our $TBTF$ measures, and use large non-financial institutions as controls. The results are reported in Table 4. On average, financial institutions are able to risk-shift, as evidenced by the positive coefficient on asset volatility (column 5). This risk-shifting effect is stronger for larger financial institutions (columns 6 and 7). When we use large non-financial institutions as controls, we find the risk-shifting incentives of large financials to be greater than those of large non-financials (column 8).

2. Quantification of the Implicit Subsidy

As the above results show, major financial institutions enjoy a funding subsidy as a result of implicit government support. In this subsection, we provide an estimate of this subsidy on a yearly basis. To compute the annual subsidy, we run the following regression each year:

$$\begin{aligned}
 \text{Spread}_{i,b,t} = & \alpha + \beta^1 \text{size90}_{i,t-1} + \beta^2 \text{Risk}_{i,t-1} + \beta^3 \text{Bond Controls}_{i,b,t} \\
 & + \beta^4 \text{Firm Controls}_{i,t-1} + \beta^5 \text{Macro Controls}_t + \varepsilon_{i,b,t}
 \end{aligned}
 \tag{4}$$

where our variable of interest, *size90*, indicates a firm in the top 90th percentile of firms by assets. The coefficient on *size90* represents the subsidy accruing to large financial institutions as a result of implicit government insurance. The estimated subsidy is plotted, by year, in Figure 2. The implicit subsidy provided large financial institutions a funding cost advantage of approximately 30 basis points per year, on average, over the 1990-2012 period. The subsidy increased to over 100 basis points in 2009.

We also quantify the dollar value of the annual implicit subsidy accruing to major financial institutions. We multiply the annual reduction in funding costs by total uninsured liabilities (in US\$ millions) to determine the yearly dollar value of the subsidy, reported in Figure 2.¹⁸ The subsidy was \$30 billion per year on average; in 2009, it was over \$150 billion.

Despite the magnitude of the implicit subsidy, few studies have attempted to quantify it, although some have attempted to measure explicit government support. For instance, Laeven and Valencia (2010) estimate that the direct fiscal cost of the U.S. government's response to the recent financial crisis amounted to approximately 5% of GDP. Veronesi and Zingales (2010) estimate the direct cost to be between \$21 billion and \$44 billion.¹⁹ Direct costs of bailouts have always caught the public's attention (Stern and Feldman 2004). Indeed, there is a growing concern that bailouts may have grown so large that they are straining the public finances in many countries and governments cannot continue to afford them (e.g., Brown and Dinç 2011; Demirgüç-Kunt and Huizinga 2010).

But direct costs provide only a narrow quantification of bailouts and likely underestimate their actual costs. Estimates of the direct, or ex post, cost of government interventions overlook the ex-ante cost of implicit support (i.e., the resource misallocation it induces), which is potentially far greater. While explicit support is relatively easy to identify and quantify, implicit support is more difficult and has

¹⁸ We exclude deposits backed by explicit government insurance. It is also possible that investors have different expectations of a guarantee for different aspects of liabilities of a given firm. Total uninsured liabilities, therefore, provides a rough estimate of the dollar value of the implicit guarantee.

¹⁹ Veronesi and Zingales (2010) use bailout events to quantify the value of the subsidy. While that approach may reveal the change in the subsidy that a particular intervention produced, it does not capture the level of the subsidy, which can be substantial even during periods between crises.

received less attention. Our approach recognizes that, even when the banking system appears strong, safety net subsidies exist for large financial institutions.

V. Robustness

In this section, we address the potential for endogeneity in the relationship between credit spreads and TBTF status. First, we examine in greater detail the relationship between the size of a financial institution and its risk. Next, we examine credit ratings issued by Fitch, which provide third-party measures of an institution's credit risk and an institution's likelihood of receiving external support in a crisis. Third, we perform an event study to examine shocks to investor expectations of support. Fourth, we examine within-firm variation in government support by comparing non-guaranteed bonds to bonds issued by the same firm with an explicit government guarantee under the FDIC's Temporary Liquidity Guarantee Program. Finally, we control for bond liquidity to make sure that the spread differences are not due to differences in liquidity, and examine TBTF in relation to two measures of systemic importance based on systemic risk contribution variables (*covar* and *srisk*) commonly used in the literature.

1. The TBTF-Risk Relationship

It is often claimed that large financial institutions are considered less risky by investors. Large institutions might benefit from government guarantees, reducing their risk of loss. But large financial institutions, by virtue of their size, might benefit from other factors that reduce the level of their risk vis-à-vis other financial institutions. For instance, large financial institutions might benefit from better investment opportunities. If so, they may have inherently less risky portfolios. In addition, large financial institutions might enjoy superior economies of scale and be better diversified than smaller ones. A growing literature argues that economies exist in banking (Wheelock and Wilson 2001, 2012; Hughes and Mester 2011; McAllister and McManus 1993). However, economies are often attributed to advances in information and financial technology, as well as regulatory changes that have made it less costly for financial institutions to become large, not increasing size itself (e.g., Stiroh 2000; Berger and Mester 1997). Moreover, most research has concluded that economies exist only for financial institutions that are not very large (Amel et al. 2004; Berger and Humphrey 1994; Berger and Mester

1997).²⁰ This indicates that economies disappear once a certain size threshold is reached, with diseconomies emerging due to the complexity of managing large institutions and implementing effective risk-management systems (e.g., Laeven and Levine 2007; Demircuc-Kunt and Huizinga 2011).

In this subsection, we address the potential endogeneity. If investors believe risk-reducing benefits accompany large size for reasons other than TBF guarantees, larger institutions should exhibit lower credit risk. Hence, we regress credit risk on size, with controls, as follows:

$$\begin{aligned} Risk_{i,t} = & \alpha + \beta^1 TBF_{i,t-1} + \beta^2 financial_{i,t-1} + \beta^3 TBF_{i,t-1} \times financial_{i,t-1} \\ & + \beta^4 Firm\ Controls_{i,t-1} + \beta^5 Macro\ Controls_t + Year\ FE + \varepsilon_{i,b,t} \end{aligned} \quad (4)$$

It is important to note that, as in equation (1), the explanatory variables are lagged, and one can think of the relationships in equations (1) and (4) as systems of equations. We use distance-to-default as our risk measure. The results for financial institutions appear in columns 1 and 2 of Table 5. We find *size* to be significantly associated with lower risk. This relationship, however, is not significant at the top of the size distribution: *size90* does not significantly affect risk. We also examine the impact of size on risk by comparing financial institutions to non-financial institutions in columns 3 and 4. We are interested in the *TBF* × *financial* variable. This interaction term captures the differential effect size has on risk for financial institutions compared to non-financial institutions. The estimated coefficient is negative and economically and statistically significant using both the *size* and *size90* variables, indicating that the effect of size on risk is smaller for financial institutions.

Overall, our results provide support for the large literature that has failed to detect efficiency and risk-reduction benefits for very large banks (e.g., Demircuc-Kunt and Huizinga 2011; Demsetz and Strahan 1997). In short, Table 5 shows that larger financial institutions are not less risky than smaller ones. Hence, it is not necessarily because of a reduction in underlying default risk that large institutions experience a reduction in their spreads. By showing that larger size does not imply lower risk, Table 5 supports our main finding that the credit market prices an expectation of government support for large financial institutions.

²⁰ The literature generally finds a U-shaped cost curve with a minimum typically reached within a range of \$10 billion to \$100 billion in assets, depending on the sample, time period, and methodology.

2. Stand-Alone and Support Ratings

To further alleviate concerns about endogeneity, we use credit ratings and government-support ratings as alternative measures of credit risk and implicit support. We examine ratings issued by Fitch, which provide a third-party's estimate of credit risk and potential external support.

In rating financial institutions, Fitch assigns both an "issuer rating" and a "stand-alone rating." Fitch's issuer rating is a conventional credit rating. It measures a financial institution's ability to repay its debts after taking into account all possible external support. In contrast, Fitch's stand-alone rating measures a financial institution's ability to repay its debts without taking into consideration any external support. The stand-alone rating reflects an institution's independent financial strength, or in other words, the intrinsic capacity of the institution to repay its debts. The difference between these two ratings reflects Fitch's judgment about government support should the financial institution encounter severe financial distress. We use Fitch's long-term issuer rating (*issuer rating*) as well as their stand-alone rating (*stand-alone rating*) as independent variables in the spread regression specified in equation (1).²¹

Table 6 (Panel A) contains results of regressions similar to the spread regressions of Table 2, but with the addition of the rating variables. The stand-alone rating is employed in column 1. Column 2 employs the issuer rating. Although both ratings are significant in affecting spreads, the issuer rating has a greater economic impact on spreads. In column 3, both ratings are employed simultaneously. In that specification, the coefficient on the issuer rating remains significant and positive. Moreover, the effect of the issuer rating subsumes the effect of the stand-alone rating. In sum, we find that issuer ratings (which incorporate an expectation of support) impact spreads, but stand-alone ratings do not have a similar effect. Investors significantly price implicit government support for the institution. This result is consistent with the findings of Sironi (2003), who uses European data, and supports our conclusion that the expectation of government support for large financial institutions impacts the credit spreads on their bonds.

²¹ The issuer rating scale ranges from AAA to C- (ratings below C- are excluded since they indicate defaulted firms). The stand-alone rating scale ranges from A to E. We transform the ratings into numerical values using the following rule: AAA=1, ..., C=9 for the issuer rating and A=1, A/B=2, ..., E=9 for the stand-alone rating.

In Panel B of Table 6, issuer and stand-alone ratings are regressed on lagged TBTF measures and control variables. Both TBTF measures (*size* and *size90*) have a significant negative effect on the issuer rating (better ratings are assigned lower numerical values). The issuer rating incorporates expectations of government support, and we see that larger institutions have significantly better issuer ratings. In contrast, the TBTF measures do not have a significant effect on the stand-alone rating. The stand-alone rating excludes potential government support, and we find that large institutions do not have significantly better stand-alone ratings.

3. Event Study

Next, we examine how credit spreads were impacted by events that might have changed investor expectations of government support. The events and their corresponding dates are in Table 7. These events offer natural experiments to assess changes in TBTF expectations over time. For instance, prior to the recent financial crisis, investors may have been unsure about whether the government would guarantee the obligations of large financial institutions should they encounter financial difficulty, since there was no explicit commitment to do so. When Bear Stearns collapsed, its creditors were protected through a takeover arranged and subsidized by the Federal Reserve, despite the fact that Bear Stearns was an investment bank, not a commercial bank.²² This intervention likely reinforced expectations that the government would guarantee the obligations of large financial institutions. Similarly, the later decision to allow Lehman Brothers to fail, in contrast, served as a negative shock to those expectations. Although the Federal Reserve and the Treasury intervened the day after Lehman was allowed to collapse (including a rescue of AIG's creditors), the government adopted a series of unpredictable and confusing policies around Lehman's collapse, making future intervention increasingly uncertain. Hence, both the Bear Stearns event and the Lehman event provide contrasting shocks to investor expectations of government support. We also examine other events that may have affected investor expectations positively. In particular, we examine the events surrounding the passage of the

²² In connection with Bear Stearns' merger with JP Morgan Chase in 2008, the Federal Reserve provided JP Morgan Chase with regulatory relief and nearly \$30 billion in asset guarantees, and Bear Stearns with lending support under section 13(3) of the Federal Reserve Act of 1913, the first time since the Great Depression that the Federal Reserve directly supported a non-bank with taxpayer funds. The Fed also announced the Primary Dealer Credit Facility, which opened the discount window to primary dealers in government securities, some of which are investment banks, bringing into the financial safety net investment banks like Lehman, Merrill Lynch, and Goldman Sachs.

Troubled Asset Relief Program (TARP), as well as other announcements of liquidity and financial support to the banking sector.

We examine a window of +/- 5 trading days around the event. We run the following regression:

$$\begin{aligned} Spread_{i,b,t} = & \alpha + \beta^1 post + \beta^2 TBTF_{i,t} \times post + \beta^3 Risk_{i,t} \times post + \beta^4 TBTF_{i,t} \times Risk_{i,t} \\ & \times post + \beta^5 Macro\ Controls_t + Issue\ FE + \varepsilon_{i,b,t} \end{aligned} \quad (6)$$

We use *size90* as our measure of systemic importance. We use a dummy variable, *post*, which equals one on the event date and the five subsequent trading days. We use issue fixed effects (*Issue FE*) and the regression corresponds to a difference-in-differences estimation. We examine the change in the TBTF subsidy after the event, as well as the change in risk sensitivity. These changes are captured by the coefficients on the $TBTF_{i,t} \times post$, and the $TBTF_{i,t} \times Risk_{i,t} \times post$ variables, respectively.

As before, we introduce non-financial institutions as controls and examine changes in both the TBTF subsidy and risk sensitivity after the event with respect to those firms. Specifically, we run the following regression for a sample of firms that includes both financial institutions and non-financial institutions:

$$\begin{aligned} Spread_{i,b,t} = & \alpha + \beta^1 post + \beta^2 TBTF_{i,t} \times post + \beta^3 financial_{i,t} \times post + \beta^4 Risk_{i,t} \times post \\ & + \beta^5 TBTF_{i,t} \times financial_{i,t} \times post + \beta^6 TBTF_{i,t} \times Risk_{i,t} \times post \\ & + \beta^7 financial_{i,t} \times Risk_{i,t} \times post + \beta^8 TBTF_{i,t} \times financial_{i,t} \times Risk_{i,t} \\ & \times post + \beta^9 Macro\ Controls_t + Issue\ FE + \varepsilon_{i,b,t} \end{aligned} \quad (7)$$

The coefficient on the $TBTF_{i,t} \times financial_{i,t} \times post$ variable captures the impact of the event on spreads for large financial institutions compared to large non-financial institutions. Similarly, the $TBTF_{i,t} \times financial_{i,t} \times Risk_{i,t} \times post$ variable captures the effect of the event on the spread-risk relationship for large financials compared to large non-financials.

The results are in Table 7. For brevity, we report only variables discussed above. We find that announcements of government financial and liquidity support have been associated with a decrease in credit spreads for larger financial institutions. In particular, the bailout of Bear Stearns and the revised TARP bill passing the House of Representatives led to decreases in spreads in excess of 100 bps (column 1). Large financial institutions also saw a decrease in the risk sensitivity of their debt to changes in risk (column 2). We find similar results when we use non-financial institutions as controls. These triple-difference results are provided in columns 3 and 4.

Next, we examine a negative shock to investor expectations of government support, namely the bankruptcy filing by Lehman Brothers on September 15, 2008. Again, our variable of interest is the term interacting *post* with *size90*. The coefficient on the interaction term is significant and positive for the Lehman event (column 1 in Table 7). The result indicates that larger institutions saw greater increases in their credit spreads after the government allowed Lehman to collapse.²³ The increase is economically significant at over 100 bps. In response to the Lehman collapse, large institutions also saw their credit spreads become significantly more sensitive to risk. The coefficient on the triple-interaction term is significant and negative (column 2), indicating an increase in risk sensitivity for large institutions following that event. The results are similar when we use non-financials as controls (columns 3 and 4).

These results indicate that market participants revised their expectations of government intervention during these events. By analyzing recent shocks to investor expectations of government assistance, we find additional evidence consistent with our main finding that credit markets price expectations of government support for large financial institutions.

We also examine two regulatory reforms that have been proposed to address problems associated with TBTF institutions. The first is the adoption of the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank). One of the main purposes of the legislation was to end investors' expectations of future government bailouts. Table 7 shows results for June 29, 2010, the date the House and Senate conference committees issued a report reconciling the bills of the two chambers, and July 21, 2010 when President Barak Obama signed the bill into law. The coefficient on the term interacting *size90* and *post* for the first event is significant and negative. This indicates that Dodd-Frank

²³ We recognize that, in addition to signaling a reduced likelihood of bailouts, Lehman's collapse might have exerted a more direct effect on financial institutions. Hence, we tried controlling for institutions' exposure to Lehman by including an indicator variable (*exposure*) that takes the value of one for an institution that declared direct exposure to Lehman in the weeks following its collapse, and zero otherwise [following Raddatz (2009)]. We obtained results similar to the reported results.

actually lowered credit spreads for the very largest financial institutions relative to the others (although the 3 basis point effect is economically small). The coefficient on $size_{90} \times merton_{d \times post}$ is significant and positive, indicating that Dodd-Frank decreased the risk sensitivity of credit spreads for large institutions (although the effect again is economically very small). We find a small positive increase in spreads using the July 21, 2010 event date. As there has been uncertainty surrounding the information regarding Dodd-Frank and its implementation, we also employ a longer event window of 132 trading days (6 months). Results using this longer window are shown in Table BI of Appendix B. The relevant coefficients are largely insignificant statistically and economically. In all, these results indicate that Dodd-Frank has been insignificant in changing investors' expectations of future support for major financial institutions.

We also examine the FDIC's recently proposed Single Point of Entry (SPOE) strategy to implement its Orderly Liquidation Authority (OLA) set out in Title II of the Dodd-Frank Act. This authority provides the FDIC with the ability to resolve large financial firms when bankruptcy would have serious adverse effects on financial stability in the U.S. We use as the event date December 10, 2012, the day the FDIC released a white paper and a press release describing the SPOE strategy. We find an increase in credit spreads for large financial institutions in response to this event. The results continue to hold when we use non-financial institutions as controls. The reaction, however, has not been economically significant.

4. FDIC Guarantee

In this subsection, we compare *implicitly* guaranteed bonds to *explicitly* guaranteed bonds issued by the same firm. To help restore confidence in financial institutions, the government issued a temporary explicit guarantee for certain new debt that financial institutions issued during the financial crisis. The FDIC's Temporary Liquidity Guarantee Program (TLG Program) provided a guarantee for senior unsecured debt issued after October 14, 2008 and before June 30, 2009 (later extended to October 31, 2009). The guarantee remained in effect until June 30, 2012 (or the date the debt matured,

if earlier). The TLG Program was available to insured depository institutions and financial holding companies that opted to participate in the program.²⁴

We examine the institutions in our data set that issued bonds under the FDIC's TLG Program and that also had similar bonds outstanding outside the TLG Program.²⁵ For a given firm, we look at the difference between spreads on bonds backed by the FDIC guarantee and spreads on bonds without the FDIC guarantee. This approach allows us to examine the effect of an implicit guarantee after controlling for time-varying firm effects. Figure 3 shows the difference in spreads for each of the top six financial institutions. Control variables are not used in Figure 3.

We introduce controls by regressing spreads on a dummy variable (*guarantee*) that takes a value of one if the bond is backed by the FDIC guarantee:

$$\text{Spread}_{i,b,t} = \alpha + \beta^1 \text{Bond Controls}_{i,b,t} + \beta^2 \text{guarantee}_{i,t-1} + \beta^3 \text{Firm} \\ \times \text{Trading Day FE} + \varepsilon_{i,b,t} \quad (8)$$

To maximize sample size, we include all bonds issued by the firms covered under the TLG Program. We control for the age of the bond since issuance in years (*age*) and the time to maturity in years (*ttm*), and include dummies set to one if the bond is *puttable*, *redeemable*, *exchangeable*, or if the bond has fixed rate coupons (*fixrate*). We also include firm-trading day fixed effects (to examine within-company variation on a given trading day).²⁶ The results appear in Table B11 of Appendix B.

²⁴ Not all the debt of these institutions was eligible to be guaranteed under the TLG Program. To be eligible, the debt had to be senior unsecured debt issued from October 2008 to October 2009. In addition, institutions could only issue new debt under the TLG Program in an amount up to 125% of its senior unsecured debt that was outstanding on September 30, 2008 and scheduled to mature on or before the October 31, 2009. The FDIC charged issuers a fee for the guarantee, and institutions could opt out of the program.

²⁵ The following companies in the TRACE/FISD databases issued bonds under the FDIC guarantee as well as non-guaranteed bonds: Bank of America, Citigroup, Goldman Sachs, JP Morgan Chase, Morgan Stanley, Sovereign Bancorp, State Street, Suntrust, US Bancorp, Wells Fargo, PNC Bank, HSBC USA, Keycorp, Metlife, John Deere Capital, and GE Capital.

²⁶ Our sample includes bonds of all institutions that have issued both types of bonds. We address bonds with extreme yields by winsorizing at the 99th percentile values for guaranteed and non-guaranteed bonds. We eliminate extreme one-day moves (>30%) that reverse the next day. We also eliminate bond with maturities less than 90 days and greater than 30 years. If we do not observe both the guaranteed and non-guaranteed bonds trading on a given day for a given company, we delete all observations for that company on that day.

Figure 4 displays the results of running the regressions in Table BII (column 4) on a daily basis. It shows how the value of the FDIC guarantee declined over the June 2009 to June 2011 period. In the middle of the time period (June 2010), Dodd-Frank was adopted. We do see a slight increase in the value of the FDIC guarantee in the months preceding Dodd-Frank's adoption. At that time, it was unclear what the final language of the legislation would be. After Dodd-Frank was finalized, however, the value of the FDIC guarantee resumed its downward trend. Dodd-Frank does not appear to have changed investors' expectations of government support for the non-guaranteed bonds of major financial institutions.

We confirm our finding by conducting an event study around the adoption of Dodd-Frank. We run a regression similar to that in Table BII (column 4), but with an additional variable, *post*. *Post* is a dummy equal to one during the 5 trading days (or 132 trading days) following the adoption of Dodd-Frank. *post* is interacted with an indicator variable (*guarantee*) that equals one if a bond is guaranteed under the FDIC's TLG Program, and zero if it is not. This interaction term captures whether Dodd-Frank impacted investor expectations of support for non-guaranteed bonds relative to FDIC guaranteed bonds. The results appear in Table 8. The coefficient on the interaction term is significant and positive during the 10-trading day window (column 1). The result indicates that, after Dodd-Frank, spreads on bonds that lacked the FDIC guarantee decreased relative to spreads on bonds of the same firm that had the FDIC guarantee. In other words, Dodd-Frank lowered the spread differential between FDIC-guaranteed bonds and non-FDIC guaranteed bonds of the same firm. As investors viewed it, Dodd-Frank made a firm's *implicitly* guaranteed debt more like its *explicitly* guaranteed debt. While this effect may not be economically significant, and no statistically significant effect is detected using the 264-trading day window (column 3), we should observe a *significant negative effect* if Dodd-Frank had been successful in eliminating TBTF expectations.

In Table 8, we also examine Dodd-Frank's impact on the risk sensitivity of guaranteed and non-guaranteed bonds, which is captured by the triple-interaction term (*mertonddxguaranteexpost*). For both the 10- and 264-trading day windows (columns 2 and 4), the coefficient is significant and negative, which indicates that the risk sensitivity of non-guaranteed debt declined following Dodd-Frank.

5. Additional Robustness Checks

It is conceivable that our results might be affected by the liquidity of the bonds we study. In Table 9, we show that our main results from Table 2 are robust to controls for liquidity. Since we do not have bond trades for the full sample period, we create a liquidity measure (*liquidity*) based on bond characteristics following Longstaff, Mithal and Neis (2005).²⁷ The maximum *liquidity* score assigned to a bond is four and the minimum *liquidity* score is zero. In column 1, the *size90* variable retains its significance in the presence of this liquidity measure. Next, in column 2, we use bond turnover (*turnover*) as our liquidity control. The *turnover* variable is constructed using data after 2003 from the TRACE dataset, which includes trade information. We compute turnover using the past three months of daily trading information. The *size90* variable retains its significance in the presence of *turnover*.

We also examine TBTF in relation to measures of systemic risk. As discussed in Section III, although systemic importance and size are likely to be highly related, there could be differences, such as in terms of political influence. In column 3, following Adrian and Brunnermeier (2011), we use an institution's contribution to systemic risk (*covar*) to identify systemically important financial institutions. Higher values of *covar* indicate greater systemic risk contribution. Results show a significant negative relationship between *covar* and *spread*. That is, the greater an institution's contribution to systemic risk, the lower its spread. The second systemic risk measure we use (*srisk*) is based on the expected capital shortfall framework developed by Acharya, Engle and Richardson (2012) and Acharya et al. (2010a). Results in column 4 show a significant negative relationship between *srisk* and *spread*. The greater an institution's systemic risk, the lower its spread. In columns 5 and 6, we replicate the risk sensitivity analyses of Table 3, controlling for the two measures of systemic importance, and the results are similar. The risk sensitivity declines for the largest institutions. In addition, both the *covar* and *srisk* variables lose some of their economic and statistical significance after we control for large size.

²⁷ In particular, a dummy variable is set each month to a value of one or zero depending on the characteristics of the underlying bond. We then add up the dummy variables to come up with an overall liquidity score. The first dummy variable captures the general availability of the bond issue in the market. If the outstanding market value of a bond is larger than the median value of all bonds, then the dummy variable is assigned a value of one. The second variable is the age of the bond and parallels the notion of on-the-run and off-the-run bonds in Treasury markets, with on-the-run bonds being more liquid. If the age of a bond is less than the median age of all bonds then the dummy variable is assigned a value of one. The third variable is the time to maturity of the bond. It has been shown that there exist maturity clienteles for corporate bonds and that shorter-maturity corporate bonds tend to be more liquid than longer-maturity bonds. If the time to maturity of a bond is less than seven years then the dummy variable is assigned a value of one. The fourth proxy that we use is a dummy variable for bonds rated AAA/AA. As Longstaff, Mithal and Neis (2005) show, highly rated bonds tend to be more marketable and liquid in times distress when there is a "flight to quality."

VI. Policy Implications

As Figure 2 shows, expectations of government support for large financial institutions persist over time. Expectations of support exist not only in times of crisis, but also in times of relative tranquility, and vary with government policies and actions.²⁸ Even when the banking system appears strong, large financial institutions benefit from expectations of TBTF assistance. In the post-crisis period after 2009, the implicit subsidy has remained at positive levels. The passage of Dodd-Frank in the summer of 2010 did not significantly alter investors' expectations of government support.

The centerpiece of Dodd-Frank is the creation of the Financial Stability Oversight Council whose objective is, in part, to "promote market discipline, by eliminating expectations on the part of shareholders, creditors, and counterparties of [large financial] companies that the government will shield them from losses in the event of failure." In pursuit of this objective, the Council is empowered to designate certain companies as "systemically important" if their failure will cause instability of the financial system and to subject them to additional oversight, including liquidation.

Despite Dodd-Frank's explicit no-bailout pledge, the Act leaves open many avenues for future TBTF rescues.²⁹ Prior to any resolution, the Federal Reserve can offer a "broad-based" lending facility to a group of financial institutions to provide an industry-wide bailout or a single-firm bailout in disguise. In addition, Congress has the option to abandon Dodd-Frank by explicitly amending or repealing the statute or by allowing regulators to interpret their authority to protect creditors and partner with large financial institutions (see, e.g., Skeel 2011; Wilmarth 2011; Standard & Poor's 2011).

Since any resulting bailouts are likely conducted using public funds, the implicit guarantee produces a transfer of resources from the government, and ultimately taxpayers, to major financial

²⁸ In response to the rescue of Continental Illinois in 1984, the government took steps to erode the perception that it backed large financial firms. In 1991, Congress passed the FDIC Improvement Act (FDICIA). It was believed that FDICIA would limit regulators' discretion to support distressed banks and enable regulators to save insured depositors without saving uninsured investors. Accordingly, Figure 2 shows a decline in the implied subsidy during this period, reflecting diminishing expectations of government support for the largest financial institutions. In contrast, expectations of government support increased during the late 1990s. In 1997 and 1998, the government responded to perceived threats to financial stability that emanated from currency crises in emerging economies. In 1998, the Federal Reserve Bank of New York brokered a bailout of hedge fund Long-Term Capital Management. In responding to the recent financial crisis, government actions nearly formalized the implicit public guarantee of the financial sector. As Figure 2 shows, investor expectations of government assistance surged to very high levels.

²⁹ For instance, although Dodd-Frank grants new authority to officials to resolve large institutions, President of the Federal Reserve Bank of Kansas City, Thomas Hoenig, noted: "The final decision on solvency is not market driven but rests with different regulatory agencies and finally with the Secretary of the Treasury, which will bring political considerations into what should be a financial determination."

institutions.³⁰ Governments are generally not required to make any apparent financial commitment or outlay, or request funds from legislatures or taxpayers, when they implicitly guarantee TBTF institutions. Since it happens implicitly, the transfer lacks the transparency and accountability that accompany explicit policy decisions. Taxpayer interests could be better served, in both good times and bad, by estimating on an ongoing basis the accumulated value of this subsidy. Public accounting of accumulated TBTF costs might restrain those government actions and policies that encourage TBTF expectations. Researchers have made similar recommendations in connection with government guarantees in other contexts, ranging from pensions to student loans to housing (e.g., Lucas 2011, 2012, 2013; Lucas and McDonald 2006).

In addition to public accounting and disclosure, large financial institutions could be charged a Pigovian-style tax designed to compensate for the underpricing of risk that results from an implicit guarantee. That is, the funding subsidy that big institutions enjoy could be neutralized by imposing a corrective levy, tax, or premium that extracts the value of the subsidy. This charge would act as a form of compensation for the public support large financial institutions are “expected” to receive in the event of a financial crisis. The goal is not to make institutions pre-pay future rescue costs, but to realign incentives among the beneficiaries of an implicit guarantee.³¹ Thus, policymakers could require financial institutions to bear the true cost of their debt, resulting in a more proper alignment of risk and return for owners and managers. Similar recommendations have been put forth in papers examining the pricing of deposit insurance (e.g., Acharya, Santos and Yorulmazer 2010b). Such a Pigovian tax would be more straightforward and transparent than extensive government supervision and regulation that attempts to manage risk taking (the Dodd-Frank Act required 2,319 pages of legislation and mandates hundreds of additional rules, yet it does not directly address mispricing of conjectural government guarantees, leaving expectations of support to persist). If the cost of the implicit guarantee is instead

³⁰ Dodd-Frank seeks to end this wealth transfer by requiring that the costs of resolving failed financial institutions be imposed on the surviving ones, not taxpayers. But during a systemic crisis, it is unlikely that the solvent part of the sector will be used to cover the losses of the failed part of the sector. Since capital is needed most during a crisis, taxpayer funds are likely to be used instead.

³¹ In contrast to Dodd-Frank’s ex post tax on financial institutions, recent proposals have called for an ex ante tax on financial institutions, with the intent to recoup future bailout costs. Most of the proposed taxes are not particularly sophisticated in design [i.e., levied at a uniform rate on total assets or total liabilities net of insured deposits, see IMF (2010)] and may result in simply transferring funds from well-managed institutions to reckless ones instead of mitigating moral hazard. We propose instead a tax designed specifically to capture the subsidy a financial institution enjoys as a result of an implicit government guarantee. Such a tax is intended to better align risk and return for bank owners and managers.

internalized through a Pigovian tax, market discipline could then work with supervisory discipline to create a more stable and efficient financial system.³²

VII. Conclusion

We find that expectations of government support are embedded in the credit spreads of bonds issued by large U.S. financial institutions. Using bonds traded between 1990 and 2012, we find that credit spreads are risk sensitive for most financial institutions, while credit spreads lack risk sensitivity for the largest financial institutions. In other words, we find that bondholders of large financial institutions have an expectation that the government will shield them from losses in the event of failure and, as a result, they do not accurately price risk. This expectation of government support constitutes an implicit subsidy of large financial institutions, allowing them to borrow at subsidized rates. The cost of this implicit insurance can be internalized to enable financial institutions to compete on a level playing field. In addition, requiring large financial institutions to bear the true cost of their debt would better align risk with return for their owners and managers, promoting a more stable and efficient financial system. Until it is internalized, implicitly-guaranteed institutions will be incentivized to take actions that promise rewards to their owners and managers while imposing costs on the rest of society.

³² We recognize that, even in an efficient market without any guarantees, it is possible for there to be externalities associated with being systemically important that will not be fully internalized (e.g., Zingales 2009; Acharya et al. 2010a).

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Figure 1: Size, Spreads and Risk

The figure the left shows the relationship between the size of a financial institution and the credit spread on its bonds. Size (x-axis) is the relative size of a financial institution, computed as size (log of assets) in a given year divided by the average size of all financial institutions in that year. Spread (y-axis) is the difference between the yield on a financial institution's bond and that on a corresponding maturity-matched Treasury bond. The figure on the right shows the relationship between the size of a financial institution and its risk. Size (x-axis) is the relative size of a financial institution, computed as its size (log of assets) in a year divided by the average size of all financial institutions in that year. Risk (y-axis) is the average distance-to-default of a financial institution in a given year, computed as described in Appendix A.

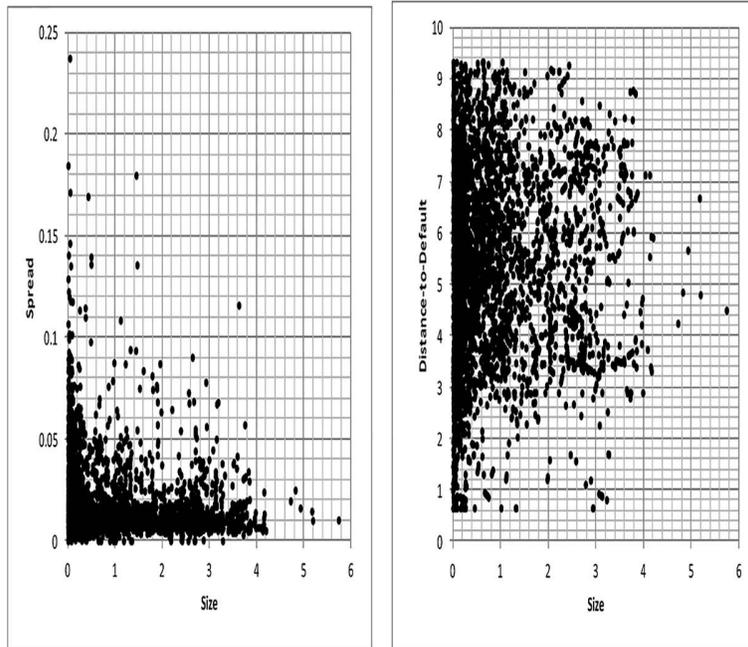


Figure 2: Value of the Implicit Subsidy (1990-2012)

This figure shows the annual subsidy to large financial institutions due to the implicit government guarantee. To compute the annual subsidy, we run the following regression each year: $Spread_{i,b,t} = \alpha + \beta^1 seniority_{i,b,t} + \beta^2 ttm_{i,b,t} + \beta^3 leverage_{i,t} + \beta^4 roa_{i,t} + \beta^5 mb_{i,t} + \beta^6 mismatch_{i,t} + \beta^7 mertondd_{i,t} + \beta^8 def_t + \beta^9 term_t + \beta^{10} mkt_t + \beta^{11} size90_{i,t} + \epsilon_{i,b,t}$. All the variables are defined in Table 1 and Appendix A. The coefficient on *size90* (z-axis) represents the subsidy accruing to large financial institutions. We also quantify the dollar value of the annual subsidy. We multiply the annual reduction in funding costs by total uninsured liabilities (in US\$ millions) to arrive at the yearly dollar value of the subsidy (y-axis). The dollar amounts are adjusted for inflation and are in constant 2010 dollars.

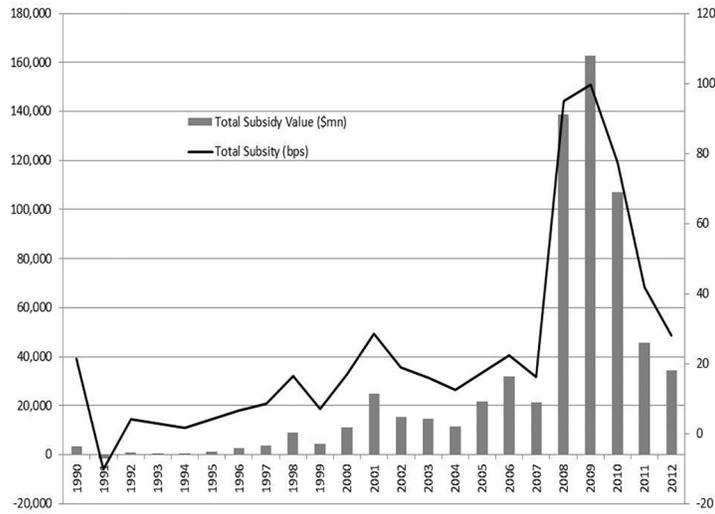


Figure 3: Explicit and Implicit Guarantee Spread Difference

This figure shows the difference in spreads between FDIC guaranteed and non-guaranteed bonds for six financial institutions. *BAC* is Bank of America, *C* is Citibank, *MS* is Morgan Stanley, *WFC* is Wells Fargo, *GS* is Goldman Sachs, and *JPM* is JP Morgan Chase. We plot averages for each month for each company if there are more than 10 daily trading observations.

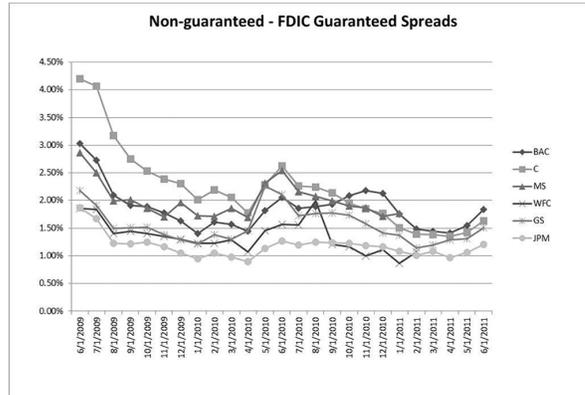


Figure 4: Explicit Guarantee Premium

This figure shows the estimated FDIC guarantee premium. To compute the premium, we run the following regression each day: $Spread_{i,b,t} = \alpha + \beta^1 seniority_{i,b,t} + \beta^2 ttm_{i,b,t} + \beta^3 fixed\ rate_{i,b,t}$

$$+ \beta^4 puttable_{i,b,t} + \beta^5 exchangeable_{i,b,t} + \beta^6 redeemable_{i,b,t} + \beta^7 guarantee_{i,b,t} + Firm\ FE + \varepsilon_{i,b,t}$$

The sample includes financial institutions that issued bonds under the FDIC's Temporary Liquidity Guarantee Program. *guarantee* is a dummy variable set equal to 1 if the bond had a special FDIC guarantee and was issued as part of the Temporary Liquidity Guarantee Program. *age* is the age of the bond since issuance in years. *ttm* is time to maturity of the bond in years. *puttable* is a dummy variable set equal to 1 if the bond is puttable. *redeemable* is a dummy variable set equal to 1 if the bond is redeemable. *exchangeable* is a dummy variable set equal to 1 if the bond is exchangeable. *fixrate* is a dummy variable set equal to 1 if the bond has fixed rate coupons. Regression includes firm fixed effects (Firm FE). We run the regression daily and then average the coefficient on the *guarantee* variable each week. When plotting we invert the *guarantee* variable so that reduction corresponds to a positive premium.

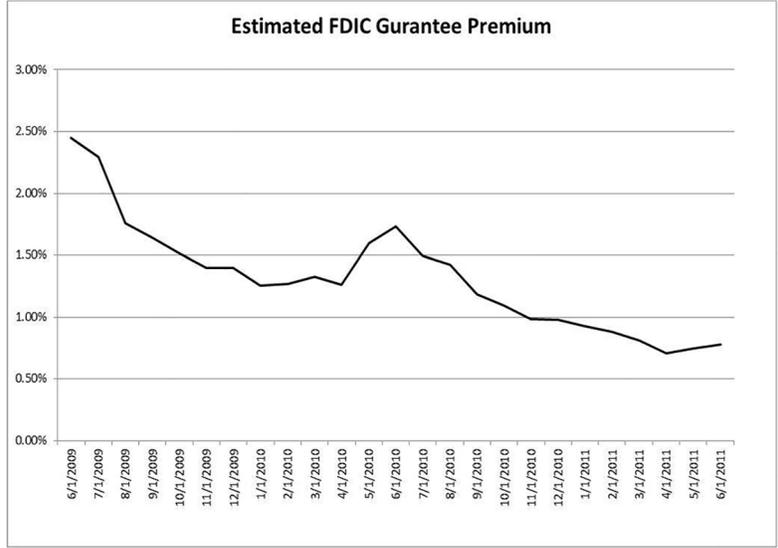


Table 1: Summary Statistics

This table presents summary statistics for the variables; Panel A for financial firms and Panel B for non-financial firms. *ttm* is years to maturity for a bond. *seniority* is a dummy variable indicating whether the bond is senior. *spread* is the difference between the yield on a given firm's bond and the yield on a maturity-matched Treasury bond. *spread* is in percentages. *size* is the size of an institution defined as the log value of total assets. *roa* is the return on assets, measured as net income divided by total assets. *mismatch* measures maturity mismatch and is computed as short-term debt minus cash divided by total liabilities. *leverage* is total liabilities divided by total assets. *mb* is the market-to-book ration computed as the value of total equity divided by book value of total equity. *mertondd* is Merton's (1974) distance-to-default measure, calculated using firm-level financial and stock return data, described in Appendix A. *z-score* is a financial distress measure calculated as the sum of *roa* and equity ratio (ratio of book equity to total assets), averaged over four years, divided by the standard deviation of *roa* over four years. *volatility* is stock return volatility computed using daily returns over the past 12 months. In calculating *volatility*, we require the company to have at least 90 non-zero and non-missing returns over the previous 12 months. Variables are defined in Appendix A.

Panel A: Financial Firms						
Variables	N	Mean	Std Dev	P25	P50	P75
<i>ttm</i>	45616	6.960	5.876	3.056	5.375	8.747
<i>seniority</i>	45616	0.695	0.460	0.000	1.000	1.000
<i>spread</i>	45616	2.371	11.221	0.703	1.019	1.776
<i>size</i>	45616	11.459	1.693	10.405	11.430	12.636
<i>roa</i>	45616	0.012	0.025	0.005	0.010	0.014
<i>mismatch</i>	45207	0.068	0.182	-0.031	0.046	0.151
<i>leverage</i>	45616	0.896	0.092	0.895	0.919	0.943
<i>mb</i>	45542	1.632	0.892	1.093	1.450	1.969
<i>mertondd</i>	45616	5.278	1.999	3.976	5.601	6.839
<i>zscore</i>	43869	37.267	40.670	13.901	24.975	46.487
<i>volatility</i>	45616	0.365	0.248	0.211	0.280	0.397
Panel B: Non-Financial Firms						
Variables	N	Mean	Std Dev	P25	P50	P75
<i>ttm</i>	78698	11.106	10.747	4.061	7.817	15.733
<i>seniority</i>	78698	0.975	0.155	1.000	1.000	1.000
<i>spread</i>	78698	2.072	4.441	0.674	0.998	1.760
<i>size</i>	78469	9.294	1.296	8.379	9.328	10.126
<i>roa</i>	78469	0.043	0.064	0.016	0.043	0.074
<i>mismatch</i>	78462	0.012	0.169	-0.056	0.001	0.071
<i>leverage</i>	78465	0.660	0.137	0.568	0.652	0.744
<i>mb</i>	78084	3.005	12.310	1.290	1.987	3.243
<i>mertondd</i>	78698	5.929	2.204	4.405	5.835	7.366
<i>zscore</i>	77097	29.524	40.890	10.172	18.549	35.816
<i>volatility</i>	78698	0.321	0.143	0.226	0.279	0.359

Table 2: TBTF-Spread Regressions

Regression results for the model $Spread_{i,t} = \alpha + \beta^1 TBTF_{i,t-1} + \beta^2 Financial_{i,t-1} + \beta^3 Risk_{i,t-1} + \beta^4 TBTF_{i,t-1} \times Financial_{i,t-1} + \beta^5 Bond\ Controls_{i,t} + \beta^6 Firm\ Controls_{i,t-1} + \beta^7 Macro\ Controls_t + Firm\ FE + Year\ FE + \varepsilon_{i,t}$ are reported in this table. We measure the systemic importance (TBTF) of an institution using a number of different proxies. *size* is log value of total assets of a financial institution. *size90* is a dummy variable equal to one if a given financial institution's size is in the top 90th percentile. *size_top_10* is a dummy variable equal to one if a given financial institution is ranked in the top ten in terms of size in a given year. *bank*, *insurance* and *broker* dummies are variables set to one if the firm belongs to the corresponding industry based on its SIC code. *financial* is a dummy variable set to one if the firm is a financial firm (SIC code starting with 6). *mkt* is the market risk premium, computed as the value-weighted stock market return minus the risk-free rate. *term* is the term structure premium, measured by the yield spread between long-term (10-year) Treasury bonds and short-term (three-month) Treasuries. *def* is the default risk premium, measured by the yield spread between BAA-rated and AAA-rated corporate bonds. Other control variables are defined in Table 1 and Appendix A. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

VARIABLES	(1) spread	(2) spread	(3) spread	(4) spread	(5) spread	(6) spread
ttm	0.018 (0.007)	0.007 (0.004)	0.020 (0.008)	0.020 (0.008)	0.020 (0.008)	0.014 (0.003)
seniority	-0.128 (0.127)	-0.170 (0.082)	-0.121 (0.132)	-0.123 (0.132)	-0.154 (0.154)	-0.034 (0.105)
leverage _{t-1}	-0.230 (0.870)	5.533 (1.906)	-2.138 (0.687)	-2.137 (0.686)	-2.114 (0.667)	0.855 (0.597)
roa _{t-1}	-5.839 (4.037)	-2.579 (1.356)	-6.350 (4.256)	-6.362 (4.264)	-6.370 (4.243)	-3.404 (0.811)
mb _{t-1}	-0.176 (0.082)	-0.149 (0.044)	-0.140 (0.083)	-0.139 (0.083)	-0.148 (0.087)	0.000 (0.001)
mismatch _{t-1}	0.076 (0.319)	-0.996 (0.362)	0.035 (0.318)	0.031 (0.319)	-0.087 (0.313)	-0.723 (0.238)
def	1.560 (0.200)	1.595 (0.080)	1.540 (0.197)	1.540 (0.198)	1.542 (0.195)	1.292 (0.116)
term	0.057 (0.047)	0.078 (0.023)	0.055 (0.046)	0.056 (0.047)	0.054 (0.045)	0.012 (0.023)
mkt	-0.653 (0.516)	-0.691 (0.211)	-0.639 (0.513)	-0.645 (0.516)	-0.640 (0.513)	-0.440 (0.222)
mertondd _{t-1}	-0.291 (0.050)	-0.208 (0.020)	-0.310 (0.054)	-0.311 (0.055)	-0.308 (0.056)	-0.254 (0.030)
size _{t-1}	-0.246 (0.065)	-0.191 (0.084)				
size90 _{t-1}			-0.320 (0.148)			0.019 (0.120)
size_top_10 _{t-1}				-0.331 (0.148)		
size _{t-1} × bank dummy					-0.382 (0.183)	
size _{t-1} × insurance dummy					-0.296 (0.334)	
size _{t-1} × broker dummy					-0.196 (0.209)	
financial _{t-1}						-0.284 (0.181)
size90 _{t-1} × financial _{t-1}						-0.241 (0.128)
constant	4.827 (1.038)	-1.238 (1.613)	4.075 (1.032)	4.121 (1.033)	4.116 (1.043)	0.192 (0.619)
Firm FE	N	Y	N	N	N	N
Year FE	Y	Y	Y	Y	Y	Y
Rating Dummies	Y	Y	Y	Y	Y	Y
Observations	39,164	39,125	39,164	39,164	39,164	104,127
R ²	0.432	0.509	0.423	0.423	0.423	0.439

Table 3: TBTF and Risk Interactions

Regression results for the model $Spread_{i,b,t} = \alpha + \beta^1 TBTF_{i,t-1} + \beta^2 Risk_{i,t-1} + \beta^3 TBTF_{i,t-1} \times Risk_{i,t-1} + \beta^4 Bond\ Controls_{i,b,t} + \beta^5 Firm\ Controls_{i,t-1} + \beta^6 Macro\ Controls_t + Firm\ FE + Year\ FE + \varepsilon_{i,b,t}$ are reported in Panel A. We measure the systemic importance (TBTF) of an institution using the *size90* dummy variable, set equal to one if a given financial institution's size is in the top 90th percentile. In column 2, we also include interactions for two other size dummy variables: *size60* is a dummy variable equal to one if a given financial institution's size is between the 60th and 90th percentiles. *size30* is a dummy variable equal to one if a given financial institution's size is between the 30th and 60th percentiles. *Risk* of a financial institution is measured by distance-to-default (*mertondd*) in columns 1 and 2, z-score (*zscore*) in column 3, and volatility (*volatility*) in column 4, the adjusted distance-to-default measure (*adj-mertondd*) in column 5, the distance-to-default measure computed using exponentially weighted moving average standard deviations (*ewma-mertondd*) in column 6, and credit risk beta (*dd-beta*) in column 7. *adj-mertondd* is the Merton's distance-to-default measure, calculated using scaled standard deviations for firms in the 90th percentile in terms of size to match the average standard deviations of all other firms in a given month. *ewma-mertondd* is the Merton's distance-to-default measure, calculated using standard deviations computed using the exponentially weighted moving average method as described in the text. *dd-beta* is the Beta obtained from regressing a firm's monthly changes of distance-to-default on the monthly changes of value-weighted average distance-to-default of all other firms using 36 months of data. In computing *dd-beta*, we require the company to have at least 24 non-missing monthly changes in distance-to-default over the previous 36 months. *mertondd*, *zscore*, *volatility*, and the other control variables are defined in Table 1 and Appendix A. For brevity, we do not report coefficients on the control variables in Panel A. Panel B reports regression results for the model $Spread_{i,b,t} = \alpha + \beta^1 TBTF_{i,t-1} + \beta^2 Risk_{i,t-1} + \beta^3 TBTF_{i,t-1} \times Risk_{i,t-1} + \beta^4 Financial_i + \beta^5 Financial_i \times TBTF_{i,t-1} + \beta^6 Financial_i \times Risk_{i,t-1} + \beta^7 Financial_i \times Risk_{i,t-1} \times TBTF_{i,t-1} + \beta^8 Bond\ Controls_{i,b,t} + \beta^9 Firm\ Controls_{i,t-1} + \beta^{10} Macro\ Controls_t + Firm\ FE + Year\ FE + \varepsilon_{i,b,t}$. *Risk* and *TBTF* variables are the same as in Panel A. *financial* is a dummy variable set to one if the firm is a financial firm (SIC code starting with 6). For brevity we do not report coefficients on the control variables in Panel B. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

PANEL A

VARIABLES	(1) spread	(2) spread	(3) spread	(4) spread	(5) spread	(6) spread	(7) spread
size90 _{t-1}	-2.022*** (0.568)	-2.246*** (0.495)	-1.305*** (0.401)	0.876*** (0.256)	-1.532*** (0.443)	-1.211*** (0.384)	-0.172* (0.091)
size60 _{t-1}		-0.577 (0.821)					
size30 _{t-1}		0.911 (0.972)					
mertondd _{t-1}	-0.446*** (0.082)	-0.354*** (0.080)					-0.291*** (0.054)
size90 _{t-1} × mertondd _{t-1}	0.332*** (0.091)	0.246*** (0.083)					
size60 _{t-1} × mertondd _{t-1}		-0.033 (0.135)					
size30 _{t-1} × mertondd _{t-1}		-0.233					

		(0.164)					
zscore _{t-1}			-0.336***				
			(0.082)				
size90 _{t-1} × zscore _{t-1}			0.266**				
			(0.115)				
volatility _{t-1}				4.885***			
				(1.106)			
size90 _{t-1} × volatility _{t-1}				-3.342***			
				(0.824)			
adj-mertondd _{t-1}					-0.179***		
					(0.049)		
size90 _{t-1} × adj-mertondd _{t-1}					0.194**		
					(0.056)		
ewma-mertondd _{t-1}						-0.097***	
						(0.021)	
size90 _{t-1} × ewma-mertondd _{t-1}						0.104**	
						(0.034)	
dd-beta _{t-1}							0.142*
							(0.076)
size90 _{t-1} × dd-beta _{t-1}							-0.295**
							(0.131)
constant	3.306***	2.533***	1.517*	-0.512	1.317	1.306	2.606***
	(0.819)	(0.929)	(0.910)	(0.809)	(0.851)	(0.847)	(0.854)
Year FE	Y	Y	Y	Y	Y	Y	Y
Rating Dummies	Y	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y
Observations	39,125	39,125	37,856	39,125	39,125	39,125	38,344
R ²	0.457	0.465	0.429	0.492	0.433	0.425	0.438

PANEL B

VARIABLES	(1) spread	(2) spread	(3) spread
size90 _{t-1}	-0.435 (0.442)	0.226 (0.398)	0.055 (0.301)
financial _{t-1}	0.482 (0.598)	0.162 (0.407)	0.558 [*] (0.313)
financial _{t-1} × size90 _{t-1}	-1.554 ^{**} (0.746)	-1.445 ^{**} (0.579)	0.721 [*] (0.377)
mertondd _{t-1}	-0.241 ^{***} (0.046)		
size90 _{t-1} × mertondd _{t-1}	0.071 (0.063)		
financial _{t-1} × mertondd _{t-1}	-0.149 (0.091)		
financial _{t-1} × mertondd _{t-1} × size90 _{t-1}	0.259 [*] (0.113)		
zscore _{t-1}		-0.172 ^{**} (0.070)	
size90 _{t-1} × zscore _{t-1}		-0.112 (0.125)	
financial _{t-1} × zscore _{t-1}		-0.134 (0.101)	
financial _{t-1} × zscore _{t-1} × size90 _{t-1}		0.387 ^{**} (0.171)	
volatility _{t-1}			8.170 ^{***} (0.824)
size90 _{t-1} × volatility _{t-1}			-0.175 (1.018)
financial _{t-1} × volatility _{t-1}			-2.740 ^{***} (1.057)
financial _{t-1} × volatility _{t-1} × size90 _{t-1}			-3.106 ^{**} (1.310)
constant	-0.617 (0.750)	-1.642 ^{**} (0.716)	-4.119 ^{***} (0.509)
Year FE	Y	Y	Y
Rating Dummies	Y	Y	Y
Controls	Y	Y	Y
Observations	104,127	101,944	104,127
R ²	0.459	0.439	0.548

PANEL B (cont'd)

VARIABLES	(4) spread	(5) spread	(6) spread
size90 _{t-1}	-0.513 (0.346)	-0.390 (0.280)	-0.211 (0.210)
financial _{t-1}	0.022 (0.500)	0.011 (0.391)	-0.540 ^{**} (0.228)
financial _{t-1} × size90 _{t-1}	-0.994 [*] (0.590)	-0.739 (0.476)	0.092 (0.241)
adj-mertondd _{t-1}	-0.142 ^{***} (0.036)		
size90 _{t-1} × adj-mertondd _{t-1}	0.072 (0.046)		
financial _{t-1} × adj-mertondd _{t-1}	-0.056 (0.066)		
financial _{t-1} × adj-mertondd _{t-1} × size90 _{t-1}	0.137 [†] (0.077)		
ewma-merton _{t-1}		-0.065 ^{***} (0.016)	
size90 _{t-1} × ewma-merton _{t-1}		0.038 (0.025)	
financial _{t-1} × ewma-mertondd _{t-1}		-0.040 (0.032)	
financial _{t-1} × ewma-mertondd _{t-1} × size90 _{t-1}		0.069 (0.042)	
dd-beta _{t-1}			-0.080 (0.072)
size90 _{t-1} × dd-beta _{t-1}			0.141 (0.162)
financial _{t-1} × dd-beta _{t-1}			0.284 ^{**} (0.114)
financial _{t-1} × dd-beta _{t-1} × size90 _{t-1}			-0.428 [†] (0.225)
constant	-1.494 ^{**} (0.745)	-1.781 ^{***} (0.672)	-2.510 ^{***} (0.662)
Year FE	Y	Y	Y
Rating Dummies	Y	Y	Y
Controls	Y	Y	Y
Observations	104,127	104,127	103,796
R ²	0.445	0.441	0.435

Table 4: TBTF and Risk-Shifting

Columns 1-4 report regressions results for the model $\Delta D/V_{i,t} = \alpha + \beta^1 \Delta S_{i,t} + \beta^2 TBTF_{i,t} + \beta^3 TBTF_{i,t} \times \Delta S_{i,t} + Year\ FE + \varepsilon_{i,t}$. We measure the systemic importance (TBTF) of an institution using log value of total assets (size), and the size90 dummy variable set equal to one if a given financial institution's size is in the top 90th percentile. $\Delta D/V$ is the annual change in the book value of debt divided by the market value of assets computed from the Merton model described in Appendix A. $\Delta asset\ vol$ is the annual change in the volatility of market value of assets computed using the Merton model described in Appendix A. *financial* is a dummy variable set to one if the firm is a financial firm (SIC code starting with 6). Columns 5-8 report regressions results for the model, $\Delta IPP_{i,t} = \alpha + \beta^1 \Delta S_{i,t} + \beta^2 TBTF_{i,t} + \beta^3 TBTF_{i,t} \times \Delta S_{i,t} + Year\ FE + \varepsilon_{i,t}$. ΔIPP is the fair insurance premium per dollar of liabilities computed following Merton (1977). The estimation is described in Appendix A. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

VARIABLES	(1) $\Delta D/V$	(2) $\Delta D/V$	(3) $\Delta D/V$	(4) $\Delta D/V$	(5) ΔIPP	(6) ΔIPP	(7) ΔIPP	(8) ΔIPP
$\Delta asset\ vol$	-0.183** (0.070)	-1.075*** (0.318)	-0.207*** (0.074)	-0.445*** (0.028)	0.191*** (0.016)	-0.424*** (0.072)	0.155*** (0.017)	0.098*** (0.009)
size _{t-1}		0.000 (0.001)				-0.001 (0.001)		
$\Delta asset\ vol \times size_{t-1}$		0.096*** (0.031)				0.066*** (0.007)		
size90 _{t-1}			-0.000 (0.003)	0.005* (0.003)			-0.003 (0.003)	-0.000 (0.000)
$\Delta asset\ vol \times size90_{t-1}$			0.308* (0.148)	0.252*** (0.089)		0.458*** (0.060)		-0.006 (0.040)
financial _{t-1}				-0.003* (0.002)				0.003*** (0.001)
financial _{t-1} \times $\Delta asset\ vol$				0.237*** (0.079)				0.057 (0.041)
financial _{t-1} \times size90 _{t-1}				-0.005 (0.004)				-0.003 (0.003)
financial _{t-1} \times size90 _{t-1} \times $\Delta asset\ vol$				0.057 (0.173)				0.464* (0.275)
Constant	0.003* (0.002)	0.001 (0.011)	0.003 (0.002)	0.006*** (0.001)	0.004*** (0.001)	0.010* (0.005)	0.004*** (0.001)	0.001*** (0.000)
Year FE	Y	Y	Y	Y	Y	Y	Y	Y
Observations	2,131	2,131	2,131	12,817	2,131	2,131	2,131	12,817
R ²	0.018	0.041	0.022	0.083	0.060	0.095	0.086	0.078

Table 5: TBTF-Risk Relationship

Regression results for the model $mertondd_{i,t} = \alpha + \beta^1 TBTF_{i,t-1} + \beta^2 Financial_{i,t-1} + \beta^3 TBTF_{i,t-1} \times Financial_{i,t-1} + \beta^4 Firm\ Controls_{i,t-1} + \beta^5 Macro\ Controls_t + Year\ FE + \varepsilon_{i,t}$ are reported in this table. *mertondd* is the Merton (1974) distance-to-default measure, calculated using firm-level financial and stock return data, as described in Appendix A. We measure the systemic importance (*TBTF*) of an institution using log value of total assets (*size*), and the *size90* dummy variable set equal to one if a given financial institution's size is in the top 90th percentile. *financial* is a dummy variable set to one if the firm is a financial firm (SIC code starting with 6). *std roa* is the standard deviation of roa computed over the past five years. Other control variables are defined in Tables 1 and 2 and in Appendix A. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

VARIABLES	(1)	(2)	(3)	(4)
	mertondd	mertondd	mertondd	mertondd
def	-89.333*** (6.431)	-86.078*** (6.195)	-91.350*** (2.203)	-90.576*** (2.325)
term	-12.792*** (3.033)	-12.971*** (3.076)	-0.092 (1.294)	0.329 (1.333)
mkt	-0.098 (0.155)	-0.111 (0.156)	0.165** (0.058)	0.120* (0.060)
roa	6.268*** (1.241)	6.324*** (1.053)	8.187*** (0.678)	9.083*** (0.714)
mb	0.088** (0.038)	0.066 (0.040)	0.008 (0.003)	0.007 (0.003)
std roa	-9.368** (4.466)	-11.392** (5.725)	-3.410*** (0.847)	-4.812*** (0.999)
leverage	-2.676*** (0.560)	-1.427** (0.599)	-3.295*** (0.305)	-3.100*** (0.311)
mismatch	-0.593** (0.281)	-0.606 (0.324)	-0.098 (0.132)	0.025 (0.145)
size _{t-1}	0.222** (0.047)		0.508** (0.031)	
size90 _{t-1}		0.066 (0.154)		1.021*** (0.133)
financial _{t-1}			2.247*** (0.515)	0.543*** (0.123)
financial _{t-1} × size _{t-1}			-0.257*** (0.052)	
financial _{t-1} × size90 _{t-1}				-0.482** (0.219)
Constant	6.604*** (0.659)	7.706*** (0.606)	3.409*** (0.346)	7.632*** (0.233)
Year FE	Y	Y	Y	Y
Rating Dummies	Y	Y	Y	Y
Observations	10,762	10,762	88,213	88,182
R ²	0.627	0.605	0.522	0.465

Table 6: Ratings as an Exogenous Measure

Panel A reports regression results for the model $Spread_{i,b,t} = \alpha + \beta^1 issuer\ rating_{i,t-1}$

$+ \beta^2 stand\ alone\ rating_{i,t-1} + \beta^3 Bond\ Controls_{i,b,t} + \beta^4 Firm\ Controls_{i,t-1} + \beta^5 Macro\ Controls_t + Firm\ FE + Year\ FE + \varepsilon_{i,b,t}$. Panel B reports regression results for the model $issuer/stand\ alone\ rating_{i,t-1}$

$= \alpha + \beta^1 TBTf_{i,t-1} + \beta^2 Firm\ Controls_{i,t-1} + Firm\ FE + Year\ FE + \varepsilon_{i,b,t}$. *issuer rating* is the Fitch long-term issuer rating, which is a number between 1 and 9, with 1 indicating the highest issuer quality. *stand-alone rating* is the Fitch individual company rating which excludes any potential government support. It takes on a number between 1 and 9, with 1 indicating the highest issuer quality. Control variables are described in Tables 1 and 2, and in Appendix A. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

Panel A

VARIABLES	(1) spread	(2) spread	(3) spread
ttm	-0.021** (0.010)	-0.014 (0.021)	-0.011 (0.020)
seniority	-0.271** (0.105)	-0.212 (0.216)	-0.208 (0.216)
leverage _{t-1}	-14.418*** (1.997)	-5.450 (3.829)	-4.093 (4.288)
roa _{t-1}	-55.024*** (10.843)	-42.518*** (11.292)	-46.346*** (11.410)
mb _{t-1}	0.419*** (0.105)	0.526*** (0.161)	0.465*** (0.164)
mismatch _{t-1}	2.971*** (0.423)	2.492** (1.110)	2.385* (1.097)
def	1.344*** (0.106)	1.309*** (0.181)	1.298*** (0.178)
term	0.031 (0.038)	0.048 (0.054)	0.044 (0.055)
mkt	-0.555 (0.369)	-0.572 (0.439)	-0.528 (0.427)
mertondd _{t-1}	-0.171*** (0.040)	-0.155*** (0.046)	-0.178*** (0.059)
stand-alone rating _{t-1}	0.107* (0.055)		-0.164 (0.147)
issuer rating _{t-1}		0.271*** (0.071)	0.340*** (0.107)
Constant	14.591*** (2.012)	4.759 (3.812)	3.335 (4.143)
Year FE	Y	Y	Y
Observations	16,127	16,120	16,107
R ²	0.644	0.654	0.655

Panel B

VARIABLES	(1) issuer rating	(2) issuer rating	(3) stand-alone	(4) stand-alone
leverage _{t-1}	-19.374** (8.490)	-25.011*** (6.312)	-2.654 (5.209)	-3.474 (4.786)
roa	-32.744* (18.217)	-35.547 (21.865)	-23.599 (15.001)	-23.952 (15.519)
mb	-0.410* (0.220)	-0.137 (0.246)	-0.259* (0.130)	-0.214 (0.134)
mismatch _{t-1}	2.863** (1.337)	3.106** (1.281)	1.047 (0.676)	1.116* (0.642)
size _{t-1}	-0.753*** (0.151)		-0.130 (0.107)	
size90 _{t-1}		-1.892*** (0.439)		-0.344 (0.299)
constant	30.062*** (7.237)	28.649*** (5.780)	6.559 (4.558)	6.153 (4.400)
Year FE	Y	Y	Y	Y
Observations	16,120	16,120	16,127	16,127
R ²	0.622	0.492	0.527	0.518

Table 7: Event Study

Regression results for the model $Spread_{i,b,t} = \alpha + \beta^1 post + \beta^2 TBTFF_{i,t} \times post + \beta^3 Fincancial_{i,t} \times post + \beta^4 Risk_{i,t} \times post + \beta^5 TBTFF_{i,t} \times Fincancial_{i,t} \times post + \beta^6 TBTFF_{i,t} \times Risk_{i,t} \times post + \beta^7 Fincancial_{i,t} \times Risk_{i,t} \times post + \beta^8 TBTFF_{i,t} \times Fincancial_{i,t} \times Risk_{i,t} \times post + \beta^9 Macro Controls_t + Issue FE + \epsilon_{i,b,t}$ are reported in this table. The variable *post* equals 1 if the transaction date is the event date or one of the five trading days following the event date, and 0 if the transaction date is one of the 5 trading days prior to the event date. We measure the systemic importance (*TBTFF*) of an institution using the *size90* dummy variable, set equal to one if a given financial institution's size is in the top 90th percentile. *Risk* of a financial institution is measured by distance-to-default (*mertondd*). *financial* is a dummy variable set to one if the firm is a financial firm (SIC code starting with 6). *Issue FE* is an issue fixed effect included in the regression. Other variables are defined in Appendix A. For brevity, we only report the relevant variables. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, *, and . indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

Event Date	Event	(1)	(2)	(3)	(4)
		size90 _{t-1} × post	size90 _{t-1} × mertondd _{t-1} × post	size90 _{t-1} × financial _{t-1} × post	size90 _{t-1} × mertondd _{t-1} × financial _{t-1} × post
03/13/08	Bear Stearns bailout	-1.149*** (0.224)	0.251** (0.103)	-1.141*** (0.228)	0.401** (0.182)
07/11/08	Paulson requests government funds for Fannie Mae and Freddie Mac	-0.222** (0.106)	0.074 (0.091)	-0.191* (0.110)	0.049 (0.093)
09/20/08	Paulson submits TARP proposal	-1.182*** (0.308)	-0.080 (0.352)	-1.259*** (0.309)	-0.050 (0.356)
10/03/08	TARP passes the U.S. House of Representatives	-1.060*** (0.292)	1.951*** (0.420)	-1.268*** (0.363)	2.186*** (0.439)
10/06/08	The Term Auction Facility is increased to \$900 billion	-0.686** (0.278)	0.808*** (0.310)	-0.878** (0.357)	1.063*** (0.340)
10/14/08	Treasury announces \$250 billion capital injections	-0.927**	0.201	-0.748*	0.269

11/13/08	Paulson indicates that TARP will be used to buy equity instead of troubled assets	(0.362)	(0.281)	(0.382)	(0.291)
		-0.630**	0.925**	-0.614*	0.901**
		(0.272)	(0.403)	(0.316)	(0.429)
02/02/09	The Federal Reserve announces it is prepared to increase TALF to \$1 trillion	-0.031	0.102	-0.297*	0.462***
		(0.086)	(0.109)	(0.162)	(0.176)
09/15/08	Lehman Brothers files for bankruptcy	1.005***	-1.464**	1.086***	-1.437***
		(0.329)	(0.293)	(0.436)	(0.184)
06/29/10	The House and the Senate conference committees reconcile the Dodd-Frank bill	-0.034*	0.039*	-0.003	0.033
		(0.019)	(0.021)	(0.022)	(0.023)
07/21/10	President Obama signs Dodd-Frank into law	0.027*	-0.019	0.017	-0.016
		(0.016)	(0.014)	(0.019)	(0.015)
12/10/12	The FDIC and the Bank of England release a white paper and press release describing SPOE	0.037***	-0.028**	0.030**	-0.029**
		(0.012)	(0.014)	(0.014)	(0.014)

Table 8: FDIC Guarantee

Regression results for the model $Spread_{i,b,t} = \alpha + \beta^1 \times Bond\ controls_{i,b,t} + \beta^2 \times guarantee_{i,b,t} + \beta^3 \times guarantee_{i,b,t} \times post + \beta^4 \times mertondd_{i,t-1} + \beta^5 \times mertondd_{i,t-1} \times post + \beta^6 \times guarantee_{i,b,t} \times mertondd_{i,t-1} + \beta^7 \times guarantee_{i,b,t} \times mertondd_{i,t-1} \times post + Issuer \times Trading\ day\ FE + \epsilon_{i,b,t}$ are reported in this table. *mertondd* is Merton's (1974) distance-to-default measure, calculated using firm-level financial and stock return data, described in Appendix A. *guarantee* is a dummy variable set equal to 1 if the bond had a special FDIC guarantee and was issued as part of the Temporary Liquidity Guarantee Program. The regression also includes additional bond controls. *age* is the age of the bond since issuance in years. *puttable* is a dummy variable set equal to 1 if the bond is puttable. *redeemable* is a dummy variable set equal to 1 if the bond is redeemable. *exchangeable* is a dummy variable set equal to 1 if the bond is exchangeable. *fixrate* is a dummy variable set equal to 1 if the bond has fixed rate coupons. The event date is June 29, 2010 (Dodd-Frank). For specifications 1 and 2, the variable *post* equals 1 if the transaction date is the event date or one of the 5 trading days following the event date, and 0 if the transaction date is one of the five trading days prior to the event date. For specifications 3 and 4, *post* equals 1 if the transaction date is the event date or one of the 132 trading days following the event date, and 0 if the transaction date is one of the 132 trading days prior to the event date. The regression includes issuer-trading day fixed effects (*Issuer* × *Trading Day FE*). Other control variables are described in Table 1 and Appendix A. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

VARIABLES	(1) spread	(2) spread	(3) spread	(4) spread
fixed rate	-1.410*** (0.095)	-1.417*** (0.047)	-0.828*** (0.194)	-0.720*** (0.181)
seniority	-0.190* (0.099)	-0.233* (0.103)	-0.259** (0.099)	-0.285** (0.104)
puttable	-0.366* (0.187)	-0.320 (0.198)	-0.227 (0.151)	-0.232 (0.141)
redeemable	0.106 (0.160)	0.160* (0.082)	-0.005 (0.166)	-0.019 (0.126)
ttm	0.090*** (0.015)	0.085*** (0.018)	0.087*** (0.012)	0.083*** (0.012)
exchangeable			1.450*** (0.231)	1.431*** (0.217)
guarantee	-1.780*** (0.227)	-2.712*** (0.181)	-1.413*** (0.202)	-2.190*** (0.129)
guarantee × post	0.134*** (0.022)	0.700** (0.259)	0.001 (0.065)	0.409** (0.129)
mertondd _{t-1} × guarantee		0.887*** (0.220)		0.662*** (0.181)
mertondd _{t-1} × guarantee × post		-0.604** (0.206)		-0.387** (0.124)
Constant	1.617*** (0.227)	1.675*** (0.174)	1.125*** (0.284)	1.062*** (0.277)
Issuer × Trading Day FE	Y	Y	Y	Y
Event days	10	10	132	132
Observations	2,537	2,090	31,338	30,011

R^2	0.687	0.703	0.594	0.595
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Table 9: Robustness Checks

Regression results for the model $Spread_{i,b,t} = \alpha + \beta^1 TBTF_{i,t-1} + \beta^2 Risk_{i,t-1} + \beta^3 Bond\ Controls_{i,b,t} + \beta^4 Firm\ Controls_{i,t-1} + \beta^5 Macro\ Controls_t + \beta^6 Bond\ Liquidity_{i,b,t} + Year\ FE + \varepsilon_{i,b,t}$ are reported in this table. In columns 1 and 2, we use alternative measures of bond liquidity as additional controls. *liquidity* is a bond liquidity measure based on Longstaff et al. (2005). A dummy variable is given a value of one or zero each month depending on the characteristics of the underlying bond. We then add up the dummy variables to compute an overall liquidity score. A dummy variable is assigned a value of one if i) the outstanding market value of a bond is larger than the median value of all bonds, ii) the age of a bond is less than the median age of all bonds, iii) the time to maturity of a bond is less than seven years, iv) the bond is rated AAA/AA. *turnover* is bond turnover computed using the past three months of trading data. This variable is computed using the TRACE database and is available only after 2003. All the variables are included in the regression but only the variables of interest are reported. In columns 3 to 6 we use two alternative measures of systemic importance (*TBTF*). *covar* is the Covar measure of Adrian and Brunnermeier (2011) described in detail in Appendix A. *srisk* is the systemic risk measure of Acharya et al. (2012) and Acharya et al. (2010a) described in detail in Appendix A. Variables are defined in Appendix A. We use the same set of controls as in column 1 of Table 2. Only the relevant variables of interest are reported for brevity. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively

VARIABLES	(1) spread	(2) spread	(3) spread	(4) spread	(5) spread	(6) spread
mertondd _{t-1}	-0.263*** (0.019)	-0.252*** (0.019)	-0.282*** (0.060)	-0.263*** (0.059)	-0.396*** (0.093)	-0.356*** (0.092)
size90 _{t-1}	-0.168** (0.067)	-0.293* (0.145)			-1.913*** (0.634)	-1.552*** (0.573)
liquidity _{t-1}	-0.100*** (0.027)					
turnover _{t-1}		-0.073*** (0.020)				
covar _{t-1}			-9.316** (3.625)		-4.516 (4.099)	
srisk _{t-1}				-0.011** (0.005)		-0.006* (0.003)
size90 _{t-1} × mertondd _{t-1}					0.315*** (0.101)	0.254*** (0.095)
Constant	-0.665** (0.289)	1.889** (0.788)	4.365*** (1.105)	3.498*** (0.736)	3.112*** (0.854)	4.113*** (0.877)
Year FE	Y	Y	Y	Y	Y	Y
Rating FE	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y
Observations	39,125	14,003	36,504	36,219	36,504	36,219
R ²	0.521	0.607	0.422	0.432	0.444	0.443

Appendix A: Variable Descriptions

Variable	Description
Bond characteristics	
<i>spread</i>	The difference between the yield on a firm's bond and the yield on a maturity-matched Treasury bond. Spread is in percentages.
<i>ttm</i>	Year to maturity.
<i>seniority</i>	Dummy variable indicating whether the bond is senior.
<i>age</i>	Age of the bond since issuance in years.
<i>puttable</i>	Dummy variable set equal to 1 if the bond is puttable.
<i>redeemable</i>	Dummy variable set equal to 1 if the bond is redeemable.
<i>exchangeable</i>	Dummy variable set equal to 1 if the bond is exchangeable.
<i>fixrate</i>	Dummy variable set equal to 1 if the bond has fixed rate coupons.
<i>guarantee</i>	Dummy variable set equal to 1 if the bond had a special FDIC guarantee and was issued as part of the "Temporary Liquidity Guarantee Program."
<i>liquidity</i>	Bond liquidity measure based on Longstaff et al. (2005). A dummy variable is set each month a value of one or zero depending on the characteristics of the underlying bond. We add up the dummy variables to determine an overall liquidity score. The first variable is used to measure general availability of the bond issue in the market. If the outstanding market value of a bond is larger than the median value of all bonds, then the dummy variable is assigned a value of one. The second variable is the age of the bond and parallels the notion of on-the-run and off-the-run bonds in Treasury markets, with on-the-run bonds being more liquid. If the age of a bond is less than the median age of all bonds then the dummy variable is assigned a value of one. The third variable is the time to maturity of the bond. It has been shown that there exist maturity clienteles for corporate bonds and that shorter-maturity corporate bonds tend to be more liquid than longer-maturity bonds. If the time to maturity of a bond is less than seven years then the dummy variable is assigned a value of one. The fourth variable is a dummy variable set equal to one if the bonds is rated AAA/AA. As Longstaff, Mithal and Neis (2005) show, highly rated bonds tend to be more marketable and liquid in times distress when there is a "flight to quality." The maximum liquidity value assigned to a bond is four and the minimum liquidity value is zero.
<i>turnover</i>	Bond turnover computed using the past three months of trading data. This variable is computed using the TRACE database and is available after 2003.
Firm characteristics	

<i>size</i>	Size of a financial institution defined as the log value of total assets.
<i>size90</i>	Dummy variable that equals 1 if an issuer's size is greater than the 90 th percentile of its distribution in that fiscal year and 0 otherwise.
<i>size60</i>	Dummy variable that equals 1 if an issuer's size is greater than the 60 th percentile of its distribution in that fiscal year but less than or equal to the 90 th percentile and 0 otherwise.
<i>size30</i>	Dummy variable that equals 1 if an issuer's size is greater than the 30 th percentile of its distribution in that fiscal year but less than or equal to the 60 th percentile and 0 otherwise.
<i>size_top_10</i>	Dummy variable that equals 1 if an issuer ranks in the top ten in terms of size in that fiscal year and 0 otherwise.
<i>financial</i>	Dummy variable that equals 1 if the company is a financial firm defined as having an SIC code starting with 6.
<i>bank dummy</i>	Dummy variable that takes on a value of one for firms with SIC codes that start with 60 and 61 and firms with SIC code 6712.
<i>insurance dummy</i>	Dummy variable that takes on a value of one for firms with SIC codes that start with 63 and 64.
<i>broker dummy</i>	Dummy variable that takes on a value of one for firms with SIC codes that start with 62.
<i>stand-alone rating</i>	Fitch individual rating, which is a number between 1 and 9, with 1 indicating the highest issue quality.
<i>issuer rating</i>	Fitch long term issuer rating, which is a number between 1 and 9, with 1 indicating the highest issue quality.
<i>covar</i>	Covar measure of systemic fragility, as described below.
<i>srisk</i>	Systemic risk based on expected capital shortfall, as described below.
<i>leverage</i>	Total liabilities divided by total assets.
<i>roa</i>	Return on assets, measured as net income divided by total assets.
<i>std roa</i>	Standard deviation of <i>roa</i> computed over 5 years.
<i>mb</i>	Market value of total equity divided by book value of total equity.
<i>mismatch</i>	Short-term debt minus cash divided by total liabilities.
<i>mertondd</i>	Merton's distance-to-default measure, as described below.
<i>adj-mertondd</i>	Merton's distance-to-default measure, calculated using scaled standard deviations for firms in the 90 th percentile in terms of size to match the average standard deviations of all other firms in a given month.
<i>ewma-mertondd</i>	Merton's distance-to-default measure, calculated using standard deviations computed using the exponentially weighted moving average method with weight factor of 0.94.
<i>dd-beta</i>	Merton's distance-to-default beta, obtained by regressing a firm's monthly changes of distance-to-default on the monthly changes of value-weighted average distance-to-default of all other firms using past 36 months of data. In computing <i>dd-beta</i> , we require the company to have at least 24 non-missing monthly changes in distance-to-default over the previous 36 months.
<i>zscore</i>	Z-score, calculated as the sum of <i>roa</i> and equity ratio (ratio of book equity to total assets), averaged over four years, divided by the standard deviation of <i>roa</i> over four years.
<i>volatility</i>	Stock return volatility computed using returns over the past 12 months.
<i>D/V</i>	Book value of debt divided by the market value of assets. Market value of assets is computed using the Merton model.
<i>IPP</i>	IPP is the fair insurance premium per dollar of liabilities computed following Merton (1977). The estimation is described in detail below.
<i>asset vol</i>	Volatility of market value of assets computed using the Merton model.
Macro controls	

<i>mt</i>	Market risk premium, computed as the CRSP value weighted stock return minus the risk free-rate.
<i>term</i>	Term structure premium, measured by the yield spread between long-term (10-year) Treasury bonds and short-term (three-month) Treasuries.
<i>def</i>	Default risk premium, measured by the yield spread between BAA-rated and AAA-rated corporate bonds.

Merton Measure of Credit Risk

We follow Campbell, Hilscher and Szilagyi (2008) and Hillegeist et al. (2004) in calculating Merton's (1974) distance-to-default. The market equity value of a company is modeled as a call option on the company's assets:

$$V_E = V_A e^{-dT} N(d_1) - X e^{-rT} N(d_2) + (1 - e^{-dT}) V_A$$

$$d_1 = \frac{\log\left(\frac{V_A}{X}\right) + \left(r - d + \frac{s_A^2}{2}\right)T}{s_A \sqrt{T}}; d_2 = d_1 - s_A \sqrt{T} \quad (A1)$$

where V_E is the market value of a bank, V_A is the value of the bank's assets, X is the face value of debt maturing at time T , r is the risk-free rate, and d is the dividend rate expressed in terms of V_A . s_A is the volatility of the value of assets, which is related to equity volatility through the following equation:

$$s_E = \frac{V_A e^{-dT} N(d_1) s_A}{V_E} \quad (A2)$$

We simultaneously solve equations (A1) and (A2) to find the values of V_A and s_A . We use the market value of equity for V_E and total liabilities to proxy for the face value of debt, X .³³ Since the accounting information is on an annual basis, we linearly interpolate the values for all dates over the period, using end of year values for accounting items. The interpolation method has the advantage of producing a smooth implied asset value process and avoids jumps in the implied default probabilities at year end. s_E is the standard deviation of daily equity returns over the past 12 months. In calculating standard deviation, we require the company to have at least 90 non-zero and non-missing returns over the previous 12 months. T equals one year, and r is the one-year Treasury bill rate, which we take to be the risk-free rate. The dividend rate, d , is the sum of the prior year's common and preferred dividends divided by the market value of assets. We use the Newton method to simultaneously solve the two equations above. For starting values for the unknown variables, we use $V_A = V_E + X$ and $s_A = s_E V_E / (V_E + X)$.

³³ For financial firms, we have found similar results using short-term debt plus the currently due portion of long-term liabilities plus demand deposits as the default barrier.

After we determine asset values V_A , we follow Campbell, Hilscher and Szilagyi (2008) and assign asset return m to be equal to the equity premium (6%).³⁴ Merton's (1974) distance-to-default (dd) is finally computed as:

$$\text{Merton}dd = \frac{\log\left(\frac{V_A}{X}\right) + \left(m - d - \frac{s_A^2}{2}\right)T}{s_A\sqrt{T}} \quad (\text{A3})$$

The default probability is the normal transform of the distance-to-default measure, defined as:

$$PD = F(-\text{Merton}DD).$$

Covar Measure of Systemic Fragility

Following Adrian and Brunnermeier (2011), we compute a conditional value-at-risk measure (*covar*) for each of the financial institutions in our sample using quantile regression. *Covar* is the value-at-risk (Var) of the financial system conditional on institutions being under distress. A financial institution's contribution to systemic risk is the difference between *covar* conditional on the institution being under distress and the *covar* in the normal state of the institution. Following Adrian and Brunnermeier (2011), we compute a time-series of *Covar* measures for each bank using quantile regressions and a set of macro state variables. We run the following quantile regressions over the sample period:

$$\begin{aligned} \Delta\text{Bank}DD_{i,t} &= \alpha_i + \gamma_i M_{t-1} + \varepsilon_{i,t} \\ \Delta\text{System}DD_t &= \alpha_{\text{system}|t} + \beta_{\text{system}|t} \Delta\text{Bank}DD_{i,t} + \gamma_{\text{system}|t} M_{t-1} + \varepsilon_{\text{system}|t} \end{aligned} \quad (\text{A4})$$

where $\Delta\text{Bank}DD_{i,t}$ is the change in the Merton (1974) distance-to-default variable for bank i in week t and $\Delta\text{System}DD_t$ is similarly the change in the value-weighted Merton distance-to-default variable for

³⁴ We obtain similar distance-to-default values if we compute asset returns (V_A), as $\max\left(\frac{V_{A,t}}{V_{A,t-1}} - 1, r\right)$, following Hillegeist et al. (2004).

all financial firms in the sample. M_{t-1} are lagged state variables and include the change in the term spread (*term*), the change in the default spread (*def*), the CBOE implied volatility index (*vix*), the S&P 500 return (*spret*), and the change in the 3-month T-bill rate (*rate*). The *covar* variable is then computed as the change in the Var of the system when the institution is at the q^{th} percentile (or when the institution is in distress) minus the Var of the system when the institution is at the 50% percentile:

$$\Delta CovarSystem_t^q = \hat{\beta}_{system|i}^q \left(\Delta \widehat{BankDD}_{i,t}^q - \Delta \widehat{BankDD}_{i,t}^{50\%} \right) \quad (A5)$$

Finally, we invert the *covar* variable, so that higher values of *covar* indicate greater systemic risk.

SRISK Measure of Systemic Expected Shortfall

The second systemic risk measure we use is based on the expected capital shortfall framework developed by Acharya, Engle and Richardson (2012) and Acharya et al. (2010a). The systemic expected shortfall of an institution describes the capital shortage a financial firm would experience in case of a systemic event. The capital short fall depends on the firm's leverage and equity loss conditional on an aggregate market decline:

$$\begin{aligned} SRISK_t^i &= E((k(Debt + Equity) - Equity|Crisis)) \\ &= k(Debt_t^i) - (1 - k)(1 - MES_t^i)Equity_t^i \end{aligned} \quad (A6)$$

Marginal Expected Shortfall (MES_t^i) of a firm, i , is the expected loss an equity investor in a financial firm would experience if the market declined substantially. Following Acharya et al. (2010a), we use the bivariate daily time series model of equity returns of firm i , along with the aggregate market index and simulate returns six months into the future. The simulation allows volatilities and correlations to change over time and samples from the empirical distribution such that empirical tail dependence is maintained. Crisis is defined as the aggregate index falling by 40% over the next six months. Marginal expected shortfall is the equity decline in such a scenario.

Measure of Risk-Shifting

We follow Bushman and Williams (2012) and Hovakimian and Kane (2000) and use the Merton (1974) contingent claim framework to calculate asset return volatility (s_A) and the fair value of the insurance put-option per dollar of liabilities (*IPP*). *IPP* is computed as:

$$IPP = N\left(\frac{\log\left(\frac{X}{V_A}\right) + \frac{s_A^2 T}{2}}{s_A \sqrt{T}}\right) - \left(\frac{V_A}{X}\right) N\left(\frac{\log\left(\frac{X}{V_A}\right) - \frac{s_A^2 T}{2}}{s_A \sqrt{T}}\right) \quad (A7)$$

where V_A is the value of the bank's assets, X is the face value of debt maturing at time T , and s_A is the volatility of the market value of bank assets. V_A and s_A are computed using Merton's (1974) model.

Appendix B. Additional Results

Table B1: Impact of Dodd-Frank

Regression results for the $\text{modelspread} = \alpha + \beta^1 \text{post} + \beta^2 \text{TBTFF}_{i,t} \times \text{post} + \beta^3 \text{mertondd}_{i,t} \times \text{post} + \beta^4 \text{TBTFF}_{i,t} \times \text{mertondd}_{i,t} \times \text{post} + \beta^5 \text{Macro Controls}_{i,t} + \text{Issuer FE} + \varepsilon_{i,t}$ are reported in this table. We measure the systemic importance (TBTFF) of an institution using the *size90* dummy variable, set equal to one if a given financial institution's size is in the top 90th percentile. *mertondd* is Merton's (1974) distance-to-default measure, calculated using firm-level financial and stock return data, as described in Appendix A. The event date is June 29, 2010 (Dodd-Frank). The variable *post* equals 1 if the transaction date is the event date or one of the 132 trading days following the event date, and 0 if the transaction date is one of the 132 trading days prior to the event date. The control variables are described in Table 1 and in Appendix A. Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

VARIABLES	(1) spread	(2) spread
ttm	0.031 [*] (0.018)	0.031 [*] (0.018)
seniority	-0.213 (0.203)	-0.212 (0.204)
leverage _{t-1}	4.951 ^{***} (1.568)	4.425 ^{***} (1.343)
roa _{t-1}	-2.395 (4.138)	-2.738 (3.517)
mb _{t-1}	0.059 (0.145)	0.244 (0.173)
mismatch _{t-1}	-1.705 ^{***} (0.592)	-0.993 (0.842)
def	0.512 [*] (0.277)	0.547 [*] (0.280)
term	-0.130 (0.102)	-0.124 (0.102)
mkt	2.377 (3.406)	2.481 (3.427)
mertondd _{t-1}	-0.012 (0.111)	-0.266 (0.179)
size90 _{t-1}	-0.722 ^{**} (0.130)	-0.499 ^{**} (0.191)
post	-0.225 ^{**} (0.102)	-0.591 ^{***} (0.217)
size90 _{t-1} * post	0.077 (0.094)	0.550 [*] (0.276)
mertondd _{t-1} * post		0.237 [*] (0.123)
size90 _{t-1} * mertondd _{t-1} * post		-0.370 (0.187)
Constant	1.939 ^{**} (0.755)	2.130 ^{***} (0.701)
Firm FE	Y	Y

Year FE	Y	Y
Rating Dummies	Y	Y
Observations	1,810	1,810
R ²	0.547	0.548

Table BII: FDIC Guarantee Estimation

Regression results for the model $spread_{i,t} = \alpha + \beta^1 Bond\ Controls_{i,t} + \beta^2 guarantee_{i,t-1} + Firm\ FE / Firm\ FE \times Trading\ Day\ FE + \varepsilon_{i,t}$ are reported in this table. The sample includes financial institutions that issued bonds under the Temporary Liquidity Guarantee Program. The time period is from December 10, 2008 to February 3, 2012. *guarantee* is a dummy variable set equal to 1 if the bond had a special FDIC guarantee and was issued as part of the Temporary Liquidity Guarantee Program. *age* is the age of the bond since issuance in years. *ttm* is time to maturity of the bond in years. *puttable* is a dummy variable set equal to 1 if the bond is puttable. *redeemable* is a dummy variable set equal to 1 if the bond is redeemable. *exchangeable* is a dummy variable set equal to 1 if the bond is exchangeable. *fixrate* is a dummy variable set equal to 1 if the bond has fixed rate coupons. We run three different specifications. Columns 1 and 2 report results without any fixed effects. Column 3 reports results using firm fixed effects (*Firm FE*). Column 4 reports results using firm-trading day fixed effects (*Firm×Trading day FE*). Standard errors are reported in parentheses below their coefficient estimates and are adjusted for both heteroscedasticity and within correlation clustered at the issuer level. ***, **, and * indicate significance at the 1%, 5%, and 10% two-tailed levels, respectively.

VARIABLES	(1) spread	(2) spread	(3) spread	(4) spread
guarantee	-2.324*** (0.244)	-2.038*** (0.321)	-2.167*** (0.259)	-2.082*** (0.248)
fixed rate		-1.646*** (0.350)	-1.059*** (0.193)	-1.117*** (0.162)
seniority		-0.536** (0.180)	-0.664** (0.147)	-0.580** (0.140)
puttable		0.777* (0.357)	0.243 (0.210)	0.317** (0.131)
exchangeable		5.406*** (0.511)	5.211*** (0.499)	5.118*** (0.415)
redeemable		0.480 (0.299)	0.095 (0.182)	-0.069 (0.139)
ttm		0.069*** (0.021)	0.059*** (0.014)	0.045*** (0.012)
age		-0.051** (0.018)	-0.054*** (0.011)	-0.020*** (0.005)
constant	0.301*** (0.013)	2.316*** (0.348)	1.945*** (0.290)	1.995*** (0.245)
Specification	OLS	OLS	Firm FE	Firm×Trading
Observations	90,528	90,528	90,528	90,528
R ²	0.233	0.275	0.329	0.782

PREPARED STATEMENT OF EDWARD KANE

PROFESSOR OF FINANCE, BOSTON COLLEGE

JULY 31, 2014

I want to begin by thanking Chairman Brown for inviting me to testify today and to congratulate him and the Subcommittee for continuing to battle against the pernicious and unfair advantages that panic-driven crisis-management policies confer on mega-institutions, not only in this country but in financial-center countries around the world. The claim that the Dodd-Frank Act of 2010 or Basel III can end these advantages is a dangerous pipe dream. There will always be institutions that regulators will—especially in crisis circumstances—find macroeconomically, politically, and administratively too difficult to fail and unwind. The existence of a powerful propensity to rescue such too-big-to-fail (TBTF) firms is the central lesson taught both by the S&L mess and by the Great Financial Crisis.

The GAO Has Bungled Its Assignment

The GAO goes wrong at the outset. The definition of TBTF offered in the Report's first sentence (lines 9–10) is incomplete. It describes TBTF as an active policy of “intervention” without confronting the more dangerous additional role played by passive capital forbearance.

The title of this hearing focuses on “funding advantages” that TBTF BHCs receive from expectations of unlimited Government support. The GAO's estimated 42 statistical models each year seek to explain in a robust manner only how the interest spreads between bonds issued by large BHCs and comparable Treasuries relate to BHC size and credit risk. This conception of TBTF subsidies treats TBTF guarantees as if they were merely a form of bond insurance and builds in an additional downward bias by not using volume-based proxies for the extent to which after-issue trading in individual BHC bonds is less liquid than in Treasuries.

But even if they were modeled perfectly, spreads on outstanding bonds capture only part of the impact of TBTF guarantees. TBTF guarantees are different from bond insurance because, as long as regulators forbear from resolving a BHC's insolvency, a truly TBTF firm can extract further guarantees by issuing endless amounts of additional debt.

Funding Cost Is More Than Debt Costs

A BHC's “funding cost” is the cost of its “funding mix.” Being TBTF lowers both the cost of debt and the cost of equity. This is because TBTF guarantees lower the risk that flows through to the holders of both kinds of contracts. The lower discount rate on TBTF equity means that, period by period, a TBTF institution's incremental reduction in interest payments on outstanding bonds, deposits, and repos is only part of the subsidy its stockholders enjoy. The other part is the increase in its stock price that comes from having investors discount all of the firm's current and future cash flows at an artificially low risk-adjusted cost of equity. This intangible benefit generates capital gains for stockholders and shows up in the ratio of TBTF firms' stock price to book value. Other things equal (including the threat of closure), a TBTF firm's price-to-book ratio increases with firm size. For four quarters in 2012–2013, Figure 1 compares the behavior of this ratio for banks in different size ranges. The comparisons show that on average this ratio increases with size in all four quarters.

I hope that contemplating the following numerical example can drive home the need to account for the equity-funding component of annual and capitalized TBTF subsidies. Let us suppose a TBTF institution is projected to earn \$12 billion a year forever and that \$2 billion of its earnings comes from the reduction in its cost of debt. By hypothesis, market participants recognize that TBTF guarantees shift a range of the deepest possible losses away from creditors and stockholders to taxpayers. If authorities were expected to take over the firm and pay off guaranteed creditors just as it became insolvent, the debt component would be the whole story. But because authorities are expected to leave the stock in play come hell or high water, TBTF policies give comfort to shareholders, too. This comfort lowers the risk class of the stock, so that the warranted return on equity falls.

Let us assume that the opportunity cost of equity would be 12 percent without the TBTF guarantee, but—in the presence of the contra-liability provided by the unlimited guarantee—this cost falls to 10 percent. Then, the capitalized subsidy built into the stock price would be not \$16.7 billion ($\$2 \text{ billion}/.12$) or even \$20 billion ($=\$2 \text{ billion}/.10$), but \$36.3 billion. The capitalized subsidy is the difference between the \$83.3 billion stock-market value of the unguaranteed firm ($=\$10 \text{ billion}/.12$) and the \$120 billion ($\$12 \text{ billion}/.10$) in value that develops under TBTF guarantees. The annual subsidy that would deserve to be passed through the Federal budget would

be \$4.4 billion: the \$2 billion in interest saving plus another \$2.4 billion (.02 x \$120 billion) subsidy on the firm's equity funding. So, for this hypothetical BHC, the annual subsidy to equity would prove roughly the same size as the subsidy to debt.

The warranted rate of return on the stock of deeply undercapitalized firms like Citi and B of A would have been sky high and their stock would have been declared worthless long ago if market participants were not convinced that authorities are afraid to force them to resolve their weaknesses. Had these BHCs' assets and liabilities been transferred to bridge institutions or put into resolution, losses that contractually deserved to be incurred by uninsured creditors and postcrisis increases in the TBTF stock prices would have accrued to taxpayers.

A simpler way to see what the GAO has missed is to think carefully about the structure of guarantee contracts. An external guarantee allows the guaranteed party to put responsibility for covering debts that exceed the value of BHC assets to the guarantor. No guarantor wants to expose itself to unlimited losses on this put. For this reason, all guarantee contracts incorporate a stop-loss provision that gives the guarantor a call on the guaranteed party's assets. Ordinarily, this right kicks in just the insolvency threshold is breached. In the FDIC Improvement Act of 1991, efforts to exercise this call are termed "prompt corrective action" (PCA).

By definition, the Government's right to take over the firm's assets will never be exercised in a financial organization is truly TBTF. This means that the Government has effectively ceded the value of its loss-stopping rights to TBTF stockholders. The value of this giveaway is what the GAO's measure ignores.

I can clarify this further by examining Figure 2. This figure graphs the behavior of AIG's stock price before, during, and after the 2008 crisis. The only times AIG's stock price approached zero was when a Government takeover of the firm was being actively discussed. Each time that this possibility was tabled, trading picked up and the stock price soared as new stockholders tried to share in the value of the unexercised call.

GAO Neglect of Differences in Political Clout

Postcrisis reforms seek to classify particular firms as either systemically important financial institutions (SIFIs) or not. But TBTF status is not a binary condition and does not start at a particular size. A firm's access to Senators and Congresspersons grows steadily with its geographic footprint and with the number of employees that can be persuaded to contribute to reelection campaigns. TBTF BHCs give heavily to candidates in both political parties as Ferguson, Jorgenson, and Chen (2013) have documented. Holding size constant, the more organizationally complex and politically influential an institution becomes, the better the chance that Government examiners will find it difficult to observe its exposure to tail risk and to discipline such risk adequately.

Need To Bring in the Behavior of Stock Market Prices

To capture the full extent of TBTF subsidies, it is critical to make use of stock-market data. Figure 3 of my presentation tracks annualized estimates that Armen Hovakimian, Luc Laeven, and I (2012) have made of the average dividend that taxpayers ought to have been paid on their stake in large BHCs. This Figure plots the mean value of the credit support in annualized basis points per dollar of assets supplied to large banking organizations, quarter by quarter between 1974 and 2010. The surge in the third quarter of 2008 is remarkable, as is its steady fallback afterwards.

Regulators and policymakers persistently misframe bailout expenditures as either loans or insurance. This false characterization helps TBTF firms and their creditors to steal wealth from taxpayers. An insurance company does not double and redouble its coverage of drivers it knows to be reckless. Similarly, lifelines provided to an underwater firm should not be thought of as low-interest loans. Loans are simply not available to openly insolvent firms from conventional sources. The ability to extract implicit guarantees on new debt and the hugely below-market character of bailout programs means that the repayment of funds that were actually advanced does not show that a bailout program is a good deal for taxpayers.

Bailout funding can more accurately be described as unbalanced equity investments whose substantial downside deserves to carry at least a 15 percent to 20 percent contractual return. The Government's bailout deals compare very unfavorably with the deal Warren Buffet negotiated in rescuing Goldman-Sachs. Buffet's deal carried a running yield of 10 percent and included warrants that gave him a substantial claim on Goldman's future profits. Government credit support transferred or "put" to taxpayers the bill for past and interim losses at numerous insolvent or nearly insolvent TBTF firms. Authorities chose this path without weighing the full range of out-of-pocket and implicit costs of their rescue programs against the costs

and benefits of alternative programs such as prepackaged bankruptcy or temporary nationalization and without documenting differences in the way each deal would distribute benefits and costs across the populace (see Bair, 2012).

In my opinion, it is shameful for Government officials to imply that TBTF bailouts were good deals for taxpayers. On balance, the bailouts transferred wealth and economic opportunity from ordinary taxpayers to much higher-income stakeholders in TBTF firms. Ordinary citizens understand that this is unfair and officials that deny the unfairness undermine confidence in the integrity of economic policymaking going forward.

How To Sanction the Pursuit of TBTF Subsidies

I hope my testimony convinces you that, in principle, the risks in backstopping TBTF firms cannot be calculated and priced in the straightforward ways that the risks of a bond or insurance contract can. Taxpayer guarantees to TBTF creditors provide unlimited loss-absorbing equity funding to zombie firms at a time when no sensible private party would even advance them a dime.

I want to convince you further that interpreting bailout support as equity funding implies that managers who adopt risk-management strategies that willfully conceal and abuse taxpayers' equity stake should be sanctioned explicitly by corporate and criminal law rather than excused by insurance law as inevitable moral hazard.

I find it disgraceful that corporate law legitimizes managerial efforts to exploit taxpayers' equity position. The norm of maximizing stockholder value is inappropriate for TBTF firms. In TBTF institutions, this norm leaves taxpayers' unbooked equity stake inferior to that of ordinary shareholders in five ways:

1. Taxpayers cannot trade their positions away.
2. Downside liability is not contractually limited, but upside gain is.
3. Taxpayer Positions carry no procedural or disclosure safeguards.
4. Taxpayer positions are not recognized legally as an "equitable interest." (This means TBTF firms may exploit them without fear of lawsuits.)
5. TBTF Managers can and do abuse taxpayers by blocking or delaying recovery and resolution.

The Problem of Regulatory Capture

In and out of crisis, taxpayer interests are poorly represented by regulators because politicians and regulators have kept themselves less than fully accountable for the costs of bailouts and have simultaneously pursued conflicting political and bureaucratic goals. Over the years, the financial industry has infiltrated the bureaucratic system that ought to monitor and regulate aggressive risk-taking and woven huge loopholes into the fabric of capital requirements that—then and now—are supposed to keep financial instability in check. The industry's capture of the regulatory system is politically very well-defended, because the subsidies are in part shifted forward to creditors and to customers in various industries (e.g., in realty and construction).

Capture can be demonstrated in at least four complementary ways: (1) by enumerating the problems that the Dodd-Frank Act set aside (such as how to define systemic risk operationally or how to resolve the Fannie and Freddie mess); (2) by examining the many loose ends left in the Act's efforts to handle regulation-induced innovation (especially in swaps) and to deal with institutions that have made or are making themselves too large, too complex, and too well-connected politically and bureaucratically to be closed and unwound; (3) by noting that crisis-management policies have helped the largest BHCs to become even larger; and (4) by recognizing that postcrisis reforms continue to feature loophole-ridden measures of accounting capital as the cornerstone of financial-stability policy.

Why Capital Requirements Can't Adequately Protect Taxpayers From BHC Shareholders

Besides setting minimums that are far too low, gaping imperfections exist in weighing risks and measuring capital that open and solidify avoidance opportunities (see Admati and Hellwig, 2013). Actual and potential zombie institutions can use accounting tricks, organizational complexity, and innovative instruments to hide risk exposures and accumulate losses until their insolvency becomes so immense that they can panic regulators and command life support from them.

The Basel control framework (see Basel Committee on Banking Supervision, 2013) is built on the fiction that all or most SIFIs can be persuaded to forgo individually profitable credit business for the greater good. This seems awfully naive (see Schelling, "Strategy of Conflict"). The naivete lies in a set of unrealistic assumptions about the regulatory game: (1) that accounting ratios are difficult to misrepresent;

(2) that supervisors are hard to mislead; (3) that bankers dutifully accept statutory burdens rather than work aggressively to adjust their risk profile to neutralize the net effect of capital restrictions on SIFI profits and market capitalization; and (4) that meritorious commitments to protect unsophisticated depositors and to keep systemically important markets and institutions from breaking down in difficult circumstances do not provide convenient cover that tempts officials to obligate taxpayer funds over-generously and without revealing the full picture of fiscal and incentive effects.

Capital requirements are merely restraints. Improved capital requirements increase the difficulty of extracting TBTF subsidies, but they do not reduce the legitimacy of adopting strategies that willfully pursue this goal. To do this, I propose that Congress declare that taxpayers have an equitable interest in any institution that can be shown to extract a subsidy from the safety net. In common law, an “equitable interest” is understood as a balance-sheet position that gives its owner a right to compensation from damages. I believe that we should conceive of this compensation as the dividend taxpayers would be paid on their implicit equity stake in any accounting period if information asymmetries did not exist. The net value of taxpayers’ stake in a TBTF firm increases with the extent to which creditors and stockholders are confident that they can hide tail risks and, if ruinous losses emerge, scare authorities into funding the losses without extracting due compensation.

Genuine reform would compel the DOJ to prosecute megabank holding companies that engaged in easy-to-document securities fraud. Numerous representations and warranties can be shown to be deliberately deceptive and designed to benefit individual firms at the expense of the rest of us. As legal persons and convicted felons, guilty BHCs could be forced to break themselves up. Subsidiaries of felonious companies could lose the right to take insured deposits or act as broker-dealer firms and futures merchants. The beauty of such penalties is that managements and not Governments would have to design the breakup plan.

Living wills, enhanced resolution authority, clawbacks of undeserved executive compensation, and an Office of Financial Research are potentially useful tools. But the failure to prosecute any TBTF firm or top manager in open court for criminal securities fraud tells us how easy it is to collect fines (because they are paid by stockholders) and how hard it can be for regulators to discipline individual managers of influential and interconnected BHCs. For top management, corporate-level fines are a nondeterrent slap on the wrist. Moreover, only a portion of most fines compensate the taxpayer by flowing through to the Treasury. Sad to say, most of these criticisms apply to the reform programs that are unfolding in the European Union as well.

The Problem of Fairness

Fairness is the heart of the Rule of Law. Whether or not enhanced resolution or contracts with bail-in provisions can be enforced in difficult circumstances, Corporate and/or Property Law needs: (1) to recognize that regulators’ demonstrated propensity to bail out creditors and shareholders in TBTF firms (e.g., in AIG, Fannie, and Freddie) assigns taxpayers’ a disadvantaged equity position in each TBTF firm, and (2) to enact personal and corporate penalties for willful efforts to pursue risks that abuse taxpayers’ equity stake and pervert the pattern of real investment. Corporate penalties could include forced sales of some or all lines of business.

It is useful to think of taxpayers’ stake in each TBTF firm as if it were a trust fund and conceive of Government officials as fiduciaries responsible for managing that fund. The purpose of the reforms I propose is to give regulators, along with managers and directors of TBTF firms, an explicit and codified fiduciary duty to measure, disclose, and service taxpayers’ stake-holding fairly. To overcome short-term benefits from ducking their implicit fiduciary responsibilities, regulators, managers, and board members need to face stricter legal liability for neglecting or incompetently performing these fiduciary duties.

Governments must rework bureaucratic and private incentives to focus reporting responsibilities for regulators and institutions on uncovering the value of safety-net support. Regulatory-agency and corporate mission statements must explicitly define, embrace, and enforce fiduciary duties of loyalty, competence and care to taxpayers in operational and accountable ways. Otherwise, it is unreasonable to hope that managers will—or that regulatory staff can—contain systemic risk during future rounds of boom and bust.

The report the GAO released today (General Accountability Office, 2014) is a small step in this direction. The downside of the report is that TBTF firms are going

to trumpet GAO's low-ball and conceptually deficient measurement of the subsidy as if it were gospel.

To support a culture of fiduciary duty, I have long maintained that we need to strengthen training and recruitment procedures for high-ranking regulators. If it were up to me, I would establish the equivalent of a military academy for financial regulators and train cadets from around the world. The curriculum would not just teach cadets how to calculate, aggregate, and monitor the costs of safety-net support in individual institutions and countries. The core of the curriculum would be to drill students in the duties they will owe the citizenry and to instruct them in how to confront and overcome the nasty political pressures that elite institutions exert when and as they become increasingly undercapitalized.

Politically, a financial crisis is a struggle by financial firms whose assets have collapsed in value to offload the bulk of their losses onto creditors, customers, and taxpayers. In the early months of the 2008 crisis, Fed and Treasury officials assisted economically insolvent zombie institutions (such as Bear Stearns and AIG) to book new risks and to transfer their losses onto the Government's balance sheet. Authorities did this by mischaracterizing the causes of these institutions' distress as a shortage of market liquidity and helping insolvent firms to expand and roll over their otherwise unattractive debt. Far from assisting zombie institutions to address their insolvency, unwisely targeted and inadequately monitored Government credit support encouraged troubled firms not only to hold, but even to redouble the kinds of go-for-broke gambles that pushed them into insolvency in the first place.

Indiscriminately bailing out giant firms was a mistake that has hampered, rather than promoted economic recovery. Similarly, prolonged uncertainty about the future of Fannie and Freddie continues to disrupt housing-finance activity. Blanket bail-outs evoke gambles for resurrection among zombie and near-zombie beneficiary firms like AIG, while uncertainty about who will finally bear the extravagant costs of these programs dampens spending plans in every sector. These problems divert and restrain the flows of credit and real investment necessary to trigger and sustain a healthy economic recovery.

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FIGURE 1

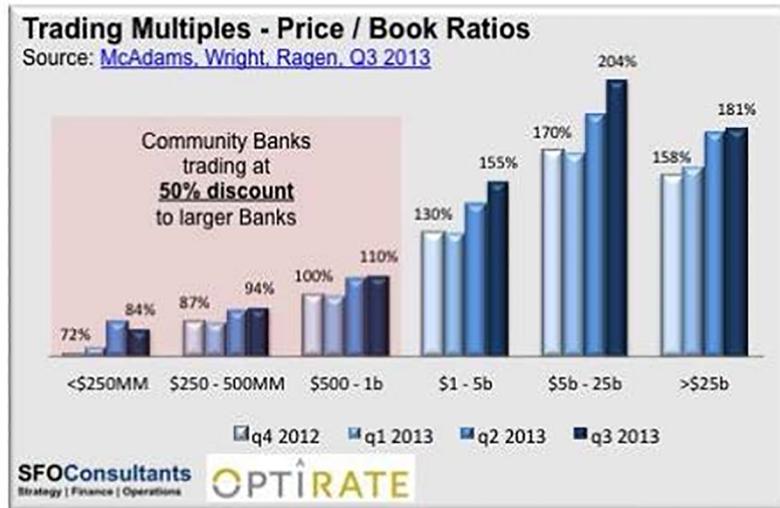


FIGURE 2

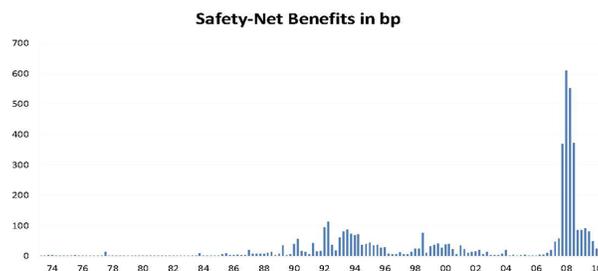
AIG Stock Never Became Valueless



FIGURE 3

Mean Annualized Value of Safety Net Benefits Per Dollar of Liabilities, 1974-2010

This figure reports quarterly average values of Hovakimian-Kane-Laeven annualized estimates of fair percentage return to taxpayers for safety-net risk, using Merton model and assuming dividend continue to be paid. Averages are computed across a sample of U.S. bank holding companies over the 1974-2010 period and reported per-dollar of debt quarter by quarter in basis points. Financial statement data are from the Compustat database for U.S. banks and daily stock returns are from CRSP.



PREPARED STATEMENT OF ANAT ADMATI

GEORGE G.C. PARKER PROFESSOR OF FINANCE AND ECONOMICS, GRADUATE SCHOOL
OF BUSINESS, STANFORD UNIVERSITY

JULY 31, 2014

Chairman Brown, Ranking Member Toomey, and Members of this Subcommittee, I commend you for holding this hearing and am grateful for the opportunity to speak to you. I am a Professor of Finance and Economics at Stanford Graduate School of Business and my recent research and writings have focused on issues immediately relevant to today's hearing.

Recent experiences have helped foster the expectations of Government support mentioned in the title of this hearing. Since 2008, the Treasury, the Federal Reserve and the FDIC provided through various programs massive and unprecedented support to the financial system. The largest bank holding companies, to varying degrees, have had access to hundreds of billions, even trillions of dollars in relatively cheap loans and guarantees, and they benefited from bailouts of their counterparties such as AIG. For some, e.g., Citigroup, the support was critical.¹

Trillions of U.S. taxpayer funds were put at risk. The supports prevented the collapse of the system and helped many financial institutions avoid default, bankruptcy, or resolution in which their shareholders would be wiped out and at least some of their creditors would suffer losses. Yet, the programs did little to solve the housing crisis, failed to improve business lending meaningfully, and at times were excessively generous and inefficient.²

Implicit guarantees for which banks do not pay create a subsidy, essentially free insurance for their debts, or at least a partial insurance that lowers the likelihood of losses in some scenarios. Because such subsidies are implicit and invisible, determining their value with any precision is difficult; there is no market in which the implicit guarantees are being valued (although some have tried to use credit insurance contracts to try to estimate their value). Any estimate depends on many variables that change over time, and estimation requires making many assumptions; such assumptions might or might not be true in reality. In fact, many of the vari-

¹ The banks and the Federal Reserve tried to keep information about the extent of Fed loans hidden. The information was released after Bloomberg fought in court. See Phil Kuntz and Bob Ivry, "Fed Once-Secret Loan Crisis Data Compiled by Bloomberg Released to Public", Bloomberg, December 22, 2011. Citigroup is discussed further below.

² Cole (2012) shows that TARP did not help improve business lending, which is not surprising since the programs did not reduce the institutions' indebtedness and the resulting debt overhangs (see Admati and Hellwig, 2013a, chapter 3, and Admati et al., 2014). Barofsky (2012) and Bair (2012) describe the bailouts programs. Additional references in the notes to chapter 9 of Admati and Hellwig (2013a), whose text is attached to this testimony.

ables that affect the size of the subsidy vary across different institution in complex ways. Moreover, actions by the institutions, by investors, and by regulators also have important impacts. Later in this document I will have additional comments on measuring the subsidies.

When implicit-guarantee subsidies are provided to institutions that have significant discretion about their investments and the risks they take, the results can be perverse. Policymakers may hope that the subsidies are passed on to specific investments or people, but the institutions, as they benefit from the guarantees, may well have incentives to make different investments altogether.

For example, guarantees may be provided in the hope that the banks will make certain loans, when in fact, given their compensation structures and the flawed regulations we have in place (e.g., the use of risk weights), the banks may only make the loan if it is very safe or if it is guaranteed by the Government. Instead, banks may prefer to invest in derivatives markets with more upside.

The institutions benefiting most from the subsidies often deny the existence of any benefit and claim that they are happy to give up the implicit subsidies. “Please,” they may say, “let banks fail when they should.”³ The difficulty is that letting systemic institutions—or many institutions at the same time—fail may be disruptive and entail enormous collateral damage. Even if the direct costs of the failure are covered, the disruptions and inefficiencies that result are costly for the economy and the harm is borne by innocent citizens. As I will explain below, we do not have workable options for the failure of systemic institutions; moreover, the harm from their distress and even from the fear of their failure creates instabilities.

Financial crises are sometimes portrayed as if they were unpreventable natural disasters, implying that bailouts are similar to emergency aid after an earthquake. This narrative is misleading. The crisis of 2007–2009 was an implosion of a system that had become too fragile, reckless, and distorted. Regulatory failures, including flawed and ineffectively enforced regulations, must take much of the blame for the excessive fragility and the buildup of risk. These failures can be corrected, and regulators have authority to do so under current laws, but, remarkably, obvious lessons have not been learned, and not enough has been done to make the system as safe as it can and should be. Some counterproductive laws have also remained in place.⁴

The situation in banking is disturbingly similar to allowing heavy trucks with dangerous cargo to drive recklessly at 95 miles per hour in residential neighborhoods. If drivers get a bonus for reaching the destination quickly, and face little risk of injury or death even in an explosion (imagine that they have a special protective mechanism), they will drive recklessly and endanger innocent citizens. Authorities can send firefighters to put out fires and medics to treat the injured if an explosion occurs, but the public would wonder why truck companies reward reckless driving and, most importantly, why a safer speed limit was not set and enforced to prevent harm.

Similar questions must be asked about the failure of financial regulation. We should have a financial system that supports the economy as efficiently and consistently as possible without major distortions. The system we have instead is too dangerous, exposing the public to unnecessary risk and distorting the economy. Much can be done—even within existing laws—to improve this situation.

This Committee has an important role in helping bring about beneficial changes. In the rest of this document, I will elaborate on the above statements, diagnose the key problems, and outline some recommendations. Additional materials are attached and referenced; I will be happy to provide more at your request.

Can/Will Large Bank Holding Companies Ever “Fail” and if so, How?

The Dodd-Frank Act (DFA) intended, among other things, to eliminate bailouts. Yet virtually everyone involved in the financial system—even if some would not admit it—expects that the Government, possibly through the Federal Reserve and

³For example, in his letter to shareholders in April 2011, Jamie Dimon, CEO of JPMorgan Chase, denies his bank benefits from implicit subsidies and suggested that the industry pay any expenses associated with the failure of “dumb banks.” For a response to this letter, see Anat Admati, “An Open Letter to JPMorgan Chase Board of Directors”, reprinted in *Huffington Post*, June 14, 2011). This letter, which was sent to at least one person within the bank, did not receive any acknowledgment and did not appear to affect the banks’ strategy. Misleading comments by bank executives and bank lobbyists as well as others are discussed in Admati and Hellwig (2013a) and in a number of short pieces, some of which are cited later in this document.

⁴I am referring, for example, to the distortive corporate tax code that penalizes equity funding and encourages borrowing, which can become excessive, and to the sweeping exemptions of repos and derivatives from stay in bankruptcy, which has likely enabled and encourage excessive growth in these markets. These issues will come up briefly below and they are discussed in Admati and Hellwig (2013a, chapters 5, 9, and 10).

FDIC, will again provide supports to large bank holding companies and other institutions considered “systemic” if authorities fear that the failure of these institutions would cause significant harm to the economy. If many small institutions become distressed at the same time, they too may be supported.

This assessment is based on the realities of today’s system and the state of its regulation.⁵ Whereas regulators receive significant authority under DFA (some of which they had all along), the implementation of the law has been messy and uneven. Some of the most critical rules are insufficient and flawed; others appear wasteful, too costly relative to the benefit they provide.

Policymakers who were involved in the bailouts extol the virtues of their actions while appearing willfully blind to their failure to reduce the fragility of the system before the crisis and to learn the lessons since. If anything, investors may reasonably expect that supports would be forthcoming for fear of another “Lehman moment” even with the alternative to bankruptcy offered through the new and still untested resolution authority by FDIC.

The DFA titles most relevant for this discussion are Titles 1, 2, and 7. I’d like to focus my discussion mainly on Titles 1 and 2, although Title 7, which deals with derivatives markets, is also critical. The still-too-opaque markets in derivatives allow banks to hide enormous amount of risk from investors and regulators. Ineffective implementation of Title 7 and poor disclosures can undermine Titles 1 and 2 and the objective of having a healthier financial system.

Stating the obvious (but see more below for nuances), a business “fails” when it does not fulfill its debt commitments or is feared to be unable to pay the debts. For “normal” companies in the U.S., failure involves filing for bankruptcy or liquidation under Chapter 11 or Chapter 7.

Title 1 of DFA requires, among other things, that large bank holding companies submit “living wills” to regulators. These documents are meant to play out a scenario in which the holding company goes through bankruptcy process, presumably under Chapter 11. In her testimony before your Committee on July 15, 2014, Fed Chair Janet Yellen was asked some pointed questions about the living-wills process by Senator Elizabeth Warren. The exchange brings out some key issues. According to Chair Yellen, the largest bank holding companies have by now submitted three rounds of living-wills documents, and received feedback on the first set of submissions. The parts of these documents that are made public provide little information, often less than is included in standard financial statements. The full submission, according to Chair Yellen, goes into tens of thousands of pages.

Senator Warren asked Chair Yellen a critical question: “Can you honestly say that JPMorgan could be resolved in a rapid and orderly fashion as described in its plans with no threats to the economy and no need for a taxpayer bailout?” The Senator pointed out that JPMorgan Chase has \$2.5 trillion in assets and 3,391 subsidiaries, compared to Lehman Brothers, which had \$639 billion in assets and 209 subsidiaries prior to its failure.

The Lehman Brothers bankruptcy, filed on September 15, 2008, caused severe disruption and damage to the global financial system. In its immediate aftermath, stock prices imploded, investors withdrew from money market funds, money market funds refused to renew their loans to banks, and banks stopped lending to each other. Banks furiously tried to sell assets, which further depressed prices. Within 2 weeks, many banks faced the prospect of default.

To prevent a complete meltdown of the system, Governments and central banks all over the world provided massive supports to financial institutions. These interventions stopped the decline, but the downturn in economic activity was still the sharpest since the Great Depression. Anton Valukas, the lawyer appointed by the bankruptcy court to investigate Lehman Brothers, put it succinctly: “Everybody got hurt. The entire economy has suffered from the fall of Lehman Brothers . . . the whole world.” Within 21 months, American households lost \$17 trillion; reported unemployment hit 10.1 percent at its peak in 2009.⁶

Chair Yellen stated that Title 1 of DFA only requires the Fed to give feedback to the companies about their plans. She referred to an “iterative process” of submission and feedback. Title 1 apparently does not require that regulators give a pass/fail grade to the living wills nor to determine definitively whether bankruptcy is a

⁵The dynamics of contagion are explained in Admati and Hellwig (2013a, chapter 5), White (2014), and testimony of James Thomson before this Subcommittee on July 16, 2014.

⁶These two paragraphs are adapted from Admati and Hellwig (2013a, p. 11), and the crisis is described in some detail in chapters 5 and 9 (the latter is attached to this testimony). Mr. Valukas made the statement here quoted in an interview on *CBS 60 Minutes*, aired April 22, 2012. The last fact is included in the 2011 report of the Financial Crisis Inquiry Commission (p. 390).

viable option. However, the title definitely authorizes regulators to take a number of strong actions if they find that bankruptcy would entail too much collateral damage. Such actions include increasing capital (equity) requirements, requiring that structures be simplified and assets sold (potentially “breaking up” the banks), etc.

The U.S. bankruptcy code to which Lehman Brothers was subjected has not changed since 2008. Other countries have different processes, which Lehman Brothers’ foreign subsidiaries must follow. The tens of thousands of pages of living wills JPMorgan Chase has submitted to regulators might be of some use should it file for bankruptcy, at least under U.S. law (although they may well be dated by the relevant time, because banks’ counterparties and businesses can change in a matter of days or months). But the process will not be much faster and simpler than Lehman Brothers bankruptcy. Moreover, should the numerous counterparties of JPMorgan Chase become concerned that bankruptcy might be forthcoming, runs and disruptions similar to those observed in 2007–08 when Bear Stearns and Lehman Brothers became distressed will likely start significantly before any filing.

It defies credibility to suggest that, at the current speed of the “iterative process” that Chair Yellen described regarding the living wills, and without major changes to their structure and funding mix, enormously large and complex institutions like JPMorgan Chase will be able to go through bankruptcy without major harmful effects. Yet, regulators may continue to “iterate” and fail to use their authority to act even knowing that bankruptcy is not viable, refusing to admit to and deal with this reality. I doubt this situation was the intent of Title 1.

DFA authors, perhaps mindful after the Lehman Brothers experience that bankruptcy may not be a realistic option for large financial institutions, included an alternative mechanism in Title 2, which gives the FDIC authority to deal with the failure of any institution deemed “systemic” through a so-called Orderly Liquidation Authority (which actually doesn’t intend to liquidate the company). The FDIC has engaged in the last few years in a serious effort to make its plans for this process credible, focusing on an approach called Single Point of Entry (SPOE).

SPOE represents an important and useful development, but, as bankruptcy expert David Skeel (2014, p. 3) assesses, “the technique also has important vulnerabilities, and some of the claims made on its behalf are quite exaggerated.” Among them, SPOE does not work for institutions that are active globally and that have systemically important operations in several countries, unless all the countries that are involved agree to such an approach. A recent coordination effort between U.S. and UK may allow for SPOE of U.S. authorities in U.S. holdings companies without intervention of UK authorities in UK subsidiaries, so the problem of UK authorities entering a Lehman Brothers subsidiary and finding that there is no cash to keep systemically important functions going might not arise.

However, the U.S.–UK coordination is the only attempt of this sort, and it does not seem to be fully symmetric. If Barclays or Deutsche Bank were to run into trouble, U.S. authorities would probably not be willing to accept SPOE resolution by the domestic authorities of these banks, but instead would intervene directly in the holdings companies that organize these banks’ U.S. activities. Multiple-entry resolution, however, destroys operational procedures that have been managed in integrated fashion across jurisdictions, for cash management, as in the case of Lehman Brothers, or, even more importantly, the joint use of Information Technology systems.

From the perspective of the different countries involved, single-entry resolution would involve significant conflicts of interest. If U.S. authorities had been in charge of Lehman Brothers, London, as well as the parent, would they have paid proper attention to London-specific concerns, including the systemically important market-making activities of Lehman Brothers in London? Alternatively, is it acceptable for U.S. authorities to follow the procedure suggested in the living will of Deutsche Bank, which argues that damage from resolution would be minimized if U.S. authorities were willing to trust the German authorities (Bafin, the supervisor, and FMSA, the resolution authority)? In a cross-border setting, SPOE resolution leaves too much room for the authority in charge to shift losses to other countries and it is therefore hardly workable.⁷

Even if we had SPOE resolution for globally systemically important banks, some of these banks would most likely be “too big to fail.” Procedures would be lengthy and cumbersome and, meanwhile, there might be substantial systemic fallout. Regulators would then be reluctant to use the procedure if multiple financial institutions face default at the same time, or if resolution would expose problems at one or more subsidiaries. In sum, Title 2 is useful, but it is certainly not a silver bullet for addressing the “too-big-to-fail” problem and it does not eliminate expectations of sup-

⁷ Even the Nordic countries have not been able to agree on an SPOE procedure for Nordea.

port for large bank holding companies. Moreover and importantly, even under the best scenario, using Title 2 resolution would be costly and entail collateral damage and, as in the case of bankruptcy, the distress of the corporation, and the fear or anticipation that Title 2 resolution might be invoked by its counterparties would likely already cause harm.⁸

The living wills requirements and Title 2 of DFA try to make palatable the notion that, like other companies, financial institutions structured as limited liability corporations should fail if they take risk and become unable to pay their debts, thus wiping out their shareholders and imposing losses on their creditors through an orderly legal process. In a vibrant market economy, innovations involve risk, and failures should be tolerated.

For normal companies, bankruptcy typically follows an actual or imminent default. Restructuring debts may allow the company to continue operating. Bankruptcy laws try to control the actions of managers and shareholders in insolvent companies, who have incentive to benefit themselves at the expense of creditors by taking out cash or gambling for survival. Since such problems and the legal and other costs of bankruptcy are anticipated by creditors, the terms of the debt claims, including both the interest rate and the conditions the contract puts on the borrower, are set by prudent lenders to compensate for the losses in the event of default and bankruptcy, and to control borrowers' actions that go against the lenders' interests.

A source of great inefficiency in banking is that banking institutions can persist in a state of distress or even insolvency without their creditors becoming alarmed and without the institution experiencing the difficulty of most distressed borrowers to raise funds and continue operating. One reason for this anomaly is that banks' creditors include depositors, who are insured and dispersed. Depositors are particularly passive in their role as lenders to the banks (a status most of them do not quite realize they have) and do not behave as normal creditors with standard debt contracts. Depositors rely on insurance and regulators to protect them.

Banks can use depositors' funds to invest in various loans and other assets that can sometimes be used as collateral and enable the bank to borrow even more under attractive terms. Creditors whose debts are secured by collateral care less than unsecured creditors about the borrower's solvency. Lending to financial institutions through so-called repurchase agreements (repos) is even safer than secured lending, because, under safe harbor laws from 2005, repos, as well as derivatives, are exempted from the normal stay in bankruptcy.⁹

For bank holding companies considered too big to fail, even unsecured bond holders feel reasonably sure they will be paid in full. In the financial crisis the creditors of numerous banking institutions, including those whose claims had counted as "regulatory capital" and were meant to absorb losses, were paid in full even as the institutions received large amounts of bailout funds and other supports. As discussed above, even today, and despite DFA, it is quite possible and even likely that the creditors of one of the largest bank holding companies will be paid in full even if the institution is insolvent.

As long as creditors are paid and do not constrain the borrowing bank much, it can continue operating. In that case, only regulators are in a position to intervene even as highly distressed or insolvent borrowers, including banks, are extremely inefficient and their decisions are distorted by conflicts of interest with creditor. In fact, I will argue below that by most standards, the banks are permanently in a state of financial distress, yet they manage to get away with it.

Essential, Yet Flawed and Insufficient Regulation

In addition to the living-wills requirement, Title 1 of DFA authorizes the Federal Reserve, in collaboration with other regulators, to design prudential regulations meant to maintain the safety and soundness of the system. The Fed is charged with regulating bank holding companies as well as all institutions declared systemic by the Financial Stability Oversight Committee.

As discussed above, the scenarios that involve default and failure of systemic institutions are complicated, disruptive, and harmful. There are no good options. It thus appears particularly important to try to prevent reaching these failure situations through prudent supervision and regulations. Most important among those

⁸See also White (2014) for a discussion of the issues regarding "fail" scenarios in "too big to fail."

⁹Skeel and Jackson (2012), and Mark Roe, another bankruptcy expert, (see, e.g., "Reforming Repo Rules", Project Syndicate, December 21, 2011), call for reexamining these exemptions. Skeel (2014) also warns with regard to Title 2 resolution that "it reinforces problematic incentives for financial institutions to rely on short-term financing."

safety measures are capital requirements meant to control the funding mix of these companies, including to ensure that they fund their investments by appropriate amount equity—money from owners and shareholders—so that they can continue making loans and investments and still pay their debts even if they incur losses. (Note: the jargon that refers to capital as something banks “hold” or “set aside” is confusing, suggesting that capital represents idle funds like cash reserves that banks cannot use, which is false.¹⁰)

According to its financial statements, on December 31, 2007, the largest bank holding company at the time, Citigroup, reported that its shareholder equity or net worth (the difference between its reported assets and liabilities) was 5.2 percent of its total assets. Citigroup’s assets were valued at almost \$2.2 trillion. As Lawrence White from New York University Stern School notes, however, this information does not capture some important facts. He writes (White, 2014, p. 7, footnotes omitted): “Citigroup is best understood as a (roughly) \$1.2 trillion depository institution, on top of which was a (roughly) \$1 trillion holding company (including its nondepository subsidiaries). The holding company’s net worth was smaller than the depository’s net worth; in essence, if the net worth of the depository (i.e., the capital of the depository, which also counted as an asset for the holding company) was ignored, the holding company was insolvent.”

Citigroup proceeded to collapse at the end of 2008 and needed a series of bailouts and massive other supports. Remarkably, the Government injected of \$25 billion of TARP funds into Citigroup on October, 8, 2008, and, even with the market value Citigroup stock falling below \$25 billion in November, the company was offered tens of billions in additional bailouts and hundreds of billions in cheap loans and guarantees from the Fed. (Citigroup, according to Arthur Wilmarth from George Washington University Law School is “a case study in managerial and regulatory failure.”¹¹)

Indeed, regulators often show forbearance and allow insolvent banks to persist and even hide their losses. Insolvent institutions are highly dysfunctional and harm the economy. They do not make new loans and may become reckless, gambling for survival or looting the institutions. Recklessness was pervasive in the Savings and Loan Crisis of the 1980, and the dysfunctionality of weak banks is evident in Europe in recent years. Yet, when banks are supported, their indebtedness is often maintained because the supports are given in the form of more loans.¹² Solvent corporations can in fact raise equity at some price, although their managers and shareholders are unlikely to do so voluntarily. Creditors or regulators can bring about reduction of indebtedness through covenants or regulation.¹³

A glaring failure of regulatory reform efforts across the globe (not just in the U.S., indeed, the situation is worse in Europe) is that, even as the largest global financial institutions have grown ever bigger, more complex, more connected and more dangerous, they continue to be allowed to operate with dangerously high levels of indebtedness and much too little equity, and to hide too much risk in opaque markets and off their balance sheets.

The minimal requirements agreed upon in Basel III allow equity to be as low as 3 percent of the total assets. Even with the harsher U.S. requirements, 95 percent of the total assets of the largest bank holding companies can be funded with debt. Note that this requirement would have been satisfied by Citigroup in December, 2007. Capital regulations also rely on an enormously complex and manipulable system of risk weights that distorts banks’ decisions and exacerbates the fragility of the system, among other things making business lending relatively unattractive.

Bankers and regulators claim that the new capital regulations are tough when in fact these reforms amount to a tweak and they have no valid justification. In the speeding analogy, the reforms are analogous to reducing the speed limit for loaded trucks from 90 miles per hour to 85 miles per hour in residential neighborhoods, with police unable to measure the actual speed. The claims made to justify the regulation or to fight higher equity requirements are fraught with flaws that range from false statements to misleading claims that divert the discussion. These statements

¹⁰ On this insidious confusion, see Admati and Hellwig (2013a, chapters 1 and 6), Admati et al. (2013, section 3.1), Claims 1 and 2 Admati and Hellwig (2014), which is attached to this testimony, and my Tedx Stanford talk <http://www.youtube.com/watch?v=sI4vx7gHPQ&feature=youtu.be&a>.

¹¹ See Wilmarth (2014). Bair (2012) and Barofsky (2012) include vivid descriptions of the bailouts.

¹² Onaran (2011) argues that both Citigroup and Bank of America were insolvent or “zombies” even in 2010. Admati and Hellwig (2013a, chapters 3, 4, and 11) emphasize the harm of allowing weak banks to persist.

¹³ Admati et al. (2014) discusses in detail how borrower-creditor conflicts affect funding decisions in highly indebted corporations, and the analysis is particularly applicable to banks.

are discussed in details in many of my writings, with colleagues, over the last 4 years; a small sample of which is attached to this testimony.¹⁴

A key observation for understanding corporate funding decisions is that heavy borrowing creates strong conflicts of interest between borrowers and lenders and potentially distorts the investments and funding decisions made by borrowers once debt is in place. Overhanging debts create inefficiencies when borrowers—or managers in an indebted corporation acting in the interests of shareholders—make decisions in their own interest and do not take into account the impact of their actions on creditors or third parties. For example, borrowers may underinvest in worthy projects if they expect the returns to accrue in part to their creditors or they may make excessively risky investments if they expect the downside of the risks to be borne by creditors, or by deposit insurance institutions and taxpayers.¹⁵

As a result of these distortions and other costs associated with distress or bankruptcy, heavy borrowing can actually reduce the total value of a firm (i.e., the sum of the values of all claims, including debt and equity). Borrower-creditor conflicts also create an “addiction” to debt on the part of heavy borrowers, biasing subsequent funding decisions towards more debt and away from equity that makes existing creditors safer.¹⁶ As mentioned above, the conflicts are particularly intense when corporations are in a state of distress or insolvency, which for most corporations are rare but which in fact are considered normal in banking.

Without any regulation of their funding, and despite a (distortive) tax code that subsidizes borrowing and penalizes the use of equity, most corporations do not borrow heavily.¹⁷ Even those who tend to use more debt, including private equity firms or Real Estate Investment Trusts, rarely have less than 30 percent equity in their funding mix. As discussed above, prudent creditors write restrictive covenants that constrain dividend payouts and other decisions by the borrower, and adjust the cost of borrowing to reflect anticipated legal costs and delays should the borrower go into bankruptcy, as well as the possibility that the borrower would take additional debt that might dilute their claims.

Banks, however, can persist in distress because they do not experience the “dark side of borrowing,” including the increased costs and harsh terms that naturally prevent other corporations from heavy borrowing. Although they use a lot of debt, much of this debt comes with fewer strings attached than those other borrowers face (and, indeed, the terms the banks often place those to whom they lend). Deposit insurance and implicit guarantees lighten the burden of debt, allowing banks to continue to borrow and take risks without much effect on the terms of their debts. Supports and guarantees enable, encourage, and feed this addiction to debt.¹⁸

Guarantees can also exacerbate the inefficiencies and distortions in banks’ investment decisions. If you could use borrowed money in a casino, keep the winnings and continue to borrow when you lose, you would certainly love gambling even if the odds were significantly against you. Chapter 9 of Admati and Hellwig (2013a), whose text is attached to this testimony, provides an accessible explanation.

The fact that banks choose to rely so much on debt does not mean that their indebtedness levels are essential or efficient. These levels are the result of a failure of internal governance and a failure of normal credit markets to constrain the love of borrowing by banks and bankers. Compensation structures that reward return on equity (ROE), which are pervasive in banking, effectively pay bankers to gamble at the expense of creditors or taxpayers who are exposed to greater risks. Even shareholders may be exposed to risks for which they are not properly compensated.¹⁹ Few benefit while the rest are harmed by this situation. When markets fail, effec-

¹⁴See Admati (2014), Admati and Hellwig (2013a, 2014), and Admati et al. (2013, 2014). Admati et al. (2013) was first posted in August, 2010. These and additional references are available at <http://bankersnewclothes.com/>; and (for more academic writing) <http://www.gsb.stanford.edu/news/research/admati.etal.html>.

¹⁵As discussed in Admati and Hellwig (2013a, chapter 3), the effects of overhanging debt can be seen in the case of homeowners who would not invest in the house if its value is low relative to the mortgage, or who might take a second mortgage even as this may put the lender of their first mortgage at risk.

¹⁶This phenomenon is explored in details in Admati et al. (2014), which is highly relevant to understanding the rationale for leverage regulation. See also Admati et al. (2013) and Admati (2014).

¹⁷White (2014) provides some comparisons based on book value of equity. The comparisons of banks and nonbanks on the basis of market value are starker. The latter have on average 60 percent or more equity relative to total assets.

¹⁸Some claim that debt disciplines managers. In banking, this idea is a myth, as discussed in Admati et al. (2013, section 5), Admati and Hellwig (2013b) and Admati and Hellwig (2014, Claim 22), attached.

¹⁹This is explained in detail in chapter 8 of Admati and Hellwig (2013a) and in many other writings. See Claim 8 in Admati and Hellwig (2014), attached.

tive laws and regulations must correct the distortions. Otherwise laissez faire can become crony capitalism.

The idea of finding ways for banks to fail, discussed above, is obviously meant to bring back market discipline into banking. However, given the collateral damage from the failure of one or more institutions, and the fact that disruptions and harm start even before an actual default, the primary focus should be on prevention. Much more can be done on this front. There is simply no justification for the current inefficient levels of indebtedness in banking. Reducing it will achieve major benefits for society at virtually no relevant costs.

The inefficiencies of heavy borrowing in banking also distort the provision of credit in the economy. Making loans is a critical contribution banks can make to the economy.²⁰ Heavily indebted banks, however, may make too few worthy (but relatively “boring”) business loans that don’t have much upside, while at the same time making too many risky loans, including credit card loans, which may lead others to borrow too much and suffer the consequences. The distortions create cycles of booms, busts and crises. Regulations based on risk weights exacerbate these distortions.

It is possible and highly beneficial to transition to a system in which banks use significantly more equity, thus reducing the likelihood of costly failures or bailouts and at the same time permitting banks to invest more efficiently on behalf of all its investors, thus supporting the economy better and with fewer distortions.

Whereas many extol the importance of increasing equity requirements, the status quo seems to be the benchmark against which changes are measured. This benchmark is entirely inappropriate. Banks are as fragile as they are only because those who make decisions in the banks benefit from the status quo and they have so far gotten away with maintaining it, even after the most recent crisis.

Requiring that banks use more equity is not a silver bullet, and much depends on the details of the regulations and its implementation and enforcement, but effective regulation of banks’ indebtedness can make other, more costly, regulations less important or necessary.²¹ Liquidity breakdowns are less likely if banks can trust each other to be solvent, and the liquidity offered by deposits and other short term debt by banks would only be enhanced if banks have more equity.²²

Existing laws still allow regulators to revise capital regulation. Title 1, specifically in the context of the living wills requirements, allows significant increases in equity requirements for institutions deemed systemic, if regulators admit that bankruptcy is not a viable option.

Comments on Measuring the Value of the Implicit Subsidies

As discussed at the start of this document, it is very difficult to measure the value of the implicit subsidy associated with guarantees. Because there are no markets for these guarantees, assumptions must be made about the underlying forces and the data being used. One can also try to focus on the cost to taxpayers or in terms of benefits to banking institutions who receive the subsidies. In fact, these two need not be the same because of the collateral impact of the banks’ choices of investment and funding, and especially of their distress and failure scenarios.

In assessing the costs to taxpayers, it is important to realize that expenses for supporting financial institutions in a systemic crisis occur at the every moment when the macro-economy is doing poorly, the country’s fiscal situation is very tight and money is sorely needed in many places.²³ Similarly, in assessing the benefits to banks, it is important to realize that Government guarantees are most useful in times of crisis, when private protection schemes are breaking down and the very survival of the institution is at stake. As discussed above, banks’ decisions about lending and investments are most distorted at that time, and bailouts that do not reduce indebtedness and thus do not alleviate banks’ distress may keep banks going but be unhelpful to the rest of the economy. (Ineffective banking regulations have caused much harm in Europe in recent years; many problems can be traced to a weak and bloated banking system and the politics of banking.)

With these caveats, I will make a few observations about attempts to estimate the size of the subsidy, but I do not wish to focus on this technical issue. As I will argue

²⁰ Despite the emphasis often placed on banks as sources of credit for firms, lending is actually a small part of what the largest bank holding companies do (see Admati and Hellwig (2013a, chapter 6). On the evolution of business of banking in the U.S., see Omarova (2013).

²¹ In chapter 11 of Admati and Hellwig (2013a) we outline briefly how better regulation can be designed and how to transition to a better system.

²² These issues are discussed in detail in Admati and Hellwig (2013a, chapter 10).

²³ For example, in the Swedish crisis of 1992–1994, Government support for the banks necessitated cutbacks in other Government spending, which greatly contributed to the sharp economic recession. Citizens in Ireland and Iceland are still suffering.

below, the size of the subsidy does not actually matter much to the policy recommendation.

1. There is compelling evidence that the Government provided a sector-wide collective bailout guarantees to the financial sector in 2007–2009.²⁴
2. The value of the subsidy, if thought of as the amount the banks would have to pay to receive perpetual (even partial) insurance for their debts in the private markets, is sensitive to many variables and can change dramatically over time depending on the level of uncertainty, the state of the local and global economy, and various fragilities in the financial system. The value is highest when uncertainty is large and when the economy and/or the financial sector are weak, and especially in a crisis. Boom times, however, when the value of the subsidy might be thought low, can quickly turn to bust. For example, uncertainty indicators were low in 2006 and through summer 2007 only to explode in late 2008 and 2009.)
3. When focusing on the funding costs of the institutions, particularly their borrowing costs, the relevant thought experiment in trying to assess the value of the implicit subsidies to the institutions who receive them from an ex ante perspective, i.e., when institutions fund their investments in light of the expectations of support, is to consider how institutions would have fared in the hypothetical scenario in which they tried to raise funding, such as unsecured, junior debt, without any chance of a guarantee, and specifically in a world in which the full costs of any failure, including bankruptcy costs and the distortions of distress and insolvency, would fall on shareholders and creditors. This counterfactual scenario cannot be observed, thus comparison requires many assumptions. One approach is to use credit ratings uplifts. The approach makes sense if the uplifts actually capture the true distinctions in the context of an individual institution and specific bond issuance.
4. None of the approaches takes into account the extreme opacity of the large banking institutions' and the difficulty in assessing their risks, including those lurking off their balance sheets and in derivatives markets.²⁵ Many banks use derivatives to get certain risks off their balance sheets. But then the counterparties on these derivatives might fail. If the counterparties have many parallel positions, as was the case when AIG wrote credit default swaps for \$500 billion on mortgage-backed securities, CDOs, and the like, the risk that the counterparty might fail is correlated with the underlying risk, i.e., the attempt to hedge risks through derivatives may end up being ineffective. In the case of AIG, fear of systemic fallout from such a failure was a major reason for the bailout.
5. Correlations of risks, i.e., the risk that the same event affects multiple institutions, are notoriously difficult to measure. This is especially true of the correlations among the risks against which derivative contracts are written and the default risks on these contracts. If these correlations are improperly measured, however, credit ratings and credit ratings uplifts are unlikely to be reliable. If these correlations are neglected, as has been the case in the past (for example the possibility that housing price declines will affect numerous mortgages at the same time), the estimates of the total risk in banks' assets are likely to be too low, and so are all estimated of the value of Government guarantees protecting against such risks.
6. In this context, it is also important to appreciate the role played by Government guarantees for counterparties of banking institutions. In a financial system with a complex network of inter-institution contracts, the individual institution benefits not only from Government guarantees protecting its own creditors but also from Government guarantees protecting the counterparties of those in which it invested. For example, the AIG bailout benefited many counterparties of AIG, not the least of these being the many banks that had purchased credit insurance from AIG. The benefit of such protection for AIG

²⁴In one example, Kelly, et al. (2014) document the fact that during the recent financial crisis, (out-of-the-money) index put options that provide protection against large drops in the value of the entire financial sector were surprisingly cheap compared to the individual options of the financial institutions that are part of this index. This finding is consistent with the notion that the Government will not tolerate large equity losses for the financial sector as a whole. As a result, the market underprices the cost of insurance against these sector-wide losses for financials.

²⁵On the poor disclosures of the banks and investors' inability to assess their risk, see for example Jesse Eisinger and Frank Partnoy, "What's Inside America's Banks", *The Atlantic*, January 2, 2013.

to, say, Goldman Sachs, however, cannot be assessed merely by looking at data for Goldman Sachs and relating the interest Goldman Sachs must pay to the risks they are taking. The embeddedness of their activities in a system to which the Government provides comprehensive support can hardly be gathered from data about individual institutions.

7. Even a resolution process such as under Title 2 of DFA may offer guarantees to some of the institutions' debt in order to avoid disruptions or runs, which would transfer some downside risk to the Government at least temporarily.²⁶
8. Being able to borrow at below-market rates relative to the risk taken with the investments provides a subsidy that affects the institutions' stock price and can favorably affect the terms at which the institution can raise equity. When an insolvent institution is given supports and does not fail, its shareholders are not wiped out. Other things equal, therefore, a systemic institution's stock price is higher in reality than in the hypothetical without support. Indeed, raising equity has been surprisingly cheap for the largest U.S. banks over the past four decades, but expensive for the smallest banks, because large bank stocks are priced under the assumption that they are relative safe while the stocks of small banks are not, despite the fact that large banks tend to be more heavily indebted.²⁷ The fact that guarantee become an asset, and the fact that commonly used assumptions about the risks banks are subject to may well be inappropriate, may lead the value of the subsidies in some studies to be under-estimated.²⁸
9. Comparisons between the interest charged on debt of large and small banks may not be informative because the large banks may well have significant risks that are harder to assess due to their more opaque disclosures. As mentioned earlier, this applies particularly to banks heavily involved in derivatives trading. The larger banks also tend to have more complex structures, more lines of business, and more off-balance sheet exposures than small banks. These factors would affect funding costs in the hypothetical scenario without support and thus the comparison between large and small banks, and they might not be sufficiently observable to correct for. Similar considerations apply to comparisons of large banks with other large corporations, whose disclosures, and business models are often simpler and less opaque.

The challenges in measuring how the banking industry as a whole, and especially the largest institutions, benefit from the possibility of future support do not change my bottom line, that the subsidy is perverse and insidious, rewarding and encouraging recklessness and excessive use of debt which endangers the public while allowing banks to make investments of many kinds to maximize their own profits that may not always benefit society.

Because the public pays for any subsidy, and the result of implicit supports is a dangerous and distorted system, these subsidies are, on net, enormously costly for society. Even if banks were to pay in full for the guarantees, at least collectively—similar to how deposit insurance works—the impact of the implicit support is harmful and distortive. The same institutions whose failure would cause significant collateral damage—individually and when they fail at the same time—have incentives to borrow too much, take too much risk, and become more highly interconnected, so as to increase the likelihood of Government support. In responding to these incentives, they can put us at yet more harm, unless these incentives are countered effectively by regulations.²⁹

²⁶DFA directs the FDIC to cover any shortfall by charging the surviving institutions, but doing so might be difficult if they too are experiencing losses.

²⁷Gandhi and Lustig (2014) find that over the past four decades the stock returns realized on the largest U.S. commercial banks, after adjusting for risk differences, are abnormally low compared to the stock returns on the smallest U.S. commercial banks. These differences are large (around 6 percent per year). The authors also provide evidence that large bank stocks are significantly less exposed to losses during recessions and financial crises, even though these large banks are typically much more heavily indebted. These findings are consistent with the notion that Government guarantees are perceived by investors to protect shareholders in large banks, but not in small banks, in financial disasters.

²⁸See, for example, Stefan Nagel, "Too Big To Fail Is Bigger Than You Think", Bloomberg, March 2, 2014.

²⁹See, for example, Brandao et al. (2013) for evidence on excessive risk taking as a result of expectations and support. Section 5 in Admati et al. (2014) which discusses the why the leverage ratchet effect (addiction to borrowing by heavy borrowers) is particularly relevant in banking and exacerbated by guarantees, and this effect exacerbates other distortions. Admati and

Continued

Among the perverse consequences of implicit guarantees is that they encourage and enable the largest institutions to grow even to inefficiently large sizes. There is no valid evidence of true scale economies for banks as they grow to trillions in assets. Such sizes are unseen in the rest of the economy.³⁰ Indeed, the problem of “empire building” by managers to benefit themselves appears particularly severe in banking.³¹ The largest institutions seem to suffer from serious governance and control problems, as evidenced by repeated scandals and fines.³² However, because the status of being too big to fail confers significant benefits and better access to funding, the largest institutions are unlikely to shrink naturally (as conglomerates often do).

These perverse effects undermine any notion of market discipline and they breed recklessness, even lawlessness, on the part of those within the largest institutions who benefit the most from the guarantees and subsidies, whose compensation reward gambling, and who rarely pay a personal price when charges for wrongdoings, including crimes, are settled by authorities or when excessive risks that harm the public, and even the shareholders of the corporations, are taken. Both corporate governance and regulations appear to fail. It is essential to take steps to counter these perverse incentives of the implicit subsidies and reduce their impact.

Fortunately, there is a straightforward and cost-effective way to do just that while reaping other critical benefits; that is to reduce banks’ excessive use of debt and requiring significantly more equity than banks are currently required to have.³³ There is no reason for banks to live so dangerously. Importantly, aside from possibly losing subsidies associated with borrowing, the overall funding costs of banks would not increase if they use more equity and less debt.³⁴ Since subsidies come from public funds, reducing them does not represent a social cost.

Encouraging and subsidizing banks to fund themselves with as much debt as is currently allowed (up to 95 percent for the large bank holding companies) as perverse as encouraging and subsidizing reckless speed for trucks or rewarding the captains of large oil tankers to go ever closer to the coast. More equity would force banks to stand more on their own when they take risk, rather than shift some of the risk and cost of bearing it to others. Shareholders who benefit from the upside, and not creditors or taxpayers, should be the ones to bear the downside.

Whatever else is done to reform the financial system so it works better for the rest of the economy, bringing banks’ indebtedness to more reasonable levels appears enormously cost-beneficial. With the perverse incentives banks have, and their ability to get away with harmful actions, many of the problems will not be corrected by markets. Making the system safer requires focused and effectively enforced regulation. If the size of individual banks, or of the banking industry, shrinks as a result, the resulting size would likely be more appropriate. The size and structure of firms and industries should be determined by undistorted markets, but the markets we have are entirely distorted. Bloated and inefficient, the financial industry may be able to attract talented workforce that may be more productive elsewhere in the economy. This system works for few and harms all the rest. When regulations fail to correct such distortions and harm, the public pays the price. Because the issues are misunderstood and the harm from excessive risk in finance, unlike that from exploding trucks, is abstract, the public may not fully realize the situation, particularly with the extent of lobbying by the industry.

Hellwig (2013a, chapter 9) provide additional references. See also Anat Admati, “Bank Immensity Undermines Responsibility”, *New York Times* Room for Debate, May 16, 2014.

³⁰Davis and Tracey (2014) use estimates of the subsidies based on credit rating uplifts and argue that, once the effect of subsidies is controlled for, the largest institutions are “too large to be efficient.”

³¹For example, Mayo (2011) describes excessive growth that appears inefficient, for example in Citigroup. A recent book (Fraser, 2014) describes the recklessness of the Royal Bank of Scotland and its CEO, which led to its spectacular failure and bailout by UK taxpayers.

³²For example, the report by the Senate Committee on Investigation chaired by Senator Carl Levin on “London Whale” scandal, entitled “JPMorgan Chase Whale Trades: A Case History of Derivatives Risks and Abuses”, reveals serious control problems in our largest banks. Suspicion of fraud and other evasion of laws and regulations appear routinely in the press.

³³Additional benefits are outlined in Admati et al. (2013, section 2) and Admati (2014).

³⁴This is explained in details in Admati et al. (2013, see especially section 4); see chapter 9 of Admati and Hellwig (2013a) Claim 11 in Admati and Hellwig (2014), both in attached documents. Taxes are public funds, and the tax impact of higher equity requirements can easily be neutralized, as explained in Admati et al., (2013, section 4.1).

Summary: If not Now, When?³⁵

In March, 2013, the Senate voted unanimously to approve an amendment proposed by Senators Brown and Vitter to eliminate the too-big-to-fail subsidies. As discussed above, among the many benefits of forcing the large banks to use more equity and less debt is that any subsidy they benefit from is immediately reduced. This benefit is obtained without having to break up the banks, and is realized in addition to all the other benefits of preventing their failure and reducing the distortions in their lending.

The focus on making the failure option palatable is as misguided as a focus on preparing ambulances for a possible explosion while police allows loaded trucks to drive at 95 miles an hour in residential neighborhoods. Whoever pays for the ambulances, explosions harm innocent people. Requiring that banks fund themselves so that those who benefit from the upside of risk bear more of its downside brings about more safety and corrects distortions.

In the exchange on July 15, 2014, between Senator Warren and Chair Yellen referred to earlier, Senator Warren pointed out that under Title 1 of DFA, the Fed has authority to break up the largest bank holding companies if it finds that bankruptcy is not a viable option if they fail. The Fed certainly has authority to ban dividends and other payouts to shareholders until banks are better prepared to absorb losses from risks they take without failing or becoming distressed.

As it goes through the “iterative process” of the living wills, and while it is not ready to assert that the failure of the largest bank holding companies will not harm the economy, the Fed must act prudently and protect the public. Corporations routinely retain their profits to fund investments, and banks should do the same. Retained profits would enable banks to make more worthy loans, and may increase their incentives to actually make them. The profits from any investments belong to shareholders as long as debt is paid.³⁶

Not only do banks have access to their own profits to become more resilient, they can sell shares to investors at appropriate prices. Other companies may be forced by debt covenants or prohibitive borrowing costs to raise equity when they are distressed. For banks, action must come from regulators. Banks unable to raise equity at any price fail a basic market “stress tests” and might be too opaque or not viable without subsidies. Such banks are unhealthy and must be dealt with promptly.

The Fed justifies allowing banks to make payouts to their shareholders on the basis of “stress tests.” This methodology uses models to predict regulatory capital levels that mean little in actual distress and especially in a crisis. The models are incapable of predicting the within-system dynamics that might follow adverse scenarios because the Fed does not have sufficient information on the many layers of interconnectedness that go beyond single counterparty exposures. Trusting models that should not be trusted has contributed to the causes of the financial crisis. The lesson from the failures of these models must be learned, particularly when there is no scarcity of equity just for banks, and no justification for allowing them to live as dangerously as they do.³⁷

If banks deny that they benefit from implicit subsidies, moreover, they cannot at the same time complain that their funding costs would increase significantly if they must use more equity.³⁸ The fact that banks are anxious to make payouts to their shareholders rather than use their profits for making worthy loans, even at their very low equity levels, calls into question their motives and exposes the disconnect between claims that higher equity requirements would prevent lending and making payout to shareholders instead of using the funds to make loans.

It is baffling that the Fed finds it appropriate, before it can assert that the largest bank holding companies would not harm the economy if they fail, to allow these institutions to make payouts to shareholders that deplete their most reliable loss-absorbing capacity, namely their equity.³⁹ A significant increase in equity require-

³⁵This is the title of chapter 11 in Admati and Hellwig (2013a), whose epigraph is “time has a trick of getting rotten before it gets ripe.” For an excerpt, see Anat Admati and Martin Hellwig, “Must Financial Reform Await Another Crisis?” *Bloomberg View*, February 6, 2013.

³⁶Warren Buffett’s company Berkshire Hathaway, for example, rarely makes payouts to its shareholders, continuing to invest on their behalf and retained earnings are considered first in the “pecking order” of funding. See Admati et al. (2014), for example.

³⁷See Claims 13–14 in Admati and Hellwig (2014), attached, for a brief discussion.

³⁸In that case, the only private cost is that banks might have to pay more corporate taxes, but, as explained in Admati et al. (2013, section 4.1), this is not a social cost, and the effect can anyway be neutralized.

³⁹I have written many commentaries on this issue, see Anat Admati, “Dividends Can Wait Until the Banks Are Stronger”, *Financial Times*, January 19, 2011, “Only Recapitalized Banks Should Pay Dividends”, a letter signed by 16 academics, *Financial Times*, February 15, 2011,

Continued

ments must be considered the most cost-effective way to make it less likely that we face difficult choices when institutions become weak, as well as to reduce the fragility of the system and many distortions. The Fed has the responsibility and the ability to protect the public, yet as a regulator, it has failed the public. On behalf of the public, I hope you will take my comments into consideration and implore it to do better.⁴⁰

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Anat Admati, “Fed Runs Scared With Boost to Bank Dividends”, *Bloomberg View*, February 24, 2011, and “Why the Bank Dividends Are a Bad Idea”, Reuters, March 14, 2012. Admati and Hellwig (2011, chapter 11) provide a more detailed explanation.

⁴⁰Other claims are made in response to such recommendations, such as concerns about the so-called shadow banking system or about the competitiveness of our banks. These concerns are invalid excuses, as explained in Admati and Hellwig (2013a, chapters 12 and 13) and Claims 26–28 in Admati and Hellwig (2014), attached.

⁴¹Most of the references (at least in working paper form) are available online. My own academic papers and other writings on the topic are posted at <http://www.gsb.stanford.edu/news/research/admati.etal.html>.

Sweet Subsidies

I don't know how you measure that subsidy. . . . That's why they say it's invaluable.

Mark Zandi, chief economist of Moody's Analytics, part of the credit rating agency Moody's, April 2009

YOGI BERRA'S SUGGESTION that the content of a pizza might depend on how it is cut is absurd. Yet when banks borrow excessively and economize on equity, the total "pie" available to their investors grows.¹ When banks borrow, they benefit from subsidies that they would not enjoy if they relied more on equity. The more banks borrow, the larger are the subsidies, as if the pizza chef added more cheese when the pizza was cut into more slices.

The main source of subsidies for banks is the support the government provides to protect banks, their depositors, and sometimes their other creditors and their shareholders. Banks and their creditors benefit from explicit and implicit government guarantees. Depositors are protected by deposit insurance, which is guaranteed by the taxpayers. Other creditors, and even the bank's shareholders, benefit if the government provides additional equity to prevent the bank from going bankrupt—for example, in a crisis.

Because depositors and other creditors count on this support, they are willing to lend to banks on more favorable terms than the terms they would require otherwise. In particular, the interest rates banks must pay on their debt are lower than they would have been without government support. This gives banks strong incentives to prefer borrowing over other types of funding they might obtain for their investments. In effect, taxpayers subsidize the use of borrowing by banks. Paradoxically, these subsidies encourage banks to be more fragile. They reinforce the distortions from the bias that heavy borrowers

have toward even more borrowing, the effect of debt overhang discussed in Chapter 3.

Excessive borrowing by banks can expose the public to great risks. A bank exposing the public to risks is similar to an oil tanker going close to the coast or a chemical company exposing the environment to the risk that toxic fluids might contaminate the soil and groundwater or an adjacent river.² Like oil tankers or chemical companies that take too much risk, banks that are too fragile endanger and potentially harm the public. Cleaning up coastlines and rivers and bailing out banks are all costly to taxpayers. The risks and costs to the public in all these cases are very real. For society, containing the risks of oil tankers, chemical factories, and banks is therefore important, even if there is a cost involved. In the case of banks, in fact, requiring more equity produces large benefits at virtually no cost to society.

Explicit and implicit government guarantees have perverse effects on the extent of borrowing and risk taking of banks. The preferential tax treatment of debt also encourages borrowing. With the additional borrowing, the incentive to take excessive risks, discussed in Chapter 8, becomes stronger.

Government guarantees and subsidies thus reinforce the effects of bankers' compensation and the focus on ROE, as well as the effects of debt overhang, all of which encourage borrowing and risk. The prospect of becoming systemically important or too big to fail provides banks with incentives to grow and become more complex. The implicit guarantees reduce the funding costs of the too-big-to-fail institutions and give these banks an advantage over other banks and over other companies in the economy. If banks respond to these incentives by growing and becoming more complex, this in turn increases the damage to society should these institutions become distressed or insolvent. It is as if the government subsidized ever larger tankers going ever closer to the coast.

Isn't It Wonderful to Have Such an Aunt?

To see how guarantees work, let us again consider the example of Kate who takes out a mortgage to buy a \$300,000 house that she sells a year later.³ In the case discussed in Chapter 8, we assumed that Kate borrows \$270,000 at 4 percent interest and puts down \$30,000 in down payment or initial equity.

If Kate settles her mortgage and pays all the interest after a year, she owes \$280,800, including \$10,800 in interest, to settle the mortgage a year later. If Kate has a nonrecourse mortgage, as we have been assuming, she does not pay her debt in full when the house subsequently declines in value to below the amount of the mortgage debt, \$280,800.⁴ We can assume that the 4 percent interest rate that Kate is charged includes some compensation for the risk to the bank of not being paid in full.

Now let us change the example slightly by assuming that Kate's Aunt Claire offers to guarantee Kate's mortgage. If the house subsequently sells for less than Kate owes on her mortgage, Aunt Claire will make up the difference. The local banker knows that Aunt Claire is wealthy. With the mortgage guaranteed by Aunt Claire, the bank faces virtually no risk and therefore allows Kate to borrow at the riskless interest rate of 3 percent.

In borrowing \$270,000 at 3 percent instead of at 4 percent, Kate pays only \$8,100 in interest instead of the \$10,800 she must pay without the guarantee. She saves 1 percent in interest on the loan of \$270,000, which amounts to \$2,700 for the year. This leaves Kate with more money after paying the mortgage debt. For example, if the house subsequently increases in value by 5 percent to \$315,000, we saw in Chapter 8 that Kate will be left with \$34,200, a 14 percent return on her equity investment, if she borrows at 4 percent. If she borrows at 3 percent and owes only \$278,100, she will instead have \$36,900 left, a 23 percent return on her equity investment, after selling the house for \$315,000 and paying her mortgage debt.

The saving of \$2,700 in interest will also soften the blow should Kate lose some of her investment, assuming that she is still "above water" and able to pay her mortgage. For example, if the house sells for \$300,000, Kate will be left with \$19,200 if she borrows at 4 percent, a loss of 36 percent of her investment, but she will have \$21,900 if she borrows at 3 percent, losing only 27 percent of her investment. Similarly, she will lose less if the house declines in value by 5 percent to \$285,000. In the worst-case scenario, if the house ends up below \$278,100 in value, Kate will lose everything whether she borrows at 3 percent or 4 percent; Aunt Claire's guarantee does not benefit Kate in this case.

The situation is summarized in Table 9.1. The top panel reviews the case discussed in Chapter 8, in which Kate pays 4 percent interest, while the bot-

TABLE 9.1 How Kate Benefits from Guarantees When Borrowing

<i>Kate's position with no guarantees (borrowing at 4 percent)</i>				
<i>Year-end house price (dollars)</i>	<i>Percent change in house price</i>	<i>Mortgage debt (dollars)</i>	<i>Final equity (dollars)</i>	<i>Return on equity (percent)</i>
345,000	15	280,800	64,200	114
315,000	5	280,800	34,200	14
300,000	0	280,800	19,200	-36
285,000	-5	280,800	4,200	-86
255,000	-15	280,800	0	-100
<i>Kate's position with guarantees (borrowing at 3 percent)</i>				
<i>Year-end house price (dollars)</i>	<i>Percent change in house price</i>	<i>Mortgage debt (dollars)</i>	<i>Final equity (dollars)</i>	<i>Return on equity (percent)</i>
345,000	15	278,100	66,900	123
315,000	5	278,100	36,900	23
300,000	0	278,100	21,900	-27
285,000	-5	278,100	6,900	-77
255,000	-15	278,100	0	-100

tom panel shows the case in which Kate borrows at 3 percent with the guarantee from her aunt. Kate benefits from the guarantee even when she is able to pay her debt, and this is reflected in her ROE.

We saw in Chapters 2 and 8 that borrowing magnifies risks for the borrower both on the upside and on the downside. With the guarantee from her aunt, the upside for Kate is even better and the downside is either better or no worse. Kate is obviously quite happy with the guarantee, and the bank is getting paid for sure. Aunt Claire, however, must put up money in the one case in the table in which Kate cannot pay. If the house sells for only \$255,000, Aunt Claire will have to add the missing amount of \$23,100 so the bank is paid \$278,100 in full.

If she can, would Kate like to reduce her down payment and borrow more? Suppose Aunt Claire is in fact willing to guarantee Kate's mortgage even if

Kate borrows \$290,000. The bank would allow Kate to take a larger mortgage because it knows that it will get paid in full no matter what happens to the value of the house. The interest rate it would charge Kate would again be 3 percent even for a larger mortgage.

How does the situation in which Kate invests only \$10,000 instead of \$30,000 in the house compare to that in which she invests \$30,000? If Kate borrows \$290,000 for a year at 3 percent, her interest payment is \$8,700, so she owes \$298,700. In this case, Kate will become underwater and will be unable to pay her mortgage debt from selling the house if the house subsequently sells for less than \$298,700. For example, if the house sells for \$285,000, Kate will default on her mortgage debt if she borrows \$290,000. In this scenario, Aunt Claire will have to pay \$13,700 to make sure the bank is paid the full \$298,700 that is owed. By contrast, if Kate borrows only \$270,000 and puts \$30,000 in as a down payment, she will absorb the entire loss without needing the guarantees.

Table 9.2 summarizes the positions of both Kate and her aunt if Kate invests \$30,000 in equity and borrows \$270,000, as shown in the top panel, which is the same as the bottom panel of Table 9.1, and if Kate invests \$10,000 and borrows \$290,000, both loans at 3 percent interest.

Obviously, if Kate borrows more, Aunt Claire will bear much more of the downside risk. For example, if the house subsequently declines to \$255,000 in value, Aunt Claire will have to put in \$23,100 if Kate borrows \$270,000 and owes \$278,100. In the bottom panel of Table 9.2, which represents the situation in which Kate borrows \$290,000 and owes \$298,700, Claire will have to cover a whopping \$43,700 to live by her guarantee. Although Kate will lose all her investment in both cases, the loss will be only \$10,000 if she borrows \$290,000, whereas it will be \$30,000 if she borrows \$270,000.

The guarantees are a gift from Aunt Claire to Kate. The more Kate borrows, the larger is the value of the gift. If Kate borrows more, as represented in the bottom panel of Table 9.2, Aunt Claire will sometimes have to pay more than she will if Kate borrows less. (In the cases in which Kate can pay the mortgage by selling the house, her aunt will pay nothing in both cases.)

If Aunt Claire asks Kate to put more of Kate's own money into her down payment, Kate might claim, "Equity is expensive!" Indeed, once she has the

TABLE 9.2 How Guarantees Make Borrowing More Attractive to Kate

<i>\$30,000 down payment (initial equity)</i>				
<i>Year-end house price (dollars)</i>	<i>Percent change in house price</i>	<i>Mortgage debt (dollars)</i>	<i>Kate's final equity (dollars)</i>	<i>Aunt Claire's position (dollars)</i>
345,000	15	278,100	66,900	0
315,000	5	278,100	36,900	0
300,000	0	278,100	21,900	0
285,000	-5	278,100	6,900	0
255,000	-15	278,100	0	-23,100
<i>\$10,000 down payment (initial equity)</i>				
<i>Year-end house price (dollars)</i>	<i>Percent change in house price</i>	<i>Mortgage debt (dollars)</i>	<i>Kate's final equity (dollars)</i>	<i>Aunt Claire's position (dollars)</i>
345,000	15	298,700	46,300	0
315,000	5	298,700	16,300	0
300,000	0	298,700	1,300	0
285,000	-5	298,700	0	-13,700
255,000	-15	298,700	0	-43,700

guarantees, it will become expensive for Kate to invest more money in the house, because by investing more she puts more of her money at risk of being lost, when instead she can leave more of the downside risk for Aunt Claire, letting her aunt absorb more losses. (We are ignoring, of course, family considerations or hard feelings that might result from Kate's taking advantage of her aunt's generosity.)

Whether Kate actually ends up doing better or worse investing \$30,000 in the house depends on what she does with the \$20,000 that she does not invest in the house if she puts only \$10,000 into the down payment and borrows \$290,000. Kate might take an expensive trip with the money, and very much enjoy the experience.⁵ If instead she invests the \$20,000 elsewhere, the question is whether the alternative investment will end up earning more or

less than what Kate can earn by investing the money in the house and saving on interest payments. If Kate can invest the money at 3 percent without risk, she will make the same in those scenarios in which she remains above water, but in the scenarios in which she is underwater and must make use of Aunt Claire's guarantees, she will do better if her money is invested elsewhere, because she will not have to bear the losses. Therefore, Kate wants to put as little equity as possible into the house; without equity in the house, she will enjoy the upside and will lose less on the downside.⁶

In summary, Kate benefits from her aunt's guarantees by being able to pay less on her loan when she borrows. This allows her to save on interest expenses. Kate can increase her gains further by borrowing more and putting less equity into the house. The more Kate borrows, the greater will be the value that Kate will derive from Aunt Claire's gift. Putting her own money into the house seems expensive to Kate because it exposes her to downside risk that she can otherwise leave for Aunt Claire.⁷

Debt guarantees of the type Aunt Claire gives to Kate make borrowing very attractive. The bright side of borrowing—the magnification of the upside—looks even brighter to the borrower, while the dark side, the magnification of losses, affects the person making the guarantees, in Kate's case Aunt Claire. With lower interest on borrowing, it is easier for investments to surpass the low borrowing rate, thereby providing larger magnified returns. The worst of the downside is shared by the guarantor.

Taking this logic a step further, suppose that Aunt Claire agrees to guarantee a mortgage of any size and the bank knows that Aunt Claire is trustworthy and able to pay. Then Kate would actually prefer, and be allowed, to have no equity at all in the house. She would have zero initial equity and borrow the entire \$300,000 at 3 percent interest, promising to pay \$309,000.⁸ If the house ends up increasing enough in value to pay the mortgage, Kate will be able to enjoy the full upside. Otherwise, she will lose nothing.⁹

The scenario in which Kate puts in zero initial equity is wonderful for her. With no investment in the house, she is not at all exposed to the risk that the subsequent value of the house might not be enough to pay the mortgage debt; she can never lose, but she will gain if the house appreciates by more

than is needed to pay the mortgage debt. The house will become a kind of money machine for Kate; allowing her to enjoy the full upside while facing no downside. The downside will be fully borne by Aunt Claire.

Banks Have Uncle Sam

The relation between Kate and Aunt Claire in the example is similar to the relation between banks that are too important to fail and taxpayers. Just as Aunt Claire steps in when Kate cannot pay her mortgage debt, governments often support banks when they cannot pay their debts. And banks, like Kate, want to economize on equity and use debt as much as possible. Borrowing is made attractive to them through subsidized guarantees. The banks' creditors are more confident that they will be paid in full than they would have been without the guarantees; because of this, creditors are willing to lend to the banks for lower interest, and creditors care relatively little about the banks' own equity or the risks banks take.

The safety net for banks takes different forms. Some guarantees are given explicitly, and some are implicit, implied by expectations that, in a crunch, the government will most likely step in and help. In the turmoil that occurred after the Lehman Brothers bankruptcy, many of the institutions that received government support had not previously been covered by any explicit guarantees.

Explicit guarantees are limited, and banks must make payments intended to cover their costs, which is similar to paying insurance premiums. For example, in the United States deposit insurance from the FDIC is available for deposits up to \$250,000.¹⁰ The FDIC charges banks a deposit insurance premium, and it is supposed to be self-financing. However, for close to a decade, until 2006, the FDIC did not charge any deposit insurance premium at all because its fund was well-capitalized given the lack of defaults in previous years.

As a result of its calibration of funding to average default rates, the FDIC is short of funds when default rates are unexpectedly high. If it runs out of funds, the FDIC can increase its insurance premium. Increasing the premium in a crisis, however, may itself exacerbate the crisis because the charges

represent a tax on surviving banks to make up for the losses of failing banks. If many banks are in trouble and the industry is not able to cover the losses, taxpayer support may be needed to make up the shortfall.¹¹

Under this arrangement, the contributions of any individual bank to the FDIC do not properly reflect the risk that the bank imposes on the deposit insurance system. Once a bank fails, of course, it no longer makes contributions, and any shortfall of funds or other expenses are covered by the FDIC, that is, by the other banks or taxpayers.

Implicit guarantees are potentially unlimited, and banks do not pay for them. In the fall of 2008, banks received large amounts of support from their governments in various forms. In the United States, the government put up \$900 billion, \$700 billion for TARP and \$200 billion for Fannie Mae and Freddie Mac, the giant mortgage corporations that had dominated housing finance for decades. In other countries, governments committed comparable amounts—for example, £550 billion in the United Kingdom, €480 billion in Germany, and €360 billion in France.¹² These operations ended up protecting most debt holders, even those with “hybrid” debt that was meant to share in absorbing losses and that banks had been allowed to use to satisfy some of their capital requirements.

Additional support was provided by central banks acquiring assets from many private banks, either directly or as collateral for loans. In the United States, the Federal Reserve increased the money supply by more than \$1.3 trillion, from just below \$900 billion to over \$2.2 trillion. In the process, it acquired assets of lower quality, taking on debts of private companies and individuals that included questionable mortgage-backed securities and related derivatives. Such interventions also affect taxpayers, because any losses on the acquired assets reduce the Fed’s profits and therefore the payments it makes to the Treasury. Altogether, the bailout operations of 2008 put about \$2.2 trillion of U.S. taxpayer money at risk, \$900 billion through the Treasury and \$1.3 trillion through the Federal Reserve.¹³

Another form of subsidy to banks comes through cheap borrowing from central banks. Since 2008, central banks in the United States, the United Kingdom, and Europe have allowed private banks to borrow at interest rates

of 1 percent or less. If this money is invested in safe securities that pay more than 1 percent in interest, the central banks are effectively providing a money machine to the private banks.¹⁴

In the United States, this kind of support was also provided in 1990, when, in response to information that large commercial banks were in trouble, the Federal Reserve lowered the short-term rate it charged banks that wanted to borrow money.¹⁵ U.S. commercial banks used this cheap borrowing to invest in long-term bonds, earning large profits from 1990 to 1994, rebuilding their equity.

In Europe, since December 2011 the European Central Bank (ECB) has provided more than €1 trillion in cheap loans to banks within the so-called long-term refinancing operations (LTRO), three-year loans at very low rates. Borrowing from the ECB at 1 percent in order to lend to Italy or Spain at 4 or 5 percent may look like an attractive way to rebuild the bank's balance sheet by means of a carry trade. (As discussed in Chapter 8, this practice may involve significant risk.)¹⁶

In all these examples of central banks' lending at below-market rates or of governments' providing guarantees of banks' debts, the institutions that have access to these loans and guarantees are provided subsidies that other companies in the economy cannot obtain. At the peak of the financial crisis in 2008, money market funds were provided guarantees, and Goldman Sachs and Morgan Stanley, the two remaining pure investment banks in the United States, changed their legal status so as to have access to various supports. They have made use of the supports and have maintained this status.¹⁷

Since the crisis, many have demanded that there should never be bailouts again. The Dodd-Frank Act in the United States forbids government bailouts and certain forms of support by the Federal Reserve, such as those used in the bailout of AIG.¹⁸ In signing the Act into law, President Obama said, "The American people will never again be asked to foot the bill for Wall Street's mistakes. There will be no more taxpayer-funded bailouts. Period."¹⁹ The Act tries to deliver on that promise by giving authority to the FDIC to take over and resolve any systemically important financial institution and by mandating that no taxpayer money be used. It requires that the costs of the FDIC's taking over and unwinding a financial institution be covered by the

institution's creditors or by contributions from other financial institutions. This requirement corresponds to the principle that the FDIC should be self-financing.

However, the FDIC is guaranteed by taxpayers. If the entire banking industry is in trouble and if imposing additional charges on remaining banks would deepen a crisis, taxpayers would have to step in and support the FDIC, as in the case of the S&L institutions in the late 1980s and early 1990s. As the entire industry was failing, taxpayers paid \$124 billion to support the deposit insurance system.²⁰ In the face of a looming crisis, most governments and central banks will likely again step in to help the banks and limit the damage. If the law forbids a bailout, lawmakers can quickly change the law again, particularly in a crisis situation. As a result, hardly anyone considers the no-bailout commitments credible. Support is most likely to be given to the largest and most "systemic" banks because winding them down would be highly disruptive and costly. As discussed in the last section of Chapter 5, there are as yet no workable procedures for winding down internationally active banks with branches and subsidiaries in different countries and no agreements on how to share losses among the different countries involved.

If governments are afraid to let systemically important banks fail, these banks enjoy essentially unlimited implicit guarantees that are similar to the blanket guarantees Kate receives from her aunt. It is very difficult for governments to convincingly commit to removing these guarantees. In a crisis it will be even more difficult to maintain this commitment and provide no support to institutions that are deemed critical to economic survival. Once a crisis is present, it may even be undesirable to do so, because letting banks fail in a crisis can be very damaging. Perversely, the prospect of government support in a crisis makes creditors willing to lend to banks at low rates of interest and provides banks with a reason to view equity as expensive.

Tax Subsidies to Borrowing

In addition to the incentives to economize on equity because of guarantees, borrowing by all corporations is encouraged by the tax systems of most countries. To see how this works, let us go back to Kate's purchase of her house without Aunt Claire's guarantees. Suppose Kate could pay for the house without

borrowing but she considered borrowing anyway. Would it make a difference? In the United States, the answer is generally “Yes,” because the interest paid on mortgages is tax deductible. In determining her taxable income, Kate could deduct the mortgage interest payments as an expense.²¹ Borrowing could therefore reduce Kate’s taxes, essentially making Uncle Sam contribute to the purchase of her house.²²

Corporations can similarly save on taxes by borrowing. In most countries, corporate taxes are paid on a corporation’s “income,” defined in such a way that interest paid on the corporation’s debt is considered a tax-deductible expense.²³ The more debt and the less equity a corporation uses in its funding, the less it pays in taxes. The part of the pie available to investors grows with more borrowing because a smaller part of the earnings goes to the government in taxes. This encourages corporations to borrow more than they might otherwise choose to do.²⁴

Some countries (for example, Australia, Germany between 1977 and 2000, and, since 2004, Belgium) have tried to neutralize the tax penalty for equity funding. Many commissions in the United States have also recommended changes to the tax code to eliminate or reduce the tax incentives for corporations to borrow.²⁵

Whereas tax legislation is usually driven by considerations and politics different from those that drive banking regulation, it is important to recognize that a corporate tax code that subsidizes debt and penalizes equity works directly against financial stability. By giving corporations tax incentives to use debt, the tax code encourages the excessive borrowing of financial institutions that harms the financial system by increasing its fragility.

Life without Guarantees

The tax subsidy of debt applies to all corporations. Yet most nonfinancial corporations refrain from borrowing extensively, and some corporations, like Apple, use virtually no debt.²⁶ How can we explain this? The primary reason has to do with the burden of debt discussed in Chapter 3, which can make high levels of indebtedness costly and undesirable to nonbank corporations.

Borrowing obviously increases the likelihood of distress and bankruptcy. Bankruptcy is costly in the sense that it depletes a corporation’s remaining

assets further than they have already been depleted prior to bankruptcy. For example, lawyers and bankruptcy courts charge fees that must be paid out of the corporation's remaining assets or by its creditors. These costs are entirely due to the use of debt, and the likelihood of incurring them would be lower if the corporation had more equity and less debt. If bankruptcy can be avoided, losses from investments will be a concern for shareholders, but there will be no expenses for bankruptcy lawyers and courts.

In terms of Yogi Berra's pizza, the bankruptcy costs reduce the amount of the total "pie" that is available to investors. Anticipating that a corporation's assets will be depleted in bankruptcy, creditors charge a higher rate of interest than they would absent the bankruptcy costs. This makes using debt more "expensive" for the corporation and acts to discourage too much borrowing.

As discussed in Chapter 3, the costs of bankruptcy go beyond those for lawyers and court fees. For example, the bankruptcy process may freeze a firm's activities. Even before bankruptcy, as distress sets in, the firm's flexibility and its ability to compete in its markets may be impaired. High levels of indebtedness also exacerbate conflicts of interest between owners or managers and creditors. Owners or managers might choose risky investments that can harm creditors, or they might pass up good investments, just as a homeowner who is underwater is less likely to invest in home improvements.

When creditors agree to lend to the corporation, they try to protect themselves in advance by charging higher interest rates or by attaching conditions, generally called "covenants," to the loans they make. Banks do the same when they lend to individuals and businesses. These conditions restrict the borrower's flexibility and can make borrowing less attractive.

For example, creditors may forbid a borrowing corporation from taking additional debts or from making dividend payments to shareholders in certain situations in which such actions would harm the creditors. Creditors may also require that major investment decisions be approved by them. This requirement can prevent the borrower from quickly taking advantage of investment opportunities as they arise.

Without guarantees, the costs and inefficiencies associated with distress and default are reflected in the interest rates and conditions attached to debt contracts, raising overall funding costs. This helps explain why, despite the

tax advantage of debt, most nonfinancial companies avoid becoming highly indebted even if they can borrow more.

With debt guarantees, however, the burdens of debt become lighter. Creditors believe that their debts will most likely be paid in full. Therefore they do not charge as much, and do not impose as many conditions, as they would if the bank made the same investments without guarantees.

For banks, therefore, the costs of added debt are much lower with guarantees, even if they are already highly indebted. They view equity as expensive; borrowing is always attractive. As discussed in the previous chapter, the focus on ROE in banking reinforces the effect by compensating bank managers in ways that encourage risk taking and borrowing.

Perverse Incentives

When large banks are treated as too big to fail, this status has strong and perverse effects on the banks' behavior. The prospect of benefiting from too-big-to-fail status can give banks strong incentives to grow, merge, borrow, and take risks in ways that take the most advantage of the potential or actual guarantees. Banks may also want to draw advantages from taking risks that are similar in that they are all likely to turn out well or to turn out poorly at the same time. If things go wrong, the entire industry may be affected, which will generate strong pressures for government support. These effects of government guarantees on banks' behavior are counterproductive in that they further increase the likelihood that the economy might suffer harm from the fallout of risks taken in the financial sector.

Some of the perverse incentives banks are given can be seen by going back to Kate and her Aunt Claire. If Aunt Claire guarantees Kate's mortgage to buy only the \$300,000 house, Claire will not lose more than \$309,000, Kate's debt if she puts in no equity; most likely, the house will not become worthless, so the cost to Aunt Claire will be lower. Uncle Sam's exposure to the risks of large, systemically important banks, or to those of the entire banking system, is not so limited, particularly when the banks and the banking sector can keep growing and taking risks.

The banks' situation is as if Aunt Claire gave Kate a guarantee for *any* debt, not just for a particular \$300,000 mortgage. With blanket guarantees, Kate

can buy a bigger house. She can also set up a corporation and make risky investments with borrowed money. If she maintains very little equity, she cannot lose much; yet, as she continues borrowing and investing, her profits can become very large.

How wonderful indeed this would be for Kate. As long as Aunt Claire's guarantees remain good, Kate can borrow cheaply and can try to maintain her equity at near zero. If her investments are profitable, Kate can pay herself a dividend and continue to borrow. And with little equity, risk does not scare Kate. She actually finds risk attractive, because it holds the prospect of large gains on the upside, with hardly any consequences on the downside. At most she might worry that, if her gambles do not succeed and Aunt Claire has to pay for them, her aunt might not be willing to provide more guarantees in the future.

In this fantasy, there are no limits to how much Kate can benefit by growing her business and taking more risk or to the amount Aunt Claire might have to put up. The more Kate borrows, the more she stands to gain on the upside while being protected on the downside. Similarly, there are no limits to the amounts that taxpayers may have to put up if they do not constrain what the banks can do, how large they can grow individually or as an industry, and how much they can borrow. In the most recent crisis, governments provided banks with blanket guarantees to avoid a potential meltdown of the financial system. In a similar crisis in the future, the cost of such guarantees could be higher.

If Kate racked up enough losses, Aunt Claire might have run out of funds. Similarly, banks can overburden taxpayers with their losses. This is essentially what happened in Iceland and Ireland in 2008. Banks in those countries grew and invested so much that their losses were larger than the countries could bear.²⁷ Spain may be facing a similar experience.

Being considered too big to fail is extremely valuable for a bank, because it lowers its borrowing costs. Just as Kate was able to borrow at a lower rate because of Aunt Claire's guarantees, banks that benefit from implicit guarantees are given higher credit ratings, and thus pay less interest when they borrow. This reduces the banks' overall funding costs and increases the amount of the total pie available to their investors.

There is significant evidence that subsidies associated with being too big to fail can make these banks seem more profitable, when in fact they are not generating more value but simply benefiting from more subsidized funding.²⁸ Banks do not seem to become more efficient when they grow beyond about \$100 billion in assets, yet growing can allow them to enjoy the subsidized funding that comes with the implicit guarantees.²⁹ With subsidized funding through guarantees, growth is easy, and building empires can be quite profitable.³⁰

Mergers in banking have also been shown to be partly motivated by a desire to attain too-big-to-fail status, which generally lowers costs and makes for easier borrowing terms. A bank is willing to pay more to acquire other banks if the merger will result in a bank that is considered too big to fail.³¹

A recent study estimated that at the peak of the financial crisis, the guarantees to the U.S. financial sector were worth close to \$160 billion.³² The value of the subsidies associated with guarantees was estimated to be about \$2.3 trillion worldwide in 2009.³³ The banks would have had to pay someone in the private market very large amounts to provide the guarantees the government provided. The magnitude of the implicit subsidies has generally grown since the crisis because the largest banks have grown in size.³⁴ Of course the value of the guarantees changes with economic conditions and is at its highest when the economy is weak and banks are more distressed.

Even when they do not cause banks to merge, guarantees can have strong and damaging effects on the behavior of banks. In the United States, mortgage giants Fannie Mae and Freddie Mac have always been considered to be protected by the government. They have not benefited from any explicit guarantees, but investors have thought they were too big to fail, and indeed they were bailed out in September 2008. Their too-big-to-fail status allowed the mortgage giants to grow at the tremendous rate of 16 percent per year from 1980 until the crisis, while their involvement in residential mortgages and mortgage guarantees rose from \$85 billion to \$5.2 trillion and their share of the mortgage market rose from 7.1 percent to 41.3 percent.³⁵

This growth was facilitated by their being able to borrow at very low rates even though their equity was between 2.5 and 5 percent of their total assets; if

their mortgage guarantees had been put on their balance sheets, their equity would have been even less, between 1 and 2 percent of their total assets. Borrowing cheaply with hardly any equity was possible only because of implicit guarantees. For the year 2000, the Congressional Budget Office estimated that the value of these guarantees amounted to \$13.6 billion. Of this amount, at least one-third was estimated to be a simple wealth transfer from taxpayers to the shareholders and managers of these companies, and no more than two-thirds were estimated to have improved the terms under which home buyers could borrow. By some accounts, the value of the implicit government guarantees accounted for almost the entire market value of these companies.³⁶

In an industry in which there is intense competition, particularly for growth, guarantees tend to encourage recklessness.³⁷ If the banks' creditors expect their investments to be safe because of the guarantees, they do not pay much attention to the risks the banks take. This enables the banks to grow fast by expanding their borrowing without seeing their borrowing rates increase. Fannie Mae and Freddie Mac are examples of this problem. Other examples, from the 1980s, were U.S. S&Ls, which attracted large amounts of funding by offering high rates of interest on federally insured deposits. In each case, the explicit or implicit government guarantees provided a basis for extraordinary growth, which ended up being very costly for taxpayers.³⁸

*Excessive Borrowing: Expensive for Aunt Claire,
Uncle Sam, and the Rest of Us*

The guarantees that allow banks to borrow cheaply and take excessive risk are a burden on taxpayers. As the subsidies become more valuable to banks, they also become more costly to society. In our example involving Kate and Aunt Claire, any equity that Kate puts into her house reduces the payments Aunt Claire may subsequently have to make to honor the guarantee she gave to cover Kate's debt. Equity is expensive *for Kate*, but any cost to her of more equity is fully balanced by lower expenses for Aunt Claire. For Kate and Aunt Claire together, Kate's using more equity and less debt is not expensive; the two of them together always pay the mortgage in full. Any benefit Kate sees

in different arrangements comes at the expense of Aunt Claire. Meanwhile, Kate benefits from the upside, but the best-case scenario for Claire is that she does not have to pay.

The combined cost to Kate and Claire will in fact be lower if Kate becomes motivated to make sounder decisions when she has more equity and thus more “skin in the game.” If Aunt Claire provides Kate with blanket guarantees and Kate cannot be made liable for her debt, there will be nothing to prevent Kate from using borrowed funds to gamble in Las Vegas. Such wasteful investments would be less likely if Kate had more of an equity stake that might be lost by gambling.

Similarly, when considering the costs and benefits of banks’ using different mixes of debt and equity, from the perspective of society, the costs to taxpayers of providing guarantees and subsidies must be considered. Also relevant is the damage to the economy when banks are in distress, even more so when they go into default and bankruptcy; this damage includes the cost of valuable loans’ not being made. A funding mix that relies on a lot of borrowing and little equity and that appears cheap to a bank can in fact be very expensive to society. Conversely, although banks consider equity funding more expensive than borrowing, additional equity funding of banks can actually be significantly *cheaper* for society once we factor in the costs and risks to society of banks’ becoming fragile through borrowing.

The magnitudes of the costs banks impose on society can be large. The recent financial crisis has led to significant loss of output, likely in the trillions of dollars. The losses of the U.S. government from its various rescue operations since 2008 have been between \$200 and \$500 billion.³⁹ Beyond the costs of the bailouts, the collateral damage to the economy has been enormous.⁴⁰ If this money had not been lost but rather invested at 4 percent per year, a typical rate for fairly safe long-term investments, it would provide \$8–20 billion of additional revenue per year. In a federal budget that includes \$129.8 billion for education and \$94.5 billion for transportation in 2012, \$8–20 billion a year could make a noticeable difference in education or transportation.

As noted in Chapter 2, in the nineteenth century and the early twentieth, equity levels in banks were often 25 percent or higher (even as high as 40 percent or 50 percent in the first half of the nineteenth century). The reduction

of bank equity to the present low levels over the past century paralleled the expansion of the government safety net of banks, with equity levels decreasing as the safety net expanded.⁴¹

If banks were to rely less on subsidized borrowing and use more equity, any increase in their cost of funding would be fully matched by taxpayers' savings on the cost of providing subsidies to the banks. Society would benefit by having healthier and safer banks that are less likely to become distressed and impose additional costs, and the distorted incentives to take advantage of the guarantees would be reduced. Would having more equity interfere with any of the services that banks provide? As the next chapter shows, the answer is a clear "No." In fact, safer banks that use more equity can serve the economy much better.

experience, one of whom was also on the board of AIG before the financial crisis. See Max Abelson, "JPMorgan Gave Risk Oversight to Museum Head Who Sat on AIG Board," *Bloomberg*, May 25, 2012. The largest institutional investors, however, may be passive and subject to their own governance problems. Allison (2011, loc. 562), for example, states that "many of the large fund family have an obvious, disturbing motive to avoid confronting megabanks about their business practices and governance; they too have conflicts of interest. The funds' sponsors derive substantial revenues from providing investment services . . . to the megabanks, and many rely on the banks to distribute their funds to the public." He points to governance problems within the funds themselves.

39. See McLean and Elkind (2004). Similar issues arose in other scandals, such as those surrounding Tyco and WorldCom.

40. Francine McKenna, who often contributes to *American Banker*, has pointed to these issues in many pieces. See, for example, "Auditors Are Asleep at the Switch on Banks' Risk Controls," *American Banker*, July 16, 2012, and "Familiar Patterns in Spain's Banking Crisis," *American Banker*, June 27, 2012. The problem of conflicted auditors who are reluctant to challenge models used by banks and their accountants or to alert investors and regulators about risks from off-balance-sheet items adds to the opacity of disclosures and accounting-based valuations, all of which call into question how informative the disclosed valuations are. For example, Das (2010, 221) refers to "the looking glass world of Japanese accounting." In describing it, he states, "This was like giving someone money and then having them give it back to you and calling it income—it did not make any sense."

NINE *Sweet Subsidies*

1. Mr. Zandi's comment in the epigraph is from Louise Story, "U.S. Program Lends a Hand to Banks, Quietly" (*New York Times*, April 14, 2009), referring to the ability of Goldman Sachs and Morgan Stanley to access loans from the Federal Reserve and guarantees from the FDIC after changing their status from investment banks to bank holding companies in 2008. Mr. Zandi continued by saying, "It's an infinite subsidy." See the section "Banks Have Uncle Sam" in this chapter.

2. Incidents such as this abound in recent history. For example, on November 1, 1986, a huge fire broke out in a dye factory on the Rhine near the Swiss city of Basel. The water used to extinguish the fire mixed with the chemicals and flowed into the river, coloring it red and killing all fish over several hundred miles downstream (see Hernan 2010). The *Exxon Valdez* and, more recently, the BP Gulf of Mexico oil spills are other examples.

3. In the entire discussion we continue to ignore the benefit Kate derived from living in the house. Considering it would not change the discussion, because she lived in the house in all scenarios.

4. To simplify the discussion we are ignoring here again the potential losses if the house had been abandoned or lost value because of lack of maintenance.

5. In the United States before 2007 many people took out second mortgages to finance additional consumption (see "Second Mortgage Misery," *Wall Street Journal*, June 7, 2011).

6. If Kate invests \$20,000 in bonds that pay her 3 percent interest for sure instead of investing that amount in the house, she will have \$20,600 from this investment no matter what happens subsequently to the value of the house. On the upside, the guarantees do not matter; Kate will be in the same situation as she would be if she was investing all \$30,000 in the house (the bottom panel of Table 9.1 and the top panel of Table 9.2). But, on the downside, Kate will be protected from losses. For example, if the house declines to \$255,000 in value, Kate will lose only \$10,000, whereas she would have lost the entire \$30,000 if she had put it all in the down payment. In all cases, Kate is better off with the larger mortgage. The example effectively assumes that the interest rate for riskless investments in the economy is 3 percent. However, the conclusion that Kate prefers the larger mortgage does not depend on what Kate does with the money she does not put in the house; it is based only on the observation that investing less in the house takes more advantage of the guarantees. Because the bank is paid for sure, whatever Kate does not pay, her aunt does; the fact that Claire may pay more and never less implies that Kate benefits more. Of course Kate can make poor investments and take a lot of risk for which she is not fully compensated. She might make less than 3 percent on her \$20,000 and therefore possibly lose more than she would by investing it in the house. However, what we have seen is that there is a way for Kate to benefit from the guarantees if she invests the money prudently. As we will see shortly, if Aunt Claire gives Kate blanket guarantees, as long as Claire is not broke, Kate benefits no matter what she does; effectively, blanket guarantees are like money machines.

7. Kate's ROE will be further magnified if she borrows more. First, the gains on her investment in the house will be further magnified in the cases in which she is able to pay her mortgage without the guarantees. For example, if the final house price is \$345,000, Kate's ROE will be 123 percent if she invests \$30,000 in the house, as seen in Table 9.1; with only \$10,000 in equity, the \$46,300 Kate will end up with, seen in Table 9.2, represents a 363 percent ROE, much higher indeed. If the house increases in value by "only" 5 percent, to \$315,000, Kate will end up with 23 percent ROE if she invests \$30,000 in the house, while her final position of \$16,300 represents a 63 percent return on her investment of \$10,000, again higher. In the unfavorable scenarios, however, with a \$10,000 investment Kate's loss per dollar is greater. Comparing Kate's returns from investing \$30,000 in the house versus investing \$10,000 in the house and \$20,000 at a riskless 3 percent, Kate's position is obtained from the bottom panel of Table 9.2 by adding \$20,600 in each scenario. Her return will be the same as shown in the bottom panel of Table 9.1 (123 percent, 23 percent, and a loss of 27 percent, respectively) in the scenarios in which the house increases in value by 15 percent and 5 percent and in that in which it stays the same, whereas Kate will lose only 31 percent of her \$30,000 thanks to the \$20,600 that she will receive on her safe investment even though she will lose the entire \$10,000 down payment in the house.

8. Even without guarantees, if lenders believe that housing prices will always increase, as they seem to have believed in the housing bubble before 2006 (or if they believe that the borrowers will always pay their mortgage debts), they might make, and indeed have made, zero-equity loans, requiring no down payment and counting on equity to build as

the value of the house increases. As we have seen, however, housing prices do not always go up.

9. Again, if Kate puts nothing into the house and invests her entire \$30,000 safely at 3 percent, she will have \$30,900 for sure, plus whatever she might make on the house if its value ends up above \$309,000. She is guaranteed an interest rate of at least 3 percent in this case, and her return will be the same as shown in the bottom panel of Table 9.1 if the house value ends up being \$315,000 or \$345,000. Her return will be 3 percent in the other three scenarios because she does not have to cover the interest or any losses in the value of the house. If Kate makes risky investments with the funds, then of course how she will end up doing depends on how these investments turn out, but clearly, having no money in the house and experiencing only the upside from it is a highly beneficial situation for Kate.

10. This represents a recent increase in the eligible amount. Placing a higher amount under deposit insurance is easy if one divides it across multiple accounts or multiple banks. There are even deposit brokers who would help in this process. Kane (2012b) describes a regulatory arbitrage created by a deposit-swap market in which one can place practically any amount under deposit insurance. Malysheva and Walter (2010) discuss the expansion of the safety net in the United States in recent years.

11. See Acharya et al. (2010) and ASC (2012).

12. For more information on the use of guarantees and recapitalization, see Laeven and Valencia (2010, 2012).

13. On the cost of the bailouts and the recent crisis in the United States, see Better Markets (2012). For detailed descriptions of how bailout funds were used—and sometimes not used, or actually abused—see Bair (2012) and Barofsky (2012).

14. See Phil Kuntz and Bob Ivry, “Fed Once-Secret Loan Crisis Data Compiled by Bloomberg Released to Public,” Bloomberg, December 22, 2011. According to this piece, the amount that the Federal Reserve pledged in order to rescue the financial industry was \$7.77 trillion, and loan rates were below market rates and provided a large subsidy. Bloomberg News had to fight in the courts to be able to obtain the information about loans. Alan Feurer, in “Appeals Court Rules Fed Must Release Loan Reports” (*New York Times*, March 19, 2010), describes the lengthy legal battle over the information. According to this story, the Federal Reserve, helped by The Clearing House, a consortium of the largest banks, fought to keep the information from becoming public. Barofsky (2012, 88) writes regarding one of the Fed support programs, the so-called Term Asset-Backed Securities Loan Facility (TALF), that “under the terms of one TALF-eligible bond issued by Ford’s finance company, an issuer could take out a TALF loan for \$100 million that required him to pay the New York Fed 3.0445 percent interest (about \$3 million) for a bond that paid out 6.07 percent (about \$6 million), allowing the investor to pocket the difference of 3 percent (about \$3 million) each year. That’s the investor’s equivalent of shooting fish in a barrel.” In lending to entities formed in the AIG bailout, the New York Fed used LIBOR to determine the interest rate it charged for loans to the entities, knowing the rate was artificially low at the time. See Mark Gongloff, “Tim Geithner Admits Banks Bailed Out with Rigged Libor, Costing Taxpayers Huge Amount,” *Huffington Post*, July 25, 2012. See more references in the following notes.

15. See Boyd and Gertler (1994).

16. See Burnside (2011) and Acharya and Steffen (2012). As pointed out by Louise Armitstead, in “ECB’s LTRO Plan Flops as Banks Cut Lending” (*The Telegraph*, March 28, 2012), banks seem to have used these funds for lending to their governments rather than private businesses.

17. See Louise Story, “U.S. Program Lends a Hand to Banks, Quietly.” (This is the story referred to in the chapter epigraph and in note 1, where Mr. Zandi is quoted as saying that “it’s an infinite subsidy.”) On Morgan Stanley’s use of the Fed lending facility, see Jonathan Weil, “Morgan Stanley’s Deep Secret Now Is Revealed,” *Bloomberg*, March 23, 2011.

18. The German Bank Restructuring Act of 2010 follows the same logic. Only the United Kingdom’s Banking Act of 2009 acknowledges the possibility that, even though this is undesirable, support from taxpayers may again be needed in a future crisis. For a discussion, see ASC (2012) and Hellwig (2012). See also our discussion and notes at the end of Chapter 5.

19. Victoria McGrane, “Obama Signs Financial Regulation Bill,” *Wall Street Journal*, July 21, 2010.

20. According to Curry and Shibut (2000), the total cost was about \$153 billion, of which \$29 billion was paid by private funds, mostly by means of charges on other institutions in the industry.

21. Rules for interest deductibility on mortgages differ by country. For example, in Switzerland interest on mortgages is deductible up to an “imputed rent” plus 50,000 Swiss francs. In Germany mortgage interest for owner-occupied housing is typically not deductible for individuals.

22. Is there a catch? If instead of investing in a house one invests one’s money elsewhere, one will pay taxes on profits from that investment. But if one makes relatively safe investments (also to prevent having to default on the mortgage), one can choose investments that would be taxed at a lower rate than income, for example, taking advantage of the lower tax rate on capital gains. This can make borrowing to buy a house attractive even to those who have enough money to buy it without borrowing.

23. This is based on the analogy between corporations and individuals. For an individual owning a firm, interest expenses are a cost. In computing the individual’s income, interest expenses are therefore deducted. For a corporation, interest expenses are also a cost, but so are, in a sense, distributions to shareholders. From the perspective of investors—that is, the individuals ultimately affected—the key question is how taxation affects the returns they earn on the different assets that the corporation is issuing.

24. When income taxation of investors is also taken into account, the picture may change somewhat, because capital gains are often taxed at a lower rate (see Miller 1977).

25. On taxes in general, see Slemrod and Bakija (2008); on correcting the tax advantage of debt, see De Mooij (2011) and Fleischer (2011). Panier et al. (2012) focus on an explicit tax subsidy to equity introduced in Belgium in 2006.

26. There are other ways for corporations to try to avoid paying corporate taxes, such as moving funds and entities to areas with lower tax rates. See, for example, Charles

Duhigg and David Kocieniewski, “How Apple Sidesteps Billions in Taxes,” *New York Times*, April 28, 2012.

27. See, for example, Lewis (2011).

28. Allison (2011) argues that the banks are inefficient and have not generated risk-adjusted shareholder value. Clear evidence of subsidized funding through implicit guarantees is the fact that credit rating agencies give large banks “credit bumps” that allow them to borrow on better, cheaper terms. Davies and Tracey (2012), Carbo-Valverde et al. (2011), Noss and Sowerbutts (2012), and Ueda and Weder di Mauro (2012) show that the size of the subsidies for systemically important financial institutions is substantial. Allison (2011), Boot (2011), and Hu (2012) argue that the increasing complexity of banks is problematic for the banks and for regulators and the public. In addition to the complications associated with resolution and bankruptcy, the complexity raises serious concerns about governance and control. Some of these issues were discussed in earlier chapters.

29. Previous authors—for example, Berger et al. (1993)—had suggested that the efficient scale of banks might be quite low, less than \$1 billion in total assets. Hughes and Mester (2011) argue that previous estimates were distorted by not paying attention to economies of scale in banks’ risk choices, diversification of risks, and information processing. When paying attention to risk choices, they find significant benefits to banks’ becoming larger, and the larger the banks, the larger are these benefits. Anderson and Jøeveer (2012) also find significant effects of bank scale; however, these take the form of higher payments to bank managers rather than gains for shareholders. Both Hughes and Mester (2011) and Anderson and Jøeveer (2012) claim that their findings cannot be due to too-big-to-fail policies, but they do not actually take account of the effects of too-big-to-fail status on banks’ borrowing costs and on banks’ behaviors. In response to Hughes and Mester (2011), Davies and Tracey (2012) provide a study that does take account of the effect of implicit guarantees on banks’ funding costs. When adjusting for the value of guarantees, they find that there are no benefits from having banks operate at a larger scale. If anything, they find that large banks are “too big to be efficient”; that is, banks benefiting from government guarantees may well be operating at an inefficiently large scale. In discussing the role of risk choices and the benefits of better diversification of risks in large banks, Hughes and Mester (2011) also fail to allow for the possibility that risk diversification in investors’ portfolios might take the place of risk diversification in banks. One might also wonder about their focusing on data from 2007, when banks were recording large profits. Boyd and Heitz (2011) discuss the issue of efficient scale from a *social* perspective, taking account of risks for the financial system from too-big-to-fail banks; they argue that the socially efficient scale of banks is likely to be quite small. Allison (2011, loc. 437) argues that it is a “fallacy that diversification can protect the megabanks during a downturn. Markets and businesses that seemed to have low correlations during good times all converged during the crisis and compounded the banks’ losses and liquidity problems.”

30. The bank analyst Mike Mayo describes the following incident from 2010 (Mayo 2011, loc. 2677–79): “One of Citigroup’s goals . . . was to increase assets on its Citicorp business by 5 percent.” He goes on to say (2685–89) that “for a company with assets of \$1.4 trillion in the targeted growth area, a 5 percent increase means generating upward of \$70 billion

in new business every year, equivalent to half a percent of total U.S. gross domestic product. Citigroup was aiming at that kind of growth during a slumping global economy. . . . Citi's 5 percent goal was like a hitter in baseball saying he's going to go three for four in a particular game before he even knows who's pitching." When he asked the company about this, he reports (2697–99), "Pandit's approach was to say, 'That's not a goal. It's not something we're reaching for—we're so well positioned that we're merely going to be the passive recipient of that growth. Nice. Like manna from heaven.'" This is consistent with our suggestion that unlimited guarantees amount to a money machine.

31. Brewer and Jagtiani (2009).

32. See Kelly et al. (2012). Gandhi and Lustig (2012, 5) discuss the impact of guarantees and implicit subsidies on the returns of large and small banks and estimate that the value of the guarantees to the largest commercial banks has been about \$4.71 billion per year.

33. Haldane (2011b, Table 1) provides estimates of the value of the guarantees to banks in the United Kingdom and globally. The estimates for the value of the subsidy that he obtains using an options pricing approach are \$496 billion in 2007, \$1.8 trillion in 2008, about \$2.3 trillion in 2009, and \$924 billion in 2010, for an average of \$1.3 trillion per year for 2007–2010. Haldane obtains lower estimates using uplifts in credit ratings; these are differences between credit ratings for banks assuming government support relative to unsupported ratings.

34. See Haldane (2011b), Davies and Tracey (2012), Gandhi and Lustig (2012), and Noss and Sowerbutts (2012).

35. All numbers here are taken from Chapter 1 of Acharya et al. (2011a), which gives a systematic account of Fannie Mae and Freddie Mac over several decades. The \$85 billion and \$5.2 trillion in engagements in mortgages and mortgage guarantees in 1980 and in 2008 are composed of \$64.8 billion and \$1.7 trillion in residential mortgages in 1980 and 2008 and \$20.6 billion and \$3.5 trillion in mortgage guarantees in 1980 and 2008.

36. Acharya et al. (2011a, 29).

37. If the industry is not very competitive, the effect of government guarantees and subsidies might be different. Subsidies and guarantees increase the value of a bank's license. The fear of losing its license might cause the bank to be more careful about the risks it takes. Keeley (1990) suggests that the increase in banks' risk taking in the 1980s was caused by reductions in banks' franchise values due to increased competition. If the industry is very competitive, the potential positive effect of subsidies and guarantees on the banks' franchise values is usually dissipated by competition. When banks have difficulties earning a profit, their owners and managers may feel that they do not have much to lose, so they gamble—for survival or for resurrection. If depositors and other creditors do not care, the result can be very costly.

38. For an early warning about the S&Ls, see Kareken (1983). An interesting natural experiment was provided by the German Landesbanken. A 2001 agreement between the European Commission and the German government determined that government guarantees to the banks would be discontinued in 2005. Thus the expected benefits from future guarantees were reduced in 2001, but the Landesbanken had four more years to borrow with the help of government guarantees. During those years they engaged in a lot of addi-

tional borrowing and risk taking. The additional risk taking was most pronounced in those Landesbanken that were weakest. See Fischer et al. (2011) and Körner and Schnabel (2012).

39. For TARP, loss estimates now are around \$60 billion. See Mark Gongloff, “TARP Profit a Myth, Claims TARP Inspector General Christy Romero,” *Huffington Post*, April 25, 2012. For Fannie Mae and Freddie Mac, loss estimates lie between \$150 billion and \$350 billion (see Acharya et al. 2011, 2). For the assets acquired by the Federal Reserve, predictions are unclear. See also Better Markets (2012) and the list provided at <http://projects.propublica.org/bailout/list>, accessed October 12, 2012. For some cost estimates in Europe, see Sebastian Dullien, “The Costs of the Financial Crisis 2008–2009: Governments Are Paying the Tab,” *Social Europe Journal*, October 19, 2011. The German cost estimates of Kaserer (2010), amounting to €34–52 billion, have been overtaken by developments since 2010, which have added some €20–30 billion to the bill. As noted in Chapter 1, on the basis of actual (rather than projected future) costs so far, Laeven and Valencia (2012) estimate that Germany’s bailout costs in the recent crisis were 1.8 percent of GDP. The corresponding figures are 1 percent for France, 6 percent for Belgium, 3 percent for Denmark, 27.3 percent for Greece, 12.7 percent for the Netherlands, 3.8 percent for Spain, and 1.1 percent for Switzerland. Whereas Kaserer’s estimates are based on forecasts of future losses that have yet to be confirmed, Laeven and Valencia’s assessments are based on actual outlays and losses already incurred, as recorded in the governments’ books.

40. This issue will be discussed in Chapter 13.

41. See Holtfrerich (1981), Berger et al. (1995), Alessandri and Haldane (2009), and Carbo-Valverde et al. (2011).

TEN *Must Banks Borrow So Much?*

1. In fact, as we saw in Chapter 6, loans are quite a small part of the assets of global banks. Smaller banks may also make investments that are not much different from those made by other investors rather than making loans. Although banks are set up to make loans, they are not required by regulation to do so, and they choose which loans and investments to make according to their own preferences. The role of regulation in distorting banks’ incentives is discussed in Chapter 11, and we return to bank lending in Chapter 13.

2. It is derived from the Italian *banca rotta*, which literally means “broken bench” or “broken table” and is said to refer to a practice in the late Middle Ages of breaking the table of a money changer when he defaulted. This explanation of the origins of the term is given for the Italian word *bancarotta* by Pietro Ottorino Pianigiani in *Dizionario etimologico online* (<http://www.etimo.it/?term=bancarotta>, accessed October 28, 2012), and for the French word *banqueroute* by François Noël ([1857] 1993). Kluge (1975) also gives this explanation of the origin of the German *Bankrott* but warns that there is no evidence to show that the practice of breaking the tables of defaulting money changers actually existed. According to Kluge, the term *rotta* should be translated as “in default, insolvent,” a second meaning that both the Italian word and its Latin ancestor, *ruptus*, broken, took on in the high Middle Ages. Hoad (1986) also refers to the medieval meaning of *ruptus* as “insolvent.”

The Parade of the Bankers' New Clothes Continues:

28 Flawed Claims Debunked

Anat Admati and Martin Hellwig*

Revised July 6, 2014

The debate on banking regulation has been dominated by flawed and misleading claims. The title of our book *The Bankers New Clothes: What's Wrong with Banking and What to Do about It* (Princeton University Press, 2013, see bankersnewclothes.com) refers to flawed claims about banking and banking regulation, and the book discusses and debunks many of them.

Flawed claims are still made in the policy debate, particularly in the context of proposals that banks be funded with more equity and less debt than current or new regulations would allow. Those who make the flawed claims do so without addressing our arguments, even when commenting on the book or on our earlier writings. Because the financial system continues to be dangerous and distorted, however, flawed claims must not win the policy debate.¹

This document provides a brief account of claims that we have come across since the book was published in February, 2013. We provide brief responses, with references to more detailed discussions in the book and elsewhere.² Many claims are asserted without any justification. Some of these claims are simply false or based on fallacious reasoning. Other claims are misleading or irrelevant, for example confusing costs and benefits to banks or bankers with costs and benefits to society, which must be the focus of policy. Still other claims are based on implausible theories that ignore important parts of reality

We first provide a list of the flawed claims that the rest of this document takes on. References to chapter numbers refer to our book. Nothing that we heard or read changes our conclusions or our strong policy recommendations.

*This document is a revision of a document posted in June 2013, which debunked 23 flawed claims. Claims 12, 13, Claims 24, 25 (inserted after original Claim 20) and Claim 28 (the last one) are new to this document. We also rephrased a few of the claims and expanded the text in some cases, specifically Claims 5, 6, 11 15 (in current count).

¹ We are grateful to Peter Conti-Brown and Paul Pfleiderer for comments on an earlier draft. Others who have written to challenge flawed claims include Mark Whitehouse (for example, "Seven Dumb Things Bankers Say," April 5, 2013 and "Too-Big-To-Fail Myths, Goldman Sachs Edition," May 28, 2013, both in Bloomberg View), Bloomberg View Editors (for example, "What's so Radical about a Safer Financial System?" April 9, 2013 and Simon Johnson (e.g., "The Impact of Higher Capital Requirements for Banks," April 18, Economix. Paul Pfleiderer has been active in the debate with academics privately and publicly (see Pfleiderer, 2014). See also the preface of the paperback edition, available at <http://press.princeton.edu/chapters/p10230.pdf>

² In some cases, we give specific references to writings where flawed claims are made, but we have not attempted to find all such references. Some of the claims have come up in various discussions of the book that we have had after its publication. Aside from the book, all our other writings are available through the book website, SSRN or the website in which we have posted writings since 2010 <http://www.gsb.stanford.edu/news/research/admati.etal.html>

List of Flawed Claims

Claim 1: Capital is money that banks hold or set aside as a reserve, like a rainy day fund.

Claim 2: Requiring banks to hold cash reserves equal to 15% or more of their assets does not make them significantly safer, and therefore even such high capital requirement would not address the key problems in banking.

Claim 3: The argument for requiring banks to have substantially more equity is only based on a theoretical result called the Modigliani-Miller theorem, which says that the funding costs of a corporation are independent of the mix of debt and equity it uses. This result does not apply in the real world because its assumptions are unrealistic.

Claim 4: The key insights from corporate finance are not relevant for banks because the economics of funding for banks is entirely different from that of other companies.

Claim 5: Banks are special because they create money.

Claim 6: Increasing equity requirements would reduce banks' ability to take people's deposits and issue short-term claims that are liquid and can be used like money.

Claim 7: Increasing equity requirements would increase the funding costs of banks because investors require higher returns when investing in equity than when investing in debt.

Claim 8: Increasing equity requirements would lower the banks' return on equity (ROE) and thus make investors unwilling to invest in banks' stocks.

Claim 9: Increasing equity requirements would constrain banks so they must reduce lending.

Claim 10: Increasing equity requirements would be harmful for the economy because banks would be less willing to make loans.

Claim 11: Higher equity requirements are undesirable because they would prevent banks from taking advantage of government subsidies and thus force them to charge higher interest on loans.

Claim 12: Historically, banks have never had as much as 30% equity; requiring as much equity would therefore harm the business of banking.

Claim 13: There is not enough equity around for banks to be funding with 30% equity.

Claim 14: Because banks cannot raise equity, they will have to shrink if equity requirements are increased, and this will be bad for the economy.

Claim 15: Increasing equity requirements would harm economic growth.

Claim 16: Basel III is already very tough, doubling or tripling previous requirements; banks that comply with Basel III requirements are safe enough.

Claim 17: Basel III is based on careful scientific analysis of the cost and benefits of different levels of equity requirements, whereas the rough numbers of those who advocate much higher requirements cannot guide policy because they are not supported by scientific calibration.

Claim 18: Because capital requirements should be adjusted to risk, it is essential to rely primarily on requirements that are based on assigning risk weights to assets.

Claim 19: Instead of issuing more equity, banks should be required to issue long-term debt or debt that converts to equity when a trigger is hit, so-called “contingent capital” or co-cos.

Claim 20: The Dodd-Frank Act in the US, or the newly adopted Banking Recovery and Resolution Directive (BRRD) and Single Resolution Mechanism in the European Union, have done away with the need to bail out banks; if a bank gets into trouble, the authority in charge of resolution will be able to resolve it without cost to taxpayers; there is therefore no need to increase equity requirements.

Claim 21: If equity requirements are increased, banks will increase their “risk appetite,” which will make the system more dangerous.

Claim 22: If equity requirements are increased, bank managers will be less disciplined.

Claim 23: The best way to make banking safer is to require banks to put funds from deposits into reserves of central bank money or Treasury Bills (so-called narrow banking, also known as the Chicago Plan for 100% reserve banking). Such a shift will give us a stable financial system, and there would be less need to impose equity requirements.

Claim 24: The financial system would be safe if banks are subject to a 100% reserve requirement so they can take no risk with depositors' money, while non-bank financial institutions are entirely prohibited from borrowing.

Claim 25: Tighter regulation of banks, and in particular higher equity requirements, are undesirable because they would cause activities to move to the unregulated shadow banking system.

Claim 26: Since banking is a global business, it is important to maintain a “level playing field”. Therefore, banking regulation must be coordinated and harmonized worldwide.

Claim 27: Stricter national regulation would harm “our” banks; instead we should be supporting them in global competition.

Claim 28: The politics of banking makes effective regulation impossible, and therefore debating the merits of specific regulations such as equity requirement is “beside the point.”

Flawed Claims Debunked

Flawed Claim 1: Capital is money that banks hold or set aside as cash reserve, like a rainy day fund.³

What's wrong with this claim? This statement is plainly false. As discussed in Chapters 1 and 6, capital in banking is a source of funding that can be used to make loans and other investments. This source of funding, elsewhere called equity, must be distinguished from debt, i.e., funds obtained by borrowing. Whereas banks typically fund less than 10% of their investments by equity, it is rare for any healthy non-financial company to have less than 25% in equity, and many successful companies borrow little or nothing, although there is no regulation that prevents them from borrowing as much as they would like (if they can find lenders).

Flawed Claim 2: Requiring banks to hold cash reserves equal to 15% or more of their assets does not make them significantly safer, and therefore even such high capital requirement would not address the key problems in banking.⁴

What's wrong with this claim? This claim rests on the same confusion between bank capital (equity) and cash reserves as Claim 1. Bank capital is *not* a cash reserve but a way of funding the bank. *Capital requirements do not impose any restriction on what assets banks hold.* They do not require banks to hold cash reserve. Since current requirements, and even the proposed Basel III reform, allow banks to have as little as 3% equity relative to their total assets, requiring 15%, or even 30% would make banks *significantly* safer. With equity levels considered minimal for healthy companies in the rest of the economy, banks would be able to absorb significantly more losses without becoming distressed or insolvent and without needing support, and, as we discuss in many writings, many distortions in the economy would be alleviated.⁵

Unlike equity requirements, reserve requirements are not as useful for maintaining the safety of banks unless they are very high. For example, if a bank has \$97 billion in deposits and \$3 billion in equity funding, cash reserve of \$15 billion will not help it to survive if it loses \$4 billion on its loans and other investments. After the loss, it has \$96 billion in assets and is insolvent, just as a homeowner is “under water” if the mortgage is larger than the value of the house. If instead the bank had \$85 billion in deposits and \$15 billion in equity, it would easily withstand the \$4 billion

³ For example, in “How to solve the bank capital Goldilocks question,” CNN Money and *Fortune*, May 6, 2013, Cyrus Sanati falsely claims that capital requirements ask banks to “hold some cash on the sidelines.” The comparison of capital to “a rainy day fund” has also been used in Andrew Ross Sorkin, “Easing of Rules for Banks Acknowledges Reality” *New York Times*, January 7, 2013, and in Gretchen Morgenson, “Trying to Slam the Bailout Door,” *New York Times*, April 27, 2013.

⁴ See for example, Cyrus Sanati, cited in footnote 3, who criticizes the higher capital requirements proposed by Senators Brown and Vitter and who, throughout the piece, falsely refers to the proposal as if it concerns cash reserves.

⁵ See Chapter 6, Admati et al (2013, Section 2) and Admati (2014).

loss and even a much larger loss without becoming distressed or insolvent. (However, see the discussion of Claims 23-24 regarding 100% reserve requirements.)

Flawed Claim 3: The argument for requiring banks to have substantially more equity is only based on a theoretical result called the Modigliani-Miller theorem. This result does not apply in the real world because its assumptions are unrealistic.⁶

What's wrong with this claim? Chapter 7 discusses the Modigliani-Miller theorem, which says that under some special conditions, a company's mix of equity and debt funding does not affect the company's overall value and funding costs, just like cutting a pizza into six slices instead of eight does not change the size of the pizza. The key insight of Modigliani and Miller, which holds universally, is that purely re-arranging how the risk taken by a corporation is divided among investor does not by itself change its funding costs.⁷ Other considerations may affect the funding costs, but they do not change our conclusions, as discussed in the context of Claims 4-11 below.

Our argument for requiring much more equity is *not in any way* based on the presumption that the funding mix, in banking or elsewhere, is irrelevant. Our argument is based, as it should be, on a comparison of the costs and benefits to society of different funding mixes for banks. We argue, in particular, that there is a large cost, and no benefit to society, from having banks funded with as much debt as they can under current and proposed regulations allow.

Flawed Claim 4: The key insights from corporate finance are not relevant for banks because the economics of funding for banks is entirely different from that of other companies.⁸

What's wrong with this claim? Chapter 7 contains a section (pages 110-112) entitled: "The Big Question: Are Banks Special?" that directly takes on the claim "Modigliani-Miller does not apply to banks." What is meant by this claim depends on whether "Modigliani-Miller" is considered as the "irrelevance" result or as an analytical approach. Whereas, as discussed in the context of Flawed Claim 3 above, the irrelevance result holds only under special assumptions, the analytical approach applies to all firms, including banks. Denying the relevance of the key insight of Modigliani and Miller is akin to denying the universal relevance of the laws of gravity in the presence of air frictions.

⁶ For example, Barclays Credit Research, "The Costs of a Safer Financial System," March 25, 2013, Clearing House, "Vanquishing TBTF," March 26, 2013, Oxford Economics, "Analyzing the impact of bank capital and liquidity regulations on US economic growth (A report prepared for The Clearing House), April 2013.

⁷ See also other references we give, and specifically Paul Pfleiderer (2010)

⁸ See, for example, Oxford Economics and Barclays Credit Research, both referenced in footnote 5, and "Safety in Numbers," *The Economist*, April 11, 2013. DeAngelo and Stulz (2013), 2013, mis-characterize our arguments as relying only on Modigliani and Miller and proceed to develop a model of liquidity benefits from deposits in a model that assumes no uncertainty, which is hardly suited for discussing the notion of "liquidity." (See the discussion of Claims 4 and 6 below.)

The logic of Modigliani and Miller applies, in particular, to bank equity and to banks' borrowing in wholesale markets and bond markets. Banks interact with the same investors that buy shares and bonds of other corporations. These investors value banks' shares and bonds in the context of their overall portfolio and using the same criteria for all investments. The logic of how funding costs and the risks borne by different investors depend on the banks' funding mix applies also to the borrowing by banks from other financial institutions.⁹

Importantly, like all other firms, banks have owners or shareholders and they can choose how much equity to use for funding and how much to borrow. And, like other firms, banks are more likely to become distressed or insolvent when they are highly indebted and have little equity. Moreover, the issues discussed in Chapter 3, entitled "The dark side of borrowing," including the strong conflicts of interest between borrowers and creditors, and the distortions and inefficiencies of high indebtedness and particularly of distress and insolvency, apply to banks. Those who argue that banks are different and seek to justify the banks' choice of funding mix as inevitable or efficient often neglect these distortions and inefficiencies, which can spill over to taxpayers and the public.¹⁰

Flawed Claim 5: Banks are special because they create money.¹¹

What's wrong with this claim? This claim rests on an abuse of the word "money."¹² The notion that banks "produce" or "create" money is based on the observation that people can easily transform deposits into cash and that they regard the funds they have in a bank deposit as being similar to cash and are able to use those funds for payments, such as by checks and credit cards.¹³ Monetary economists therefore refer to people's total holdings of cash and of deposits in the economy as the amount of "money" in the economy.¹⁴

⁹ In some of the academic literature on banking, the statement "MM does not apply to banks" is used to postulate frictions that, under the assumptions of the models, might be addressed by borrowing, while conveniently ignoring the enormous frictions and collateral damage on the system that borrowing creates, which we discuss in Chapters 3, 6, 8 and 9. See also Pfeleiderer (2010) and Admati and Hellwig (2013).

¹⁰ On the inefficiency of high leverage even from the private perspective of all banks' investors, see Admati et al (2014).

¹¹ We have been confronted with this statement in various discussions of the book.

¹² For a forceful criticism of this abuse of language, see Tobin (1967).

¹³ Some (for example, Gorton, 2010) have suggested that the use of short-term borrowing, for example through so-called repos, is a modern-day form of deposits. (See also Cyrus Sanati, referenced in footnote 3.) Repos share with deposits the very short-term nature of the lenders' claims. Unlike deposits, however, repo borrowing is not accompanied by provision of payment services. The repo lender, e.g., a money market mutual fund, might provide payment services to its own investors, but those services have nothing to do with the bank that acts as repo borrower. Repo borrowing takes place in wholesale markets with financial institutions acting as lenders. In these markets, as discussed in the context of Claim 6, the insights about the economics of funding that apply to all firms are fully relevant. The so-called shadow banking system, with money market mutual funds offering money-like claims and investing the funds they get in short-term claims on banks as well as other institutions, poses problems for monetary policy as well as prudential regulation and supervision. On the former, see Pozsar (2014), on the latter Gorton and Metrick (2010).

¹⁴ The value of this amount depends on how one draws the line between claims that are "money like" and claims that are not, for example whether one considers savings deposits or term deposits to be sufficiently similar to demand

“Money creation” in the sense described above is related to banks’ holding so-called fractional reserves, i.e. keeping a fraction of the funds deposited with them as cash reserves and using the remainder for loans. As the banks’ borrowers use the funds they get to make payments, the recipients will keep parts of these payments in bank deposits. In this way, fractional reserve banking causes total deposits to be larger than the amount of central bank money deposited with the banks. The amount of “money” measured as the sum of deposits and cash in the economy is thus bigger than the amount of money that the central bank has issued.

Putting demand deposits and cash into the same macroeconomic aggregate does not mean that they are literally the same. A critical difference is that *deposits are a form of debt*.¹⁵ Banks are obliged to pay the depositor when he or she wants the money back. If a bank cannot repay depositors, there is clearly a problem. By contrast, cash, issued by a central bank, is nobody’s debt.¹⁶ (For a detailed discussion, see Chapter 10.)

Some argue that deposits differ from other kinds of debt because the banks themselves create deposits by their lending. Moreover, this “money creation through lending” is said to be the way money from the central bank gets into the economy.¹⁷ Indeed, if a commercial bank borrows from the central bank and then makes a loan to a nonfinancial firm or to a private household it provides its borrowers with a claim on a deposit account. The bank’s borrowers, however, will generally use these deposits for payments to third parties. The recipients of these payments may want to put some of the money they get into deposits, but they may instead prefer to move the money out of the banking system altogether, e.g., to a money market fund or a stock investment fund.¹⁸

From the perspective of the individual bank, the fact that lending goes along with deposit creation does not change the fact that *the bank owes its depositors the full amount they deposited*. The key difference between deposits and other kinds of debt is not that deposits are “like money” or that deposits may be created by lending, but rather that the bank provides depositors with

deposits to be included. Pozsar (2014) suggests that the amount of “money like” claims in non-bank institutions such as money market mutual funds should also be taken in.

¹⁵ One of the strangest statements in this context comes from John Stumpf, the CEO of Wells Fargo Bank, who reportedly said in an interview: “Because we have this substantial self-funding with consumer deposits we don’t have a lot of Debt.” (See Tom Braithwaite, “Wells Chief warns Fed over Debt proposal,” *Financial Times*, June 2, 2013. “Self-funding” ordinarily refers to equity and retained earnings. Deposits, by contrast, are a form of debt. It is false, indeed a contradiction in terms, to say that a bank that relies primarily on deposit funding does not have a lot of debt.

¹⁶ Deposits with the central bank usually are claims to receive cash. Since the central bank can itself create this cash, these deposits do not involve serious obligations for the central bank

¹⁷ See, for example, Thomas Mayer, “Lasst Bankpleiten zu!” (Allow banks to fail!), *Frankfurter Allgemeine Sonntagszeitung*, January 5, 2014, Martin Wolf, “Only the Ignorant Live in Fear of Inflation,” *Financial Times* April 10, 2014, and “Strip Private Banks of Their Power to Create Money”, *Financial Times* April 24, 2014.

¹⁸ Nor is it the case that lending by commercial banks is necessary for central bank money to get into the economy. Central bank lending to commercial banks and the latter’s lending and deposit creation represent only one channel by which the central bank can inject money into the economy. Another way is for the central bank to buy securities such as government bonds or even shares of private companies in the open market. The sellers of such shares might be private investors rather than banks, in which case bank lending plays no role in the central bank’s money creation at all.

services such as payments through checks and credit cards or ATM machines that make funds available continuously. The demand for deposits depends on these services, as well as the interest that the bank may offer, and it may also depend on the risk of the bank becoming insolvent or defaulting.¹⁹

Flawed Claim 6: Increasing equity requirements would reduce banks' ability to take people's deposits and issue short-term claims that are liquid and can be used like money.²⁰

What's wrong with this claim? The claim falsely assumes that the amount of a bank's equity is fixed and limited, and that none of the banks' debt can be replaced with equity without interfering with "liquidity provision." In fact, a bank can raise the amount of equity by retaining and reinvesting its earnings, or by issuing new shares, either in addition or instead of some of its debt. By increasing its equity, the bank could actually raise the amount of deposits it can take; if equity requirements are increased, adding equity would allow the bank to keep its deposits and other "liquid" debts unchanged.

Relying on more equity would actually *enhance* a bank's ability to provide useful liquidity because, with more equity, the bank's debt is more trustworthy. Thus, contrary to the claim, the "liquidity" or "money-like" nature of deposits and other short-term bank debt is actually improved when the bank is less highly indebted and has more equity. By making the banks' deposits and other short-term debt safer, additional equity actually enhances the banks' ability to provide benefits to depositors without needing support from central banks or governments.

In this context, however, the banks have flawed incentives, which lead them to borrow excessively. If the banks' owners and managers could firmly commit all their future funding decisions, they would take account of the fact that additional equity enhances the safety and the liquidity of their debt and makes the creditors willing to accept lower interest rates. As a matter of fact, however, such commitment is impossible. Over time, banks repeatedly take new funding decisions. In these decisions, the interest rates on previously-contracted debt are taken as given. Banks have no reason to take into account the fact that additional equity makes their previously-contracted debt safer whereas additional debt and the risky investments funded with this new debt make it less safe.

¹⁹ Because depositors get returns through services just as well as, or instead of interest payments, the key insight of Modigliani and Miller is less important for deposits. As discussed in the context of Claim 4 and as explained in Chapter 7 of the book, however, this insight is essential for the other borrowing banks do, such as short-term borrowing from money market funds or hedge funds, and to their equity. This is discussed in Chapters 4 and 7.

²⁰ Barclays Credit Research, referenced in footnote 5, DeAngelo and Stulz (2013), *The Economist*, referenced in footnote 7, and Kling, "What Do Banks Do?" *The American*, February 26, 2013 warn of the reduction in bank deposits that, in their view, would be implied by higher equity requirements. Gorton (2012) refers to banks as "producers of debt" in the form of deposits and other short-term claims that people want because these debts are similar to money. Gorton views equity and investments as "inputs" for this debt "production." There is actually no sense in which the bank's equity is an input to its debt when both debt and equity entitle investors to payments from the bank, both being on the same side of the bank's balance sheet. Indeed, it makes little sense to refer to debt promises the bank makes to its creditors as something that is "produced."

Debt overhang, i.e., the existence of previously-contracted debts, may generate a ratchet effect that makes the bank's leverage increase whenever new needs or opportunities call for additional borrowing, whereas there is an aversion (on the part of the bank's owners, shareholders and managers) to decreasing leverage because such a decrease would benefit incumbent debt holders. Because of this effect, the mix of debt and equity funding of banks that we see is likely to take insufficient account of the beneficial effects of additional equity for the safety and liquidity of deposits and other reforms of "money-like debt" of banks, in addition to not taking account of the effects of the risks to which their actions expose the rest of the financial system and the overall economy.

The discussion above also suggests that the increased reliance of banks on short-term debt that we have seen in the past decade cannot be presumed to be beneficial for society or even privately for the banks. More likely, as we explain in our book and in other writings, this increase reflects the flawed incentives that banks' managers and shareholders have as a result of debt overhang.²¹

Flawed Claim 7: Increasing equity requirements would increase the funding costs of banks because investors require higher returns when investing in equity than when investing in debt.²²

What's wrong with this claim? First, as discussed in Chapter 7, it is fallacious to suggest that using more equity in the funding mix is more costly on the basis of the mere observation that the required return on equity is higher than the required return on debt. The required return on equity, debt, or any other security depends on the entire funding mix, and the required return on equity (as well as generally on other securities, including debt) will go down if the bank has more equity. As discussed in Chapter 9, and below in the context of Claim 11, a reason that total funding costs of banks might increase as a result of higher equity requirements is that with more equity banks would be less able to benefit from guarantees and subsidies, which come at the expense of taxpayers. For the policy debate, the relevant concern must be the cost and benefits *to society* of banks using different mixes of funding with different levels of equity. Because the fragility of the financial system is costly and harmful to society, a correct statement, contrary to the claim, is: "Increasing equity requirements would reduce the cost to society of having a fragile and inefficient financial system where banks and other financial institutions borrow excessively, and thus it would be highly beneficial."

Flawed Claim 8: Increasing equity requirements would lower the banks' return on equity (ROE) and thus make investors unwilling to invest in banks' stocks.

²¹ For more detail, see Admati et al (2013, Sections 4.2 and 4.3) and Admati et al (2014). The latter contains a detailed analysis of this effect as well as the method by which banks would choose to reduce leverage in response to leverage ratios requirements. This analysis and our recommendations in Chapter 11 of the book are relevant for making leverage regulation work.

²² See, for example, Oxford Economics, and Barclays Credit Research, (referenced in footnote 5), *The Economist* (referenced in footnote 7), and Douglas Elliott "Higher Bank Capital Requirements Would Come at a Price," Brookings paper, February 20, 2013.

What's wrong with this claim? As explained in Chapter 8, the first statement is false; when asset returns are low, the ROE is actually higher with more equity. Investors' willingness to invest in banks' stocks, or in the stocks of other firms, depends on whether they are properly compensated for the risk they take, not just on the stocks' expected returns. If managers target specific ROE levels, they may actually harm shareholders by exposing them to risk without proper compensation. Moreover, when managers borrow excessively or take excessive risks, they harm creditors and taxpayers and endanger the public, which includes most of their shareholders.

Flawed Claim 9: Increasing equity requirements would constrain banks so they must reduce lending.²³

What's wrong with this claim? As explained in Chapters 6 and 11, to comply with higher equity requirements, healthy banks can increase their equity levels by retaining their earnings or by selling new shares to investors. In either case, with more equity banks would have *more* funds, which can in turn be used to increase their lending. If increased equity requirements cause banks to reduce their lending, the reason is that they do not *want* to increase their equity. As explained in Chapters 3, 8, and 10 and in other writings, this phenomenon is due to the effect of overhanging debt and the conflicts of interest created by indebtedness which create a sort of addiction to borrowing that is reinforced and encouraged by government guarantees and by compensation structures in banking.²⁴ Banks that are unable to raise equity at any price may well be insolvent and should be unwound, as discussed in Chapter 11.

Banks' lending decisions also depend on how attractive loans are relative to other investments. Many banks, including most of the large banks in the United States, are not even using all the funding they obtain from depositors to make loans.²⁵ If banks do not make loans, therefore, the problem is *not* a lack of funds *nor* an inability to raise more funds for profitable loans, but rather the banks' choices to focus on other investments instead.²⁶ The risk-weighting system used in capital regulation, which we discuss in some detail in Chapter 11, also creates incentives for banks to invest in securities in the market rather than, for example, make business loans.

²³ See, for example, S&P, "Brown Vitter Bill: Game-Changing Regulation for U.S. banks, April 25, 2013. Elliott (referred to in footnote 17) stresses that frictions in capital markets make it difficult or impossible for banks to raise new equity. As we discuss in Chapter 11, the arguments he gives that allude to information asymmetries are not applicable to new equity issues through rights offerings.

²⁴ Admati et al. (2014) explores in detail the leverage ratchet effect and explains why the effect is so important in banking.

²⁵ See, for example, Elizabeth Dexheimer, "JPMorgan Leads U.S. Banks Lending Least Deposits in 5 Years," Bloomberg, February 20, 2013. In the same story quotes a principal at Deloitte & Touche LLP, saying that new regulations that include "holding more capital to cushion losses" would impede lending. Quite obviously, especially in the context of the story (about the low ratio of loans to deposits), this statement is fallacious and misleading. This fact may not be as obvious because of the pervasive confusion between capital and cash reserves discussed in Claim 1 above).

²⁶ Under-investment is among the distortions and inefficiencies associated with heavy borrowing, again due to a "debt overhang" effect. This problem is explained in Chapter 3.

Flawed Claim 10: Increasing equity requirements would be harmful for the economy because banks would be less willing to make loans.²⁷

What's wrong with this claim? This claim obscures the fact that credit crunches are primarily due to heavy indebtedness and financial distress, not from “too much equity.” More equity generally enables banks to *increase* their lending and to be able to continue to lend in downturns.²⁸ As discussed in our response to the preceding claim and in Chapter 11, if banks choose to make fewer loans, the reason would most likely be because their overhanging debt makes issuing new shares unattractive or because they intensify their efforts at “risk weight management,” which, under the current system of capital regulation, induces a bias against lending and in favor of other investments. Controlling the transition to more equity by banning payouts to shareholders and specifying target levels of equity rather than ratios would mitigate any such effect.

It is also false to presume that all lending is useful. Banks help the economy by making *appropriate* loans at *appropriate* interest rates that reflect the borrowers' risks and the cost of funds. Some loans (such as, quite clearly some subprime mortgages prior to 2008) might actually be wasteful and inappropriate; such loans are usually the result of banks counting on someone else to bear the losses. Excessive lending can also result when there are too many banks with too much capacity; in this case, banks' “gambling for survival” may offer cheap loans for a while, but their actions may expose the economy to increased risk of a major crisis later on. In fact, as already noted, credit crunch and reduced lending are due to the effect of debt overhang, which comes from excessive borrowing, not from having “too much equity.”

Flawed Claim 11: Higher equity requirements are undesirable because they would prevent banks from taking advantage of government subsidies and thus force them to charge higher interest on loans.²⁹

²⁷ In addition to Barclays Credit Research, Oxford Economics, referenced in footnotes 5, and Elliott, referenced in footnote 17. The Clearing House, referenced in footnote 5, and S&P, referenced in footnote 18, also warn that higher equity requirements would reduce the supply of credit.

²⁸ In the same spirit, Mervyn King, the outgoing governor of the Bank of England, recently said: “Those who argue that requiring higher levels of capital will necessarily restrict lending are wrong. The reverse is true. It is insufficient capital that restricts lending. That is why some of our weaker banks are shrinking their balance sheets. Capital supports lending and provides resilience. And, without a resilient banking system, it will be difficult to sustain a recovery.” (See “A Governor looks back – and forward,” speech given at the Lord Mayor's Banquet for Bankers and Merchants of the City of London, June 19, 2013.) Kapan and Minoiu (2013) show that “banks with strong balance sheets were better able to maintain lending during the crisis,” and suggest that “strong bank balance sheets are key for the recovery of credit following crises.” Cole (2013) shows that bank lending to businesses suffered when banks incurred losses and that the Troubled Asset Relief Program (TARP), which did not alleviate the banks' indebtedness, did not result in improved lending.

²⁹ See, for example, Oxford Economics, referenced in footnotes 5, Tucker, referenced in footnote 16 and Elliott, referenced in footnote 17. William Isaac, in “Better than Brown-Vitter: Make Banks Issue Long-Term Debt,” *American Banker*, June 4, 2013 warns that higher equity requirements on the largest banks would cause them “to decrease their lending dramatically and/or increase significantly the price of loans.”

What's wrong with this claim? Whereas deposit insurance is useful for preventing inefficient bank runs, it is often underpriced for individual banks, and it has the undesirable impact of enabling and encouraging banks to take risk and to “economize” on equity. Underpriced explicit or implicit guarantees to any form of bank borrowing make bank funding artificially cheap and create a distortion in the economy. By rewarding debt and penalizing equity funding the subsidies are socially harmful, especially at the very high levels of debt the banks choose. Even if all the subsidies are passed to banks' customers in the form of cheaper loans, they contribute to the financial system's being inefficient, bloated and fragile, and they distort competition and the allocation of resources in the economy.

There are two types of subsidies banks receive when they borrow but not when they use equity funding. First, the tax code in most countries gives debt a tax advantage relative to equity for all corporations. Despite this tax treatment, and even with no regulation of their funding, no healthy corporation maintains as little equity as banks. The tax effect can be neutralized, but there is no social cost if banks pay more taxes.

Second, explicit guarantees through deposit insurance for which banks often do not pay the appropriate economic costs, and implicit guarantees that allow banks to borrow at terms that are more favorable than their indebtedness and the risks they take would normally imply, encourage and subsidize excessive borrowing.³⁰ Measuring the size of subsidy is difficult because it amounts to an underpriced insurance contract whose value changes with the likelihood and extent to which it will be needed. In fact, there is reason to believe even many academic studies under-estimate the subsidies.³¹ Despite the overwhelming evidence that the subsidies are

³⁰ There is broad agreement that the subsidies are substantial. For example, see Chapter 3 of IMF 2014 Financial Stability Report, yet in documents such as, “Measuring the TBTF effect on bond pricing,” by Goldman Sachs Global Markets Institute, May 22, 2013, large banks argue that large banks do not benefit from a too-big-to-fail effect on their funding costs. There are a number of critical flaws in the Goldman Sachs analysis, and most are discussed in Mark Whitehouse “Too-Big-To-Fail Myths, Goldman Sachs Edition,” Bloomberg View, May 28, 2013. (See also Christopher Cole, “Goldman's TBTF Study Used Flawed Data to Reach Flawed Conclusions,” *American Banker*, May 30, 2013.) First, it compares interest rates on bonds of large banks and small banks without adjusting for differences in the risk creditors are supposedly exposed to. As discussed by Brando et al (2013), however, too-big-to-fail banks tend to take more risks in their investments than smaller banks; unless the implicit guarantee is perfect, this would raise the interest TBTF banks have to pay. (Frank Partnoy and Jesse Eisinger, in “What is Inside America's Banks,” *The Atlantic*, January 3, 2013 also shows banks' disclosures make it difficult for investors to assess the risk.) Second, the observation that creditors suffer more in failures of small banks relative to those of large itself reflects too-big-to-fail policies, including support from the Federal Reserve that has provided ample and cheap funding to banks since 2008. The GS paper dismisses findings of a large literature (some of which is also cited in Chapter 9) without engaging on substance, including academic studies that conclude that the value of the subsidies is in the tens of billions of dollars and particularly large in downturns. Many other industry-sponsored studies also fail to correct properly for the funding mix and other parameters of the bank borrowing that would affect the risks that their long term creditors would be exposed to, relative to those of other companies that do not have access to safety nets.

³¹ See Stefan Nagel, “Too Big to Fail is Larger than You Think,” Bloomberg View, March 2, 2014. Given the opacity and complex structure of the liabilities of the largest banks, it is possible that without any guarantees, the cost of unsecured borrowing to these banks would be prohibitive. Of course, among the reasons banks are able to borrow as much using collaterals is that deposits are unsecured, and at least some assets purchased with deposits can be used as collateral for additional borrowing.

substantial, large banks deny the existence of subsidies, while claiming that their cost of funding would increase with more equity. These claims are inconsistent with one another.

Requirements that banks use much more equity do not impose a cost to society; rather, they attempt to correct distortions and reduce excessive subsidies. If it is deemed desirable to subsidize specific loans or any other activities, subsidies should be given directly to the intended recipient, for example by attaching the subsidies to specific loans. Blanket subsidies to bank borrowing, by contrast, provide banks with below-market funding that they can use at their discretion. The cheap funds may not actually go to the loans that the economy needs, and instead the borrowing itself makes banks more fragile, exposes the economy to substantial risks, and distorts banks' investment decisions, giving them incentives to take excessive risk in their investments or to under-invest in relatively safe but worthy loans because bankers do not find them to have enough upside.³²

For more on these issues, see Chapter 9, entitled "Sweet Subsidies," which discusses harmful effect of guarantees and subsidies, and Chapters 12 and 13. The critical distinction between private costs to the banks and social costs to society is discussed in more detail in Admati et al, (2013, Section 4). If banks' funding costs (or any costs to banks' shareholders) are increased as a result of them being less able to take advantage of subsidies, the impact is entirely private. The cost and the harm of excessive indebtedness in banking is borne by the broader public without producing any corresponding benefit. Nevertheless, subsidizing banks through implicit guarantees is attractive for policymakers, because it does not show on budgets as it is given, thus appearing costless. In fact, the costs to society of providing banks with outsized and highly distortive subsidies are large, and equity requirements that reduce these subsidies and correct the distortions are thus highly beneficial.

Flawed Claim 12: Historically, banks have never had as much as 30% equity; requiring as much equity would therefore harm the business of banking.³³

What's wrong with this claim? The statement is false. First, references provided in our book (particularly in notes 20-27, pp. 242-243) support the claim that going back more than a century to the period before bank owners and shareholders could rely on creditors, central banks, or governments to pay their creditors, it was common for banks to have as much as 50% equity.

³² Paul Tucker, referenced in Footnote 14, takes the tax code as given and states that the cost advantage of debt "cost" "should be largely passed on to customers," failing to recognize that blanket subsidies to banks' debt are highly inefficient and distortive. Levitin (2014) also questions our statements that there is no social cost in reducing distortive subsidies, missing the distinction between social and private costs that is explained in detail in Admati et al (2013, Section 4). Matt Yglesias, in "Banks Borrow Too Much," Slate, March 7, 2013, expresses concerns regarding the potential cost of withdrawing the banks' subsidies. However, in his subsequent blog post entitled "How I Learned to Stop Worrying and Love Higher Capital Requirements," March 8, 2013, he states that in our book we "in many ways end up underselling the power of [our] idea," emphasizing that, as we explain in Admati et al (2013, Sections 2 and 9), not only would more equity make banks safer, but it will also make their lending and investment decisions more appropriate and better for society.

³³ Calomiris (2013) and Levitin (2014)

Second, arguments based on history presume that circumstances are similar. However, since the 1970s (uninsurable) macroeconomic risks have become much larger than they had been in the preceding decades. More importantly, financial institutions worldwide have become much more interconnected; this has greatly increased systemic from contagion. In some parts of the business also competition has become much more intense; this has reduced the ability of banks to rely on margins to provide buffers against shocks.

Our proposed leverage ratios *do not stand* on any historical figures, but are rather based on the economic arguments and observations of leverage in other, unregulated industries and on considerations of the social cost of banks' leverage. As indicated in Claims 4 and 5 above, the economics of high leverage is not fundamentally different for banks even if some of banks' debt is useful for providing liquidity.³⁴ Quite clearly, the bankruptcy of Lehman Brothers had significant collateral damage. As Admati et al (2013, 2014) explain, markets may allow leverage to get socially, and even privately, excessive. Requiring investment banks, which can scale up risk and become systemic, to have 30% equity corrects this situation and produces substantial social benefits with minimal if any relevant cost.

We are sometimes asked why we do not go to 100% equity. The reason is precisely that deposits do provide benefits that are not captured by standard corporate finance arguments. However, for most large banks today, deposits amount to less than half of their funding.³⁵ The 30% ratio we propose is roughly what banks themselves impose on financial institutions, such as hedge funds or REITs, to which they lend.

Flawed Claim 13: There is not enough equity around for banks to be funding with 30% equity.

What's wrong with this claim? As explained in the context of Claim 1, equity is not a cash reserve but a financial claim that banks can issue to obtain funding for their investments. Contrary to this claim, higher equity funding for banks does *not* require new savings and new inflows into capital markets. If a bank issues more equity and uses the funds it obtains to buy listed securities, capital markets will adjust so that investors who have sold the other securities will hold additional bank shares because the bank's returns would partly reflect the returns on those other securities. No new savings and no new inflows of funds into capital markets are required. To the extent that all assets in the economy are held by, and all risks are borne ultimately by end investors and taxpayers, the effect of a reshuffling of financial claims to make

³⁴ Levitin (2014) also argues that the market does not demand 20% or 30% of small banks that can fail or of investment banks. But small banks have insured deposits who don't bear deadweight bankruptcy costs, and Lehman Brothers' creditors may have well believed that they would be paid in full, as were the creditors of Bear Stearns even though they were not explicitly insured.

³⁵ See Advisory Scientific Committee (2014), as well as Chapter 6.

sure more equity funds banks' investments would generate less distorted, more appropriately priced investments in the economy.³⁶

Flawed Claim 14: Because banks cannot raise equity, they will have to shrink if equity requirements are increased, and this will be bad for the economy.

What's wrong with this claim? As we discuss in Chapter 11, solvent banks can always raise equity by selling additional shares, to existing shareholders through rights offerings or to new shareholders in the market.

If a bank cannot raise equity at any price, the bank is likely to be insolvent.³⁷ The existence of nonviable banks that cannot raise equity may reflect excess capacity in banking. (Excess capacity appears to be a serious problem in some countries and maybe globally at this time.) In this case, some downsizing of the industry would benefit the economy, contrary to the claim. The remaining banks would be viable and would have fewer incentives to gamble at the expense of their creditors, the taxpayers and the economy.

Flawed Claim 15: Increasing equity requirements would harm economic growth.³⁸

What's wrong with this claim? Those who make this sweeping assertion do not typically provide a coherent explanation for why increased equity requirements, which amount to a reshuffling of financial claims in the economy, would have a harmful effect on growth. They also neglect the fact that the worst downturn in economic growth occurred as a result of the actions taken by highly indebted banks and other financial institutions, which led to the financial crisis in the last quarter of 2008. One reason for the severity of this crisis was the lack of equity in banks, which made banks vulnerable to the decline in US real estate markets, defaults on subprime mortgages and the collapse of the markets for asset-backed securities.

Reference to the impact of higher equity requirements on bank lending ignores the fact that it is overhanging debt, and not excessive equity that lead to credit crunches, as discussed above in the context of Claim 10. In fact, banks with more equity to absorb losses without becoming distressed would be more able to sustain lending in a subsequent economic downturn, which would have positive effects for investment and the economy. Growth, as seen for example in Iceland and Ireland, can be temporary and illusionary when it reflects a boom that is followed by bust. As we discuss in Chapter 11, if the transition to a system with more equity funding for

³⁶ A more detailed discussion of this argument is offered in Section 7 of Admati et al (2013). At current levels of indebtedness, individual institutions, and the banking sector as a whole, are likely to be inefficiently bloated due to excessive subsidies. See also the discussion of Claim 14.

³⁷ For details of the argument, see Admati et al. (2013, 2014)

³⁸ See for example Oxford Economics, referenced in footnote 5. Levitin (2014, p. 2036) complains that we have not dealt with this claim in the book even as he does not explain why the claim should be true (except that bankers such as Josef Ackermann have asserted it to be true). In the book and elsewhere (including in the current document) we have argued that whatever justification (if any) is given to this claim, it is invalid or misleading.

banks and other institutions is handled properly, there would be no negative consequences to making the financial system less indebted and thus safer and less distorted.

Flawed Claim 16: Basel III is already very tough, doubling or tripling previous requirements; banks that comply with Basel III requirements are safe enough.³⁹

What's wrong with this claim? As we discuss in Chapter 11 (on the basis of the arguments of previous chapters), these statements use a false benchmark for the desired and feasible equity levels. Basel III still allows banks to fund up to 97% of the assets on their balance sheets by borrowing, just as Lehman Brothers did. As discussed below, the numbers in Basel III are not based on sound analysis, and the papers justifying them are fundamentally flawed. Stress tests have also been based on flawed and incomplete approaches involving biased scenarios and unreliable data; they have been much derided when banks that the stress tests said were safe became insolvent only a few months afterwards.⁴⁰ Moreover, the measurements of so-called bank capital often refer to accounting ratios of accounting measures of equity relative to risk-weighted assets, which has proven very poor for predicting banks' ability to withstand losses. Moreover, the regulations often rely on debt-like alternatives to equity, which have significant disadvantages relative to equity. (See the discussion of Claims 17-20 below.)

Flawed Claim 17: Basel III is based on careful scientific analysis of the cost and benefits of different levels of equity requirements, whereas the rough numbers of those who advocate much higher requirements cannot guide policy because they are not supported by scientific calibration.⁴¹

What's wrong with this claim? Basel III appears to be the result of a political process much more than of valid scientific analysis. As we discuss in Chapter 11 and elsewhere, the studies that support the Basel III rules are based on flawed models and their quantitative results are meaningless. For example, they assume that the required return on equity is independent of risk; one paper purports to derive the “optimality” of Basel III without even considering the costs that bank failures can impose on the rest of the financial system and the economy.⁴²

In a subsequent paper we compare the use of flawed theoretical models as a basis for quantitative analysis to the use of the distorted “map of the world as seen from New York’s 9th Avenue” for

³⁹ Claims that the requirements are tough and that banks are stronger now are frequently made by regulators, bankers and others. For example, Tom Braithwaite, in “Quest for Profits can Make Banks Safer,” *Financial Times*, February 18, 2013, suggests that the “lust for improved ROE” is a helpful, ignoring the possibility that a lust for return often involves taking risks and borrowing inefficiently, including to get around regulations based on risk weights.

⁴⁰ We discuss stress tests in Chapter 11. See also Vestergaard and Retana (2013).

⁴¹ Claims that the requirements are tough and based on “science” are frequently made by regulators, bankers and others. For example, in a November 19, 2013 interview to *Die Welt* Lloyd Blankfein, CEO of Goldman Sachs, said: “The new capital adequacy regulations under Basel III are the results of a long and meticulous process.”

⁴² See “An Assessment of the Long-term Economic Impact of Stronger Capital and Liquidity Requirements” and “Calibrating Regulatory Minimum Capital Requirements.” and “Capital Buffers – A Top-Down Approach,” Basel Committee on Banking Supervision Discussion Papers 173 and 180, Bank for International Settlements, 2010.

orientation in traveling through the American Midwest.⁴³ The fact that studies end up with precise numbers for “optimal” capital regulation is irrelevant if the foundations of the studies are shaky.

We are not aware of any theory or model that would provide appropriate estimates of the costs and benefits to society associated with different funding mixes for banks. Despite this, we are confident in asserting that equity levels of three percent of total assets, as admitted by Basel III, are unsafe, and that a significant increase will substantially improve the health and safety of the financial system. Low levels of equity expose the banks and the economy to unnecessary risk. And allowing banks to rely as much on subsidized borrowing distorts the economy. Countering the banks’ tendency to choose unsafe levels by effective regulation is essential.

Flawed Claim 18: Because capital requirements should be adjusted to risk, it is essential to rely primarily on requirements that are based on assigning risk weights to assets.⁴⁴

What’s wrong with this claim? As we discuss in Chapter 11, the system of risk weights that we currently have has more to do with politics and tradition than with science. In fact, the Basel rules negate important sources of risk altogether: Risks from sovereign debt that is funded in the currency of the country in question, risks of changes in funding conditions for medium or long-term loans, risks from the possibility that borrowers might default simultaneously because their default risks are correlated. Risk from sovereign debt that is funded in the currency of the country was in evidence in the Greek default in 2012. Funding risk for long-term loans was a key factor in the S&L crisis in the 1980s. Correlated borrower defaults were a major factor in the subprime mortgage crisis of 2006-2009. Even if the politics of the regulation could be dealt with, attempts to improve risk weighting are limited by a lack of data and by the never-ending changes in the risks and correlations.

In practice, the system of risk weights allows banks to be extremely highly indebted, masks important risks, and adds to the interconnectedness of the system. Whereas proponents of the system argue that it is important to require banks to have more equity funding when their assets are more risky, in fact the system allows banks to get away with *much less* equity funding when they say that their assets are less risky. A uniform ratio of required equity to total assets would provide a bound on the banks’ leverage. By contrast, because some risk weights are (near) zero, the risk-weighting system allows very high leverage. Thus, banks could take large positions in assets with (close to) zero risk weights, such as Greek sovereign debt or AAA-rated toxic securities, and fund them almost entirely with debt and with hardly any equity. The system also

⁴³ See “Does Debt Discipline Bankers? An Academic Myth about Bank Indebtedness,” referred to in footnote 9.

⁴⁴ For example, Tom Braithwaite (referenced in footnote 25) praises the Basel risk weights system for controlling banks’ risks. Most regulators appear to take it for granted that risk weights are essential, and the Federal Reserve has proposed to adopt Basel III, including the use of risk weights, for all US banks.

distorts banks investment decisions, typically against business lending, and is highly manipulable by the banks.⁴⁵

Flawed Claim 19: Instead of issuing more equity, banks should be required to issue long-term debt or debt that converts to equity when a trigger is hit, so-called “contingent capital” or co-cos.⁴⁶

What’s wrong with this claim? As we explain in Chapter 11 (pp. 187-188), in a section entitled “Anything but Equity,” and in Admati et al (2013, Section 8), the various proposals to use hybrids between debt and equity as a way of forcing investors rather than taxpayers to bear losses offer no advantages, and in fact have important disadvantages, relative to equity. First, like other debt, they raise the specter of domino effects or near the triggers where debt converts to equity (or is written down, depending on what the contract says). If the institutions that hold the co-cos are systemic, the consequences of a conversion to equity can be dramatic, and fear of these consequences might motivate a bailout. Indeed, in 2008-2009, holders of long-term debt and other hybrid securities meant to absorb losses as Tier 2 capital were paid even as banks were bailed out with taxpayer funds. Second, when conversion is imminent, the strategic behavior of market participants can induce dramatic changes in prices of equity and/or co-cos. Thus, co-cos do not provide reliable loss absorption and can create instability in a crisis. Third, as long as they have not been converted to equity, co-cos and other debt-like claims add distortions to banks’ lending decisions by exacerbating the effect of debt overhang and contributing to credit reductions in downturns.

There is no sense in which having banks rely on these hybrid securities is “cheaper” or better for society than relying on equity. For the purpose of regulation, using equity simply dominates these alternatives. Those who propose such alternatives as a substitute for equity have yet to give a valid reason for their proposal that is relevant for policy considerations.⁴⁷

⁴⁵ See further discussion in Chapter 11. The report on JP Morgan Chase “London Whale” loss by the Senate Committee on Investigation specifically refers to attempts to manipulate models, and points to poor risk controls. See, for example, David Henry and Lauren Tara LaCapra, “JPMorgan and other banks tinker with risk models,” Reuters, March 18, 2013, and Floyd Norris, “Masked by Gibberish, the Risks Run Amok,” *New York Times*, March 21, 2013. On the flaws in the Basel approach, see also Thomas Hoenig, “Basel III, a Well Intentioned Illusion,” Speech in Basel, Switzerland, April 9, 2013, Andrew Haldane, “Constraining discretion in bank regulation,” speech at the Federal Reserve Bank of Atlanta Conference, April 9, 2013, Joe Rizzi, “Risk-Based Capital: The Good, the Bad and Mostly the Ugly,” *American Banker*, May 20, 2013, William Isaac, referenced in Footnote 24, and Robert T. Taylor, “Basel Rules Echo Missteps of S&L Era,” *American Banker*, June 19, 2013.

⁴⁶ See, for example, Calomiris (2014). Proposals to use co-cos instead of equity have been implemented in Switzerland and have been discussed in the UK (see UK Independent Commission on Banking) and the European Union (see Liikanen Report). A variation on the concept is Equity Recourse Notes (ERNs) proposed by Bulow and Klemperer (2014), which amount to debt whose coupon payments are made in equity when a trigger is hit.

⁴⁷ As discussed in the context of Claim 9, compromising financial stability in order to give tax subsidies to inefficient funding by banks makes no sense. (Because they can force conversion to equity and do not confer creditors’ rights on their holders, co-cos do not qualify as debt under the US tax code, and thus do not have the tax advantage over equity in the US that they appear to have in Europe.) On the claim that long-term debt provides better discipline than equity, see the discussion of Claim 22 below. Co-cos and ERNs that they are meant to convert

Flawed Claim 20: The Dodd-Frank Act in the US, or the newly adopted Banking Recovery and Resolution Directive (BRRD) and Single Resolution Mechanism in the European Union, have done away with the need to bail out banks; if a bank gets into trouble, the authority in charge of resolution will be able to resolve it without cost to taxpayers; there is therefore no need to increase equity requirements.⁴⁸

What's wrong with this claim? As we discuss at the end of Chapter 5 and in Chapter 9, this claim ignores a number of critical points and is not credible.⁴⁹ First, to minimize the economic disruptions from having banks go into resolution, it may be necessary to maintain some important operations at least temporarily. This requires funding. Under the Dodd-Frank Act, such funding might be obtained by borrowing from the government; such borrowing puts the taxpayer at risk.⁵⁰ Second, whereas both the Dodd-Frank Act in the US and the BRRD in the EU rely on industry levies and on creditor bail-ins to absorb losses, in a crisis, when many banks may be weak at the same time and the financial system is at risk, the industry as a whole or the banks' creditors (which may be other financial institutions) may be too weak to perform this role. Even if the charges are spread over time, the burden of obligations they impose may be so great that the institutions involved become incapable of functioning. These concerns arise even if the debt in question is long-term or, as in Claim 19, subject to contingent conversion clauses. If the banks were required to rely on equity levels much higher than the low levels current regulations allow, loss absorption would be obtained without any of these disruptions.

Third, cross-border issues in the resolution of global banks, which played an important role in the Lehman Brothers bankruptcy, have hardly been addressed. If a bank with systemically important operations in different countries goes into a resolution procedure, the procedure will be handled by different authorities in the different countries in which the bank has legally independent subsidiaries; because the different authorities act independently and each authority takes care of problems in its domain, integrated operations in areas such as cash management and

some debt to equity ahead of insolvency and failure are better than debt claims that can only suffer losses within a "bail-in" process or in a resolution or bankruptcy (which are discussed in the context of Flawed Claim 21 below). And they are obviously a less fragile funding source than short-term debt that is subject to runs.

⁴⁸ See, for example, presentation by the Clearing House to the Board of Governors of the Federal Reserve regarding Title II of Dodd Frank Act on February 13, 2013, and their March 26, 2013 "Vanquishing TBTF." See also Paul Tucker, referenced in Footnote 16, and William Isaac, referenced in Footnote 24. This claim is the basis for proposals by the Federal Reserve to force bank holding companies to use more long-term debt (see, e.g., Governor Daniel Tarullo testimony to Senate Committee on Banking, Housing and Urban Affairs, February 6, 2014), and similar discussions by the Financial Stability Board about so-called GLAC "Gone Concern Capital Absorbing Capacity" (e.g., "Progress and Next Steps Towards Ending Too-Big-to-Fail," Report to G-20, September 2, 2013).

⁴⁹ See also Simon Johnson, "The Myth of a Perfect Orderly Liquidation Authority for Big Banks," *New York Times* Economix, May 16, 2013, and Simon Johnson and Marc Jarsulic, "How a Big Bank Failure Could Unfold," *New York Times* Economix, May 23, 2013. See also Anat Admati, "Too Much Equity? If Anything, Brown-Vitter Asks Too Little," *American Banker*, June 24, 2013.

⁵⁰ The Bank Recovery and Resolution Directive in the European Union ignores the problem altogether.

IT systems are no longer feasible. It may therefore be impossible to maintain, even temporarily, some of the functions which are essential for the rest of the financial system.⁵¹

Flawed Claim 21: If equity requirements are increased, banks will increase their “risk appetite,” which will make the system more dangerous.⁵²

What’s wrong with this claim? As we discuss in Chapter 8, such a claim was made by Bob Diamond when he was CEO of Barclays. Statements like these may be empty threats, but if they are not, the claim raises serious concerns about governance that should trouble banks’ shareholders and boards of directors. If risks are worth taking on behalf of the banks’ investors, why aren’t the banks already taking them? If the risks are not worth taking, why would the banks take them when they are funded with more equity? The claims appear related to the flawed focus on ROE in banking that we discuss in Chapter 8.⁵³

Flawed Claim 22: If equity requirements are increased, bank managers will be less disciplined.⁵⁴

What’s wrong with this claim? The claim rests on the false notion that bank creditors can “discipline” bankers, or provide better governance, than shareholders, and that bankers are more disciplined when investing borrowed money than when they invest shareholders’ money.

The academic literature includes theoretical models that claim to capture the idea that “debt disciplines managers.” Some such theories are specific to banks, arguing that by threatening to withdraw their funding, depositors and short-term creditors can provide “discipline.” As we have argued in various writings, including Chapter 10, these models are a poor basis for policy advice because they lack empirical support and ignore critical elements of the real world which, if included, would reverse their conclusions.⁵⁵ The fact that assertions about the real world are

⁵¹ See Advisory Scientific Committee (2012).

⁵² See, for example, Bill Black, “Brown-Vitter Will not and Cannot Work but it is Criminogenic,” Naked Capitalism blog, May 11, 2013.

⁵³ See also Anat Admati, “Beware of Banks’ Flawed Focus on Return on Equity,” *New York Times Dealbook*, July 25, 2011, and Anat Admati and Martin Hellwig, “The Case Against Banking’s Case for Less Capital,” Bloomberg View, February 5, 2013.

⁵⁴ A recent example is Raghuram Rajan, “Love the Bank, Hate the Banker,” Project Syndicate, March 27, 2013, which refers to the Washington Mutual (WaMu) bank failure, claiming that it is an illustration that the threat of runs helps provide “discipline” to bank managers. In fact, the timing of the events in the WaMu case is at odds with the argument Rajan seems to be trying to make. Significant withdrawals from WaMu started after the Lehman Brothers bankruptcy on September 15, 2008, and the bank was closed on September 24, 2008. By that time, it was too late to “discipline” the bank’s managers. William Isaac, referenced in Footnote 24, and Paul Tucker, referenced in Footnote 16, argue that long-term debt provides better discipline than equity. Seemingly echoing such claims, Jamie Dimon, CEO of JP Morgan Chase, warned in 2011 that bankers might do “stupid things” if they had “too much capital.” (See Alistair Barr, “J.P. Morgan’s Dimon concerned about too much capital: Surfeit of capital may make people do ‘stupid things,’ CEO says,” *Wall Street Journal MarketWatch*, February 15, 2011.) His statement raises the concern of why bankers would do stupid things with shareholder money, and why they would expect to get away with it.

⁵⁵ We have discussed this problem in earlier writings, particularly Admati et al (2013, Section 5), which first appeared in 2010. In Admati and Hellwig (2013), we explain that fragility in banking is more likely to reflect a *lack*

made on the basis of theoretical models without justifying the appropriateness of the models or addressing the critical issues we raise about their inadequacy is highly disturbing.

The suggestion that long-term debt provides better discipline to managers than equity is flawed in the context of banking. First, whereas long-term debt does not cause a risk of runs, it may still generate systemic risk. As discussed in the context of Claims 19 and 20, if debt holders are sufficiently important for the financial system, for example large insurance companies, it may be deemed undesirable to impose losses on them in resolution or insolvency. Moreover, the too-big-to-fail problem is relevant for long-term debt as well as short-term debt in that the collateral damage associated with distress or insolvency may lead to bailouts. If debt holders believe they can count on being bailed out, they will not impose any discipline on the bank.

Second, even if long-term creditors want to impose discipline, the scope for doing so is limited. For example, with a ten-year bond, on average one tenth of the debt is rolled over each year. But discipline can only be imposed when the debt must be renewed and investors negotiate with the bank for the conditions under which a renewal would be granted. As we have argued in the context of the possibility that deposit and short-term debt provide “discipline,” long-term debt may in fact provide the precise *opposite* of discipline: Negotiating with new short-term creditors, or offering them collateral can make incumbent long-term creditors worse off (should they expect to bear losses), yet these creditors are unable to withdraw their claims until the debt expires.

Flawed Claim 23: The best way to make banking safer is to require banks to put funds from deposits into reserves of central bank money or Treasury Bills (so-called narrow banking or the Chicago Plan for 100% reserve banking). Narrow banking will give us a stable financial system, and there would be less need to impose equity requirements.

What’s wrong with this claim? Requiring banks to put all funds into cash or Treasury Bills will make these banks safer but the financial system as a whole may become less efficient and/or less safe. If final investors maintain current funding patterns, banks will provide a lot of funding to the government; which may well come at the expense of funding of nonfinancial firms. The experience of southern European countries in the decades before 1990 shows such crowding out of private borrowing by government borrowing can have substantial negative effects on economic growth.⁵⁶

More likely, narrow banking would lead investors to put substantially more of their money in other institutions, for example money market funds which are “bank-like” without being subjected to the same regulation as banks. As we have seen in the weeks after the Lehman bankruptcy, such institutions can also be subject to runs and can be a major source of systemic risk. Financial instability would merely shift from banks to those “bank-like” institutions. In this

of discipline, which allows bankers to continue to borrow and thus prevents debt from providing any discipline. See also Admati et al (2014, Section 5), and Pfleiderer (2014).

⁵⁶ See, for example, the essays by Bruni, Caminal et al., and Borges in Dermine (1990)

context, it is useful to recall that Lehman Brothers was an investment bank, AIG was and is an insurance company and, in Europe, Dexia and Hypo Real Estate were in the covered-bond business; none of the institutions had any deposits.

Flawed Claim 24: The financial system would be safe if banks are subject to a 100% reserve requirement so they can take no risk with depositors' money, while non-bank financial institutions are entirely prohibited from borrowing.⁵⁷

What is wrong with this claim? This ignores the benefits of using some debt to fund difficult-to-value investments such as loans. Moreover, having no debt in financial intermediation would not necessarily eliminate fragility and possible harm to small investors. Investors want much of their money to earn some interest and yet to be liquid so they can get it fairly reliably when they need it. If banks must operate as open-end mutual funds with no debt, investors who need cash would return (or sell) their shares and get whatever the shares were worth. Determining share values would be easy if the assets held by a fund (of the fund itself) were traded daily on a public exchange, but otherwise would be problematic, and the mutual fund could suffer something similar to runs if shareholders fear significant asset price declines returned their shares and the fund had to sell assets in a hurry.⁵⁸

Trading in stock markets exposes individuals who need to trade for liquidity reasons to losses from better-informed investors. The opacity of assets consisting of many mortgages and other loans would give rise incentives to those with access to better information to engage in such trading if the shares of banks with 100% equity were traded on stock exchanges. The information-insensitivity of banks' debt is valuable for liquidity provision and the idea of requiring significant equity (such as 30% or even more) but not as much as 100% is intended to preserve this function and strike a balance between liquidity provision and the stability of the banking system.

Flawed Claim 25: Claim 25: Tighter regulation of banks, and in particular higher equity requirements, are undesirable because they would cause activities to move to the unregulated shadow banking system.⁵⁹

What's wrong with this claim? As we discuss, particularly in Chapter 13, the development of the shadow banking system and the risks it poses point to the past weakness of enforcement. The most dangerous parts of the shadow banking system developed primarily to avoid existing regulation. Examples include the so called off-balance-sheet special purpose vehicles and money market funds, both of which played in infamous role in the 2007-2009 financial crisis. The

⁵⁷ See Kotlikoff (2010) and Cochrane (2014) for such proposals.

⁵⁸ Gordon and Gandia (2013), for example, show that money market funds with floating value were also quite unstable at the same time that those that promised fixed net asset value were experiencing runs in 2008. Because Germany has had such experiences with open-end mutual funds for real estate investments, the German Federal Ministry of Finance proposed in July 2012 to outlaw open-end mutual funds for real estate investments.

⁵⁹ See, for example Elliott, referenced in footnote 17.

lessons should be that we need better rules and better enforcement, not that we should give up on rules. Dealing with regulatory arbitrage is challenging, but the challenge can be met, and it must be met if the regulation is important and beneficial.⁶⁰

Flawed Claim 26: Since banking is a global business, it is important to maintain a “level playing field”. Therefore, banking regulation must be coordinated and harmonized worldwide.⁶¹

What’s wrong with this claim? The claim, discussed in Chapter 12, is false. If some countries foolishly allow their banks to pursue very risky strategies and to borrow excessively, this is not a reason why other countries should do the same. Each country should be concerned with how much of a risk from its banks it is willing to accept, just as each country has its own building codes, consumer safety standards, environmental regulation and energy policy. We would not allow chemical companies to pollute rivers and lakes simply because the industry maintains that somewhere in the world another country is allowing these things. The search for “level playing fields” in global competition is highly damaging if it leads to a race to the bottom, where each country ends up fighting stricter regulation on behalf of its members of the industry.⁶²

Flawed Claim 27: Stricter national regulation would harm “our” banks; instead we should be supporting them in global competition.

What’s wrong with this claim? Like the preceding claim, this claim is false, as discussed in detail in Chapter 12.⁶³ The success of a nation’s banks in global competition is not an appropriate objective for policy. The global economy is not a sports event where a country might win medals in all disciplines. Rather, it is a system in which people and firms from different countries trade with each other, and a country necessarily “loses” in the markets for those goods which it imports. For the country, and for the people living in it, it is efficient to specialize on goods they are good at and to import the others. Government subsidies to banks, or indeed any firms, in international competition is undesirable; such subsidies creates distortions in favor of these firms at the expense of others in the economy, and it may direct too many resources, including talent, inefficiently to one industry over others. Weak regulation that allows banks or other firms to take

⁶⁰ Levitin (2014, p. 2037) asserts that “Admati and Hellwig think that [dealing with the shadow banking system] is easy.” In fact, we have not claimed it is easy to enforce the regulation effectively, only that it is important and possible. In “We are Still Hostages to the Big Banks,” *New York Times*, August 26, 2013, Anat Admati summarized the response: past failures to make sure that banks could not hide risks using various tricks in opaque markets is hardly reason to give up on essential new regulations. We must face the challenge of drawing up appropriate rules and enforcing them, or pay dearly for failing to do so.”

⁶¹ This argument is made frequently. See, for example, The Clearing House, referenced in footnote 5, and S&P, referenced in footnote 18.

⁶² See also Anat Admati and Martin Hellwig, “Global Level Playing Field Arguments are Invalid,” a version of which appeared as a comment in *Financial Times*, June 3, 2011. (The text is available at <http://www.gsb.stanford.edu/news/research/admati-battle-begun.html>) The Federal Reserve has effectively rejected this notion in other aspects of U.S. financial regulation by mandating the creation of intermediate holding companies to focus all the assets and liabilities of foreign banks operating in the United States to make it harder for these banks to evade national regulation. This model can be extended and applied to other aspects of international banking in a way to reduce the consequences of a failure of international financial regulatory harmony.

⁶³ See also the article referred to in the previous footnote.

risks at the expense of others is also very distorting. It is also legitimate for national regulators to protect their citizens by regulating foreign banks' subsidiaries if they deem regulations in the banks' home country to be insufficient or ineffective.

Flawed Claim 28: The politics of banking makes effective regulation impossible, and therefore debating the merits of specific regulations such as equity requirement is “beside the point.”⁶⁴

What's wrong with this claim? This claim, typically made without a suggestion as to how to overcome the political challenge, suggests that there is no choice but to allow flawed claims and dangerous policies to persist. The claim is analogous to saying that “politics makes corruption unavoidable; thus debating the merits of specific anti-corruption strategies is beside the point,” or: “the politics of organized crime makes effective criminal enforcement impossible; thus debating specific strategies for fighting organized crime is beside the point.” Whereas the politics of financial reform (including the outsized influence that banks have on the political process and the symbiotic relations of banks and governments) certainly makes quick progress unlikely, the eventual success of many reform movements has shown that change is possible. Reform, however, requires public awareness and debate, and sensible debate requires understanding of the issues. Clarifying the issues and empowering more people to participate can create public pressure on those who refuse to engage or to take action, and can eventually bring about the necessary political will for better regulation.⁶⁵

In reviewing our book, Martin Wolf concluded that our views are not more widely accepted because “bankers are so influential and the economics are so widely misunderstood.” His final assessment is that: “we have failed to remove the cause of the crisis. Further such crises will come.”⁶⁶ Because risk from banking is more abstract than risk from plane crashes or shoddy bridge construction, flawed claims about banking may have more staying power. However, the harm from a distorted and dangerous financial system is large and affects many people. The current regulations can be greatly improved, bringing large benefits to society. And understanding the issues does not require advanced training. If more people understand the issues, we have a chance of getting serious reform.

⁶⁴ This claim is made in Levitin (2014, p. 2067), who reviews our book together with others. A few of these books describe the writers' experiences in politics and regulation. The books by Sheila Bair, Neil Barofsky and Jeff Connaughton, in particular, highlight the political challenge and aim to increase political pressure for reform, but they do not explain the underlying economics in as much detail as we do in our book.

⁶⁵ We discuss the problem of willful blindness in the preface of the book and of the paperback edition, both of which are available on the book website.

⁶⁶ See Martin Wolf, “Why Bankers are Intellectually Naked,” *Financial Times*, March 17, 2013.

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PREPARED STATEMENT OF DOUGLAS HOLTZ-EAKIN

PRESIDENT, AMERICAN ACTION FORUM

JULY 31, 2014

Chairman Brown, Ranking Member Toomey, and Members of the Subcommittee, I am grateful for the privilege of appearing today. In my brief testimony today I would like to make four main points:

- Any expectations of Government support for bank holding companies is at root a problem created by policymakers' discretionary actions;
- The history of Federal Government assistance is not a pattern of consistent intervention on behalf of large firms, but rather an erratic and unpredictable series of interventions on behalf of firms large, small, financial, and non-financial;
- Attempts to measure any "implicit too-big-to-fail (TBTF) subsidy" is an elusive quest due to the many confounding factors; and
- Any market TBTF expectation is hardly fixed, but is necessarily a changing reality.

To start, I should stipulate that I do not seek in this testimony to specifically criticize or address the Government Accountability Office report on Government support for bank holding companies, nor the several other reports from other institutions on the same topic. Let me also stipulate that no firm (financial or otherwise) should ever benefit from an unfair advantage owing to policy-induced bias. Herein I only hope to provide the Committee with a brief conceptual discussion of some of the issues surrounding the question too big to fail (TBTF) and implicit subsidies.¹

The Policymaker-Creditor Nexus

What is too big to fail?² It is not a market failure, like an externality; it "is a rational market response to expectations set by Government policy."³ The proximate beneficiaries of any perceived bailout expectations (the banks) benefit passively—the ultimate source of any implicit subsidy exists at the nexus of the banks' creditors and expectations imputed from policymaker choices. As Minneapolis Fed President Narayana Kocherlakota put it, the proper conception of too big to fail "emphasizes the role of creditor beliefs . . . The beliefs of other parties are much less relevant."⁴

A creditor's belief that an institution will receive Government support will be rooted in an expectation that policymakers will take extraordinary steps to prevent contagion from one firm's failure to spread to others. Financial interdependencies may be the transmission mechanism for shocks to spread throughout a system, but policymakers make the ultimate decision to intervene, creating the ex ante expectation in the first place. Thus policymakers attempting to eliminate any implicit TBTF subsidy will need to look to themselves—or more specifically they will need to consider the rules and regulations which open the door to future intervention, or even lead creditors to believe intervention is forthcoming.

Unpredictability

The Federal Government has a dubious history of intervening in times of economic distress to save certain firms or otherwise mitigate their losses. Unfortunately for analysts and policymakers seeking to determine the financial effects of these interventions, this history is inconsistent, not hewing to any rule or regularity. In the most recent financial crisis, the Federal Government's response swung from pillar to post, intervening (Bear Stearns), then not (Lehman Brothers), intermittently providing assistance to investment banks, banks large and small (TARP), investment funds, and automakers (GM and Chrysler). If we go further back, we see intervention on behalf of a large, conventional commercial bank (Continental Illinois), a not particularly large or major money center institution (Long Term Cap-

¹A longer discussion of these issues can be found in Satya Thallam, "Reconsidering Too Big To Fail", American Action Forum, Research, March 12, 2014, <http://americanactionforum.org/research/reconsidering-too-big-to-fail>.

²Here I use the phrase "too big to fail" or "TBTF".

³Supra, n. 1.

⁴Narayana Kocherlakota, "Too-Big-To-Fail: The Role of Metrics", Speech delivered at "Quantifying the 'Too Big to Fail' Subsidy Workshop", Federal Reserve Bank of Minneapolis, Minneapolis, Minnesota, November 18, 2013, http://www.minneapolisfed.org/news_events/pres_speech_display.cfm?id=5203.

ital Management), savings and loans, airlines, and even a city (New York City).⁵ It's the very breadth and variety of these interventions (not to mention the extreme infrequency relative to the gross number of large firm failures during the same period) that should lead one to be skeptical of claims purporting a robust relationship between certain firms' insolvency and Government rescue.

And yet, even this incomplete list understates the highly heterogeneous nature of interventions. Loans, loan guarantees, capital infusions, stock purchases and warrants, direct transfers—all interventions are not born the same, and more to the point, have differing effects on different parties.

The larger point is that if, for example, investors in a bank holding company's bonds are pricing in a discount (lower yield) owing to some probability of a bailout conditional on insolvency, we must presume those investors have determined the likelihood not only that policymakers will in fact intervene, but that they have also correctly identified the firm that will receive assistance, and that the intervention will benefit them as opposed to shareholders, executives, employees, or even other classes of debtholders. Indeed, as we saw in the Chrysler bailout, some bondholders were in fact made worse off.⁶

Confounding Factors

One prevailing line of thinking points to the fact that large financial institutions can borrow more cheaply relative to smaller ones, and thus this differential is evidence of TBTF. But there are many factors that affect the funding costs of various institutions. This large-small differential in fact exists across most industries, with the banking industry somewhere near the middle.⁷ Differences in the liquidity of debt, risk diversification, information limitations, and other factors may explain much or all of the differential. That said, there still might be a part of the differential that cannot be explained by size-dependent factors—a TBTF subsidy may still be embedded. But any attempt to quantify the TBTF subsidy using cost of funding will need to successfully separate out the non-TBTF factors, which is exceedingly difficult and perhaps even impossible.

If a TBTF subsidy does exist, it stands to reason that it exists on a continuum, rather than simply as a binary condition between those firms that are TBTF and those that are absolutely not. Thus properly determining the subsidy portion of the differential is beside the point if one cannot properly identify the two categories of institutions.

Changing Expectations

The yield spread between firms may be ever changing; indeed, it has at times even become negative.⁸ As it changes, one must conclude either that: (1) the TBTF subsidy is in fact changing and transferring among institutions over time;⁹ (2) the yield spread attributable to TBTF is being swamped by other effects; or (3) the yield spread is not a reliable measure of the TBTF subsidy.

Consider what bank investors and creditors must have thought about the likelihood of rescue following the collapse of Bear Stearns as compared to after the collapse of Lehman Brothers. In just 1 year, real-time policy choices must have drastically changed the implied TBTF subsidy. Thus the outcome of any TBTF study will be directly affected by the window of time chosen to examine. But the larger point is that any policy chosen now or in the near future as a TBTF corrective may be (in the best case scenario) appropriately targeted for some fixed state of the world, but cannot easily adjust to changing conditions. In the extreme, would such a policy corrective (such as a tax) become a refund if and when the TBTF subsidy reverses?

Final Thoughts

Two wrongs do not make a right. Even if we presume the existence of a consistent and significant TBTF subsidy, one must consider the net effect of applying another distortion on top of the first. That is, proposed solutions such as a bank tax or a

⁵ Jesse Nankin and Krista Kjellman Schmidt, "History of U.S. Gov't Bailouts", *ProPublica* April 15, 2009, <http://www.propublica.org/special/government-bailouts>.

⁶ Todd Zywicki, "The Auto Bailout and the Rule of Law", *National Journal*, No. 7, Spring 2011, <http://www.nationalaffairs.com/publications/detail/the-auto-bailout-and-the-rule-of-law>.

⁷ Randall Kroszner, "A Review of Bank Funding Differentials", Presented at "Too Big to Fail and Its Implications on Bank Funding Costs", NYU School of Business, October 8, 2013, http://www.stern.nyu.edu/cons/groups/content/documents/webasset/con_044532.pdf.

⁸ Steve Strongin, et al., "Measuring the TBTF Effect on Bond Pricing", Goldman Sachs Global Markets Institute, May 2013, <http://www.goldmansachs.com/our-thinking/public-policy/regulatory-reform/measuring-tbtf-doc.pdf>. See also Kroszner 2013, *supra*.

⁹ Kenichi Ueda and Beatrice Weder di Mauro, "Quantifying Structural Subsidy Values for Systemically Important Financial Institutions", IMF Working Paper 12/128, May 2012, <http://www.imf.org/external/pubs/ft/wp/2012/wp12128.pdf>.

financial transactions tax applied to TBTF institutions are attempting to counteract a distorting dynamic created by policymaker expectations and creditors' response with a punitive measure which works along a somewhat different channel.

Discretion is the handmaiden of bailouts. Time consistency in policymaking is an age-old problem and is not limited to financial crises.¹⁰ Congress should focus its energy on those mechanisms which: (1) make bank failures easier and predictable; and (2) limit policy choices even in a time of crisis.

One particularly promising avenue in this regard is to replace Title II of the Dodd-Frank Act with a bankruptcy process for banks. This would place decisions in the hands of a court, and not either an agency or the Congress. In the process it would limit discretion and clarify the outlook for creditors.

The Dodd-Frank Act happened. Whether one considers the Dodd-Frank Act a positive or negative change to financial regulation, there is little argument that it has a significant effect on financial institutions. This includes numerous new requirements and restrictions on the industry, many of them directed specifically at the largest bank holdings companies. The upshot is that any perceived advantages must be considered on net with any of these new costs.

Thank you and I look forward to answering your questions.

¹⁰ See Finn Kydland and Edward Prescott, "Rules Rather Than Discretion: The Inconsistency of Optimal Plans", *Journal of Political Economy*, Vol. 85, Iss. 3, pp. 473–492, June 1977. The difficulty of time-consistent plans are illustrated by a recent report which stated: "If the only choices are between bailout and fire-sale liquidations or value-destroying reorganizations that can result in a contagious panic and collapse of the financial system, responsible policymakers typically choose bailout as the lesser of two evils." John Bovenzi, Randall Guynn, and Thomas H. Jackson, "Too Big to Fail: The Path to a Solution", Report of the Failure Resolution Task Force of the Financial Regulatory Reform Initiative, Bipartisan Policy Center, May 2013, p. 43.

**RESPONSES TO WRITTEN QUESTIONS OF CHAIRMAN BROWN
FROM LAWRENCE EVANS**

Q.1. GAO used wide-ranging data and a number of models to estimate the various funding cost differences in its study. Will GAO make the full documentation of its data, coding, methodology, etc., available to third parties—either for free or at cost—so that independent experts can examine the data and processes to make their own evaluations and draw their own conclusions?

A.1. While GAO is not subject to the Freedom of Information Act, its disclosure policy follows the spirit of the act consistent with GAO's duties and responsibilities to the Congress. Upon written request, GAO may provide GAO records associated with this engagement to parties wishing to replicate our work. However, please be advised that certain exemptions to disclosure apply and GAO does not release certain information including proprietary and trade secret data. See 4 CFR §81.5 and 4 CFR §81.6.¹ Interested parties should submit their request in writing to GAO's Chief Quality Officer. The request may be emailed to recordsrequest@gao.gov, faxed to (202) 512-5806, or mailed by traditional mail.

Q.2. Has GAO released any information—such as a list of meetings, conference calls, and other conversations—regarding the parties with whom you consulted in preparing this report?

A.2. No, GAO has not released identifying information on the parties interviewed for the report.² The Objectives Scope and Methodology section of the report discloses only that we conducted interviews with representatives from credit rating agencies, investment firms, and corporations that are customers of banks, bank holding companies of various sizes, bank industry associations, public interest groups, academics, and other experts.

Q.3. Would you be willing to provide such information, including the party initiating the contact?

A.3. Yes, GAO will grant Members, upon their written request, access to the available information at GAO offices or will provide copies of such lists. The Objectives, Scope, and Methodology Section of the report details the criteria we used to select parties to interview.

Additional Information To Correct the Record

During the hearing Chairman Brown stated,

GAO used three industry-funded studies to design this report . . .

For the record, this is inaccurate. To inform our econometric approach and understand the breadth of results and methodological approaches, we reviewed 16 studies—1 of which was conducted by researchers at a large bank holding company and two others that

¹For information concerning fees and charges, please see 4 CFR 81.7.

²As per our protocols, for any ongoing work—except for classified work and investigations—GAO will disclose, if asked (e.g., by Members, congressional staff, agencies, or the press) the source of the request and the project's objectives, scope, and methodology. Additionally, all congressional offices have, through the Senate and House intranet connections to GAO, access to the background and key research questions for active GAO assignments, except for those cases where the reporting of such work would result in disclosing classified or other sensitive information. The information we volunteer would not include the detailed information on the parties we selected for interview.

were sponsored by a trade group representing large commercial banks. Taking into consideration the strengths and limitations of different methodologies, we developed our own econometric approach. We then selected three experts with relevant expertise to review our methodology and assess its strengths and limitations. These experts reviewed our approach before we implemented it and provided comments. In many instances, we made changes or additions to our models to address their comments, and in other instances, we disclosed additional limitations of the models. Before selecting these experts, we reviewed potential sources of conflicts of interest, and we determined that the experts we selected did not have any material conflicts of interest for the purpose of reviewing our work. Note well, the GAO approach was influenced most significantly by the research conducted by Dr. and his colleagues.

During the hearing Chairman Brown stated

. . . and the GAO arranged meetings with corporate treasurers of companies suggested exclusively—I believe exclusively—by the U.S. Chamber of Commerce . . .

GAO—not the Chamber of Commerce—identified firms we planned to contact. At GAO’s request, the Chamber informed its members that GAO was reaching out to corporate customers of banks. GAO then contacted and interviewed four of the member firms that expressed interest and met our criteria. We subsequently selected two additional firms to achieve further diversity across industry sectors. Note, GAO selected U.S. corporations from different industry sectors and with a range of banking needs. These corporate treasurers provided a diverse set of views on the issue.

RESPONSES TO WRITTEN QUESTIONS OF CHAIRMAN BROWN FROM DOUGLAS HOLTZ-EAKIN

Q.1. During the hearing, I asked all of the witnesses about the ratings “uplift” given to banks by ratings agencies as a result of perceived Government support. In response, you said that “recently most if not all the major credit agencies have removed the credit uplifts . . . If you care about ‘too big to fail’ now and 2013, ’14, it’s gone from that perspective.”

It is true that Moody’s recently removed the uplift for the holding company debt of the eight U.S. G–SIBs, while maintaining its assumption of support for bank-level senior debt. However, S&P released a report on August 4th—after the Subcommittee hearing—titled “U.S. Banks: Government Support Is Fading But Not Gone—Yet.” In it, they maintain a 1-2 notch uplift for the U.S. G–SIBs. In March, Fitch Ratings also released support ratings for some U.S. G–SIBs that “reflect Fitch’s expectation that there remains an extremely high probability of support from the U.S. Government (rated ‘AAA’, Rating Outlook Stable) if required. This expectation reflects the U.S.’s extremely high ability to support its banks especially given its strong financial flexibility, though propensity is becoming less certain.”

Would you care to amend or revise your response to the question in any way?

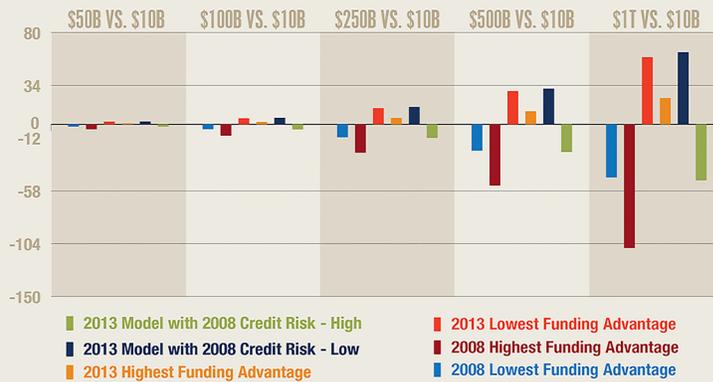
A.1. Thank you for bringing these more recent data to my attention. The Moody's report indicates that the basic trend toward no Government support remains, but that the pace is slower than I had estimated and markets may not as yet have fully reflected these developments as I had anticipated.

ADDITIONAL MATERIAL SUPPLIED FOR THE RECORD

CHARTS SUBMITTED BY CHAIRMAN SHERROD BROWN

Differences in Bond Yield Spreads

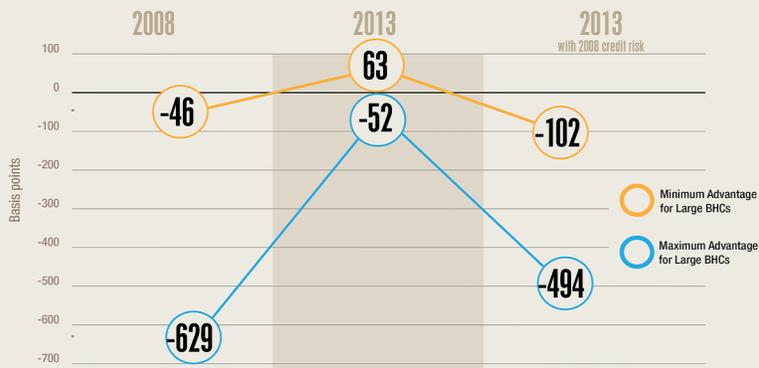
Based on Asset Size Assuming Average Credit Risk, 2008 and 2013



SOURCES: GAO Report: Large Bank Holding Companies, Expectation of Government Support

Estimated Funding Advantages for BHCs

with \$1Trillion in Assets Relative to BHCs with \$10 billion in Assets



SOURCE: GAO Report: Large Bank Holding Companies, Expectation of Government Support.

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REPORT SUBMITTED BY THE GOVERNMENT ACCOUNTABILITY
OFFICE



United States Government Accountability Office

Report to Congressional Requesters

July 2014

LARGE BANK
HOLDING
COMPANIES

Expectations of
Government Support

GAO-14-621

GAO Highlights

Highlights of [GAO-14-621](#), a report to congressional requesters

Why GAO Did This Study

"Too big to fail" is a market notion that the federal government would intervene to prevent the failure of a large, complex financial institution to avoid destabilizing the financial sector and the economy. Expectations of government rescues can distort investor incentives to properly price the risks of firms they view as too big to fail, potentially giving rise to funding and other advantages for these firms.

GAO was asked to review the benefits that the largest bank holding companies (those with more than \$500 billion in assets) have received from perceived government support. This is the second of two GAO reports on government support for bank holding companies. The first study focused on actual government support during the 2007-2009 financial crisis and recent statutory and regulatory changes related to government support for these firms. This report examines how financial reforms have altered market expectations of government rescues and the existence or size of funding advantages the largest bank holding companies may have received due to perceived government support.

GAO reviewed relevant statutes and rules and interviewed regulators, rating agencies, investment firms, and corporate customers of banks. GAO also reviewed relevant studies and interviewed authors of these studies. Finally, GAO conducted quantitative analyses to assess potential "too-big-to-fail" funding cost advantages.

In its comments, the Department of the Treasury generally agreed with GAO's analysis. GAO incorporated technical comments from the financial regulators, as appropriate.

View [GAO-14-621](#). For more information, contact Lawrence Evans, Jr. at (202) 512-4802, or EvansL@gao.gov.

July 2014

LARGE BANK HOLDING COMPANIES

Expectations of Government Support

What GAO Found

While views varied among market participants with whom GAO spoke, many believed that recent regulatory reforms have reduced but not eliminated the likelihood the federal government would prevent the failure of one of the largest bank holding companies. Recent reforms provide regulators with new authority to resolve a large failing bank holding company in an orderly process and require the largest bank holding companies to meet stricter capital and other standards, increasing costs and reducing risks for these firms. In response to reforms, two of three major rating agencies reduced or removed the assumed government support they incorporated into some large bank holding companies' overall credit ratings. Credit rating agencies and large investors cited the new Orderly Liquidation Authority as a key factor influencing their views. While several large investors viewed the resolution process as credible, others cited potential challenges, such as the risk that multiple failures of large firms could destabilize markets. Remaining market expectations of government support can benefit large bank holding companies if they affect investors' and customers' decisions.

GAO analyzed the relationship between a bank holding company's size and its funding costs, taking into account a broad set of other factors that can influence funding costs. To inform this analysis and to understand the breadth of methodological approaches and results, GAO reviewed selected studies that estimated funding cost differences between large and small financial institutions that could be associated with the perception that some institutions are too big to fail. Studies GAO reviewed generally found that the largest financial institutions had lower funding costs during the 2007-2009 financial crisis but that the difference between the funding costs of the largest and smaller institutions has since declined. However, these empirical analyses contain a number of limitations that could reduce their validity or applicability to U.S. bank holding companies. For example, some studies used credit ratings which provide only an indirect measure of funding costs.

GAO's analysis, which addresses some limitations of these studies, suggests that large bank holding companies had lower funding costs than smaller ones during the financial crisis but provides mixed evidence of such advantages in recent years. However, most models suggest that such advantages may have declined or reversed. GAO developed a series of statistical models that estimate the relationship between bank holding companies' bond funding costs and their size or systemic importance, controlling for other drivers of bond funding costs, such as bank holding company credit risk. Key features of GAO's approach include the following:

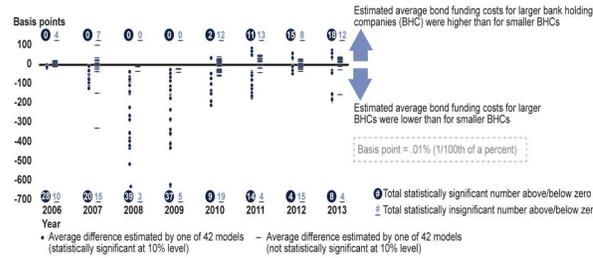
- **U.S. Bank Holding Companies:** The models focused on U.S. bank holding companies to better understand the relationship between funding costs and size in the context of the U.S. economic and regulatory environment.
- **Bond Funding Costs:** The models used bond yield spreads—the difference between the yield or rate of return on a bond and the yield on a Treasury bond of comparable maturity—to measure funding costs because they are a risk-sensitive measure of what investors charge bank holding companies to borrow.

Highlights of GAO-14-621 (Continued)

- **Extensive Controls:** The models controlled for credit risk, bond liquidity, and other variables to account for factors other than size that could affect funding costs.
- **Credit Risk Levels:** GAO compared bond funding costs for bank holding companies of different sizes at the average level of credit risk for each year, at low and high levels of credit risk for each year, and at the average level of credit risk during the financial crisis.
- **Multiple Models:** GAO used 42 models for each year from 2006 through 2013 to assess the impact of using alternative measures of credit risk, bond liquidity, and size and to allow the relationship between size and bond funding costs to vary over time with changes in the economic and regulatory environment.

The figure below shows the differences between model-estimated bond funding costs for bank holding companies with \$1 trillion in assets and bank holding companies with \$10 billion in assets, with average levels of credit risk in each year. Circles represent statistically significant model-estimated differences.

Estimates from 42 Models of Average Bond Funding Cost Differences between Bank Holding Companies with \$1 Trillion and \$10 Billion in Assets, 2006-2013



Source: GAO analysis of data from Bloomberg and the Financial Stability Board. | GAO-14-621

Notes: GAO estimated econometric models of the relationship between BHC size and funding costs using data for U.S. BHCs and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and BHCs that can affect funding costs. GAO estimated 42 models for each year from 2006 through 2013 to assess the sensitivity of estimated funding cost differences to using alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance. This figure compares bond funding costs for BHCs of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. Each circle and dash shows the comparison for a different model, where circles and dashes below zero suggest BHCs with \$1 trillion in assets have lower bond funding costs than BHCs with \$10 billion in assets, and vice versa.

All 42 models found that larger bank holding companies had lower bond funding costs than smaller ones in 2008 and 2009, while more than half of the models found that larger bank holding companies had higher bond funding costs than smaller ones in 2011 through 2013, given the average level of credit risk each year (see figure). However, the models' comparisons of bond funding costs for bank holding companies of different sizes varied depending on the level of credit risk. For example, in hypothetical scenarios where levels of credit risk in every year from 2010 to 2013 are assumed to be as high as they were during the financial crisis, GAO's analysis suggests that large bank holding companies might have had lower funding costs than smaller ones in recent years. However, reforms in the Dodd-Frank Wall Street Reform and Consumer Protection Act, such as enhanced

standards for capital and liquidity, could enhance the stability of the financial system and make such a credit risk scenario less likely.

This analysis builds on certain aspects of prior studies, but important limitations remain and these results should be interpreted with caution. GAO's estimates of differences in funding costs reflect a combination of several factors, including investors' beliefs about the likelihood a bank holding company will fail and the likelihood it will be rescued by the government if it fails, and cannot precisely identify the influence of each factor. In addition, these estimates may reflect factors other than investors' beliefs about the likelihood of government support and may also reflect differences in the characteristics of bank holding companies that do and do not issue bonds. Finally, GAO's estimates, like all past estimates, are not indicative of future trends.

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Abbreviations

AIG	American International Group, Inc.
BHC	bank holding company
CCAR	Comprehensive Capital Analysis and Review
FDIC	Federal Deposit Insurance Corporation
FDICIA	FDIC Improvement Act of 1991
FSOC	Financial Stability Oversight Council
GSIB	global systemically important bank
IDI	insured depository institution
LTCM	Long-Term Capital Management
OCC	Office of the Comptroller of the Currency
OFR	Office of Financial Research
OLA	Orderly Liquidation Authority
S&P	Standard & Poor's
SIFI	systemically important financial institution
SPOE	Single Point-of-Entry
TARP	Troubled Asset Relief Program

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U.S. GOVERNMENT ACCOUNTABILITY OFFICE

441 G St. N.W.
Washington, DC 20548

July 31, 2014

The Honorable Sherrod Brown
Chairman
Subcommittee on Financial Institutions and Consumer Protection
Committee on Banking, Housing, and Urban Affairs
United States Senate

The Honorable David Vitter
United States Senate

"Too big to fail" refers to a market notion that the federal government would intervene to prevent the failure of a large, interconnected financial institution to avoid harm to the economy. Events during the 2007-2009 financial crisis heightened concerns that market participants had come to view several of the largest U.S. financial institutions as too big to fail. Most notably, the U.S. government intervened to provide tens of billions of dollars of capital and other support to a few large troubled financial institutions out of concern that allowing these firms to go into bankruptcy would have further disrupted troubled credit markets and damaged confidence in the U.S. financial system.¹ Market expectations of government rescues can distort the incentives of investors and counterparties to properly price and restrain the risks of firms they believe to be too big to fail, potentially giving rise to funding cost and other advantages for these firms relative to smaller competitors. For example, creditors may be willing to accept lower interest rates on debt issued by these firms if they believe the possibility of a government rescue reduces the likelihood that they could suffer losses. If creditors and other counterparties do not fully charge a firm for the risks it is taking, that firm may have incentives to take on greater risks in the pursuit of higher returns. Excessive risk-taking in response to such incentives can increase the likelihood that such a firm could become distressed and disrupt financial markets.

¹Bankruptcy is a federal court procedure conducted under rules and requirements of the U.S. Bankruptcy Code. The goal of bankruptcy is to give individuals and businesses a "fresh start" from burdensome debts by eliminating or restructuring debts they cannot repay and helping creditors receive some payment in an equitable manner through liquidation or reorganization of the debtor.

The Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) prohibits rescues of individual failing financial institutions and provides new tools and authorities for the Federal Deposit Insurance Corporation (FDIC) to resolve a large failing financial institution in a manner that imposes losses on the firm's creditors and other investors while minimizing adverse impacts to the economy.² Nevertheless, market observers have continued to debate whether some of the largest and most complex financial institutions may continue to benefit from beliefs among their investors and counterparties that the government might intervene to prevent their failure.

You asked us to review any economic benefits that the largest bank holding companies (those with more than \$500 billion in total consolidated assets) have received as a result of actual or perceived government support. This is the second of two reports we are issuing on this topic.³ In this report, we review (1) what is known about how financial reforms have altered market expectations of government rescues and the relative advantages or disadvantages of being a large bank holding company and (2) the extent to which the largest bank holding companies have received funding cost advantages as a result of perceptions that the government would not allow them to fail.

Scope and Methodology

To address our first objective, we reviewed information from relevant statutory provisions and regulations and prior GAO reports to describe financial reforms that could impact market expectations of government rescues or relative advantages or disadvantages of being a large bank

²Pub. L. No. 111-203, 124 Stat. 1376 (2010).

³In November 2013, we issued the first report, which examined (1) actual government support for banks and bank holding companies during the financial crisis and (2) recent statutory and regulatory changes related to government support for banks and bank holding companies. See GAO, *Government Support for Bank Holding Companies: Statutory Changes to Limit Future Support Are Not Yet Fully Implemented*, [GAO-14-18](#) (Washington, D.C.: Nov. 14, 2013). At a January 2014 hearing, we provided testimony based on this report. See GAO, *Government Support for Bank Holding Companies: Statutory Changes to Limit Future Support Are Not Yet Fully Implemented*, [GAO-14-174T](#) (Washington, D.C.: Jan. 8, 2014).

holding company.⁴ We obtained perspectives on the potential impacts of these reforms from credit rating agencies, investment firms, and corporations that are customers of banks. Where available and relevant, we reviewed some public statements, reports, and other analyses by these groups. For example, to obtain information about credit rating agencies' assessments of the likelihood and level of government support for large bank holding companies, we reviewed relevant publications by the three largest credit rating agencies: Fitch Ratings (Fitch), Moody's Investors Service (Moody's), and Standard & Poor's (S&P). We interviewed representatives from each of these rating agencies to obtain their perspectives on factors contributing to changes in their assessments of government support over time.

We conducted interviews with representatives from 10 investment firms and six corporations to learn about (1) factors that influence their decisions to invest in or do business with bank holding companies of various sizes; (2) how they assess the risks of banks and the extent to which they rely on credit rating agencies' assessments of these risks; (3) their views on the likelihood that the federal government would intervene to prevent the failure of a large bank holding company and factors that have influenced these views over time; and (4) how, if at all, expectations of government support have impacted their decisions to invest in or do business with banks of various sizes. In selecting investment firms and large corporations for interviews, we selected nonrepresentative samples of firms. As a result, the views we present from these firms are not generalizable to the broader community of bank investors and customers and do not indicate which views are most prevalent. We selected investment firms with experience investing in debt or equity securities of banks and bank holding companies and selected different types of investment firms to obtain perspectives reflecting a range of investing strategies. Specifically, we selected three large asset management firms (each with more than \$1 trillion in assets under management); three public pension funds (each with more than \$50 billion in assets under management); three hedge funds; and one large insurance company. We

⁴For example, we reviewed [GAO-14-18](#), which describes Dodd-Frank Act provisions intended to place limits on agency authorities to provide emergency assistance to financial firms and strengthen regulatory oversight of large bank holding companies. We also reviewed prior GAO work on potential impacts of the Dodd-Frank Act. See GAO, *Financial Regulatory Reform: Financial Crisis Losses and Potential Impacts of the Dodd-Frank Act*, [GAO-13-180](#) (Washington, D.C.: Jan. 16, 2013).

selected U.S. corporations from different industry sectors and with a range of banking needs. We identified four of these firms and contacted them with the assistance of the U.S. Chamber of Commerce, which reached out to its members on our behalf, and selected two additional firms to achieve additional diversity across industry sectors. The corporations we interviewed included four multinational corporations (a chemical company, a delivery and logistics company, an energy company, and a technology company) and two corporations with all or close to all of their operations in the United States (a regional electric utility company and a national retail services company).

To obtain additional information and perspectives on how financial reforms or credit ratings could impact the relative advantages or disadvantages of being a large bank holding company, we reviewed relevant publicly available information in the financial statements of bank holding companies and conducted interviews with bank holding companies of various sizes, bank industry associations, public interest groups, academics, and other experts. For example, we reviewed bank holding companies' financial disclosures about how Dodd-Frank reforms could increase certain fees and how a credit rating downgrade could impact the amount of collateral required of them under certain financial contracts. We also reviewed our prior work on potential impacts of Dodd-Frank Act implementation.⁵

As part of our first objective, we reviewed regulators' efforts to assess their progress in addressing too-big-to-fail perceptions and market distortions that can result. We reviewed Dodd-Frank Act provisions that outline statutory responsibilities for the Financial Stability Oversight Council (FSOC) and reviewed relevant sections of the FSOC annual report. We interviewed officials from FSOC, the Department of the Treasury (Treasury), the Board of Governors of the Federal Reserve System (Federal Reserve Board), FDIC, and the Office of the Comptroller of the Currency (OCC) about their efforts to analyze the impacts of Dodd-Frank reforms on too-big-to-fail perceptions and to evaluate whether additional policy actions may be needed to address any remaining market distortions. We also reviewed relevant congressional testimonies and other public statements by agency officials.

⁵See [GAO-13-180](#).

To assess the extent to which the largest bank holding companies have received funding cost advantages as a result of perceptions that the government would not allow them to fail, we conducted an econometric analysis of the relationship between a bank holding company's size and its funding costs. To inform our econometric approach and understand the breadth of results and methodological approaches, we reviewed studies that estimated the funding cost difference between large and small financial institutions that could be associated with the perception that some institutions are too big to fail. We evaluated studies that met the following criteria: (1) used a comparative empirical approach that attempted to account for differences across financial institutions that could influence funding costs, (2) included U.S. bank holding companies, and (3) included analysis of data from 2002 or later. We chose these criteria to identify the most relevant and rigorous studies related to our research objective. To identify studies that met these criteria, we sought input from individuals, agencies, and groups that we interviewed, identified studies cited in an initial set of studies we had already identified, and conducted a systematic search of research databases (including Google Scholar and SSRN).

Our criteria excluded studies that used option-pricing approaches—that is, techniques that use tools for pricing stock options to estimate the value associated with possible government interventions to assist distressed banks—because these studies assume a too-big-to-fail funding cost advantage exists and only estimate its magnitude. We also excluded two studies that otherwise met our criteria, but did not attempt to control for important differences between financial institutions. We were aware of potential conflicts of interest associated with a number of studies in our review. For example, one study was conducted by researchers at a large bank holding company and two others were sponsored by a trade group representing large commercial banks. We considered the potential impact these conflicts of interest might have on their methods and results. We ultimately included 16 studies in our review that we determined were sufficiently reliable for the purposes of this report.

In reviewing these studies, we assessed what they identified as the level of funding cost differences and how that level has changed over time and we identified the strengths and limitations of the studies' approaches. Because of limitations of the methodologies of these studies, their results, while suggestive of general trends, are not definitive and thus should be interpreted with caution. We interviewed authors of selected studies, federal financial regulators, and other experts to obtain perspectives on

the strengths and limitations of relevant quantitative approaches that have been used.

Taking into consideration the strengths and limitations of different methodologies, we developed our own econometric approach to evaluate the extent to which the largest bank holding companies may have received funding cost advantages as a result of perceptions that the government would not allow them to fail. In addition, we selected three experts with relevant expertise to review our econometric approach and assess its strengths and limitations. These experts reviewed our approach before we implemented it and provided comments on our methodology. In many instances, we made changes or additions to our models to address their comments, and in other instances, we disclosed additional limitations of the models. Before selecting these experts, we reviewed potential sources of conflicts of interest, and we determined that the experts we selected did not have any material conflicts of interest for the purpose of reviewing our work.

We used a multivariate regression model to estimate the relationship between bank holding companies' funding costs and their size while controlling for factors other than size that may also influence funding costs. Our general regression model is the following:

$$\text{funding cost}_{bq} = \alpha + \beta \cdot \text{size}_{bq} + \gamma \cdot \text{credit risk}_{bq} + \delta \cdot (\text{size}_{bq} \times \text{credit risk}_{bq}) + X'_{bq} \cdot \theta + \varepsilon_{bq}$$

In this model, b denotes the bank holding company, q denotes the quarter, funding cost_{bq} is the bank holding company's cost of funding in a quarter, size_{bq} is a measure of the bank holding company's size at the beginning of the quarter, credit risk_{bq} is a list of proxies for the bank holding company's credit risk—the risk that the bank holding company will not repay the funds it borrowed as agreed, X_{bq} is a list of other variables that may influence funding costs, ε_{bq} is an idiosyncratic error term, and $\alpha, \beta, \gamma, \delta,$ and θ are parameters to be estimated. The parameter β captures the direct relationship between a bank holding company's funding cost and its size. The parameter δ captures the indirect relationship between a bank holding company's funding cost and its size that exists if the size of a bank holding company affects the relationship between its funding cost and credit risk. If investors view larger bank

holding companies as less risky than smaller bank holding companies due to beliefs that the government is more likely to rescue larger bank holding companies in distress, then either β is less than zero, δ is less than zero, or both.⁶ However, the parameters β and δ may also reflect factors other than these beliefs.

We used a measure of funding costs based on bonds issued by bank holding companies. Bank holding companies use a variety of funding types from different sources, including various types of deposits, bonds, and equity. We used bond yield spreads—the difference between the yield on a bond and the yield on a Treasury bond of comparable maturity—to measure a bank holding company's cost of bond funding. Treasury securities are widely viewed as a risk-free asset, so the yield spread measures the price that investors charge a bank holding company to borrow to compensate them for credit risk and other factors. We focused on bond yield spreads because they are a measure of funding costs that is available for bank holding companies of a range of sizes, including bank holding companies with less than \$10 billion in assets. Furthermore, bonds are traded in secondary markets, so changes in bond yield spreads can be publicly observed in a timely manner. Finally, bond yield spreads are a direct measure of funding costs, unlike alternatives such as credit ratings.

We used Bloomberg to identify U.S. bank holding companies with more than \$500 million in assets that were operating in 1 or more years from 2006 through 2013, and to identify all plain vanilla, fixed-rate, senior unsecured bonds issued by these bank holding companies, excluding bonds with an explicit government guarantee.⁷ We collected data on bond yield spreads, bank holding company size, variables associated with bank holding company credit risk, and bond characteristics from Bloomberg. We used these data to assemble a dataset with one observation for each bond in each quarter from the first quarter of 2006 through the fourth quarter of 2013. We constructed alternative measures to control for size, bond liquidity, and credit risk due to uncertainty about how to

⁶Negative values of β and δ are consistent with these beliefs as long as greater values of the size measure are associated with larger bank holding companies and greater values of the credit risk proxies are associated with greater credit risk.

⁷Plain vanilla bonds refer to bonds that pay interest at regular intervals and return the principal at maturity with no additional features such as convertibility to stock or options to redeem the bond before maturity. Such bonds are also known as straight bonds.

appropriately capture these important factors influencing bond yields and because the regression results may be sensitive to alternative specifications (see table 1). The numbers of bank holding companies and bonds we analyzed and summary statistics for our indicators of size, credit risk, and other factors are in appendix I.

Table 1: Overview of Variables Used in Econometric Models

Funding costs	Size	Credit risk ^a	Other bond and bank holding company characteristics
Quarterly average bond yield spreads based on prices from executed trades, executable quotes, and composites derived from executable and indicative quotes. ^b	Total assets. Total assets and total assets squared. An indicator for whether or not a bank holding company had \$50 billion or more in assets. ^c	<i>Capital adequacy:</i> Equity capital and subordinated debt as percentages of assets and risk-weighted assets. ^d <i>Asset quality:</i> Nonperforming assets as a percentage of tangible common equity plus loan loss reserves. ^e <i>Earnings:</i> Net income as a percentage of assets. <i>Maturity mismatch:</i> Volatile liabilities minus liquid assets as a percentage of total liabilities. ^f <i>Volatility:</i> Standard deviation of equity prices over the quarter, option-implied volatility for the quarter, the standard deviation of equity returns over the quarter, the standard deviation of excess equity returns over the quarter, and the standard deviation of earnings. ^g	<i>Bond liquidity:</i> Issue size, total volume traded during a quarter, and average bid-ask spread over a quarter. <i>Coupon rate:</i> The current interest rate on the bond. <i>Time to maturity:</i> The number of quarters until the bond matures. <i>Operating expenses:</i> Noninterest expense as a percentage of total assets.
Quarterly average bond yield spreads based on executed trades only.	An indicator for whether or not a bank holding company was designated a globally systemically important bank in November 2013.		

Source: GAO, IGAO-14-621

Note: Unless otherwise noted, all balance sheet and income statement variables—such as assets, liabilities, and net income—are measured as of the beginning of the quarter.

^aCredit risk increases with higher values of our asset quality, maturity mismatch, and volatility measures and with lower values of our capital adequacy and earnings measures.

^bBond yield spreads are the difference between the yield on a bond and the yield on a comparable Treasury bond. Executed trades are completed transactions for which the terms have been agreed upon and assets have been exchanged. Executable quotes (or firm quotes) are prices quoted by dealers at which they would be willing to trade. Indicative quotes are prices quoted by dealers that give an indication of the price at which a bond might trade but at which they are not obligated to trade. Composite quotes or prices are derived from quantitative algorithms that aggregate information on prices from executed trades, executable quotes, and indicative quotes to give an indication of the market price of a bond.

^cThe Dodd-Frank Act requires bank holding companies with \$50 billion or more in total assets to be subjected to enhanced regulatory standards and supervision. Pub. L. No. 111-203, § 165, 124 Stat. 1376, 1423 (2010) (codified at 12 U.S.C. § 5365).

^dRegulators generally require that banks maintain certain ratios of capital as a share of assets to ensure that they have sufficient capital to absorb losses. Under the Basel approaches, banks may

weight certain assets based on their risks, and use these risk-weighted assets to calculate their capital adequacy ratios.

⁸Nonperforming assets include assets in nonaccrual status, other real estate owned, restructured loans, and restructured loans in compliance. Tangible common equity is total capital minus perpetual preferred stock minus goodwill and other intangibles.

⁹Volatile liabilities include federal funds purchased and repurchase agreements, trading liabilities, other borrowed funds, foreign deposits, and jumbo deposits less derivatives with negative fair value. Liquid assets include cash, securities, federal funds sold and reverse repurchase agreements, and trading assets less pledged securities.

¹⁰Option-implied volatility is a measure of a security's expected volatility as reflected by the market price of traded options on that security. The theoretical price of an option is a function of the underlying price, strike price, historical volatility of the underlying, the risk-free rate, and the time to expiration. Implied volatility is calculated by using the market price of the option and solving for volatility. Excess return is a security's return minus the return from a no-risk security during the same time period.

¹¹The bid-ask spread is the difference between the best buying price and the best selling price.

We developed a variety of econometric models that use alternative measures of bond liquidity, bank holding company credit risk, and the size or systemic importance of a bank holding company. We estimated the parameters for each of our models separately for each year from 2006 through 2013 to allow the relationship between bank holding company size and bond funding costs to vary over time.⁸ Our baseline models used average yield spreads on senior unsecured bonds based on actual trades, executable quotes, and composites derived from executable and indicative quotes to measure bond funding costs; total assets to measure size; equity capital and subordinated debt as percentages of total assets to measure capital adequacy; and issue size and total volume to measure bond liquidity. We estimated the baseline model for each year and for each of our five measures of volatility, as well as for each year without a measure of volatility. We also estimated models that added average bid-ask spread to our baseline indicators of bond liquidity, models that used average yield spreads based only on actual trades, models that used equity capital and subordinated debt as percentages of risk-weighted assets as our indicators of capital adequacy, models that used global systemically important bank (GSIB) designation as an indicator of size, models that used the \$50 billion asset threshold as an indicator of size, and models that used both total assets and the square of total assets as

⁸We estimated the parameters of our models using the least squares estimator, which is a standard statistical and econometric technique that calculates the values of the parameters of our regression model that minimize the sum of the squared errors—the differences between bond funding costs observed in the data and bond funding costs predicted by the model.

indicators of size.⁹ Altogether, we used 42 separate models for each year from 2006 through 2013. For all models, we included indicators for each quarter to control for the influence on yield spreads of economic conditions, the regulatory environment, and other factors that vary over time but not across bank holding companies. The details of the models we estimated and the results for our baseline models for select years are in appendix I.

We used our models to compare bond funding costs for bank holding companies of different sizes, all else being equal.¹⁰ Because our models account for the possibility that investors' beliefs about government rescues depend on the credit risk level of the bank holding company, we made comparisons for bank holding companies with the average level of credit risk that prevailed each year. In addition, we assessed the impact of credit risk on our comparisons by making comparisons at credit risk levels higher and lower than the average for each year and also while holding the level of credit risk constant over time at the average level for 2008—the year when the financial crisis peaked and credit risk for bank holding companies was high. By holding credit risk constant, we can assess the extent to which changes in average credit risk over time may have influenced changes in funding costs relative to other factors.

Our approach is limited by several factors. Investors' beliefs about the likelihood of government support are composed of several different elements, including the likelihood that a bank holding company will fail, the likelihood that it will be rescued by the government if it fails, and the

⁹The Dodd-Frank Act requires bank holding companies with \$50 billion or more in total assets to be subjected to enhanced regulatory standards and supervision. Pub. L. No. 111-203, § 165, 124 Stat. 1376, 1423 (2010) (codified at 12 U.S.C. § 5365). In addition, the Financial Stability Board designated 29 GSIBs, including eight U.S. bank holding companies, for the purpose of identifying firms that should be subject to resolution planning requirements and heightened regulatory supervision. The GSIBs generally comprise the largest and most complex internationally active financial firms. The bid-ask spread is the difference between the best buying price and the best selling price.

¹⁰Our models allow the size of a bank holding company to influence its bond funding costs directly and also indirectly through the interactions between size and the credit risk variables. As a result, no single parameter is sufficient to describe the relationship between bond funding costs and size. To summarize the overall relationship between bond funding costs and size reflected in each specification, we calculated bond funding costs for bank holding companies of different sizes and credit risk levels using our estimates of the parameters for each specification for each year. See appendix I for more details on the calculations.

size of the losses that the government may impose on investors if it rescues the bank holding company, but our methodology—like the methodologies used by other researchers—does not allow us to precisely identify the influence of each of these components. Although we have taken into account many factors that may influence bond yield spreads and that differ for bank holding companies of different sizes, our estimates of differences in bond yield spreads for bank holding companies of different sizes may reflect factors other than investors' beliefs about the likelihood of government support because our control variables are imperfect or may be incomplete. In addition, our estimates of differences in bond yield spreads for bank holding companies of different sizes may reflect differences in the characteristics of bank holding companies that choose to issue bonds. The section of this report that addresses our second objective contains a fuller discussion of the limitations associated with our empirical work.

For parts of our work that involved the analysis of computer-processed data, such as market data used in our analysis of funding cost differences, we assessed the reliability of these data by reviewing relevant documentation and conducting interviews with data providers to review steps they took to collect and ensure the reliability of the data. In addition, we electronically tested data fields for missing values, outliers, and obvious errors. We determined that these data were sufficiently reliable for our purposes.

We conducted this performance audit from January 2013 to July 2014 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Background

While the 2007-2009 financial crisis highlighted concerns about the market distortions that can result from too-big-to-fail perceptions, concern about such distortions pre-dated the crisis. A key factor giving rise to the too-big-to-fail dilemma has been the emergence of financial institutions of such size, interconnectedness, and market importance that their failure could threaten to severely disrupt the financial system and damage the economy. Although the federal government's policy responses to failing financial institutions in recent decades have not formed a clear pattern in terms of the availability or structure of government support, these

responses may have influenced market views on the likelihood of government support. Several observers trace too-big-to-fail concerns back to 1984 when FDIC provided support to Continental Illinois National Bank, then the sixth largest U.S. bank in terms of total assets, to prevent its failure and losses to its depositors and creditors.¹¹ The Federal Reserve Board's response to the near failure of a large U.S. hedge fund, Long-Term Capital Management (LTCM), in 1998 was another significant event that may have contributed to too-big-to-fail perceptions.¹² While LTCM was not itself a large bank, the Federal Reserve Board's intervention in helping to facilitate private-sector assistance to LTCM may have signaled the willingness of federal government authorities to intervene to avoid potential systemic consequences from a large, interconnected financial firm's failure. Other factors may have contributed to some ambiguity surrounding the likely recipients and circumstances of government support in the years leading up to the 2007-2009 financial crisis. For example, failures and near-failures of large financial firms had been infrequent and occurred under varying circumstances, making it difficult to discern a clear pattern of government support.

During the 2007-2009 crisis, the federal government took actions to stabilize the financial system by creating new emergency programs with broad-based eligibility and providing firm-specific assistance to prevent the failures of large financial institutions.¹³ Notably, however, U.S. government authorities' initial responses to impending failures of large financial institutions did not send a clear signal about the availability of government support. In March 2008, the Federal Reserve Board authorized emergency assistance to prevent the failure of one large

¹¹For more information about the government rescue of Continental Illinois National Bank, see GAO, *Financial Markets and Institutions: Views on the Federal Rescue of the Continental Illinois National Bank and Trust Co.*, Testimony by the Comptroller General of the U.S. before the Subcommittee on Financial Institutions Supervision, Regulation, and Insurance of the Committee on Banking, Finance and Urban Affairs of the U.S. House of Representatives (Washington, D.C.: Dec. 14, 1984); and GAO, *Financial Crisis Management: Four Financial Crises in the 1980s*, GAO/GGD-97-96 (Washington, D.C.: May 1, 1997).

¹²For more information on the near-collapse of Long-Term Capital Management and broader issues it raised, see GAO, *Long-Term Capital Management: Regulators Need to Focus Greater Attention on Systemic Risk*, GAO/GGD-00-3 (Washington, D.C.: Oct. 29, 1999).

¹³For more discussion of the federal government's emergency actions to assist the financial sector, see [GAO-14-18](#).

investment bank (Bear Stearns Companies, Inc.), but 6 months later, Federal Reserve Board officials determined that they could not assist another large failing investment bank, Lehman Brothers Holdings, Inc. (Lehman Brothers).¹⁴ Following Lehman Brothers' bankruptcy announcement on September 15, 2008, which triggered an intensification of the financial crisis, U.S. government authorities took actions that signaled a stronger near-term commitment to prevent the failure of systemically important financial institutions. On the day after Lehman Brothers' bankruptcy announcement, the Federal Reserve Board authorized up to \$85 billion of credit assistance for American International Group, Inc. (AIG) to prevent its failure.¹⁵ In addition, on September 29, 2008, the Secretary of the Treasury invoked the systemic risk exception for the first time since the enactment of the FDIC Improvement Act of 1991 (FDICIA) to authorize FDIC to provide assistance to avert the failure of Wachovia Corporation—then the fourth-largest banking organization in

¹⁴At the time, Bear Stearns was one of the largest investment banks. For further discussion of this assistance, see GAO, *Federal Reserve System: Opportunities Exist to Strengthen Policies and Processes for Managing Emergency Assistance*, [GAO-11-696](#) (Washington, D.C.: July 21, 2011). During the weekend of September 13-15, 2008, government officials met with leaders of major financial firms to devise a private-sector solution to Lehman Brothers' likelihood of defaulting on its obligations, but they were unable to find a solution. While the Federal Reserve Board was able to provide liquidity to Lehman Brothers against collateral through its emergency credit programs, according to the Federal Reserve Board Chairman at that time, neither the Federal Reserve Board nor any other agency had the authority to provide the capital or unsecured guarantee of its obligations that they believed Lehman Brothers needed to avert failure. See Ben S. Bernanke, Board of Governors of the Federal Reserve System, "Lessons from the Failure of Lehman Brothers" (testimony before the Committee on Financial Services, U.S. House of Representatives, Washington, D.C., Apr. 20, 2010).

¹⁵Subsequent to the announcement of the \$85 billion credit assistance, Treasury and the Federal Reserve provided new forms of assistance and restructured the assistance package for AIG over time. For more information about the federal government's assistance to AIG, see GAO, *Troubled Asset Relief Program: Status of Government Assistance Provided to AIG*, [GAO-09-975](#) (Washington, D.C.: Sept. 21, 2009).

terms of assets in the United States—by facilitating Citigroup Inc.'s acquisition of its banking operations.¹⁶

At the height of the crisis in late 2008, the United States and other G7 countries announced an agreement to implement a comprehensive action plan to provide liquidity to financial markets and prevent the failure of any systemically important institution, among other objectives.¹⁷ That month, U.S. government agencies launched two of the largest U.S. emergency initiatives: the Troubled Asset Relief Program, through which Treasury provided capital and other assistance to eligible financial institutions, and the Temporary Liquidity Guarantee Program, through which FDIC guaranteed certain uninsured deposits and newly issued unsecured debt of eligible financial institutions.¹⁸ In late 2008 and early 2009, Treasury, the Federal Reserve Board, and FDIC authorized packages of firm-specific assistance for two of the largest U.S. bank holding companies, Citigroup Inc. and Bank of America Corporation. Foreign governments launched parallel initiatives to provide broad-based liquidity support and

¹⁶A few days after the announcement of the proposed Citigroup acquisition, Wachovia announced that it would instead merge with Wells Fargo in a transaction that would include all of Wachovia's operations and require no FDIC assistance. As a result, the FDIC loss-sharing agreement on Wachovia assets was not implemented. FDICIA included a systemic risk exception to the requirement that FDIC resolve failed banks using the least costly method. Pub. L. No. 102-242, § 141, 105 Stat. 2236, 2275 (codified at 12 U.S.C. § 1823(c)(4)(G)). Under this exception, FDIC could provide assistance to a failing bank if compliance with its requirements to resolve the bank using the least costly approach would have "serious adverse effects on economic conditions or financial stability"—that is, would cause systemic risk—and if such assistance would "avoid or mitigate such adverse effects." *Id.* FDIC could act under the exception only under a process that included recommendations from the FDIC Board of Directors and Federal Reserve Board and approval by the Secretary of the Treasury. The Dodd-Frank Act restricts FDIC's authority to provide open bank assistance to an individual failing bank outside of receivership and replaces it with a new authority, subject to certain restrictions and a joint resolution of congressional approval, to create a debt-guarantee program with broad-based eligibility. Pub. L. No. 111-203, § 1105(a), 124 Stat. 1376, 2121 (2010) (codified at 12 U.S.C. §§ 5612(a) and 5613(b)).

¹⁷The G7 is an informal forum of coordination among Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

¹⁸For more about the Troubled Asset Relief Program, see GAO, *Troubled Asset Relief Program: One Year Later, Actions Are Needed to Address Remaining Transparency and Accountability Challenges*, GAO-10-16 (Washington, D.C.: Oct. 8, 2009). For more about the Temporary Liquidity Guarantee Program, see GAO, *Federal Deposit Insurance Act: Regulators' Use of Systemic Risk Exception Raises Moral Hazard Concerns and Opportunities Exist to Clarify the Provision*, GAO-10-100 (Washington, D.C.: Apr. 15, 2010).

also took steps to prevent the failures of large financial institutions. Examples of large foreign financial institutions that received firm-specific assistance from their governments include Royal Bank of Scotland Group PLC (United Kingdom) and UBS (Switzerland).

Since the onset of the financial crisis, the largest banks have grown bigger in many major advanced economies, even as the financial sector has shrunk, and U.S. and foreign policymakers have acknowledged that crisis policy interventions raised moral hazard concerns.¹⁹ As discussed earlier, market perceptions that some firms are too big to fail can distort market participants' incentives to properly price and restrain risk-taking by these firms. U.S. regulators have coordinated with foreign counterparts through the G20 and the Financial Stability Board to develop a policy framework for addressing the risks posed by large, complex financial institutions.²⁰ In November 2010, G20 leaders endorsed the Financial Stability Board's framework for addressing too-big-to-fail concerns. The framework aims to reduce the probability and impact of the failure of systemically important firms.²¹ Key elements of this framework include developing effective resolution regimes and strengthening capital standards for systemically important financial institutions. FDIC, the Federal Reserve Bank of New York, and Treasury helped to develop standards the Financial Stability Board issued for effective resolution regimes in October 2011.²² In addition, U.S. banking regulators have worked with their foreign counterparts to develop a strengthened capital regime that will require global systemically important banks to have

¹⁹The share of total bank assets held by the five largest global banks has increased in many advanced countries and highlights concerns about too big to fail.

²⁰The G20, established in 1999, is a forum for international cooperation on important issues of the global economic and financial agenda. Its members include 19 countries and the European Union. The G20 leaders established the Financial Stability Board as the successor to the Financial Stability Forum and made it responsible for coordinating and promoting the implementation of the G20 reform commitments.

²¹Financial Stability Board, "Reducing the Moral Hazard Posed by Systemically Important Financial Institutions – FSB Recommendations and Time Lines," October 20, 2010. In September 2013, the Financial Stability Board issued a report providing an update on progress in implementing this framework. See Financial Stability Board, "Progress and Next Steps Towards Ending 'Too-Big-to-Fail' (TBTF) – Report of the Financial Stability Board to the G20," September 2, 2013.

²²Financial Stability Board, "Key Attributes of Effective Resolution Regimes for Financial Institutions," October 2011.

additional loss absorbing capacity.²³ U.S. federal financial regulators are implementing these and other elements of the Financial Stability Board's framework for addressing too big to fail as part of the process of implementing relevant Dodd-Frank Act provisions.

Dodd-Frank Act Provisions

U.S. federal financial regulators have made progress in implementing Dodd-Frank Act provisions and related reforms to restrict future government support and reduce the likelihood and impacts of the failure of a systemically important financial institution (SIFI).²⁴ These reforms can be grouped into four general categories: (1) restrictions on regulators' emergency authorities to provide assistance to financial institutions; (2) new tools and authorities for regulators to resolve a failing SIFI outside of bankruptcy if its failure would have serious adverse effects on the U.S. financial system; (3) enhanced regulatory standards for SIFIs related to capital, liquidity, and risk management; and (4) other reforms intended to reduce the potential disruptions to the financial system that could result from a SIFI's failure.

Restrictions on Emergency Authorities. The Dodd-Frank Act revised Federal Reserve Board and FDIC emergency authorities so that emergency assistance can no longer be provided to assist a single and specific firm but rather can only be made available through a program with broad-based eligibility—that is, a program that provides funding support to institutions that meet program requirements and that choose to participate.²⁵

New Tools and Authorities for Resolving SIFIs. The Dodd-Frank Act includes two key reforms intended to facilitate the orderly resolution of a

²³For more information about the U.S. role in international financial reform efforts, including the development of international financial standards, see GAO, *International Financial Reforms: U.S. and Other Jurisdictions' Efforts to Develop and Implement Reforms*, GAO-14-261 (Washington, D.C.: Apr. 3, 2014).

²⁴While the Dodd-Frank Act does not use the term "systemically important financial institution," this term is commonly used by academics and other experts to refer to bank holding companies with \$50 billion or more in total consolidated assets and nonbank financial companies designated by FSOC for Federal Reserve supervision and enhanced prudential standards.

²⁵Pub. L. No. 111-203, §§ 1101 and 1105, 124 Stat. 1376, 2113 and 2121 (2010) (codified at 12 U.S.C. §§ 343(3)(A) and 5612). For more information about changes to these authorities, see GAO-14-18.

large failing firm without a taxpayer-funded rescue: (1) requirements for SIFIs to formulate and submit to regulators resolution plans (or “living wills”) that detail how the companies could be resolved in bankruptcy in the event of material financial distress or failure; and (2) the Orderly Liquidation Authority (OLA), through which FDIC can resolve large financial firms, and which provides an alternative to bankruptcy if resolution under the bankruptcy code would have serious adverse effects on financial stability.²⁶

- *Living wills.* Title I of the Dodd-Frank Act requires bank holding companies with \$50 billion or more in consolidated assets and nonbank financial companies designated by FSOC to formulate and submit to FDIC, the Federal Reserve Board, and FSOC resolution plans (or “living wills”) that detail how the companies could be resolved in bankruptcy in the event of material financial distress or failure.²⁷ The Federal Reserve Board and FDIC have finalized rules relating to resolution plans, and the large bank holding companies that were the first firms required to prepare and submit such plans submitted these to regulators as expected in July 2012.²⁸ Regulators reviewed these initial plans and developed guidance on what information should be included in 2013 resolution plan submissions.²⁹ If FDIC and the Federal Reserve Board jointly determine that a resolution plan is not credible or would not facilitate an orderly resolution of the company under the bankruptcy code, after giving the company an opportunity to remedy the plan’s deficiencies, the

²⁶§ 165(d), 124 Stat. at 1426 (codified at 12 U.S.C. § 5365(d)); § 204, 124 Stat. at 1454-56 (codified at 12 U.S.C. § 5384). During the financial crisis, several large financial institutions became insolvent and filed for bankruptcy when no private-sector solution was found. For example, Lehman Brothers filed for Chapter 11 bankruptcy on September 15, 2008. Lehman had \$639 billion in total assets and \$613 billion in total liabilities as of May 31, 2008. The bankruptcy proceedings highlighted inconsistencies in laws and regulations across countries and limitations on the ability of countries to coordinate effectively during the reorganization or liquidation of international financial institutions.

²⁷§ 165(d)(1), 124 Stat. at 1426 (codified at 12 U.S.C. § 5365(d)(1)).

²⁸Resolution Plans Required, 76 Fed. Reg. 67323 (Nov. 1, 2011).

²⁹In October 2013, the Federal Reserve Board and FDIC released the public sections of filed annual resolution plans for 11 firms. “Federal Reserve Board and FDIC, Agencies Release Public Sections of the Second Submission of Resolution Plans for 11 Institutions,” accessed on November 7, 2013, <http://www.federalreserve.gov/newsevents/press/bcreg/20131003a.htm>.

agencies may jointly decide to impose more stringent regulatory requirements on the company.³⁰

- *Orderly Liquidation Authority.* OLA gives FDIC the authority, subject to certain constraints, to resolve large financial firms, including nonbanks, outside of the bankruptcy process.³¹ This authority allows for FDIC to be appointed receiver for a financial firm if the Secretary of the Treasury determines, among other things, that the firm's failure and its resolution under applicable federal or state law, including bankruptcy, would have serious adverse effects on U.S. financial stability and no viable private-sector alternative is available to prevent the default of the financial company.³² While the Dodd-Frank Act does not specify how FDIC must exercise this authority, FDIC is developing an approach to resolving a firm under OLA that it refers to as the Single Point-of-Entry (SPOE) approach.

Under the SPOE approach, FDIC would be appointed receiver of the top-tier U.S. parent holding company of a financial group determined to be in default or in danger of default following the completion of the appointment process set forth under the Dodd-Frank Act. Immediately after placing the parent holding company into receivership, FDIC would transfer assets (primarily the equity and investments in subsidiaries) from the receivership estate to a bridge financial holding company. By allowing FDIC to take control of the firm at the holding

³⁰§ 165(d)(4)-(5), 124 Stat. at 1426-27 (codified at 12 U.S.C. § 5365(d)(4)-(5)). Further, if, after 2 years following the imposition of the more stringent standards, the resolution plan still does not meet the statutory standards, FDIC and the Federal Reserve Board may, in consultation with FSOC, direct a company to divest certain assets or operations. *Id.*

³¹§ 204, 124 Stat. at 1454-1456 (codified at 12 U.S.C. § 5384).

³²§ 204(b), 124 Stat. at 1455 (codified at 12 U.S.C. § 5384(b)). The factors to be considered by the Secretary of the Treasury are set forth in Section 203(b) of the Dodd-Frank Act. § 203(b), 124 Stat. at 1451 (codified at 12 U.S.C. § 5383(b)). Before the Secretary of the Treasury, in consultation with the President, makes a decision to seek the appointment of FDIC as receiver of a financial company, at least two-thirds of those serving on the Board of Governors of the Federal Reserve System and at least two-thirds of those serving on the Board of Directors of FDIC must vote to make a written recommendation to the Secretary of the Treasury to appoint FDIC as receiver. §203(a)(1)(A), 124 Stat. at 1450 (codified at 12 U.S.C. § 5383(a)(1)(A)). In the case of a broker-dealer, the recommendation must come from the Federal Reserve Board and the Securities and Exchange Commission, in consultation with FDIC, and in the case of an insurance company, from the Federal Reserve Board and the Director of the Federal Insurance Office, in consultation with FDIC. § 203(a)(1)(B)-(C), 124 Stat. at 1450 (codified at 12 U.S.C. § 5383(a)(1)(B)-(C)).

company level, this approach is intended to allow subsidiaries (domestic and foreign) carrying out critical services to remain open and operating. In a SPOE resolution, at the parent holding company level, shareholders would be wiped out, and unsecured debt holders would have their claims written down to reflect any losses that shareholders cannot cover. Under the Dodd-Frank Act, officers and directors responsible for the failure cannot be retained.³³

The new resolution authority under the Dodd-Frank Act provides a back-up source for liquidity support, the Orderly Liquidation Fund, which could provide liquidity support to the bridge financial company if customary sources of liquidity are unavailable.³⁴ The law requires FDIC to recover any losses arising from a resolution by collecting assessments from bank holding companies with \$50 billion or more in consolidated assets, nonbank financial holding companies designated for supervision by the Federal Reserve Board, and other financial companies with \$50 billion or more in consolidated assets.³⁵

Enhanced Regulatory Standards. The Dodd-Frank Act also introduced a number of regulatory changes designed to reduce the risks that the largest financial institutions pose to the financial system. The act requires the Federal Reserve Board to create enhanced capital and prudential standards for SIFIs.³⁶ According to Federal Reserve Board officials, in implementing these reforms, the Federal Reserve Board aims to design prudential standards that will both reduce the likelihood of a covered institution's failure and create incentives for these institutions to reduce their systemic footprint. The act's provisions related to enhanced prudential standards for these covered firms include, but are not limited to, the following:

- *Risk-based capital requirements and leverage limits.* The act required the Federal Reserve Board to establish capital and leverage standards, which, as finalized, include a requirement for covered firms to develop capital plans to help ensure that they maintain capital

³³§ 204(a)(2), 124 Stat. at 1454 (codified at 12 U.S.C. § 5384(a)(2)).

³⁴§ 210(n), 124 Stat. at 1506 (codified at 12 U.S.C. § 5390(n)).

³⁵§ 210(o)(1), 124 Stat. at 1509 (codified at 12 U.S.C. § 5390(o)(1)).

³⁶§ 165(a)(1), 124 Stat. at 1423 (codified at 12 U.S.C. § 5365(a)(1)).

ratios above specified standards, under both normal and adverse conditions.³⁷ In addition, the Federal Reserve Board has announced its intention to apply capital surcharges to some or all firms based on the risks these firms pose to the financial system.³⁸

- *Liquidity requirements.* The act required the Federal Reserve Board to establish liquidity standards, which as finalized include requirements for covered firms to hold liquid assets that can be used to cover their cash outflows over short periods and in stressed conditions.³⁹ In addition, the Federal Reserve Board, FDIC, and OCC have issued a proposed rule that would implement a minimum liquidity requirement that is consistent with the Basel III liquidity coverage ratio and would apply to internationally active U.S. banking organizations and U.S. depository institutions with \$250 billion or more in total consolidated assets.⁴⁰
- *Risk management requirements.* Publicly traded covered firms must establish a risk committee and be subject to enhanced risk management standards.⁴¹
- *Stress testing requirements.* The Federal Reserve Board is required to conduct an annual evaluation of whether covered firms have

³⁷§165(b)(1)(A)(i), 124 Stat. at 1424; Enhanced Prudential Standards for Bank Holding Companies and Foreign Banking Organizations; Final Rule, 79 Fed. Reg. 17240 (Mar. 27, 2014) (codified at 12 C.F.R. pt. 252).

³⁸The Federal Reserve Board plans to issue a proposal to impose graduated common equity risk-based capital surcharges on U.S. bank holding companies designated as global systemically important banks (GSIB). The Federal Reserve Board has said this proposal will be based on the GSIB capital surcharge framework developed by the Basel Committee, under which the size of the surcharge for an individual GSIB would vary from 1 percent to 2.5 percent, depending on the firm's systemic importance.

³⁹§165(b)(1)(A)(ii), 124 Stat. at 1424 (codified at 12 U.S.C. § 5365(b)(1)(A)(ii)). Enhanced Prudential Standards for Bank Holding Companies and Foreign Banking Organizations; Final Rule, 79 Fed. Reg. 17240 (Mar. 27, 2014) (codified at 12 C.F.R. pt. 252).

⁴⁰Liquidity Coverage Ratio: Liquidity Risk Measurement, Standards, and Monitoring; Proposed Rule, 78 Fed. Reg. 71818 (Nov. 29, 2013). The requirement is designed to promote the short-term resilience of the liquidity risk profile of internationally active banking organizations, thereby improving the banking sector's ability to absorb shocks arising from financial and economic stress. *Id.*

⁴¹§§ 165(b)(1)(A)(iii) and 165(h), 124 Stat. at 1424 and 1429 (codified at 12 U.S.C. §§ 5365(b)(1)(A)(iii) and 5365(h)).

sufficient capital to absorb losses that could arise from adverse economic conditions.⁴²

The Federal Reserve Board has been implementing the enhanced standards required by the Dodd-Frank Act in conjunction with its implementation of Basel III, a set of risk-based capital, leverage, and liquidity standards developed by the Basel Committee on Banking Supervision.⁴³ The Basel capital reforms include a risk-based capital surcharge that will apply to financial institutions that have been designated as GSIBs. Further, the U.S. banking agencies have already adopted a leverage capital surcharge that will apply to the eight U.S. banking organizations that are GSIBs.⁴⁴

Other Reforms. The act includes other reforms that could help reduce the likelihood or impacts of a SIFI's failure.

- *Authorities related to SIFI size and complexity.* The Dodd-Frank Act grants regulators new authorities to take certain actions if they determine that a SIFI poses risks of serious adverse effects on the stability of the financial system. These include the authority for the Federal Reserve Board to require a SIFI to meet even stricter

⁴²§165(i)(1), 124 Stat. at 1430 (codified at 12 U.S.C. § 5365(i)(1)). Companies subject to enhanced prudential standards as well as regulated financial firms with more than \$10 billion in consolidated assets also must conduct their own semiannual or annual stress tests, respectively. § 165(i)(2), 124 Stat. at 1430-31 (codified at 12 U.S.C. § 5365(i)(2)).

⁴³The Basel Committee has developed international standards for bank capital for its member economies since the 1980s. In recent years, U.S. federal banking regulators have worked with other members of the Basel Committee to strengthen the regulatory capital regime for internationally active banks and develop a framework for a risk-based capital surcharge for the world's largest, most interconnected banking companies. The new regime, known as Basel III, seeks to improve the quality of regulatory capital and introduces a new minimum common equity requirement. Basel III also raises the numerical minimum capital requirements and introduces capital conservation and countercyclical buffers to require banking organizations to hold capital in excess of regulatory minimums. In addition, Basel III establishes for the first time an international leverage standard for internationally active banks. Federal banking regulators recently finalized capital reforms in the United States that are generally consistent with Basel III. The Federal Reserve Board will separately implement consistent capital and liquidity standards for nonbank financial companies designated for enhanced supervision by FSOC.

⁴⁴Regulatory Capital Rules: Regulatory Capital, Enhanced Supplementary Leverage Ratio Standards for Certain Bank Holding Companies and Their Subsidiary Insured Depository Institutions, 79 Fed. Reg. 24528 (May 1, 2014).

regulatory standards, the authority for the Federal Reserve Board to limit (with the approval of FSOC) the ability of a SIFI to merge with another company if it determines that the merger would pose a grave threat to U.S. financial stability, and, as noted above, the joint authority for the Federal Reserve Board and FDIC to require a firm to take steps to become more resolvable in bankruptcy.⁴⁵

- *Volcker rule.* Section 619 of the Dodd-Frank Act (also known as the Volcker rule) generally prohibits proprietary trading by insured depository institutions and their affiliates and places restrictions on sponsorship or investment in hedge and private equity funds.⁴⁶ The Volcker rule's restrictions may have greater impacts on larger bank holding companies that have been more involved in the types of activities the rule restricts. To the extent that Volcker rule implementation prevents these large institutions from engaging in certain risky activities, it could serve to reduce the likelihood of their failure.
- *Swaps clearing and margin requirements.* Title VII of the Dodd-Frank Act establishes a new regulatory framework for swaps to reduce risk, increase transparency, and promote market integrity in swaps markets.⁴⁷ As we previously reported, requirements for swaps to be cleared through clearinghouses can reduce the vulnerability of the financial system to the failure of one or a few of the major swap dealers by transferring credit risk from the swap counterparties to the clearinghouse.⁴⁸ At the same time, experts have pointed out that clearinghouses concentrate credit risk and thus represent a potential

⁴⁵§ 121(a)(1), 124 Stat. at 1410 (codified at 12 U.S.C. § 5331(a)(1)); § 165(a)(1), 124 Stat. at 1423 (codified at 12 U.S.C. § 5365(a)(1)); § 165(d)(4)-(5), 124 Stat. at 1426-27 (codified at 12 U.S.C. § 5365(d)(4)-(5)).

⁴⁶§ 619, 124 Stat. at 1620-31 (codified at 12 U.S.C. § 1851). Proprietary trading includes trading activities conducted by banking entities for their own account as opposed to those of their clients.

⁴⁷A swap is a type of derivative that involves an ongoing exchange of one or more assets, liabilities, or payments for a specified period. Financial and nonfinancial firms use swaps and other over-the-counter derivatives to hedge risk, or speculate, or for other purposes.

⁴⁸See [GAO-13-180](#). Counterparty credit risk is the risk to each party in an over-the-counter derivatives contract that the other party will not perform the contractual obligations. Technically, the clearing house members interact with the counterparties.

source of systemic risk.⁴⁹ A benefit of the central clearing requirement is that clearinghouses require members to post margin for their trades and the Dodd-Frank Act also includes provisions that require regulators to develop margin requirements for uncleared swaps.⁵⁰ These new requirements could help reduce systemic risk by preventing the build-up of large, undercollateralized exposures.

Although federal financial regulators have finalized a number of rules related to these reforms, implementation of some key reforms has not yet been completed. For example, FDIC has largely completed the core rulemakings necessary to carry out its systemic resolution responsibilities, and is continuing to develop its SPOE approach. FDIC requested public comments on its SPOE resolution strategy in December 2013, and the comment period closed in March 2014.⁵¹ In addition, regulators have not finalized certain rules that would subject SIFIs to enhanced prudential standards. For example, regulators have not finalized rules on single-counterparty credit limits.⁵²

⁴⁹FSOC has identified certain clearinghouses as systemically important financial market utilities, which are subject to risk management and other enhanced supervisory and prudential requirements under the Dodd-Frank Act and may be afforded access to collateralized emergency liquidity from Federal Reserve Banks in unusual or exigent circumstances.

⁵⁰In May 2011, OCC, the Federal Reserve Board, FDIC, the Farm Credit Administration, and the Federal Housing Finance Agency issued a notice of proposed rule-making on margin and capital requirements for covered swap entities. Margin and Capital Requirements for Covered Swap Entities; Proposed Rule, 76 Fed. Reg. 27564 (May 11, 2011).

⁵¹Resolution of Systemically Important Financial Institutions: The Single Point of Entry Strategy, 78 Fed. Reg. 243 (Dec. 18, 2013); Resolution of a Systemically Important Financial Institution: The Single Point of Entry Strategy, 79 Fed. Reg. 9899 (Feb. 21, 2014).

⁵²In March 2014, the Basel Committee published a standardized approach to measuring counterparty credit risk exposures. This standardized approach will take effect starting on January 1, 2017.

Reforms Have Reduced Expectations of Government Support among Key Market Observers and Increased Regulation for Large Institutions

While views among investment firms we interviewed and credit rating agencies varied, many believe the Dodd-Frank Act has reduced but not eliminated the possibility of a government rescue of one of the largest bank holding companies. Two of the three largest credit rating agencies cited FDIC's resolution process as a key factor in their decisions to reduce or eliminate "uplift"—an increase in the credit rating—they had assigned to the credit ratings of eight of the largest bank holding companies due to their assumptions of government support for these firms. Several representatives from large investment firms with whom we spoke told us that FDIC's resolution process makes significant progress in reducing expectations of government support, but several agreed that uncertainty around its implementation or the circumstances of its use remains. As such, some market perceptions that the government might not allow the largest bank holding companies to fail remain and can give rise to advantages for these firms if these perceptions affect decisions by investors, counterparties, and customers of these firms. For example, credit rating agencies' assignment of higher credit ratings due to assumed government support can create benefits for these firms, but because investors may rely on credit ratings to varying degrees, the impact of such benefits may vary accordingly. In addition, Dodd-Frank Act provisions and related rules subject the largest firms to higher fees and stricter regulation that may reduce their risk of failure and increase costs on them relative to smaller competitors. Officials from FSOC and some of its member agencies have stated that financial reforms have not completely removed too-big-to-fail perceptions, but have made significant progress toward doing so. They anticipate that remaining expectations of government support will decline as Dodd-Frank implementation progresses.

Some Credit Rating Agencies and Large Investors Believe Dodd-Frank Has Reduced the Likelihood of Government Rescues

While views among credit rating agencies and investment firms varied, many believe the Dodd-Frank Act has reduced but not eliminated the possibility of a government rescue of one of the largest bank holding companies. During the financial crisis, credit rating agencies assigned or increased "uplift"—or an increase in the credit rating—for several large bank holding companies' credit ratings to reflect their view that the increased possibility of government support for these firms reduced the risk that the firms' creditors would suffer losses.⁵³ We reviewed changes

⁵³For example, in December 2008, S&P introduced government support as a factor that could affect a financial institution's ratings. Moody's had assigned uplift in ratings for some bank holding companies before the financial crisis and during the crisis increased the amount of uplift for these firms and began to assign uplift to several other financial institutions.

in credit rating agencies' assumptions about government support over time and interviewed credit rating agency representatives. Because large investors do not necessarily rely on credit ratings or rating agencies' assessments of government support, we obtained perspectives from representatives of large asset management firms, pension funds, hedge funds, and other investment firms that purchase debt and equity issued by bank holding companies.⁵⁴

Citing progress in Dodd-Frank implementation and other changes, two credit rating agencies have reduced or eliminated their rating uplift for the largest bank holding companies since the end of the 2007-2009 financial crisis, and a third rating agency has noted that regulatory developments may lead it to reduce or eliminate the uplift it assigns to these bank holding companies' ratings. The three largest credit rating agencies—Fitch, Moody's, and S&P—have incorporated government support into their ratings over time, with the amount of increase in credit rating being driven by their assessment of the firm's standalone credit rating—the credit rating that assumes no government support—and the impact on the firm's creditworthiness they attribute to the likelihood of government support.⁵⁵ These three rating agencies have incorporated government support into their ratings using different approaches and under Fitch's approach, assumptions of extraordinary government support have not led to an increase in rating for U.S. bank holding companies in all cases. Fitch incorporates government support into its ratings by assigning a "support rating floor," a minimum credit rating that reflects its view about the likelihood an entity will receive company-specific government support in case of need, though the entity only receives "uplift" in its rating if its standalone credit rating is below the "support rating floor." Following the July 2010 enactment of the Dodd-Frank Act, Fitch and Moody's removed their assumptions of government support for several large regional bank holding companies and their subsidiary banks and reduced (but did not eliminate) their assumptions of support for eight of the largest U.S. bank

⁵⁴As explained earlier in this report's scope and methodology section, we selected nonrepresentative samples of investment firms for interviews. As a result, the views of investment firm representatives we interviewed are not generalizable to the broader universe of investors.

⁵⁵A firm with a lower standalone credit rating may receive a bigger increase in its rating from government support than a firm with a stronger standalone rating.

holding companies.⁵⁶ Fitch and Moody's reports cited FDIC's new resolution authority and a reduced willingness by the U.S. government to assist a failing bank holding company as key factors influencing these changes in assumed government support. As of June 2014, S&P had not changed its level of assumed government support since the financial crisis.⁵⁷ However, in June 2013, S&P noted that regulatory developments may lead it to reassess its assumptions of government support for the eight bank holding companies.⁵⁸ The three credit rating agencies each noted that their remaining assumptions of government support reflected continued uncertainty about the ability of the U.S. government to effectively resolve one of the largest bank holding companies in OLA. In September 2013, Fitch indicated that it would conduct a global review of its support ratings and in March 2014, Fitch reported that it expects to remove its support rating floor for several of the largest U.S. bank holding companies within the next one or two years.⁵⁹ In November 2013, Moody's removed all uplift from assumed government support from its

⁵⁶These eight companies were Bank of America Corporation, Bank of New York Mellon, Citigroup Inc., Goldman Sachs Group, JPMorgan Chase & Co., Morgan Stanley, State Street Corporation, and Wells Fargo & Company. While Fitch continued to assign a support rating floor to eight bank holding companies, only 3 of these companies had standalone credit ratings below the support rating floor and thus received a higher credit rating from Fitch as a result of assumed government support. These three companies were Bank of America Corporation, Citigroup Inc., and Morgan Stanley. Following a March 2014 upgrade to Citigroup Inc.'s rating, only Bank of America Corporation and Morgan Stanley continued to have a standalone rating below the support rating floor.

⁵⁷In a July 2013 report, S&P noted that regulatory developments may lead it to reassess its assumptions of extraordinary government support on the holding company ratings of the eight systemically important banks, but it was not considering removing such support assumptions at the subsidiary level.

⁵⁸Accordingly, S&P revised its rating outlook on the holding company of JPMorgan Chase & Co. to negative from stable, while maintaining negative rating outlooks on the holding companies of the other seven bank holding companies. S&P noted that it is monitoring FDIC's progress in developing a resolution mechanism that aims to ensure that market confidence will not erode with the failure of a big bank and its resolution through Title II of Dodd-Frank. Furthermore, it indicated that it would consider the required level of long-term debt at the holding company as another factor in removing government support from those ratings.

⁵⁹In March 2014, Fitch revised its outlook on Bank of America Corporation from "stable" to "negative," reflecting its expectation that its assumption of weakening sovereign support is likely to result in a downgrade. Fitch also upgraded Citigroup Inc.'s standalone rating, after which only Bank of America Corporation and Morgan Stanley—which Fitch noted was likely to be upgraded—had standalone ratings below the support rating floor and thus benefitted from an uplift.

credit ratings for the remaining eight large bank holding companies.⁶⁰ Moody's cited regulators' substantial progress in establishing the SPOE receivership framework as a main consideration in their decision to remove the uplift. They noted that the SPOE framework would allow FDIC to impose losses on the creditors of a U.S. bank holding company to recapitalize and preserve the operations of the bank's systemically important subsidiaries in a stress scenario. As a result, they believe that the holding company creditors of systemically important U.S. banks are unlikely to receive government support.

Representatives of large investment firms with whom we spoke said that they rely primarily on their own assessments of government support when investing in financial institutions, and they identified OLA and other reforms as factors influencing their views. While representatives of several firms said that Dodd-Frank reforms have significantly reduced or eliminated expectations of government rescues, others said they continue to expect that the government would rescue one of the largest bank holding companies under certain scenarios if policymakers judged the potential costs to the economy from such a failure to be too great.

Investors generally cited progress on OLA and enhanced regulatory standards for the largest bank holding companies as among the most important factors influencing their views on the likelihood of government support, and many considered living wills and other reforms to be less significant factors.

⁶⁰While Moody's removed rating uplift at the holding company level, it retained uplift in its ratings for the senior and subordinated debt of bank subsidiaries of these bank holding companies. Moody's did not change its assignment of uplift for bank-level senior debt, explaining that it continued to believe that the disorderly failure of one of these large bank subsidiaries would create the risk of contagion to the broader financial system. In contrast, Moody's reduced but did not eliminate uplift for subordinated debt of these banks' subsidiaries. Moody's attributed differences in its assessment of uplift for senior and subordinated debt to potential differences in the level of government support for senior and subordinated creditors. Moody's noted that it expects support for bank-level creditors to come primarily from the protection provided by holding company creditors, who take losses before the bank-level creditors under the SPOE framework. However, if imposing losses on holding company creditors does not prove sufficient to ensure the viability of the bank subsidiary, Moody's believes it is unlikely that bank-level subordinated creditors would receive direct government support. In contrast, in such a scenario, Moody's believes senior creditors might still be supported by the government.

FDIC's resolution process. Investors with whom we spoke said that FDIC's progress in developing its resolution process to implement OLA as an alternative to bankruptcy has caused them to significantly reduce their expectations of government support, but uncertainty around its implementation and circumstances of its use remains. Although several investors believed that FDIC's resolution process is credible for managing a single large failure, two expressed doubts about whether it could be used to resolve multiple failing firms in a systemic crisis. They noted that if the economic costs of a large firm's failure were judged to be too high, the federal government might not want to risk using OLA if regulators believed it would destabilize markets. Two investors noted that in the event that concerns about destabilizing markets led the federal government to provide emergency assistance to a failing firm in lieu of using OLA, policymakers might face political pressure to structure the assistance in a manner that imposed losses on creditors.⁶¹ Other factors being equal, an investor's belief that there is a possibility of incurring losses even if the government prevents a firm's failure would reduce that investor's willingness to provide funds to that firm on more favorable terms because of a too-big-to-fail perception. Because OLA is untested, some uncertainty may exist about its viability as an alternative to bankruptcy and government rescues until it is used.

Some investors identified areas where further progress is needed to enhance the credibility of OLA. First, some market observers have pointed to opportunities to further minimize the adverse market impacts that could result from resolving a firm under OLA. For example, although OLA provides for a 1-day stay on qualified financial contracts to allow for the selection of contracts to transfer to the bridge company, derivatives contracts written under the laws of other countries could allow counterparties to close out those contracts immediately, possibly posing liquidity issues for the firm and leading it to sell assets at depressed

⁶¹While the Dodd-Frank Act contains provisions that prohibit rescues of individual failing institutions, a few investment firm representatives believed that, under certain scenarios, the federal government might intervene to provide capital injections to distressed bank holding companies, which would require an act of Congress. These representatives said they did not know what form a government intervention would take, but indicated that elected officials could face pressure to intervene as the U.S. Congress did in October 2008 when it passed legislation authorizing TARP. One representative of a large asset management firm said that while the political cost to elected officials of rescuing large financial institutions would be high, the costs to the economy of not intervening could also be high.

prices into the market. Some regulatory officials have said that cross-border agreements that create conformity in the treatment of derivatives contracts in resolution processes would enhance OLA's effectiveness and practicality as a resolution tool. In addition, some investors noted that progress on the Federal Reserve's planned proposal for a minimum long-term debt requirement could create greater certainty that the largest bank holding companies would have enough equity and debt to absorb losses and recapitalize their operating subsidiaries under OLA.⁶²

Enhanced regulatory standards. Many investment firm representatives credited enhanced regulatory standards for the largest bank holding companies with improving the safety and soundness of these firms and reducing the likelihood that they would experience distress that could result in failure or government support. One representative from a large investment firm said that the best defense against banks needing government support is to make sure they are well-capitalized. Similarly, another investment firm representative said that higher capital ratios and strengthened balance sheets have given confidence to the markets that the institutions are more sound, in turn reducing the likelihood that they would fail and potentially receive government assistance. A representative from one large asset management firm said that enhanced capital and liquidity standards are a positive from a debt holder's perspective because increased capital provides a bigger buffer to absorb losses and increased liquidity makes a run on the firm less likely.

Living wills. Several investors said the living wills may have positive effects, but some investors have expressed doubts about the effectiveness of the plans, with one investor citing a lack of public transparency. In a public comment letter to FDIC, The Credit Roundtable, a financial industry association, noted that additional living will disclosures would improve the market's ability to gauge the level of risk under a SPOE scenario. Additionally, while the purpose of living wills is to make

⁶²In his February 6, 2014, testimony to the Senate Banking Committee, Federal Reserve Governor Daniel Tarullo said that in the event that the equity of a financial firm is wiped out, successful resolution without taxpayer assistance would be most effectively accomplished if a firm has sufficient long-term, unsecured debt to absorb additional losses and to recapitalize the business transferred to a bridge operating company. In a public comment to FDIC on OLA's single-point-of-entry framework, former FDIC Chair Sheila Bair identified the long-term debt requirement as a key component to ensure that a firm in OLA has sufficient loss-absorbing capacity.

<p>Remaining Market Expectations of Government Support Can Have Benefits for Large Firms</p>	<p>SIFIs resolvable in bankruptcy, several large investors said they assume that a failing SIFI would be resolved through OLA.</p>
<p>Funding Costs</p>	<p>Market beliefs about government support could benefit a firm by lowering its funding costs. However, the extent to which this occurs depends in part on the extent to which providers of funds—such as depositors, bond investors, and stockholders—rely on credit ratings that assume government support or incorporate their own expectations of government support into their decisions to provide funds. For example, an investor that relies on credit ratings may view a firm with a rating that incorporates implied government support as having lower risk—other factors being equal—and may be more inclined to invest in the firm and accept a lower interest rate or return on the firm’s obligations. These effects can be more pronounced during a financial crisis, particularly if market strains cause credit rating agencies to reduce ratings more for firms they believe the government would not rescue and if providers of funds seek to reduce their risk exposures to firms they believe are not too big to fail.</p> <p>Several factors influence the extent to which investors rely on ratings. For example, an investor’s reliance on credit ratings can depend on the extent to which the investor conducts its own credit analysis. While representatives of large investment firms with whom we spoke said they rely primarily on their own assessments of credit risk and do not rely on credit ratings, smaller investors lacking the resources to do their own credit analysis may rely more on credit ratings and rating agencies’ assessments of the impact of possible government support on a firm’s risk profile. In addition, while an investment firm’s assessment of government support can be relevant to funds that it actively manages, it may not incorporate this factor into the investment decisions of funds that</p>

it manages using passive investment strategies.⁶³ Finally, some representatives of large investment firms said that while they do not rely on credit ratings for investment decisions, they pay attention to them when managing funds for clients whose investments must meet minimum credit rating requirements and for clients who may use credit ratings to assess their performance.

Representatives of large investment firms with whom we spoke generally said their views on the likelihood of government support do not affect their investment decisions. Some representatives of investment firms said that while they believe some probability of government rescues remains, there is too much uncertainty surrounding future government support to factor it into their current investment decisions. Several bond investors said it is difficult to distinguish any pricing impacts from market expectations of government support from the variety of other factors related to firm size that can impact debt pricing and investors' investment decisions. For example, compared to smaller institutions, large bank holding companies issue bonds more frequently and in larger amounts, which increases the liquidity of their bonds. Investors may accept lower interest rates on more liquid bonds because more liquid bonds can be sold more easily without reducing the price. In the section addressing the second objective of this report, we analyze the existence and size of potential funding cost advantages for the largest bank holding companies using quantitative approaches that control for factors outside of government support that can influence funding cost differences.

Financial Contracts That
Reference Ratings

Higher credit ratings from assumed government support can also benefit firms through private contracts that reference credit ratings. For example, derivative contracts often tie collateral requirements to a firm's credit rating. Representatives of some large bank holding companies said that reduced credit ratings would require them to post more collateral. Additional collateral requirements would demand additional funds that could otherwise be used in other investments. The largest bank holding companies disclose information in their financial statements about how a credit rating downgrade could cause them to post more collateral. While

⁶³For example, an investment firm may employ a passive investment strategy by managing the selection and allocation of investments in a particular fund with the goal of matching the returns of a benchmark index. In contrast, the firm may actively manage other funds by choosing investments with the goal of generating returns that outperform a benchmark index.

estimates of these collateral impacts have varied over time and across firms, several of these firms have estimated that a downgrade in their credit rating could require them to post between \$1 billion and \$4 billion of additional collateral, depending on the size of the downgrade. Another way that private contracts can reference credit ratings is by setting minimum credit rating requirements. Examples of such requirements include investment funds that cannot purchase securities that are below minimum ratings requirements and counterparties that will not accept a letter of credit from a bank with a low credit rating.

Ability to Attract Customers

Corporate customers with whom we spoke expressed varying views on the degree to which expectations of government support influence their banking decisions. Two corporate customers with whom we spoke said that they believe the government would intervene to prevent the failure of the largest bank holding companies, but that potential government support is only one of several factors they consider in choosing a bank and is not necessarily a decisive factor. Several corporate treasurers identified size-related factors that are unrelated to government support that make them more inclined to use the largest banks for their banking needs. For example, treasurers of global firms noted that the largest U.S. banks have the geographic presence and ability to provide funding on the scale they need to support their operations around the world. One corporate customer noted that although the company's credit facility includes both regional banks and some of the largest banks, they tend to use the services of large banks more because of their capacity for handling large transactions and the variety of their business lines.

However, while two treasurers said that they tend to select the largest U.S. banks primarily for reasons that are unrelated to government support, their beliefs about which banks would be rescued by the government can impact how they manage their risk exposures to banks of different sizes. For example, a treasurer for a large domestic corporation said that the possibility of government rescues can be a factor when evaluating counterparty risk and the safety of deposits. She noted that in normal economic conditions, the likelihood of government support for banks is not a significant factor, but when markets become strained, her company may reduce its deposits and other exposures to regional banks they believe the government would allow to fail. Outside of these treasurers, a treasurer from a large global company said that potential government support may impact his company's banking decisions indirectly through credit ratings. He noted that the company uses credit ratings as a factor in assessing a bank's creditworthiness and adjusting its exposures to banks. For example, if a bank's credit rating falls, the

company may reduce its intraday exposure to that bank by shifting deposits and other exposures away from that bank. A few corporate customers told us they do not consider the possibility of government support for large banks when they decide how to allocate their banking business.

Stricter Capital and Other Regulatory Standards May Reduce Risk of Failure and Increase Costs for Largest Firms

The Dodd-Frank Act imposes new and higher fees on large bank holding companies and requires the Federal Reserve Board to subject large bank holding companies to enhanced regulatory standards for capital, liquidity, and risk management. These enhanced standards may help to reduce the likelihood and potential market impacts of the failure of a large bank holding company. Taken together, higher fees, stricter regulatory standards, and other reforms could increase costs for the largest bank holding companies relative to smaller competitors.⁶⁴ New or revised fees and assessments impose higher direct costs on bank holding companies with more than \$50 billion in total assets.

- **Deposit insurance assessments.** The Dodd-Frank Act required FDIC to change the definition of an insured depository institution's assessment base, which can affect the amount of deposit insurance assessment the institution pays into the deposit insurance fund.⁶⁵ According to FDIC, this change shifted some of the overall assessment burden from smaller banks to larger institutions that rely less on deposits but did not affect the overall amount of assessment revenue collected. The base was changed from total domestic deposits to average consolidated total assets minus average tangible equity. The largest bank holding companies generally saw the largest percentage increases in their deposit insurance assessments

⁶⁴In this report, we do not attempt to quantify the extent to which such higher costs for the largest firms could offset benefits they receive as a result of expectations of government support. For example, we did not attempt to determine the differential impacts of various Dodd-Frank Act provisions on bank holding companies of different sizes. Implementation of some Dodd-Frank Act provisions specifically targets only SIFIs, while other provisions affect both SIFIs and non-SIFIs. Representatives of community banks and other non-SIFIs have noted that while some Dodd-Frank Act provisions—such as the Volcker rule—were intended to target activities at the largest bank holding companies, smaller banks can still face burdens associated with ensuring they comply with these rules. Federal financial regulators have acknowledged the importance of minimizing regulatory burdens for financial institutions and particularly for smaller banks, whose fixed costs arising from regulatory compliance must be spread over a smaller base of revenues.

⁶⁵Pub. L. No. 111-203, § 331(b), 124 Stat. 1376, 1538 (2010).

because they rely less on domestic deposits for their funding than smaller institutions. One of the largest bank holding companies reported that the change to the assessment calculation resulted in a \$600 million increase in its deposit insurance assessments in 2011. In the quarter after the rule became effective, those banks with less than \$10 billion in assets saw a 33 percent drop in their assessments (from about \$1 billion to about \$700 million), while those banks with over \$10 billion in assets saw a 17 percent rise in their assessments (from about \$2.4 billion to about \$2.8 billion).

- **Fees on SIFIs.** In addition, the Dodd-Frank Act directs the Federal Reserve Board to collect fees from bank SIFIs equal to the expenses the Federal Reserve Board estimates are necessary or appropriate to carry out its supervision and regulation of those companies.⁶⁶ In addition, the Dodd-Frank Act directs Treasury to collect assessments from bank and nonbank SIFIs to fund the operations of the Office of Financial Research. These assessments totaled \$137 million in 2012 and \$35 million in 2013.

The Dodd-Frank Act requires the Federal Reserve Board to subject large bank holding companies to heightened standards for capital, liquidity, and stress testing, as well as other provisions, all of which could reduce the risk of their failure and the costs that their distress could impose on the financial system. Following Dodd-Frank enactment, bank SIFIs significantly increased their capital and liquidity in advance of finalization of new rules for capital, leverage, and liquidity standards. As of December 31, 2013, the six largest U.S. GSIBs had an average tier 1 common equity capital ratio of 12.1 percent, compared to the 4.5 percent minimum required under Basel III and an average of 8.4 percent among these firms

⁶⁶§ 318(c), 124 Stat. at 1527. In addition to these fee assessments related to Federal Reserve Board supervision, in April 2014 OCC proposed increasing the assessments it collects for national banks and federal savings associations with more than \$40 billion in total assets. Assessment of Fees, 79 Fed. Reg. 23297 (Apr. 28, 2014). Under the proposal, the assessment increases would range from 0.32 percent to 14 percent, depending on the total assets of the institution reflected in its June 30, 2014, call report. *Id.* The proposed rule presented estimates of the size of the increase for institutions of various sizes. For example, a national bank with assets of \$2 trillion would see its semiannual assessment increase by an estimated \$9.3 million, or 14 percent.

as of December 31, 2009.⁶⁷ In addition, pursuant to the Dodd-Frank Act, the Federal Reserve Board conducts stress testing and evaluates the capital planning process of large bank holding companies to help ensure these firms are resilient to periods of economic or financial stress. In the most recent round of capital planning reviews, the Federal Reserve Board rejected the capital plan of one U.S. GSIB and required another to resubmit its capital plan after errors were discovered.⁶⁸ Pending approval of their revised capital plans, the Federal Reserve Board did not allow proposed actions by these firms, such as dividend increases, that would have reduced their capital. In April 2014, U.S. bank regulators adopted a new rule that strengthens the leverage ratio standards for the largest, most interconnected U.S. banking organizations.⁶⁹

Beyond the new rules and regulatory reviews to ensure capital adequacy, the Federal Reserve Board has indicated that eight of the largest U.S.

⁶⁷National banking regulators classify capital as either Tier 1—currently the highest-quality form of capital and includes common equity—or Tier 2, which is weaker in absorbing losses. Tier 1, or core, capital consists primarily of common equity. Tier 2 is supplementary capital and includes limited amounts of subordinated debt, loan loss reserves, and certain other instruments.

⁶⁸On March 26, 2014, the Federal Reserve Board announced that it approved the capital plans of 25 bank holding companies participating in its Comprehensive Capital Analysis and Review (CCAR) program. It objected to the capital plans of 5 bank holding companies, including Citigroup Inc., one of the U.S. GSIBs. On April 28, 2014, the Federal Reserve Board announced that it was requiring Bank of America Corporation to resubmit its capital plan and to suspend planned increases in dividend distributions. The decision related to the disclosure by Bank of America that it incorrectly reported data used in the calculation of regulatory capital ratios and submitted as inputs for the most recent stress tests conducted by the Federal Reserve. The Federal Reserve Board can require a banking organization that is part of the annual CCAR program to resubmit its capital plan at any time if there has been or likely will be a material change in a firm's capital position. 12 C.F.R. § 225.8(d)(4)(i)(C)(2).

⁶⁹Regulatory Capital Rules: Regulatory Capital, Enhanced Supplementary Leverage Ratio Standards for Certain Bank Holding Companies and Their Subsidiary Insured Depository Institutions, 79 Fed. Reg. 24528 (May 1, 2014). The final rule applies to U.S. bank holding companies with more than \$700 billion in consolidated total assets or more than \$10 trillion in assets under custody (covered BHCs) and their insured depository institution (IDI) subsidiaries. Covered BHCs must maintain a leverage buffer greater than 2 percentage points above the minimum supplementary leverage ratio requirement of 3 percent, for a total of more than 5 percent, to avoid restrictions on capital distributions and discretionary bonus payments. IDI subsidiaries of covered BHCs must maintain at least a 6 percent supplementary leverage ratio to be considered "well capitalized" under the agencies' prompt corrective action framework. The final rule, which has an effective date of January 1, 2018, currently applies to eight large U.S. banking organizations that meet the size thresholds and their IDI subsidiaries.

bank holding companies will be subject to a capital surcharge—an increase in their risk-based capital requirement—based on their size, complexity, and interconnectedness.⁷⁰ Federal Reserve Board officials have stated that the capital surcharge is intended to force the largest bank holding companies to internalize the costs they could impose on the financial system from their systemic footprint. Federal Reserve Board and Treasury officials said that this capital surcharge could also help to offset any funding cost advantages that remain from market perceptions that the government would not allow the largest bank holding companies to fail.

Higher capital and liquidity requirements for banks can increase their funding and other costs. For example, higher capital requirements can require banks to increase the portion of their funding that comes from equity capital rather than debt, which can increase funding costs.⁷¹ In prior work, we have summarized the results of studies by the Bank for International Settlements and others on the benefits and costs of increasing capital requirements for banks, but these studies generally estimated cost impacts to the economy rather than the incidence of increased costs for the institutions themselves. While banks can respond to additional costs in a variety of ways, including passing on some costs to borrowers by charging higher interest rates on loans, a Federal Reserve Board official noted that costs associated with the GSIB capital surcharges—which will not apply to most banks and will not apply evenly among the GSIBs—may be more difficult for the largest bank holding companies to pass on to customers.

Dodd-Frank also imposes additional compliance costs on large bank holding companies required to comply with other Dodd-Frank provisions. For example, as previously discussed, Dodd-Frank requires SIFIs to

⁷⁰As noted earlier in this report, the Federal Reserve Board has said its proposal will be based on the G-SIB capital surcharge framework developed by the Basel Committee, under which the size of the surcharge for an individual G-SIB would vary from 1 percent to 2.5 percent, depending on the firm's systemic importance.

⁷¹In theory, increasing the required proportion of equity funding relative to debt funding should not affect a firm's overall cost of funding as it reduces the risk that the firm will fail, thereby reducing the returns demanded by both equity and debt holders. However, certain government policies make equity financing (such as through issuing stock to investors) more expensive for financial institutions than debt financing. For example, interest on debt is tax deductible, while dividends on equity securities are not. In addition, bank deposits benefit from federal guarantees and the interest rates a bank pays on its insured deposits may not fall as capital levels and the perceived safety of the firm increases.

periodically submit resolution plans to the Federal Reserve and FDIC, as well as to conduct company-run stress tests semiannually. Regulators and industry officials have stated that SIFIs have devoted significant staffing resources to developing these resolution plans. According to industry representatives, stress testing requires newly covered firms to incur significant compliance costs associated with building information systems, contracting with outside vendors, recruiting personnel, and developing stress testing models that are unique to their organization. Furthermore, changes to the market infrastructure for swaps—such as clearing and exchange-trading requirements—and real-time reporting requirements for designated major swap dealers or major swap participants will require firms to purchase or upgrade information systems. Industry representatives and regulators said that while some compliance costs of the derivatives reforms could be recurring, a large part of these costs will come from one-time upfront investments to update processes and technology. Additionally, by generally prohibiting banks from engaging in proprietary trading and limiting their ability to sponsor or invest in hedge and private equity funds, the Volcker rule restrictions could eliminate past sources of trading and fee income for some banks.

As we have noted in prior work, measuring the costs of financial regulation is challenging because of the multitude of intervening variables, the complexity of the financial system, and data limitations.⁷² For example, the extent to which regulated institutions pass on a portion of their increased costs to their customers may be impacted by competitive forces or other factors. Other sources of uncertainty, such as the potential for regulatory arbitrage, add to the challenges of estimating the act's potential costs. For example, increased regulation could cause certain financial activities in the United States to move to foreign jurisdictions with less stringent regulations. U.S. regulators have acknowledged the importance of harmonizing international regulatory standards and noted that it can be advantageous for the United States to be the leader in implementing new regulatory safeguards.

⁷²See [GAO-13-180](#).

Agencies See Progress in Addressing Too-Big-to-Fail Perceptions and Expect Further Progress as Reforms Are More Fully Implemented

Officials from FSOC and its member agencies have stated that financial reforms have not completely removed too-big-to-fail perceptions but have made significant progress toward doing so. In a December 2013 speech, Treasury Secretary Jack Lew said there is growing recognition of the Dodd-Frank reforms and that market analysts are factoring them into their assumptions. However, he noted that there is still more work to be done.

Under the Dodd-Frank Act, FSOC is, among other things, charged with promoting market discipline by eliminating expectations on the part of shareholders, creditors, and counterparties of large bank holding companies that the U.S. government will shield them from losses in the event of failure. FSOC and its member agencies monitor progress in addressing expectations of government support primarily through monitoring progress in implementing relevant Dodd-Frank reforms. FSOC's 2014 annual report includes a discussion of progress made on OLA, enhanced prudential standards, and other relevant reforms. According to Treasury officials, several key areas require continued progress:

- **International regulatory reform.** In its 2013 annual report, FSOC writes that international coordination of financial regulation is essential to mitigate threats to financial stability. FDIC officials said they continue to work with foreign regulators to address issues related to creating a viable process for effecting the orderly resolution of a failing financial institution with significant cross-border activities. For example, FDIC is working with foreign counterparts on changes needed to ensure that derivatives contracts under other countries' laws include a stay similar to that which applies to U.S. contracts under Dodd-Frank to prevent termination of these contracts by counterparties of a firm pulled into resolution. Federal Reserve Board staff said U.S. regulators are considering steps that may be needed to help ensure that foreign regulators do not take disruptive actions with respect to foreign operations of a U.S. firm pulled into resolution. They noted that global U.S. SIFIs may need to create intragroup loss absorbency arrangements that provide clarity and assurance to foreign regulators about how loss absorbency from the U.S. holding company will be made available to support foreign operations during a resolution.
- **The Federal Reserve's long-term debt requirement.** The Federal Reserve Board has identified the implementation of a long-term debt requirement as a regulatory priority that it and other agencies are actively considering. In testimony before the Senate Banking

Committee, Federal Reserve Board Governor Daniel Tarullo said that successful resolution without taxpayer assistance would be most effectively accomplished if a firm has sufficient long-term, unsecured debt to absorb additional losses and to recapitalize the business transferred to a bridge operating company.

- **General education of market participants on reforms.** Treasury officials identified the education of market participants as a key area for progress. Public outreach and education often take the form of speeches from agency officials and meetings with industry stakeholders. Regulators also solicit feedback on proposed rulemakings and regulations during public comment periods. For example, on December 18, 2013, FDIC published a public notice on the framework for a SPOE approach for resolution of failed financial institutions under OLA and solicited comments from the public through February 18, 2014, before subsequently extending the comment period through March 20, 2014.⁷³

Treasury officials also monitor market trends and outside research to inform their assessment of progress in addressing too-big-to-fail perceptions. Treasury staff have looked at trends in bond prices, credit-default-swap prices, and other market data for bank holding companies of different sizes for evidence that investors have reduced their expectations of government support. Treasury staff also monitor relevant outside research, including a growing body of research by academics and others that has used quantitative approaches to analyze the existence and size of potential funding cost advantages that the largest bank holding companies could receive because of market expectations of government support. The next section of this report includes a summary of selected studies in this literature and discusses the strengths and limitations of the methods they use. FSOC and Treasury staff have reviewed these studies and noted that while the studies have limitations, their findings are consistent with a reduction in expectations of government support following the Dodd-Frank Act.

⁷³Resolution of Systemically Important Financial Institutions: The Single Point of Entry Strategy, 78 Fed. Reg. 243 (Dec. 18, 2013); Resolution of a Systemically Important Financial Institution: The Single Point of Entry Strategy, 79 Fed. Reg. 9899 (Feb. 21, 2014).

Evidence Suggests Large Banks Had a Funding Cost Advantage over Small Ones during the Financial Crisis That May Have Declined or Reversed Since

Our analysis and the results of studies we reviewed provide evidence that the largest bank holding companies had lower funding costs than smaller bank holding companies during the 2007-2009 financial crisis but that differences may have declined or reversed in more recent years. To inform our econometric approach, we reviewed studies that estimated funding cost differences between large and small financial institutions that could be associated with the perception that some institutions are too big to fail. Studies we reviewed generally found that the largest financial institutions had lower funding costs during the 2007-2009 financial crisis but that the difference between the funding costs of the largest and smaller financial institutions has since declined. In some cases these findings could be interpreted as evidence of advantages driven by too-big-to-fail perceptions; however, these empirical analyses are imperfect and contain a number of limitations that could reduce their validity or applicability to U.S. bank holding companies. Our analysis, which addresses certain limitations of these studies, also provides evidence that large or systemically important bank holding companies had lower funding costs than smaller bank holding companies during the 2007-2009 financial crisis, which may have been associated with expectations of government assistance. In addition, our analysis provides some evidence that funding cost differences may have declined or reversed in recent years and that large bank holding companies may have had higher funding costs since the crisis. However, we also analyzed what funding cost differences might have been since the crisis in hypothetical scenarios where levels of credit risk in every year from 2010 to 2013 are assumed to be as high as they were during the financial crisis. This analysis suggests that large bank holding companies might have had lower funding costs than smaller bank holding companies since the crisis if levels of credit risk had remained high, indicating that changes in funding cost differences over time may be due in part to improvements in bank holding companies' financial conditions. Although our analysis improves on certain aspects of prior studies, important limitations remain and our results should be interpreted with caution.

Studies Generally Found the Largest Banks Had Lower Funding Costs during the Financial Crisis but Results Have Limitations

Studies we reviewed generally found that the largest financial institutions had lower funding costs than smaller ones during the 2007-2009 financial crisis but that the difference between the funding costs of the largest and smaller financial institutions has since declined. In some cases these findings could be interpreted as evidence of advantages driven by too-big-to-fail perceptions; however, these empirical analyses are imperfect and contain a number of limitations that could reduce their validity or applicability to U.S. bank holding companies.

We reviewed studies that estimated the funding cost difference between large and small financial institutions that could be associated with the perception that some institutions are too big to fail. We evaluated studies that met the following criteria: (1) used a comparative empirical approach that attempted to account for differences across financial institutions that could influence funding costs, (2) included U.S. bank holding companies, and (3) included analysis of data from 2002 or later. See our scope and methodology section for more information on our criteria and approach.

The 16 studies we reviewed made a wide variety of methodological decisions and came to a range of conclusions. We present the variety of methodological decisions along two key dimensions—which source of funding is analyzed (e.g., deposits, bonds) and time period of analysis—in table 2 below. The source of funding that is analyzed is an important methodological decision because investors may have differing expectations regarding the likelihood that various sources of funding might receive government support, and these expectations could differ by the size of the financial institution. Results could differ across studies because of differences in creditor priority (subordinated debt versus senior debt) or maturity (bonds that mature several years in the future versus deposits that can be demanded at any time). We also include information in table 2 on the reported affiliations of the study authors.

Table 2: Empirical Studies of Too-Big-to-Fail Funding Cost Differences

Study authors (Year)	Measure of funding cost	Time period	Affiliation category
Acharya, Anginer & Warburton (2013)	Bonds	1990-2011	Academic
Araten & Turner (2012)	Combination of funding sources	2002-2011	Private ^a
Balasubramnian & Cyree (2014)	Bonds ^b	2009-2011	Academic
Balasubramnian & Cyree (2013)	Bonds ^c	2009-2011	Academic
Barth & Schnabel (2013)	Credit default swaps	2005-2011	Academic
Bertay, Demirgüç-Kunt & Huizinga (2013)	Combination of funding sources	1990-2011	Academic and public
International Monetary Fund (2014)	Credit ratings, credit default swaps	2005-2014	Public
Jacowitz & Pogach (2012)	Deposits	2005-2010	Public
Keppo & Yang (2013)	Bonds, deposits	1990-2011	Academic and public
Kumar & Lester (2014a)	Deposits	2006-2012	Private ^d
Kumar & Lester (2014b)	Bonds	2009-2013	Private ^d
Li et al. (2011)	Credit default swaps	2001-2010	Private
Santos (2014)	Bonds	1985-2009	Public
Tsesmelidakis & Merton (2012)	Credit default swaps	2002-2010	Academic and private
Ueda & Di Mauro (2012)	Credit ratings	2007, 2009	Academic and public

Study authors (Year)	Measure of funding cost	Time period	Affiliation category
Volz & Wedow (2009)	Credit default swaps	2002-2007	Public

Source: GAO | GAO-14-621

Note: We read and evaluated studies that met the following criteria: (1) used a regression or similar comparative empirical methodology to estimate any funding cost difference, (2) included U.S. bank holding companies, and (3) included analysis of data from 2002 or later. Our criteria excluded studies that used option-pricing approaches—this methodology assumes a too-big-to-fail funding cost advantage exists and only estimates its magnitude. We identified author affiliations based on information included in the papers, which may not reflect all relevant affiliations. Academic affiliation includes authors at universities or research institutes. Private affiliation includes authors at financial institutions and other private firms. Public affiliation includes authors at government and regulatory agencies (including the regional Federal Reserve banks which are private corporations), and international financial institutions such as the World Bank. We also excluded two studies that otherwise met our criteria but did not attempt to control for important differences between financial institutions. We were aware of potential conflicts of interest associated with a number of studies in our review. As with other studies we reviewed, these studies must have attempted to address factors that might account for differences in funding costs in order to be included, and we also considered the potential impact these conflicts of interest might have on their methods and results. See our scope and methodology for more details on our approach.

⁴This study was conducted by researchers at JP Morgan Chase.

⁵This study focused on subordinated bonds.

⁶This study focused on senior bonds.

⁷This study was conducted by researchers at Oliver Wyman and sponsored by the Clearinghouse Association, a trade association of the world's largest commercial banks.

Studies we reviewed generally found that the largest financial institutions had lower funding costs than smaller ones during the 2007-2009 financial crisis, but that the difference between the funding costs of the largest and smaller financial institutions has since declined. For example, one study estimated that large U.S. financial institutions had roughly 100 basis points lower bond funding costs than smaller ones in 2009, but this difference had declined to around 40 basis points by 2011.⁷⁴ Similarly, a study of U.S. bank credit default swaps found that large U.S. bank holding companies had roughly 100 basis points lower funding costs in 2009, but this difference had declined to around 15 basis points in 2013.⁷⁵ In some cases these differences could be interpreted as evidence of funding cost advantages driven by too-big-to-fail perceptions. In other cases, limitations in the studies make it difficult to eliminate other explanations of

⁷⁴A basis point is one one-hundredth of a percentage point. Viral V. Acharya, Deniz Anginer and A. Joseph Warburton, "The End of Market Discipline? Investor Expectations of Implicit State Guarantees," *Social Science Research Network Working Paper* (December 2013).

⁷⁵International Monetary Fund, "How Big is the Implicit Subsidy for Banks Considered Too Important to Fail?" *Global Financial Stability Report*, Ch. 3 (Washington, D.C.: 2014).

why funding cost differences might exist—such as greater liquidity or diversification that could be associated with size or spurious results driven by imperfect measures of funding costs. Time period of analysis was another important difference across studies we reviewed. Few studies in our review included data beyond 2011. Therefore, most results may not reflect recent changes in the regulatory environment and market expectations discussed earlier in the report.

Studies also varied in their approach to identifying financial institutions that might be perceived as too big to fail, using a variety of size and other thresholds. For example, some studies measured too-big-to-fail status by a bank's assets; however, the threshold between too-big-to-fail and other banks varied from \$50 billion to \$500 billion. Several papers estimated too-big-to-fail status by size relative to industry, such as the largest 20 banks or top 10 percent by assets. These different approaches indicate that there is no consensus within the literature on which financial institutions may be considered too big to fail for the purposes of comparing funding costs.

The studies we reviewed can be grouped into categories based on their approaches. While all studies included in our review used standard approaches and attempted to address factors that might account for differences in funding costs, these empirical analyses remain imperfect.

- **Regression.** Most studies we reviewed adopted a regression methodology in which some measure of funding costs was explained by a variety of control variables, such as risk, liquidity, and maturity, to attempt to account for differences across financial institutions. These models are standard empirical tools and are flexible in terms of the information about financial institutions and markets that they can incorporate. In some instances these models rely on a small number of indicators that may only imperfectly measure underlying default risks. As a result, some analyses may not correctly estimate the size of any too-big-to-fail advantages because they omit important factors that influence funding costs. In other studies that account for a more thorough set of factors that influence funding costs, results may be sensitive to alternative measurements of these factors.⁷⁶ For example,

⁷⁶Results of these models will also be sensitive to the typical assumption that the impact of variables on funding costs is linear—that is, changes in credit risk and liquidity have a constant and proportional impact on funding costs.

default risk is an underlying driver of funding costs, and studies may produce different results by using a bank's earnings volatility as an indicator for default risk as opposed to other indicators such as the quality of a bank's assets. In addition, liquidity is another important factor to account for when attempting to explain funding cost differences—investors charge banks more for less liquid sources of funding—and some studies do not adequately control for the liquidity of the funding source. Challenges similar to those involved in accurately capturing default risk arise in finding appropriate indicators for a bond's liquidity.

- **Equity-based.** Three papers we reviewed measured the difference between observed credit default swap spreads (which approximate bond funding costs) and hypothetical credit default swap spreads (which are estimated based on information implied by equity prices).⁷⁷ This approach estimates hypothetical spreads with a standard theoretical model used in finance that uses the risk of a firm's equity to estimate the risk of a firm's debt.⁷⁸ In doing so, the approach assumes that hypothetical spreads derived from equity prices are *not* influenced by any expectations of government support, but that observed credit default swap spreads *are* influenced by such expectations. By comparing the two spreads the approach can estimate the magnitude of expectations of government support. While this approach has some advantages, it relies on critical assumptions about how a limited number of factors influence the risk of default.⁷⁹

⁷⁷International Monetary Fund, "How Big is the Implicit Subsidy for Banks Considered Too Important to Fail?" *Global Financial Stability Report*, Ch. 3 (Washington, D.C.: 2014), Zoe Tsesmelidakis and Robert C. Merton, "The value of implicit guarantees," *Social Science Research Network working paper*, September 1, 2012, and Zan Li, Shisheng Qu and Jing Zhang, *Quantifying the Value of Implicit Government Guarantees for Large Financial Institutions* (Moody's Analytics, 2011).

⁷⁸This approach can be referred to as a "Merton model" based on Robert C. Merton, "On the pricing of corporate debt: the risk structure of interest rates," *Journal of Finance* vol. 29, 1974. Holders of equity and debt in a bank both face a risk of loss. Equity holders face a higher risk because they are the first to take losses in a failure (i.e., debt holders have higher priority). However, the risk that a debt holder will take a loss is likely to be proportional to—but smaller than—the risk facing an equity holder. As a result, one can estimate the risk of default on a debt based in part on the volatility of the stock price of the bank.

⁷⁹Another weakness of this model is that the market pricing of credit default swaps may not be reliable during a crisis.

As a result, these analyses may also omit important factors that influence funding costs, such as earnings.⁸⁰

- **Ratings-based.** Two papers used Fitch credit ratings to estimate the funding cost difference that could be associated with potential government support.⁸¹ Models based on credit ratings offer a convenient way to incorporate all the factors the rating agency considers relevant to default risk and take advantage of the rating agency's explicit separation of the impact of expected government support through, for example, the assignment of a standalone credit rating (assuming no government support) and a higher credit rating assuming government support.⁸² However, this approach assumes that all information about market expectations of default risk and government support are incorporated into credit ratings, which is a potentially weak assumption. Credit ratings had a limited impact on the views of large investors we interviewed, as previously discussed. Moreover, funding costs vary for firms within a particular rating. As a result, these studies may estimate funding costs with considerable error. Finally, results of these studies are sensitive to the credit rating agency used—for example, results based on Moody's ratings could be quite different than other rating agencies because Moody's removed expectations of government support for U.S. bank holding companies in 2013.

In addition to the approach-specific limitations, a number of general limitations related to implementation of the various approaches exist across studies we reviewed that could reduce their validity or applicability to U.S. bank holding companies. For example, studies varied in the

⁸⁰See Sreedhar T. Bharath and Tyler Shumway, "Forecasting default with the Merton distance to default model," *Review of Financial Studies*, vol. 21, no. 3, May 2008.

⁸¹International Monetary Fund, "How Big is the Implicit Subsidy for Banks Considered Too Important to Fail?" *Global Financial Stability Report*, Ch. 3 (Washington, D.C.: 2014), and Kenichi Ueda and Beatrice Weder di Mauro, "Quantifying structural subsidy values for systemically important financial institutions," *Journal of Banking & Finance* vol. 37, no. 10, October 2013.

⁸²In assessing the creditworthiness of bank holding companies, all three major rating agencies discuss the extent to which a rating is influenced by potential government support, though the specific approach differs by rating agency. By comparing a bank holding company's credit rating—with and without expected government support—to the average historical funding cost for corporations at those ratings, one can estimate the benefit of the amount of government support associated with the rating uplift.

countries that were included in the analysis—some studies focused on the United States, while others included a broad cross-section of more than 20 countries. Studies that pooled a large number of countries in their analysis have results that may not be applicable to U.S. bank holding companies. For example, studies that included Switzerland and Iceland in their analyses may not apply to the United States because banking sectors in those countries are much larger relative to the economy. As noted above, because few studies included data past 2011, results may not reflect recent changes in the regulatory environment and market sentiment; for example, the Federal Reserve's rule for enhanced prudential standards for large bank holding companies and FDIC's proposed strategy for orderly liquidation.

As a result of the limitations associated with these methodological choices, estimates of the size of the funding cost difference associated with a too-big-to-fail advantage based on this literature—while suggestive of general trends—are not definitive and should be interpreted with caution.

GAO Analysis Suggests Large Banks Had Lower Funding Costs during the Financial Crisis but This Advantage May Have Declined or Reversed Since

We conducted our own analysis to assess the extent to which the largest bank holding companies have had lower funding costs as a result of perceptions that the government would not allow them to fail. Overall, our analysis provides some evidence that large or systemic bank holding companies had lower funding costs than smaller ones during the 2007-2009 financial crisis that may have been associated with expectations of government assistance. Our analysis provides only limited evidence that large bank holding companies had lower funding costs since the crisis and instead provides some evidence that the opposite may have been true at the levels of credit risk that prevailed in those years. However, in hypothetical scenarios where levels of credit risk in every year from 2010 to 2013 are assumed to be as high as they were during the financial crisis, our analysis suggests that large bank holding companies might have had lower funding costs than smaller bank holding companies. Although our analysis improves on certain aspects of prior studies, important limitations remain and our results should be interpreted with caution.

To conduct our analysis, we developed a series of econometric models—models that use statistical techniques to estimate the relationships between quantitative economic and financial variables—based on our assessment of relevant studies and expert views. These models estimate the relationship between bank holding companies' bond funding costs

and their size, while also controlling for other drivers of bond funding costs, including credit risk and bond liquidity. Key features of our econometric approach include the following:

- **U.S. bank holding companies.** To better understand the relationship between bank holding company funding costs and size in the context of the U.S. economic and regulatory environment, we only analyzed U.S. bank holding companies. In contrast, some of the literature we reviewed analyzed nonbank financial companies and foreign companies.
- **2006-2013 time period.** To better understand the relationship between bank holding company funding costs and size in the context of the current economic and regulatory environment, we analyzed the period from 2006 through 2013, which includes the recent financial crisis as well as years before the crisis and following the enactment of the Dodd-Frank Act. In contrast, some of the literature we reviewed did not analyze data in the years after the financial crisis.
- **Bond funding costs.** We used bond yield spreads as our measure of bank holding company funding costs because they are a direct measure of what investors charge bank holding companies to borrow money and because they are sensitive to credit risk and hence expected government support. This indicator of funding costs has distinct advantages over certain other indicators used in studies we reviewed, including credit ratings, which do not directly measure funding costs, and total interest expense, which mixes the costs of funding from multiple sources.
- **Alternative measures of size.** Size or systemic importance can be measured in multiple ways, as reflected in our review of the literature. Based on that review and the comments we received from external reviewers, we used four different measures of size or systemic importance: total assets, total assets and the square of total assets, whether or not a bank holding company was designated a GSIB by the Financial Stability Board in November 2013, and whether or not a bank holding company had assets of \$50 billion or more.
- **Extensive controls for bond liquidity, credit risk, and other key factors.** To account for the many factors that could influence funding costs, we controlled for credit risk, bond liquidity, and other key factors in our models. We included a number of variables that are associated with the risk of default, including measures of capital adequacy, asset quality, earnings, and volatility. We also included a number of

variables that can be used to measure bond liquidity. Finally, we included variables that measure other key characteristics of bonds, such as time to maturity, and key characteristics of bank holding companies, such as operating expenses. Our models include a broader set of controls for credit risk and bond liquidity than some studies we reviewed and, as we discuss later, we directly assess the sensitivity of our results to using alternative controls on our estimates of funding costs.

- **Multiple model specifications.** In order to assess the sensitivity of our results to using alternative measures of size, bond liquidity, and credit risk discussed above, we estimated multiple different model specifications. We developed models using four alternative measures of size, two alternative sets of measures of capital adequacy, six alternative measures of volatility, and three alternative measures of bond liquidity to assess the impact of using alternative measures on our results. In contrast, some of the studies we reviewed estimated a more limited number of model specifications.
- **Annual estimates of models.** To allow for changes in investors' beliefs about the likelihood of government rescues between the years of the financial crisis—when emergency government programs designed to assist financial institutions were available—and the years following the crisis, our models allow the relationship between bank holding company funding costs and size to vary over time. In contrast, some of the studies we reviewed assumed that the relationship between bank holding company funding costs and size was constant over time.
- **Link between size and credit risk.** To account for the possibility that investors' beliefs about government rescues affect their responsiveness to credit risk, our models allow the relationships between bank holding company funding costs and credit risk to depend on size.

Altogether, we estimated 42 different models for each year from 2006 through 2013 and then used these models to compare bond yield spreads—our measure of bond funding costs—for bank holding

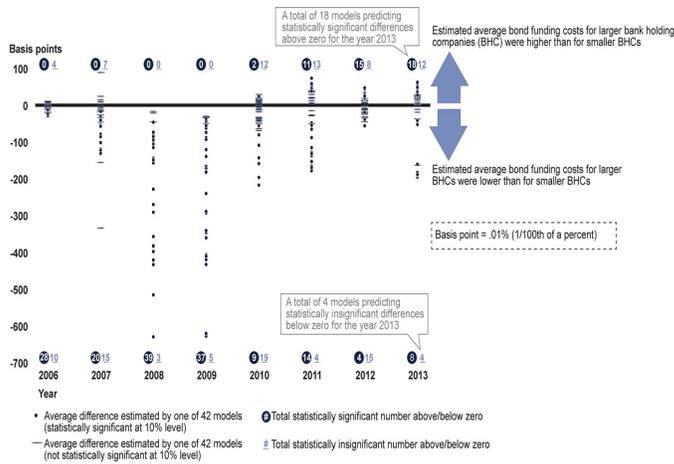
companies of different sizes but with the same level of credit risk.⁸³ Figure 1 shows our models' comparisons of the difference between bond funding costs for bank holding companies with \$1 trillion in assets and average credit risk and bond funding costs for similar bank holding companies with \$10 billion in assets, for each model and for each year.⁸⁴ Each circle and dash in figure 1 shows the comparison of bond funding costs for a different model. Circles show model-estimated differences that were statistically significant at the 10 percent level, while dashes represent differences that were not statistically significant at that level.⁸⁵ Circles and dashes below zero correspond to models suggesting that bank holding companies with \$1 trillion in assets have lower bond funding costs than bank holding companies with \$10 billion in assets, and vice versa.

⁸³Our models allow the size of a bank holding company to influence its bond funding costs directly and also indirectly through the interaction between size and credit risk. As a result, no single parameter is sufficient to describe the relationship between bond funding costs and size. To summarize the overall relationship between bond funding costs and size reflected in each specification, we calculated bond funding costs for bank holding companies of different sizes and credit risk levels using our estimates of the parameters for each specification for each year. See appendix I for more details on these calculations.

⁸⁴We also compared funding costs for bank holding companies with \$50 billion, \$100 billion, \$250 billion, and \$500 billion in assets to bank holding companies with \$10 billion in assets. See appendix I.

⁸⁵Many of the estimates that were statistically significant at the 10 percent level were also statistically significant at the 5 percent or 1 percent level. See table 5 in appendix I.

Figure 1: Estimates from 42 Models of Average Bond Funding Cost Differences between Bank Holding Companies with \$1 Trillion and \$10 Billion in Assets, 2006-2013



Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated 42 models for each year from 2006 through 2013 to assess the sensitivity of estimated funding cost differences to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance. We used the models to compare bond funding costs for bank holding companies of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. This figure compares bond funding costs for bank holding companies with \$1 trillion and \$10 billion in assets, for each model and for each year, with average levels of credit risk. Each circle and dash shows the comparison for a different model, where circles and dashes below zero suggest bank holding companies with \$1 trillion in assets have lower bond funding costs than bank holding companies with \$10 billion in assets, and vice versa.

Our analysis provides evidence that the largest bank holding companies had lower funding costs during the 2007-2009 financial crisis but that differences may have declined or reversed in recent years. However, we found that the outcomes of our econometric models varied with the various controls we used to capture size, credit risk, and bond liquidity. This variation indicates that uncertainty related to how to model funding costs has an important impact on estimated funding cost differences

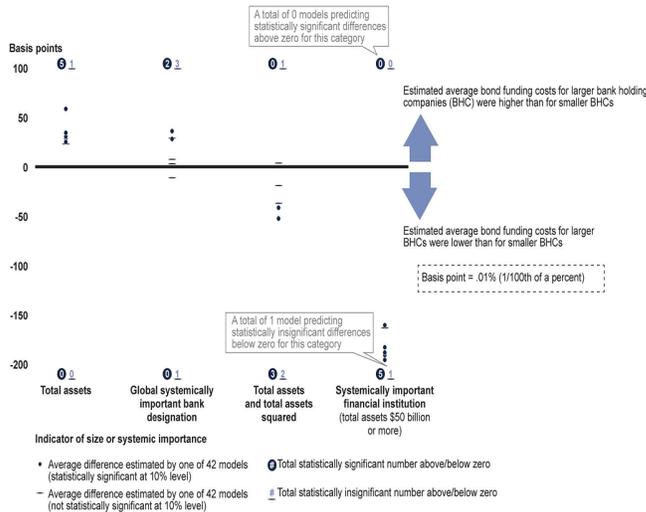
between large and small bank holding companies. As figure 1 shows, most models found that larger bank holding companies had lower bond funding costs than smaller bank holding companies during the 2007-2009 financial crisis, but the magnitude of the difference varied widely across models, as indicated by the range of results for each year. For example, for 2008, our models suggest that bond funding costs for bank holding companies with \$1 trillion in assets and average credit risk were from 17 to 630 basis points lower than bond funding costs for similar bank holding companies with \$10 billion in assets. For 2009, our models suggest that bond funding costs for bank holding companies with \$1 trillion in assets and average credit risk were from 30 to 628 basis points lower than bond funding costs for similar bank holding companies with \$10 billion in assets.

Our models' comparisons of bond funding costs for different-sized bank holding companies for 2010 through 2013 also vary widely. For bank holding companies with average credit risk, more than half of our models suggest that larger bank holding companies had higher bond funding costs than smaller bank holding companies from 2011 through 2013, but many models suggest that larger bank holding companies still had lower bond funding costs than smaller ones during this period. For example, for 2013, our models suggest that bond funding costs for average credit risk bank holding companies with \$1 trillion in assets ranged from 196 basis points lower to 63 basis points higher than bond funding costs for similar bank holding companies with \$10 billion in assets (see fig. 1). For 2013, thirty of our models suggest that the larger banks had higher funding costs, and 12 of our models suggest that the larger banks had lower funding costs.

Our models' comparisons were particularly sensitive to the measure of size or systemic importance we used. For example, for 2013, models that used total assets as the indicator of size or systemic importance suggest that bond funding costs for bank holding companies with \$1 trillion in assets and average credit risk ranged from 23 to 59 basis points higher than bond funding costs for similar bank holding companies with \$10 billion in assets (see fig. 2). Models that used the GSIB designation suggest that bond funding costs for bank holding companies with \$1 trillion ranged from 11 basis points lower to 36 basis points higher than bond funding costs for bank holding companies with \$10 billion in assets. Models that used total assets and the square of total assets—which allows for a nonlinear relationship between size and yield spreads—suggest that bond funding costs for bank holding companies with \$1 trillion in assets ranged from 52 basis points lower to 4 basis points higher

than bond funding costs for bank holding companies with \$10 billion in assets. Finally, models that used whether or not a bank holding company had \$50 billion in assets suggest that bond funding costs for bank holding companies with \$1 trillion ranged from 161 to 196 basis points lower than bond funding costs for bank holding companies with \$10 billion in assets.

Figure 2: Difference in Estimated Bond Funding Costs for Average Credit Risk Bank Holding Companies with \$1 Trillion versus \$10 Billion in Assets by Indicator of Size or Systemic Importance, 2013



Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated multiple models for each year from 2006 through 2013 to assess the sensitivity of estimated funding cost differences to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance. We used the models to compare bond funding costs for bank holding companies of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. This figure compares bond funding costs for bank holding companies with \$1 trillion and \$10 billion in assets with average levels of credit risk for 2013 for models that differ in how they measure size. Each circle and dash shows the comparison for a different model, where circles and dashes below zero suggest bank holding companies with \$1 trillion in assets have lower bond funding costs than bank holding companies with \$10 billion in assets, and vice versa.

We also found that our models' comparisons of bond funding costs for bank holding companies of different sizes varied depending on bank holding companies' level of credit risk. For low credit risk bank holding companies, most models suggest that bond funding costs for larger bank holding companies were lower than bond funding costs for smaller bank holding companies during the 2007-2009 financial crisis and that bond funding costs for larger bank holding companies were higher than bond funding costs for smaller bank holding companies from 2010 through 2013. Depending on the year, 25 to 42 of our 42 models suggest that bond funding costs for larger, low risk bank holding companies were lower during the financial crisis, while 31 to 41 of our 42 models suggest that bond funding costs for larger low risk bank holding companies were higher following the crisis. However, for high credit risk bank holding companies, most models suggest that bond funding costs for larger bank holding companies were lower than bond funding costs for smaller bank holding companies in every year (28 to 41 of our 42 models, depending on the year).

Given that most models suggest that large bank holding companies' bond funding costs are typically lower than small bank holding companies' bond funding costs at high levels of credit risk, this suggests that size-related funding cost differences that favor large bank holding companies are more likely to emerge when the likelihood that a bank holding company will fail increases. As we discuss later, investors' overall beliefs about the likelihood of government support may have several components, including beliefs about whether or not a bank holding company will fail—which is related to its credit risk—and beliefs about whether or not a bank holding company will be supported by the government if it fails. For example, investors may believe that larger bank holding companies are more likely to be supported than smaller bank holding companies in the event of failure, but investors may also believe that all bank holding companies are relatively safe and unlikely to fail. In this case, investors' overall expectations of government support for all bank holding companies are likely to be low, and differences in funding costs due to varying expectations of government support for bank holding companies of different sizes are likely to be small or nonexistent. In contrast, if investors believe that all bank holding companies are risky and prone to fail, then investors' overall expectations of government support for larger bank holding companies are likely to be higher than for smaller bank holding companies, and differences in funding costs are likely to be greater.

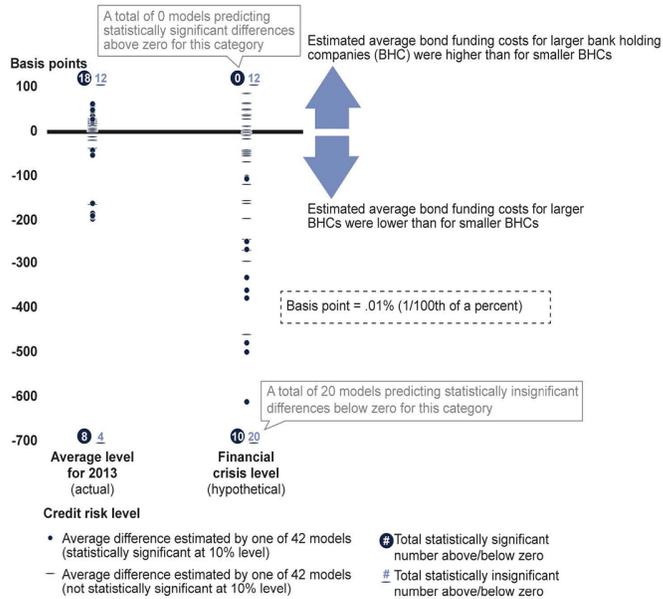
To assess how investors' beliefs that the government will support failing bank holding companies have changed over time, we compared bond funding costs for bank holding companies of various sizes while holding the level of credit risk constant over time at the average for 2008—a relatively high level of credit risk that prevailed during the financial crisis.⁸⁶ In these hypothetical scenarios, most models suggest that bond funding costs for larger bank holding companies would have been lower than bond funding costs for smaller bank holding companies in most years. For example, most models for 2013 predict that bond funding costs for larger bank holding companies would be higher than for smaller bank holding companies at the average level of credit risk in that year, but would be lower at financial crisis levels of credit risk (see fig. 3). These results suggest that changes over time in funding cost differences we estimated (depicted in fig. 1) have been driven at least in part by improvements in the financial condition of bank holding companies.⁸⁷ At the same time, more models predict lower bond funding costs for larger bank holding companies in 2008 than in 2013 when we assume that financial crisis levels of credit risk prevailed in both years, which suggests that investors' expectations of government support have changed over time.⁸⁸ However, it is important to note that the relationships between variables estimated by our models could be sensitive to the average level of credit risk among bank holding companies, making these estimates of the potential impact of the level of credit risk from 2008 in the current environment even more uncertain. Moreover, Dodd-Frank Act reforms discussed earlier in this report, such as enhanced regulatory standards for capital and liquidity, could enhance the stability of the U.S. financial system and make such a credit risk scenario less likely. However, the extent to which such benefits will materialize depends on many factors that remain difficult to predict.

⁸⁶Although higher, credit risk in 2008 was not outside the range of credit risk in 2013 in every dimension. Specifically, the average values of the credit risk variables for 2008 were less than the maximum values of the credit risk variables for 2013, with the exceptions of the variables measuring equity price volatility, option implied volatility, equity return volatility, and excess equity return volatility.

⁸⁷As discussed earlier in this report, many investment firm representatives with whom we spoke credited enhanced regulatory standards with improving the safety and soundness of the largest bank holding companies and reducing the likelihood that they would experience distress that could result in failure or government support.

⁸⁸To see this, compare the 2008 estimates in figure 1 to the “financial crisis level” estimates for 2013 in figure 3. Both sets of estimates are derived assuming that the level of credit risk is equal to the average for 2008.

Figure 3: Difference in Estimated Bond Funding Costs for Bank Holding Companies with \$1 Trillion versus \$10 Billion in Assets by Level of Credit Risk, 2013



Source: GAO analysis of data from Bloomberg and the Financial Stability Board. | GAO-14-621

Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated 42 models for each year from 2006 through 2013 to assess the sensitivity of estimated funding cost differences to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance. We used the models to compare bond funding costs for bank holding companies of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. This figure compares bond funding costs for bank holding companies with \$1 trillion and \$10 billion in assets, for each model for 2013, with the average level of credit risk in 2013 and the average level of credit risk in 2008 during the financial crisis. Each circle and dash shows the comparison for a different model, where circles and dashes below zero suggest bank holding companies with \$1 trillion in assets have lower bond funding costs than bank holding companies with \$10 billion in assets, and vice versa.

Estimates of Size-Related
Funding Cost Differences
Should Be Interpreted with
Caution

Our estimates of the relationship between the size of a bank holding company and the yield spreads on its bonds are limited by several factors and should be interpreted with caution. These factors present challenges to using our results and the results of other studies as the basis for public policy responses to concerns about the risks posed by large financial institutions.

Investors' beliefs about the likelihood of government support are composed of several different elements, including the likelihood that a bank holding company will fail, the likelihood that it will be rescued by the government if it fails, and the size of the losses that the government may impose on investors if it rescues the bank holding company. Like the methodologies used in the literature we reviewed, our methodology does not allow us to precisely identify the influence of each of these factors. As a result, changes over time in our estimates of the relationship between bond funding costs and size may reflect changes in one or more of these components, but we cannot identify which with certainty. For example, if bond funding costs for a bank holding company with \$1 trillion are less than those for a bank holding company with \$10 billion but the difference decreases over time, this trend may indicate that investors believe that the larger bank holding company is relatively less likely to fail, which could be the case if the level of credit risk is falling over time, either due to market pressure, regulatory requirements, or other reasons. This trend could also indicate that investors believe that the government has become less likely to rescue the larger bank holding company if it fails or more likely to impose losses on investors in a rescue.

In addition, our estimates of differences in bond funding costs for bank holding companies of different sizes may reflect factors other than investors' beliefs about the likelihood of government support. We have taken into account many of the factors that may help explain differences in yield spreads for bank holding companies of different size, such as credit risk and bond liquidity. However, we may not have taken into account all possible factors. If a factor that we have not taken into account is associated with size, then our results may reflect the relationship between bond funding costs and this omitted factor instead of, or in addition to, the relationship between bond funding costs and bank holding company size.

Our estimates of differences in bond funding costs for bank holding companies of different sizes may also reflect differences in the characteristics of bank holding companies that choose to issue bonds. Bank holding companies that issue bonds may differ from those that do

not in ways that may or may not be observable. If such differences exist and are unobservable, then our models' comparisons are likely to be consistently either too high or too low depending on the relationship between size and the relevant unobservable characteristic. However, if bank holding companies that issue bonds differ from those that do not in ways that are observable in our model, then our models' comparisons of bond funding cost differences for bank holding companies of different sizes are unlikely to be consistently either too high or too low. We found some evidence that this may be the case. Investors with whom we spoke told us that larger bank holding companies are generally more likely to issue bonds than smaller ones because they can issue a large enough quantity of debt to satisfy investors' demand for liquidity and to allow investors to make a large enough investment to cover their transaction costs. Thus, size, which is observable, may be an important difference between bank holding companies that issue bonds and those that do not. Importantly, bank holding company size matters in this case because it is associated with bond issue size, which we control for, not because it is associated with investors' beliefs about government rescues.

In general, our estimates of the impact of size on bond funding costs may reflect a relationship between size, credit risk, or other explanatory variables and the part of bond funding costs that is not explained by our model (endogeneity). This could occur if any of our control variables are influenced by bond funding costs. In this case, our estimates of the magnitude of the association between size and bond funding costs will be imperfect and our ability to infer a causal relationship between size and bond funding costs will be limited.

Historical estimates of differences in bond funding costs for bank holding companies of different sizes are not indicative of future differences. As we have discussed, our estimates of the historical relationship between bank holding company size and bond funding costs vary from year to year. Thus, it is likely that the relationship between bond funding costs and bank holding company size may change in the future. As we have noted, the Dodd-Frank Act imposes new and higher fees on large bank holding companies and requires the Federal Reserve Board to subject large bank holding companies to enhanced regulatory standards for capital, liquidity, and risk management. These enhanced standards may help to reduce the likelihood that a large bank holding company will fail, which may in turn alter investors' beliefs about the likelihood of government support and thus affect the size of any differences in yield spreads on bonds issued by large and small bank holding companies. Improvements in economic conditions, such as faster economic growth and lower

unemployment, may have a similar effect. Finally, changes in the structure of financial markets, such as an increase in the share of credit provided by nonbank financial companies that reduces the systemic importance of large bank holding companies, could also lead investors to change their beliefs about government rescues in future episodes of individual or system-wide distress.

Finally, our estimates of the differences in bond funding costs for bank holding companies of different sizes do not necessarily reflect the harm that the failure of a large bank holding company could do to the economy. Bond funding costs reflect the risk that a bank holding company might fail and not be able to fully repay its investors. However, parties other than investors may be harmed if a bank holding company fails. For example, the customers of a failed bank holding company may be harmed if they have less access to credit or to specialized services provided by the bank holding company, which could be the case if the bank holding company has a large enough share of the market.

Agency Comments and Our Evaluation

We made copies of the draft report available to FDIC, the Federal Reserve Board, FSOC, OCC and Treasury for their review and comment. We also provided excerpts of the draft report for technical comment to Fitch, Moody's, Standard and Poor's, and the International Monetary Fund. All of these agencies and third parties, except for FSOC, provided technical comments, which we have incorporated, as appropriate.

In its written comments, which are reprinted in appendix II, Treasury generally agreed with the results of our analysis and commented that our draft report represents a meaningful contribution to the literature. Treasury further commented that the Dodd-Frank Act makes clear that shareholders, creditors and executives—not taxpayers—will be responsible if a large company fails and that our results reflect increased market recognition that the Dodd-Frank Act ended "too big to fail" as a matter of law. While our results do suggest bond funding cost differences between large and smaller bank holding companies may have declined or reversed since the 2007-2009 financial crisis, we also report that a higher credit risk environment could be associated with lower bond funding costs for large bank holding companies than for small ones. Furthermore, as we have noted, many market participants we spoke with believe that recent regulatory reforms have reduced but not eliminated the perception of "too big to fail" and both they and Treasury officials indicated that additional steps were required to address "too big to fail." As discussed in the final section of our report on page 56, changes over time in our estimates of

the relationship between bond funding costs and size may reflect changes in one or more components of investors' beliefs about government support—such as their views on the likelihood that a bank holding company will fail and the likelihood it will be rescued if it fails—but we cannot precisely identify the influence of each of these components with certainty. A decline or reversal of funding cost advantages for large bank holding companies could indicate that investors believe that the government has become less likely to rescue a large bank holding company if it fails or more likely to impose losses on investors in a rescue. This trend could also indicate that investors believe that large bank holding companies are less likely to fail.

On separate dates in July 2014, Treasury, the Federal Reserve Board, OCC and FDIC provided via email technical comments related to the draft report's analysis of funding cost differences between large and small bank holding companies. We summarize their most significant comments and our responses below.

- Treasury provided comments on our presentation of the impact of a higher credit risk environment on our analysis of bond funding costs and the statistical robustness of these results. In response to these comments, we revised text on the Highlights and in the report body to clarify that the results of this analysis reflect hypothetical scenarios and to provide greater attention to the potential impacts of regulatory reforms. With respect to the statistical robustness of these results, we note that the draft report contained clear information about the statistical significance of our results. Importantly, we note that whether one considers the estimates from all 42 models for 2013 or only the 10 models with statistically significant results, higher credit risk substantially increases (1) the number of models that suggest bond funding costs would have been lower for the largest bank holding companies than for smaller bank holding companies and (2) the size of funding cost differences in 2013. In addition, we amended the draft to clarify that our results for the hypothetical scenario for 2013 differ from our results for 2008, in which all 42 models predicted lower funding costs for larger bank holding companies.
- Treasury and the Federal Reserve Board provided comments related to the draft report's presentation of statistical significance in figures 1, 2, and 3. In response to these comments, we made formatting changes to the figures to more clearly differentiate estimates that are statistically significant from those that are not.

In addition, we note that table 7 on pages 79-81 of the report contains some of the data used to create figures 1, 2 and 3 and differentiates between estimates that are statistically significant at the 1 percent, 5 percent, and 10 percent levels. Finally, while statistically insignificant estimates may be viewed as weaker evidence than statistically significant estimates and may influence how our results are interpreted, we note that statistical significance is not the only relevant characteristic of an econometric estimate and that by presenting the full range of results one can better assess their magnitude and economic significance.

- Treasury and the Federal Reserve Board also commented that in comparing bond funding costs for large and small bank holding companies, a bank holding company with \$10 billion in assets is too small to make a meaningful comparison to a bank holding company with \$1 trillion in assets. They commented that a bank holding company with at least \$50 billion in assets would provide a more relevant comparison for this analysis. While we agree that bank holding companies with \$50 billion in assets may be more similar to \$1 trillion bank holding companies than bank holding companies with \$10 billion in assets, we used a smaller size for small bank holding companies because bank holding companies with \$50 billion or more in assets may be viewed by investors as "large" and systemically important, in part because \$50 billion in assets is the size threshold for Dodd-Frank Act requirements related to enhanced regulatory standards. While we agree that bank holding companies of different sizes have different characteristics, we compared estimated funding costs for bank holding companies assuming their credit risk and other characteristics are identical. Finally, increasing the size of the small bank holding company in our comparisons would not have a substantive impact on the sign or statistical significance of our estimated differences in funding costs, nor would it change the trends in estimated differences in funding costs over time.
- The Federal Reserve Board and OCC commented that few of the estimated coefficients on the variables measuring size and size interacted with credit risk reported in table 5 were individually statistically significant, suggesting that there is little statistical evidence of a relationship between bond funding costs and size. To address this concern, we conducted hypothesis tests that the coefficients on the size and size-credit risk interaction terms are

jointly equal to zero. The results of these hypothesis tests suggest that the coefficients on the size and size-credit risk interaction terms are jointly significant at the 5 percent level, suggesting that there is statistical evidence of a relationship between bond funding costs and size. We report the results of our joint hypothesis tests in table 5 on pages 74 and 76 of the report. In addition, we note that the draft report only contains coefficient estimates for the 6 baseline models of the 42 total models for 2008 and 2013 and that those 6 models are presented as examples and do not fully reflect the impact of size in all the specifications in those years or in other years. However, we believe the regression-level detail on the 6 baseline models included in the report is sufficient to assist readers looking to understand our methodology and conclusions.

- OCC suggested that selection bias and omitted variables bias could reduce the validity of our econometric results. We agree that these biases are potential limitations of the model and are among the reasons the results should be interpreted with caution. We discuss the potential impact of these concerns on pages 56-57.
- OCC and FDIC commented on the endogeneity of some independent variables and the impact this could have on our results. We agree that endogeneity is a potential limitation of the model and is among the reasons the results should be interpreted with caution. In response to this comment, we added a paragraph discussing the potential impact of endogeneity on our results on page 57 of the report.

We are sending copies of this report to FDIC, the Federal Reserve Board, FSOC, OCC, Treasury, interested congressional committees, members, and others. In addition, the report is available at no charge on the GAO website at <http://www.gao.gov>.

If you or your staffs have any questions regarding this report, please contact me at (202) 512-4802 or EvansL@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix III.



Lawrence L. Evans, Jr., PhD
Director, Financial Markets
and Community Investment

Appendix I. Methodology for Analysis of Funding Cost Differences between Large and Small Bank Holding Companies

To assess the extent to which the largest bank holding companies have received funding cost advantages as a result of perceptions that the government would not allow them to fail, we conducted an econometric analysis of the relationship between a bank holding company's size or systemic importance and its funding costs. Bank holding companies obtain funds from investors—such as depositors, creditors, or shareholders—which they use to finance assets, such as various types of credit. The prices that bank holding companies pay to obtain these funds are influenced by several factors, including credit risk—the likelihood that bank holding companies will repay the funds they borrowed as agreed—and other factors. Funding cost advantages may arise if investors believe that the government is more likely to support larger bank holding companies in distress than smaller bank holding companies in distress. This belief may lead investors to view larger bank holding companies as having less credit risk than smaller bank holding companies and thus charge larger bank holding companies a lower price to borrow than smaller bank holding companies.

We used a multivariate regression model to estimate the relationship between bank holding companies' funding costs and their size while controlling for factors other than size that may also influence funding costs. Our general regression model is the following:

$$\text{funding cost}_{bq} = \alpha + \beta \cdot \text{size}_{bq} + \gamma \cdot \text{credit risk}_{bq} + \delta \cdot (\text{size}_{bq} \times \text{credit risk}_{bq}) + X'_{bq} \cdot \theta + \varepsilon_{bq}$$

In this model, b denotes the bank holding company, q denotes the quarter, funding cost_{bq} is the bank holding company's cost of funding in a quarter, size_{bq} is a measure of the bank holding company's size at the beginning of the quarter, credit risk_{bq} is a list of proxies for the bank holding company's credit risk, X_{bq} is a list of other variables that may influence funding costs, ε_{bq} is an idiosyncratic error term, and $\alpha, \beta, \gamma, \delta$, and θ are parameters to be estimated. The parameter β captures the direct relationship between a bank holding company's funding cost and its size. The parameter δ captures the indirect relationship between a bank holding company's funding cost and its size that exists if the size of a bank holding company affects the relationship between its funding cost and credit risk. If greater values of the size measure are associated with larger bank holding companies, if greater values of the credit risk proxies

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Funding Cost Differences between Large and
Small Bank Holding Companies

are associated with greater credit risk, and if investors view larger bank holding companies as less risky than smaller bank holding companies due to beliefs that the government is more likely to rescue larger bank holding companies in distress, then either β is less than zero, δ is less than zero, or both. However, the parameters β and δ may also reflect factors other than these beliefs.

We used a measure of funding costs based on bonds issued by bank holding companies that is available for bank holding companies with a wide variety of sizes. Bank holding companies use a variety of funding types from different sources, including various types of deposits, bonds, and equity. We used bond yield spreads—the difference between the rate of return on a bond and the rate of return on a Treasury bond of comparable maturity to measure a bank holding company's cost of bond funding. Treasury securities are widely viewed as a risk-free asset, so the yield spread measures the price that investors charge a bank holding company to borrow to compensate them for credit risk and other factors. We focused on bond funding costs for several reasons. First, bonds are traded in secondary markets, so timely information about changes in their yield spreads, which reflect investors' perceptions of the credit risk of the bond's issuing bank holding company, is easily observable.¹ In contrast, some uninsured deposit products are not traded in secondary markets, so changes in the prices of those deposits, which may reflect depositors' perceptions of the riskiness of the bank holding company, may be less easy to observe. Second, bond yield spreads are a direct measure of bank holding companies' funding costs. In contrast, credit ratings are indirect measures of bank holding companies' funding costs because funding costs can vary for firms with the same rating. Similarly, total interest expense as reported on a bank holding company's balance sheet is an imperfect measure of funding costs because total interest expense may aggregate the prices of liabilities with many important differences, including term and creditor priority. Third, bonds generally rank higher in a bank holding company's capital structure than equity, so bondholders are less likely to suffer losses and more likely to be repaid if a bank holding company becomes distressed. Bondholders are thus more likely to benefit if a distressed bank holding company is rescued by the government. In contrast, equity holders generally rank lowest in a bank holding company's capital structure and are the first to suffer losses if a

¹Secondary markets are markets where investors purchase securities or assets from other investors, rather than from issuing companies themselves.

Appendix I. Methodology for Analysis of
Funding Cost Differences between Large and
Small Bank Holding Companies

bank holding company becomes distressed. Shareholders are thus the least likely to benefit if a distressed bank holding company is rescued by the government. It follows that the cost of bond funding is more likely to reflect investors' beliefs about the likelihood of government support than the cost of equity funding. Fourth, bank holding companies with a wide variety of sizes issue bonds, including some with less than \$10 billion in assets. In contrast, credit default swaps—the prices of which likely reflect perceptions of a bank holding company's credit risk—are available for only a small number of large bank holding companies.²

We used Bloomberg to identify U.S. bank holding companies with more than \$500 million in assets that were active in one or more years from 2006 to 2013, and to identify all plain vanilla, fixed-rate, senior unsecured bonds issued by these bank holding companies, excluding bonds with a government guarantee.³ See table 3 for the numbers of bank holding companies and bonds we analyzed.⁴

Table 3: Numbers of Bank Holding Companies and Bonds, 2006-2013

Year	Number of bank holding companies	Number of bank holding companies with senior unsecured bonds outstanding	Number of senior unsecured bonds outstanding
2006	1178	22	166
2007	1209	23	202
2008	1192	22	203

²A credit default swap is a credit derivative in which two parties enter into an agreement whereby one party pays the other a fixed periodic coupon for the specified life of the agreement and the other party makes no payments unless a credit event relating to a predetermined reference asset occurs. If such an event occurs, the party will then make a payment to the first party and the swap will terminate. The size of the payment is usually linked to the decline in the reference asset's market value following the determination of the occurrence of a credit event.

³A plain vanilla bond, also known as a straight bond, is a bond that pays interest at regular intervals and at maturity pays back the principal that was originally invested. These bonds are debt instruments because they are essentially loaning money (creating debt) to an entity, which promises to pay the interest on the debt and at maturity pay back the original loan.

⁴Our sample includes only bank holding companies, so it excludes companies like Goldman Sachs and Morgan Stanley before they became bank holding companies. Similarly, our sample excludes other financial companies that were never bank holding companies.

Appendix I. Methodology for Analysis of
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Year	Number of bank holding companies	Number of bank holding companies with senior unsecured bonds outstanding	Number of senior unsecured bonds outstanding
2009	1178	26	333
2010	1133	29	368
2011	1038	29	374
2012	1046	31	447
2013	1033	30	510

Source: GAO analysis of Bloomberg data. | GAO-14-621

Notes: We used Bloomberg to identify U.S. bank holding companies that reported positive average assets as of the end of at least one year from 2006 to 2013, where average assets consist of the quarterly average for total assets, less goodwill, other disallowed intangible assets, disallowed deferred tax assets, and any other assets that are deducted in determining Tier 1 capital in accordance with the capital standards issued by the reporting bank's primary federal supervisory authority and are reported on form FR Y-9C. Only bank holding companies with \$500 million in assets or more are required to file form FR Y-9C. We also used Bloomberg to identify all plain vanilla, fixed-rate, senior unsecured bonds issued by these bank holding companies, where "plain vanilla" bonds are bonds without any derivative or equity features. We excluded bonds guaranteed by either the Federal Deposit Insurance Corporation (FDIC) or the U.S. government.

We collected data on bond yield spreads, bank holding company size, other variables associated with bank holding company credit risk, and bond characteristics from Bloomberg and used these data to assemble a dataset with one observation for each bond in each quarter from the first quarter of 2006 to the fourth quarter of 2013.

Yield spreads. For each bond, we collected daily data on its yield spread based on prices from executed trades, executable quotes, and composites derived from executable and indicative quotes.⁵ For each bond and for each quarter from 2006 to 2013, we calculated the average yield spread for each bond based on (1) executed trades, executable quotes, and composites derived from executable and indicative quotes; and (2) actual trades only.⁶

Size. We constructed four alternative indicators of a bank holding company's size or systemic importance: (1) total assets as of the

⁵Executed trades are trades that have been completed. Executable quotes are quotes provided by bond dealers at which they are willing to trade. Indicative quotes are quotes provided by bond dealers to give an indication of the price at which a bond might trade, but at which they are not obligated to trade. Composites are aggregates of quotes from multiple sources that are suggestive of the price at which a bond might trade.

⁶The correlation between the two measures of bond yield spreads was 0.96.

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beginning of the quarter; (2) an indicator for whether or not a bank holding company had \$50 billion or more in assets, i.e., is a systemically important financial institution (SIFI), as of the beginning of the quarter, which captures those bank holding companies that are subject to enhanced prudential standards under the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act); (3) an indicator for whether or not the Financial Stability Board designated a bank holding company a global systemically important bank (GSIB) in November 2013 based on its size, interconnectedness, lack of readily available substitutes or financial institution infrastructure, global (cross-jurisdictional) activity, and complexity; and (4) total assets and total assets squared.⁷

Credit risk. For each bank holding company, we constructed several indicators of credit risk, including indicators of capital adequacy, asset quality, earnings, maturity mismatch, and volatility.⁸

- **Capital adequacy.** Capital absorbs losses, promotes public confidence, helps restrict excessive asset growth, and provides protection to creditors. We constructed two alternative sets of indicators of capital adequacy: (1) equity capital and subordinated debt as percentages of assets as of the beginning of the quarter, and (2) equity capital and subordinated debt as percentages of risk-weighted assets as of the beginning of the quarter.
- **Asset quality.** Asset quality reflects the quantity of existing and potential credit risk associated with a bank holding company's loan and investment portfolios and other assets, as well as off-balance sheet transactions. It also reflects the ability of management to identify and manage credit risk. We used the Texas ratio—nonperforming assets as a percentage of tangible common equity plus loan loss reserves—as of the beginning of the quarter as an

⁷A bank holding company's total assets may change from one quarter to the next. Similarly, a bank holding company may have less than \$50 billion in assets in some quarters and more than \$50 billion in assets in others. An alternative measure of a bank holding company's size or systemic importance is whether or not it participated in the Federal Reserve's Comprehensive Capital Analysis and Review (CCAR). However, the measure of size based on CCAR participation is highly correlated with the measure of size based on whether or not a bank holding company had \$50 billion or more in assets, so these two measures of size are not substantively different.

⁸Credit risk increases with higher values of our asset quality, maturity mismatch, and volatility measures and with lower values of our capital adequacy and earnings measures.

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indicator of asset quality, where nonperforming assets include assets in nonaccrual status, other real estate owned, restructured loans, and restructured loans in compliance and tangible common equity is total capital minus perpetual preferred stock minus goodwill and other intangibles. The Texas ratio can indicate a bank holding company's likelihood of failure by comparing its troubled loans to its capital. The higher the ratio, the more likely the institution is to fail because more of its capital could be eroded by realized losses on these troubled loans.

- **Earnings.** Earnings are the initial safeguard against the risks of engaging in the banking business and represent the first line of defense against capital depletion that can result from declining asset values. We used net income as a percentage of assets as of the beginning of the quarter as an indicator of earnings.
- **Maturity mismatch.** Maturity mismatch reflects a bank holding company's ability to obtain funds at a reasonable price within a reasonable time period to meet obligations as they come due. We used the difference between volatile liabilities—liabilities that may quickly or unexpectedly come due—and liquid assets—assets that can easily be converted to cash to cover liabilities—as a percentage of total liabilities as of the beginning of each quarter as an indicator of maturity mismatch. Volatile liabilities include federal funds purchased and repurchase agreements, trading liabilities, other borrowed funds, foreign deposits, and jumbo deposits less derivatives with negative fair value. Liquid assets include cash, securities, federal funds sold and reverse repurchase agreements, and trading assets less pledged securities.⁹
- **Volatility.** Volatility reflects how much the value of a bank holding company fluctuates over a given amount of time and the possibility that the value will fall below a given threshold for default. We constructed five alternative indicators of volatility: (1) the standard deviation of equity prices over the quarter, (2) option implied volatility for the quarter, (3) the standard deviation of equity returns over the quarter, (4) the standard deviation of excess equity returns over the

⁹Several components of volatile liabilities, such as federal funds purchased, repurchase agreements, and demand deposits, have relatively short maturities and may not be rolled over by the creditor when they mature. Maturity mismatch measures the bank holding company's capacity to cover these liabilities if the creditor chooses to not roll them over.

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quarter, and (5) the standard deviation of earnings over the past 16 quarters as alternative indicators of volatility.

Other factors. We also collected data on several other factors that may influence bond yield spreads, including bonds' coupon rates, times to maturity, and liquidity, and bank holding companies' operating expenses. We used three alternative indicators of a bond's liquidity: (1) issue size, (2) total volume traded during a quarter, and (3) average bid-ask spread over a quarter.¹⁰ Finally, we used a bank holding company's noninterest expenses as a percentage of total assets as an indicator of its operating expenses.¹¹ Table 4 shows summary statistics for bank holding companies with senior unsecured bonds outstanding in 2008 and 2013 and for senior unsecured bonds outstanding in 2008 and 2013.

Table 4: Summary Statistics for Bank Holding Companies and Bonds Analyzed, 2008 and 2013

	Mean	Standard deviation	Minimum	Maximum
<i>Bank holding companies with senior unsecured bonds outstanding, 2008</i>				
Total assets (dollars in billions)	403.974	640.816	7.685	2134.499
Operating expense/assets (%)	1.067	0.801	0.576	4.451
Equity capital/assets (%)	10.602	5.226	5.916	31.332
Equity capital/risk-weighted assets (%)	14.340	9.326	7.688	52.366
Subordinated debt/assets (%)	3.308	1.353	0	6.010
Subordinated debt/risk-weighted assets (%)	4.157	1.412	0	6.364
Earnings/assets (%)	0.110	0.440	-1.032	1.349
Maturity mismatch (%)	17.869	18.000	-53.133	34.162
Texas ratio (%)	16.287	10.946	0.011	40.211
Equity price volatility (%)	88.156	31.924	48.106	180.773

¹⁰The bid-ask spread is the difference between the best buying price and the best selling price. We expressed the bid-ask spread as a percentage of the midpoint between the bid price and the ask price.

¹¹Some studies suggest that there may be economies of scale or scope in banking. For example, see Joseph P. Hughes and Loretta J. Mester, "Who Said Large Banks Don't Experience Scale Economies? Evidence From a Risk-Return-Driven Cost Function," *Journal of Financial Intermediation* 22 (2013), pp. 559-585. We include noninterest expense as a percentage of total assets to control for a channel through which economies of scale may affect bond funding costs. Other channels through which economies of scale or scope may affect bond funding costs are profitability, which is captured in our earnings variable, and riskiness, which is captured in our volatility variable.

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	Mean	Standard deviation	Minimum	Maximum
Option implied volatility (%)	66.246	14.459	43.573	97.816
Equity return volatility (%)	5.079	0.899	3.508	6.962
Excess equity return volatility (%)	3.723	0.969	2.231	5.817
Earnings volatility (%)	6.108	4.353	0.460	23.510
GSIB designation (indicator)	0.273	—	0	1
Assets \$50 billion or more (indicator)	0.818	—	0	1
<i>Senior unsecured bonds outstanding, 2008</i>				
Average bond yield spread calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes (bps)	456.407	305.194	15.066	1479.019
Average bond yield spread calculated using prices from executed trades (bps)	474.809	342.013	15.066	1479.019
Bond issue size (dollars in millions)	1004.746	1028.839	0.143	5500.000
Total trade volume (dollars in millions)	160456.800	225838.100	0	1663766.000
Average bid-ask spread, all pricing sources (%)	1.535	1.621	0.0156	14.224
Time to maturity (quarters)	17.177	19.706	0	119.000
Coupon (%)	5.461	1.219	2.000	12.500
<i>Bank holding companies with senior unsecured bonds outstanding, 2013</i>				
Total assets (dollars in billions)	413.488	672.505	4.563	2412.823
Operating expense/assets (%)	0.986	0.598	0.613	3.899
Equity capital/assets (%)	10.993	2.375	7.207	19.144
Equity capital/risk-weighted assets (%)	16.206	4.358	10.676	31.576
Subordinated debt/assets (%)	1.602	0.996	0	4.137
Subordinated debt/risk-weighted assets (%)	2.402	1.205	0	5.171
Earnings/assets (%)	0.280	0.150	0.040	0.766
Maturity mismatch (%)	-1.044	20.512	-53.133	47.001
Texas ratio (%)	17.523	12.061	0.812	38.690
Equity price volatility (%)	20.629	3.280	12.952	28.572
Option implied volatility (%)	23.996	3.656	15.788	30.250
Equity return volatility (%)	1.311	0.202	0.828	1.758
Excess equity return volatility (%)	1.003	0.200	0.630	1.478
Earnings volatility (%)	3.936	4.771	0.355	23.510
GSIB designation (indicator)	0.267	—	0	1
Assets \$50 billion or more (indicator)	0.700	—	0	1
<i>Senior unsecured bonds outstanding, 2013</i>				

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	Mean	Standard deviation	Minimum	Maximum
Average bond yield spread calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes (bps)	140.684	69.252	15.066	500.750
Average bond yield spread calculated using prices from executed trades (bps)	132.952	71.563	15.066	796.406
Bond issue size (dollars in millions)	1042.622	1107.804	0.350	5500.000
Total trade volume (dollars in millions)	161367.900	293879.200	0	33334868.000
Average bid-ask spread, all pricing sources (%)	0.537	0.474	0.003	2.819
Time to maturity (quarters)	24.548	24.729	0	126.000
Coupon (%)	4.320	1.712	0.800	10.000

Source: GAO analysis of Bloomberg and Financial Stability Board data. | GAO-14-621

We estimated a variety of models for each year from 2006 to 2013 to address uncertainty about how to appropriately control for bond liquidity, bank holding company credit risk, and the size or systemic importance of a bank holding company and also to allow the relationship between bank holding company size and bond funding costs to vary over time. In our baseline specifications, we measured bond funding costs using average yield spreads on senior unsecured bonds based on executed trades, executable quotes, and composites derived from executable and indicative quotes; size using total assets; capital adequacy using equity capital and subordinated debt as percentages of total assets; and bond liquidity using issue size and total volume. We estimated the parameters for each year and for each of our five volatility variables, as well as for each year without controlling for volatility. We also estimated the parameters of the following variations of the baseline specifications for senior unsecured bonds:

- **Bid-ask specification.** We measured bond liquidity using issue size, total volume, and average bid-ask spread.
- **Trade Reporting and Compliance Engine specification.** We measured bond funding costs using average yield spreads based only on actual trades reported in the Trade Reporting and Compliance Engine database.
- **Risk-weighted assets specification.** We measured capital adequacy using equity capital and subordinated debt as percentages of risk-weighted assets.
- **GSIB specification.** We measured size using the indicator for whether or not a bank holding company was designated a GSIB in November 2013.

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- **Systemically important financial institution (SIFI) specification.** We measured size using the indicator for whether or not a bank holding company had \$50 billion or more in assets.
- **Total assets and total assets squared specification.** We measured size using both total assets and the square of total assets.

Altogether, we estimated the parameters of 42 separate specifications for each year from 2006 to 2013. For all specifications, we included indicators for each quarter to control for the influence on yield spreads of economic conditions, the regulatory environment, and other factors that vary over time but not across bank holding companies. We also adjusted the standard errors of our parameter estimates to allow for the possibility that they are not identically distributed and to allow for arbitrary correlation between observations on bonds issued by the same bank holding company. Table 5 shows the estimates of the parameters for our baseline regressions for 2008 and 2013.

Table 5: Parameter Estimates for Baseline Regressions, 2008 and 2013

Dependent variable = average bond yield spreads calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes (basis points)						
2008	Volatility variable					
	Equity price volatility	Option implied volatility	Equity return volatility	Excess equity return volatility	Earnings volatility	No volatility variable
Time to maturity	-1.269* (0.614)	-1.187* (0.641)	-1.255* (0.606)	-1.255* (0.611)	-1.232** (0.570)	-1.267** (0.590)
Coupon	30.982 (20.589)	29.042 (21.853)	30.547 (20.257)	30.517 (20.379)	29.479 (19.355)	29.876 (20.006)
Operating expenses	-92.810** (37.956)	-202.517*** (60.420)	-89.526** (36.812)	-70.820* (35.180)	-138.984** (55.786)	-111.772** (34.104)
Issue size	0.000 (0.023)	0.004 (0.024)	0.000 (0.023)	0.003 (0.023)	0.002 (0.022)	-0.000 (0.022)
Total trade volume	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Total assets	0.124 (0.144)	0.064 (0.139)	0.124 (0.129)	0.130 (0.104)	0.055 (0.133)	0.063 (0.129)
Equity capital	19.526** (6.944)	23.180** (10.197)	18.946** (7.655)	17.337** (6.725)	18.710** (8.084)	19.686** (6.863)
Equity capital x total assets	0.013 (0.023)	-0.022 (0.026)	0.012 (0.024)	0.017 (0.018)	0.021 (0.020)	0.020 (0.021)

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Dependent variable = average bond yield spreads calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes (basis points)						
Subordinated debt	7.918 (31.859)	14.153 (29.805)	6.180 (31.162)	0.322 (26.788)	10.856 (29.995)	11.004 (32.695)
Subordinated debt x total assets	-0.099 (0.065)	-0.025 (0.046)	-0.090 (0.065)	-0.092* (0.053)	-0.108 (0.064)	-0.103 (0.065)
Earnings	-167.831* (96.274)	-108.627 (97.037)	-143.709 (99.636)	-146.072 (84.756)	-177.705 (108.083)	-163.593* (93.830)
Earnings x total assets	0.068 (0.138)	0.169 (0.138)	0.045 (0.130)	0.060 (0.106)	-0.000 (0.130)	0.013 (0.125)
Maturity mismatch	-5.968** (2.466)	-8.608*** (2.105)	-5.385** (2.422)	-4.915** (2.181)	-7.370*** (2.349)	-6.829** (2.535)
Maturity mismatch x total assets	0.003 (0.002)	0.007*** (0.002)	0.003 (0.002)	0.002 (0.002)	-0.001 (0.003)	0.003 (0.002)
Texas ratio	6.512* (3.526)	0.258 (1.979)	6.320* (3.453)	4.985 (3.813)	7.060* (3.514)	7.531* (3.615)
Texas ratio x total assets	-0.002 (0.002)	-0.000 (0.001)	-0.002 (0.002)	-0.002 (0.002)	-0.002 (0.002)	-0.003 (0.002)
Equity price volatility	0.586 (0.396)					
Equity price volatility x total assets	-0.000 (0.000)					
Option implied volatility		1.696 (1.463)				
Option implied volatility x total assets		0.000 (0.001)				
Equity return volatility			34.178* (17.628)			
Equity return volatility x total assets			-0.005 (0.010)			
Excess equity return volatility				48.618** (18.522)		
Excess equity return volatility x total assets				-0.017* (0.009)		
Earnings volatility					7.787 (10.992)	
Earnings volatility x total assets					0.014 (0.011)	

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Dependent variable = average bond yield spreads calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes (basis points)						
Number of observations	478	428	478	478	478	478
Adjusted R-squared	0.628	0.606	0.631	0.638	0.624	0.622
Akaike Information Criteria	5917	5254	5913	5904	5922	5927
Schwartz Information Criteria	6000	5323	5997	5988	6005	6010
Number of bank holding companies	21	18	21	21	21	21
Hypothesis test that the coefficients on total assets and the total assets-credit risk interaction terms are jointly equal to zero:						
F-statistic	3.579	3.792	2.972	4.486	2.983	4.207
Probability of observing F-statistic if hypothesis is true	0.012	0.012	0.026	0.004	0.026	0.007
2013	Volatility variable					
	Equity price volatility	Option implied volatility	Equity return volatility	Excess equity return volatility	Earnings volatility	No volatility variable
Time to maturity	0.788*** (0.093)	0.775*** (0.087)	0.794*** (0.095)	0.798*** (0.095)	0.857*** (0.120)	0.878*** (0.128)
Coupon	9.497*** (2.079)	8.455*** (1.742)	9.453*** (2.047)	9.197*** (1.926)	8.396*** (2.459)	10.085*** (2.511)
Operating expenses	5.749 (8.154)	0.972 (6.588)	6.741 (8.190)	7.736 (8.433)	-10.274** (4.296)	-13.639** (5.668)
Issue size	-0.013*** (0.004)	-0.010** (0.004)	-0.013*** (0.004)	-0.013*** (0.004)	-0.013*** (0.004)	-0.016*** (0.004)
Total trade volume	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Total assets	0.013 (0.032)	0.017 (0.022)	0.010 (0.034)	0.013 (0.033)	0.269*** (0.077)	-0.037 (0.048)
Equity capital	6.763* (3.856)	7.444** (3.428)	6.072 (3.923)	3.375 (3.965)	5.487 (3.716)	0.470 (4.559)
Equity capital x total assets	-0.005 (0.005)	-0.009* (0.005)	-0.004 (0.005)	-0.002 (0.005)	-0.011 (0.007)	0.012** (0.005)
Subordinated debt	-29.137** (13.149)	-29.108*** (9.968)	-29.921** (13.257)	-31.370** (13.438)	-19.769 (16.353)	-25.283* (14.168)
Subordinated debt x total assets	0.052** (0.019)	0.057*** (0.017)	0.054** (0.020)	0.057** (0.021)	0.065* (0.033)	0.030 (0.023)
Earnings	-89.186 (49.502)	-44.545 (44.445)	-71.544 (49.088)	-74.556 (47.102)	-32.870* (17.759)	-48.299** (21.803)

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Earnings x total assets	0.027 (0.041)	0.044 (0.028)	0.026 (0.042)	0.018 (0.038)	-0.070*** (0.022)	-0.048 (0.034)
Maturity mismatch	0.522 (0.695)	1.136* (0.593)	0.559 (0.714)	0.555 (0.706)	1.062 (0.779)	2.244*** (0.531)
Maturity mismatch x total assets	-0.001* (0.001)	-0.001*** (0.000)	-0.001* (0.001)	-0.001 (0.001)	-0.002* (0.001)	-0.003*** (0.001)
Texas ratio	3.207*** (1.114)	2.961*** (0.933)	3.270*** (1.108)	2.826** (1.055)	4.106*** (1.463)	3.447** (1.464)
Texas ratio x total assets	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)	-0.004*** (0.001)	-0.008*** (0.002)	-0.006*** (0.001)
Equity price volatility	5.959*** (1.434)					
Equity price volatility x total assets	0.000 (0.001)					
Option implied volatility	9.397*** (1.818)					
Option implied volatility x total assets	0.000 (0.001)					
Equity return volatility	98.615*** (25.234)					
Equity return volatility x total assets	-0.001 (0.014)					
Excess equity return volatility	124.829*** (32.956)					
Excess equity return volatility x total assets	-0.020 (0.017)					
Earnings volatility	12.388*** (3.559)					
Earnings volatility x total assets	-0.029*** (0.007)					
Number of observations	1446	1446	1446	1446	1535	1535
Adjusted R-squared	0.521	0.563	0.519	0.519	0.521	0.469
Akaike Information Criteria	15083	14951	15090	15090	16221	16378
Schwartz Information Criteria	15199	15067	15206	15206	16338	16484
Number of bank holding companies	30	30	30	30	31	31

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Dependent variable = average bond yield spreads calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes (basis points)

Hypothesis test that the coefficients on total assets and the total assets-credit risk interaction terms are jointly equal to zero:

F-statistic	3.027	3.907	3.009	4.477	7.309	5.258
Probability of observing F-statistic if hypothesis is true	0.016	0.004	0.017	0.002	<0.001	0.001

Source: GAO analysis of Bloomberg and Financial Stability Board data | GAO-14-621

Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated multiple models for each year from 2006 through 2013 to assess the sensitivity of our results to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance. This table shows estimates of the parameters of models for 2008 and 2013 that used average bond yield spreads calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes to measure bond funding costs; total assets to measure bank holding company size; issue size and total trade volume to measure bond liquidity; equity capital and subordinated debt as percents of assets to measure capital adequacy; and each of equity price volatility, option implied volatility, equity return volatility, excess equity return volatility, and earnings volatility to measure volatility, as well as a model with no volatility measure. Other explanatory variables include coupon, time to maturity, Texas ratio, maturity mismatch, and operating expenses. Standard errors clustered by bank holding company are in parentheses. *—statistically significant at the 10 percent level. **—statistically significant at the 5 percent level. ***—statistically significant at the 1 percent level.

Our econometric models allow the size of a bank holding company to influence its bond yield spreads both directly and indirectly through the relationships between yield spreads and each indicator of credit risk, i.e., through the interaction term. To summarize the overall relationship between yield spreads and size reflected in each specification, we predicted yield spreads on senior unsecured bonds for bank holding companies of different sizes and credit risk levels using our estimates of the parameters for each specification for each year. Specifically, for each year, we predicted bond yield spreads for bank holding companies with \$10 billion, \$50 billion, \$100 billion, \$250 billion, \$500 billion, and \$1 trillion in assets assuming that all bank holding companies had the average level of credit risk each year, a low level of credit risk each year, a high level of credit risk each year, and the average level of credit risk for

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2008.¹² Table 6 shows all of the differences between predicted bond yield spreads for bank holding companies with \$50 billion, \$100 billion, \$250 billion, \$500 billion, and \$1 trillion in assets and predicted bond yield spreads for bank holding companies with \$10 billion in assets for our baseline regressions for 2008 and 2013 assuming bank holding companies have the average level of credit risk each year.

Table 6: Baseline Comparisons of Bond Yield Spreads for Bank Holding Companies of Different Sizes by Year, 2008 and 2013 (basis points)

2008, credit risk equal to average for 2008						
Comparison	Comparison from baseline model with volatility variable:					
	Equity price volatility	Option implied volatility	Equity return volatility	Excess equity return volatility	Earnings volatility	No volatility variable
\$50 billion vs. \$10 billion in assets	-3.860*** (1.175)	-1.867** (0.770)	-4.124*** (1.186)	-3.590*** (1.181)	-4.353*** (1.235)	-4.011*** (1.256)
\$100 billion vs. \$10 billion in assets	-8.686*** (2.644)	-4.201** (1.734)	-9.278*** (2.669)	-8.078*** (2.658)	-9.794*** (2.779)	-9.026*** (2.627)
\$250 billion vs. \$10 billion in assets	-23.161*** (7.050)	-11.204** (4.623)	-24.742*** (7.118)	-21.541*** (7.088)	-26.119*** (7.410)	-24.069*** (7.537)
\$500 billion vs. \$10 billion in assets	-47.288*** (14.394)	-22.874** (9.439)	-50.515*** (14.532)	-43.980*** (14.471)	-53.326*** (15.128)	-49.140*** (15.389)
\$1 trillion vs. \$10 billion in assets	-95.541*** (29.081)	-46.215** (19.070)	-102.061*** (29.360)	-88.858*** (29.237)	-107.739*** (30.565)	-99.284*** (31.092)

¹²For predictions at average levels of credit risk, we set variables equal to the unweighted average for the sample used to estimate the regression for each year. For predictions at low levels of credit risk, we set variables measuring asset quality, maturity mismatch, and volatility equal to their 25th percentiles for each year and we set variables measuring capital adequacy and earnings equal to their 75th percentiles for each year. For predictions as high levels of credit risk, we set variables measuring asset quality, maturity mismatch, and volatility equal to their 75th percentiles for each year and we set variables measuring capital adequacy and earnings equal to their 25th percentiles for each year.

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2013, credit risk equal to average for 2013						
Comparison from baseline model with volatility variable:						
Comparison	Equity price volatility	Option implied volatility	Equity return volatility	Excess equity return volatility	Earnings volatility	No volatility variable
\$50 billion vs. \$10 billion in assets	1.152** (0.446)	1.011*** (0.365)	1.239** (0.463)	1.388*** (0.498)	0.930 (0.861)	2.365*** (0.727)
\$100 billion vs. \$10 billion in assets	2.591** (1.004)	2.276*** (0.820)	2.787** (1.042)	3.123*** (1.120)	2.093 (1.936)	5.322*** (1.635)
\$250 billion vs. \$10 billion in assets	6.910** (2.676)	6.088*** (2.187)	7.432** (2.778)	8.329*** (2.985)	5.582 (5.164)	14.19*** (4.359)
\$500 billion vs. \$10 billion in assets	14.107** (5.464)	12.389*** (4.465)	15.174** (5.673)	17.006*** (6.095)	11.397 (10.542)	28.977*** (8.900)
\$1 trillion vs. \$10 billion in assets	28.502** (11.039)	25.031*** (9.022)	30.658** (11.461)	34.358*** (12.315)	23.027 (21.30)	58.546*** (17.982)
2013, credit risk equal to average for 2008						
Comparison from baseline model with volatility variable:						
Comparison	Equity price volatility	Option implied volatility	Equity return volatility	Excess equity return volatility	Earnings volatility	No volatility variable
\$50 billion vs. \$10 billion in assets	1.976 (3.253)	2.541 (2.414)	1.465 (2.899)	-0.639 (2.598)	-0.087 (1.704)	-1.971 (1.750)
\$100 billion vs. \$10 billion in assets	4.447 (7.319)	5.717 (5.431)	3.296 (6.523)	-1.437 (5.846)	-0.195 (3.835)	-4.435 (3.937)
\$250 billion vs. \$10 billion in assets	11.859 (19.517)	15.245 (14.483)	8.789 (17.395)	-3.833 (15.588)	-0.519 (10.226)	-11.826 (10.499)
\$500 billion vs. \$10 billion in assets	24.212 (39.846)	31.126 (29.570)	17.943 (35.514)	-7.826 (31.828)	-1.060 (20.879)	-24.148 (21.436)
\$1 trillion vs. \$10 billion in assets	48.918 (80.509)	62.888 (59.743)	36.253 (71.754)	-15.812 (64.305)	-2.142 (42.183)	-48.789 (43.309)

Source: GAO analysis of Bloomberg and Financial Stability Board data | GAO-14-621

Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated multiple models for each year from 2006 through 2013 to assess the sensitivity of estimated funding cost differences to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance and then used the models to compare bond funding costs for bank holding companies of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. This table shows bond funding cost comparisons from models for 2008 and 2013 that used average bond yield spreads calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes to measure bond funding costs; total assets to measure bank holding company size; issue size and total trade volume to measure bond liquidity; equity capital and subordinated debt as percents of assets to measure capital adequacy; and each of equity price volatility, option implied volatility, equity return volatility, excess equity return

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volatility, and earnings volatility to measure volatility, as well as a model with no volatility measure. Other explanatory variables include coupon, time to maturity, Texas ratio, maturity mismatch, and operating expenses. *—statistically significant at the 10 percent level. **=statistically significant at the 5 percent level. ***=statistically significant at the 1 percent level.

Table 7 shows the difference in predicted bond yield spreads for bank holding companies with \$1 trillion and \$10 billion in assets for all specifications for 2008 and 2013 assuming bank holding companies have the average level of credit risk each year. Table 7 also shows the difference in predicted bond yield spreads for bank holding companies with \$1 trillion and \$10 billion in assets for all specifications for 2013 assuming bank holding companies have the average level of credit risk in 2008.

Table 7: Comparisons of Bond Yield Spreads for Bank Holding Companies with \$1 trillion versus \$10 billion in Assets, All 42 Models, 2008 and 2013 (basis points)

2008, credit risk equal to average for 2008	Comparison from model with volatility variable:					
	Equity price volatility	Option implied volatility	Equity return volatility	Excess equity return volatility	Earnings volatility	No volatility variable
Baseline model ¹	-95.54*** (29.08)	-46.22** (19.07)	-102.06*** (29.36)	-88.86*** (29.24)	-107.74*** (30.57)	-99.28*** (31.09)
Add bid-ask spreads to bond liquidity measures	-98.52*** (32.98)	-21.30 (15.94)	-104.08*** (31.57)	-88.60** (32.09)	-106.98** (37.49)	-104.99** (37.40)
Measure size using GSIB designation	-148.78** (60.01)	-115.16*** (35.69)	-157.00** (60.78)	-143.10** (58.73)	-145.12** (55.21)	-148.98** (57.39)
Measure size using total assets and total assets squared	-382.78*** (119.13)	-629.74*** (82.69)	-422.24*** (101.56)	-270.29** (113.61)	-228.54* (127.27)	-291.43** (120.81)
Measure capital adequacy using equity capital and subordinated debt as percents of risk-weighted assets	-86.43** (30.87)	-44.90 (32.54)	-96.96*** (31.12)	-77.63** (29.26)	-96.79*** (32.30)	-92.96** (34.10)
Measure size using an indicator of whether a bank holding company has assets of \$50 billion or more	-432.86*** (90.04)	-397.28** (146.06)	-420.42*** (67.65)	-357.57*** (30.33)	-515.38*** (133.82)	-357.49*** (73.88)

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Measure bond yield spreads using prices from executed trades only	-79.73** (31.77)	-16.75 (20.62)	-89.17** (32.85)	-73.39** (32.98)	-93.21** (34.18)	-85.16** (35.49)
2013, credit risk equal to average for 2013						
	Comparison from model with volatility variable:					
	Equity price volatility	Option implied volatility	Equity return volatility	Excess equity return volatility	Earnings volatility	No volatility variable
Baseline model ^a	28.50** (11.04)	25.03*** (9.02)	30.66** (11.46)	34.36*** (12.31)	23.03 (21.30)	58.55*** (17.98)
Add bid-ask spreads to bond liquidity measures	32.80*** (10.95)	29.63*** (8.431)	34.86*** (11.35)	38.49*** (12.41)	25.87 (21.28)	62.60*** (17.88)
Measure size using GSIB designation	3.07 (11.43)	-11.18 (11.32)	7.49 (11.10)	28.13*** (9.52)	36.07** (14.40)	28.97 (20.42)
Measure size using total assets and total assets squared	-51.80** (23.50)	-41.43** (18.95)	-52.43** (23.06)	-36.89 (22.97)	-19.01 (52.29)	3.73 (43.74)
Measure capital adequacy using equity capital and subordinated debt as percents of risk-weighted assets	23.17** (10.53)	20.33** (7.790)	24.33** (11.00)	28.05** (11.91)	0.264 (15.62)	45.88** (17.03)
Measure size using an indicator of whether a bank holding company has assets of \$50 billion or more	-183.08** (81.39)	-195.76*** (59.77)	-190.95** (80.21)	-160.67* (85.47)	-188.38*** (66.17)	-163.51 (100.2)
Measure bond yield spreads using prices from executed trades only	17.32 (14.24)	13.21 (12.66)	20.06 (14.78)	24.87 (15.86)	13.39 (25.28)	49.02*** (17.37)

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2013, credit risk equal to average for 2008	Comparison from model with volatility variable:					
	Equity price volatility	Option implied volatility	Equity return volatility	Excess equity return volatility	Earnings volatility	No volatility variable
Baseline model [§]	48.92 (80.51)	62.89 (59.74)	36.25 (71.75)	-15.81 (64.31)	-2.14 (42.18)	-48.79 (43.31)
Add bid-ask spreads to bond liquidity measures	64.91 (76.62)	86.12 (54.27)	51.00 (66.88)	3.65 (62.80)	-0.28 (42.16)	-43.14 (44.27)
Measure size using GSIB designation	-290.72 (210.512)	-264.12** (103.19)	-266.26 (197.211)	-118.16 (184.807)	-41.328 (55.122)	28.798 (54.296)
Measure size using total assets and total assets squared	-455.05 (279.97)	-327.16** (141.48)	-494.45* (253.52)	-473.93* (242.11)	-241.81 (195.99)	-160.75 (153.44)
Measure capital adequacy using equity capital and subordinated debt as percents of risk- weighted assets	-54.12 (68.63)	-7.73 (71.92)	-67.52 (58.98)	-102.48** (47.92)	-45.56 (35.37)	-105.58*** (37.02)
Measure size using an indicator of whether a bank holding company has assets of \$50 billion or more	-194.56 (144.1)	-606.39* (307.14)	-373.43* (195.44)	-355.84*** (107.35)	-246.16* (143.55)	-154.46 (144.58)
Measure bond yield spreads using prices from executed trades only	38.47 (87.83)	35.45 (61.70)	36.14 (75.85)	-1.00 (64.28)	12.43 (35.46)	-50.39 (41.98)

Source: GAO analysis of Bloomberg and Financial Stability Board data | GAO-14-621

Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated multiple models for each year from 2006 through 2013 to assess the sensitivity of estimated funding cost differences to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance and then used the models to compare bond funding costs for bank holding companies of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. This table shows bond funding cost comparisons from models for 2008 and 2013 for bank holding companies with the average level of credit risk for those years, and from models for 2013 for bank holding companies with the average level of credit risk for 2008. *=statistically significant at the 10 percent level, **=statistically significant at the 5 percent level, ***=statistically significant at the 1 percent level.

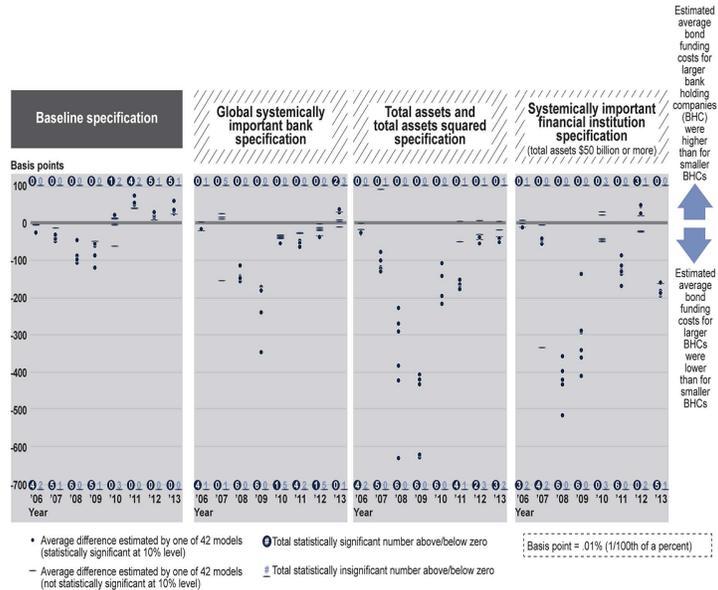
[§]The baseline model used average bond yield spreads calculated using prices from executed trades, executable quotes, and composites of executable and indicative quotes to measure bond funding

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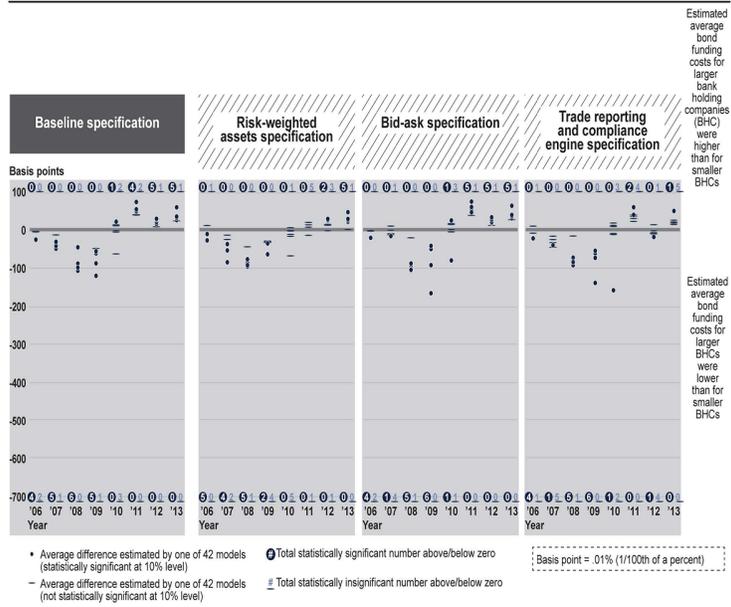
costs; total assets to measure bank holding company size; issue size and total trade volume to measure bond liquidity; equity capital and subordinated debt as percents of assets to measure capital adequacy; and each of equity price volatility, option implied volatility, equity return volatility, excess equity return volatility, and earnings volatility to measure volatility, as well as a model with no volatility measure. Other explanatory variables include coupon, time to maturity, Texas ratio, maturity mismatch, and operating expenses.

Figure 4 shows estimated bond funding costs for bank holding companies with \$1 trillion in assets versus those with \$10 billion in assets by model and year, assuming that all bank holding companies have the average level of credit risk in each year.

Figure 4: Difference in Estimated Bond Funding Costs for Average Credit Risk Bank Holding Companies with \$1 Trillion versus \$10 Billion in Assets by Model Specification, by Year, 2006-2013



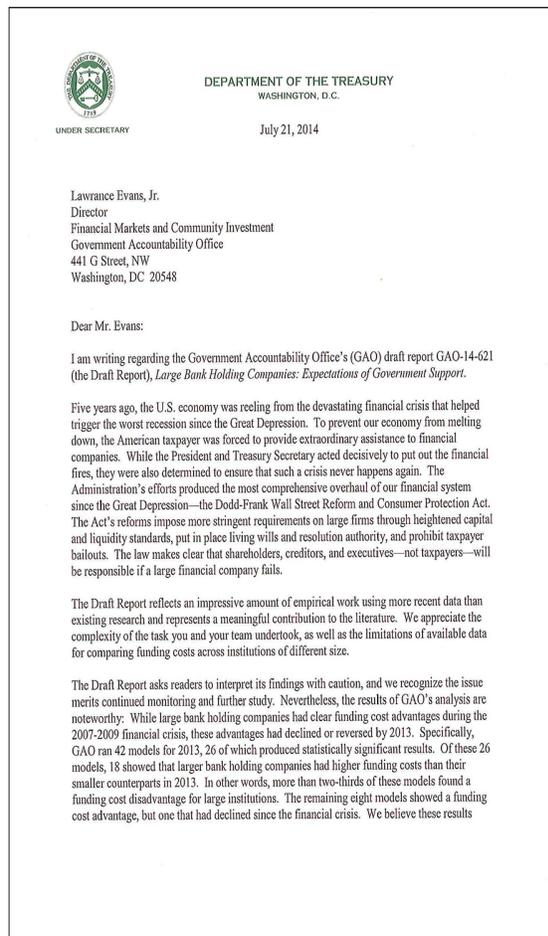
Appendix I. Methodology for Analysis of Funding Cost Differences between Large and Small Bank Holding Companies



Source: GAO analysis of data from Bloomberg and the Financial Stability Board. | GAO-14-621

Notes: We estimated econometric models of the relationship between bank holding company size and funding costs using data for U.S. bank holding companies and their outstanding senior unsecured bonds for the first quarter of 2006 through the fourth quarter of 2013. The models used bond yield spreads to measure funding costs and controlled for credit risk factors such as capital adequacy, asset quality, earnings, maturity mismatch, and volatility, as well as bond liquidity and other characteristics of bonds and bank holding companies that can affect funding costs. We estimated 42 models for each year from 2006 through 2013 to assess the sensitivity of estimated differences in funding costs to alternative measures of capital adequacy, volatility, bond liquidity, and size or systemic importance. We used the models to compare bond funding costs for bank holding companies of different sizes but the same levels of credit risk, bond liquidity, and other characteristics. This figure compares bond funding costs for bank holding companies with \$1 trillion and \$10 billion in assets, for each model and for each year, with average levels of credit risk. Each circle and dash shows the comparison for a different model, where circles and dashes below zero suggest bank holding companies with \$1 trillion in assets have lower bond funding costs than bank holding companies with \$10 billion in assets, and vice versa.

Appendix II: Comments from the Department of the Treasury



Appendix II: Comments from the Department
of the Treasury

reflect increased market recognition of what should now be evident—Dodd-Frank ended “too big to fail” as a matter of law.

We thank all those involved for their professionalism and diligence throughout the study process. Treasury is continuing its efforts to fully implement the Dodd-Frank reforms to reduce the likelihood and the impact of the failure of a large, interconnected financial company. We also recognize that we must remain vigilant on this issue. We look forward to working with you on additional matters related to strengthening the financial system.

Sincerely,



Mary J. Miller

Appendix III: GAO Contact and Staff Acknowledgments

GAO Contact

Lawrance L. Evans, Jr., (202) 512-4802, or EvansL@gao.gov

Staff Acknowledgments:

In addition to the contact named above, Karen Tremba (Assistant Director), John Fisher (Analyst in Charge), Bethany Benitez, Michael Hoffman, Risto Laboski, Courtney LaFountain, Rob Letzler, Marc Molino, Jason Wildhagen, and Jennifer Schwartz made significant contributions to this report. Other assistance was provided by Abigail Brown, Rudy Chatlos, Stephanie Cheng, and José R. Peña.

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STATEMENT SUBMITTED BY THE AMERICAN BANKERS ASSOCIATION

July 31, 2014

Statement for the Record

On behalf of the

American Bankers Association

before the

Committee on Banking, Housing, and Urban Affairs

of the

United States Senate



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Chairman Johnson, Ranking Member Crapo, and members of the Committee, ABA appreciates the opportunity to submit comments for the record on the availability of financial products for students. The ABA is the voice of the nation's \$14 trillion banking industry, which is composed of small, regional and large banks that together employ more than 2 million people, safeguard \$11 trillion in deposits and extend nearly \$8 trillion in loans.

Banks provide an array of products and services for students. Banks provide student loans, but that product was dramatically reduced due to onerous requirements on private lenders following the enactment of the Health Care and Education Reconciliation Act of 2010. The federal government now has the majority stake in student loan underwriting and, since 2010, the growth of student loans provided by the government has skyrocketed, rising over \$100 billion annually. Private sector loans make up only 8% of the volume of student loans. Banks also provide checking accounts (usually with a debit card), direct deposit, convenience ATM and branch locations, bill payment options, and stored value and credit cards.

Banks are committed to ensuring students have safe, convenient, and affordable access to banking services so they can buy books and pay their living expenses. Access to banking services—at such a critical point in life—is essential to the long-term financial health of America's students. Many students open their first bank account when they reach college. It is often a landmark event that brings a student into the banking system, promotes financial literacy and develops saving habits that will help them reach their long-term goals.

The costs of providing account services to students is high and the revenue low as most accounts have low account balances and few transactions. Instead, banks offer services to students—often at a loss—in an effort to build a financial relationship with students that someday

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will include more sophisticated products such as mortgages, college savings, investments and other services. The relationship formed with young adults helps to establish long-term banking relationships. Treating students right is the only way banks can keep customers for life.

We are very concerned about the Department of Education's (DoE) proposal that was the subject of a recent negotiated rulemaking process ("proposal"). First, we believe that DoE has no authority to implement this proposal as a regulation given the plain text of the statute, the legislative history of the provision, and the comprehensive regulatory scheme already in place. Second, if the DoE concept is adopted, significant new regulations, burdens, and restrictions will be placed on any bank account that is the subject of a partnership between a bank (or credit union) and an educational institution. The result will be a discontinuation of accounts tailored to and beneficial to students, whether or not the account receives student loan aid balances. Although the DoE's Proposal seeks to ensure students have access to banking options, it will instead limit their access, harming students and educational institutions alike. Already, it is estimated that as many as 19 percent of college students in the United States have no access to banking services. The DoE proposal would likely make that number much higher.

Make no mistake: it is students who will bear the brunt of the Department of Education's rulemaking. Students will find it harder to secure affordable, convenient bank accounts and services tailored to their needs, often including an on-campus presence. Students who come from families that do not have a bank account or any banking relationship may struggle with how to go about even opening an account. Without these options, many students will be compelled to turn to loosely regulated, less secure, less convenient, and more costly options.

DoE's proposal will also negatively impact educational institutions. Banks have long partnered with educational institutions to offer financial services to students. The revenue received by educational institutions helps to offset tuition and other costs. The DoE proposal would make these arrangements less likely, reduce revenue for these schools, and tie schools up with unnecessary red-tape—all of which would make the cost of attending these schools by students higher than it has to be.

In our statement we will make the following points:

- The Department of Education Proposal will severely limit banks' ability to serve students, meaning fewer services will be available;
- Banks partner with educational institutions to offer services that benefit students; and

- Educational institutions will bear a heavy cost.

I. The Department of Education Proposal will Severely Limit Banks' Ability to Serve Students, Meaning Fewer Services Will Be Available to Students

There are very real costs in offering a checking account. The banks cost to open an account was estimated to be between \$150 and \$200 and between \$250 and \$300 annually to maintain it.¹ These costs have only increased since 2010. Balances on student accounts tend to be low and transactions are often limited. As a result banks earn little return on these accounts. These accounts often end up losing money for the bank, but are nonetheless offered to meet the needs of students and develop life-long relationships that continue long after graduation.

Currently, banks partner with educational institutions to provide students no-cost and low-cost services and products. Typically, the accounts have no minimum balance requirements and waive monthly fees. They usually include a free university ID card that also serves as a debit card. Students have choice and are not obligated to open an account. Some banks also fund financial literacy courses or events. Unfortunately, the DoE's proposal in effect would regulate bank accounts by imposing significant requirements and restrictions on all accounts that are part of a bank and educational institution partnership—whether or not the student is receiving federal student loan credit balances. Simply put, the DoE would be regulating bank accounts independent of any relationship with federal student loan credit balances.

The requirements in the DoE proposal would greatly increase the net cost of opening these accounts on a prohibitive basis. The proposal would impose significant requirements and restrictions on bank accounts of students and parents *eligible* to receive student aid balances. Thus, the broad proposal affects *any* covered bank account whether or not it receives any student aid balances.

The DoE requirements are designed to give away valuable bank account services for free while the bank bears the full cost—including new regulatory requirements—of providing these accounts. The significant costs of these added requirements and regulatory burdens will mean fewer of these accounts will be offered. It also means that the attractive accounts already offered under existing

¹ Dan Fitzpatrick & Robin Sidel, *End Is Seen to Free Checking*, Wall Street Journal, June 16, 2010.

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programs would be jettisoned (since they could not be offered by partnering with the school) and students would have to seek out an account that may not be as tailored to their needs as students as the ones currently offered.

In addition to the new requirements imposed on financial institutions, there are also requirements placed on the educational institutions in relation to these sponsored accounts. The educational institutions must:

- Base their decision to partner with a bank on the interests of the account holders. This includes financial terms, account features, and customer service.
- Review any information that is provided to the account holder when the account is opened to ensure that it is clear, fact-based, and neutral.
- Disclose on their site links to all sponsored accounts, accompanied by a summary of terms and conditions of the contract.

Educational institutions already are sensitive to these issues and handle them in different ways depending upon the particular accounts they sponsor and their student needs. Imposing a rigid framework adds additional and unnecessary costs.

Instead of helping students, these onerous requirements will result in the opposite of their intention. There will be fewer, if any, specialized accounts offered to students and parents, whether they are seeking financial aid or not.

II. Banks Partner With Educational Institutions to Offer Services that Benefit Students

Access to safe, secure banking services is critical to students' academic success and long-term financial wellbeing. Many students sign up for their first bank account when they arrive at college. Hundreds of colleges and universities have long standing agreements—both formal and informal—with banks to offer convenient, affordable, and secure banking services to their students. As noted above, typically, the agreements include a specially designed free checking account with a debit card (possibly co-branded with the college) that can also serve as a college ID card. The students have the clear option for a traditional ID card instead. The students with the account also have access to free on-campus ATMs and possibly a banking center. Often part of this package is

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financial literacy education. If students lose access to these tailored options they will be forced to do without an account or seek other accounts that may not offer services that students value most.

Students have a choice in what bank to use. There is no mandate to use any campus related checking account. Moreover, there are already clear and transparent disclosures provided to the students. The fact is many students opt for these accounts because they are tailored to their needs. They provide convenient access to secure banking services on campus. It also facilitates transactions with local businesses who accept payment with their college ID card. This DoE proposal would directly limit the financial autonomy of students, and prevent them from individually pursuing the options that best suit them.

Students who arrive on campus without a checking account will have to open an account somewhere else or simply go without one. At best, a student will have to find a traditional bank account from an area bank (which may not be tailored to students and may lack some of the convenient features like on-campus ATMs and links to the college ID). In fact the GAO in February 2014 noted that: “Most of the college card fees we reviewed generally were not higher, or in some cases were lower, than those associated with a selection of basic or student checking accounts.” At worst, students may not establish a bank account, have to receive financial aid disbursements by check, and use costly check cashing services. Cashing and storing large loan checks involves risks that simply are unacceptable.

Students from traditionally unbanked demographics will be hit hardest. Restricting financial services offerings to students who are eligible for financial aid will disproportionately harm those students with the greatest need. Students receiving financial aid may come from families with little or no banking relationships. They may not understand the value of a bank account, are perhaps the most in need of financial education, and may not seek out off-campus banks to set up accounts. The goal should be to encourage all students to establish a banking relationship. By discouraging bank accounts in partnership with educational institutions, the DoE proposal makes this goal much harder to achieve—to the disadvantage of students.

III. Educational Institutions Will Bear a Heavy Cost As Well

Students will not be the only ones to suffer if the DoE proposal is adopted. Educational institutions will lose access to valuable programs which provide revenue to help offset expenses and keep tuition and other costs as low as possible. These schools will also be subject to new regulatory

burdens which also absorb resources. The end result will be to increase the costs at these schools which will result in higher tuitions—paid for by all students.

Educational institutions already choose which options are right for their students. There are generally competing banks offering account services enabling the school to find the best fit. Educational institutions are able to leverage these relationships to provide financial literacy programs for students, faculty, and staff. They are also able to leverage these relationships to build campus infrastructure, ensuring a network of ATMs and sometimes branches on campus. Funds provided by these relationships also fund scholarships, endowments and infrastructure that would otherwise be unavailable.

The DoE's conceptual proposal would place tremendous burdens on educational institutions that choose to partner with a bank. Banking regulations are complex, and require substantial specialized knowledge to comply with them all. The proposal would place the burden of ensuring compliance on the educational institution. Managing banking regulations is a monumental task even for banks accustomed to complicated banking regulations. In contrast, educational institutions, whose staff has no experience in banking regulations, stand little chance of being able to comprehend and comply with complex bank account regulation.

Conclusion

Having convenient, inexpensive and secure bank accounts are extremely important for students. These are often the very first accounts for these students. Banks are dedicated to providing these services as they know it will establish a long-term banking relationship with the students. Banks can only be successful in building and maintaining those relationship if they treat the students right and provide the services that they need. Educational institutions also benefit from these services, providing revenue that keeps student costs as low as possible.

ABA shares the goals of promoting financial education among students and ensuring that they have meaningful account choices. However, the Department of Education's proposal goes beyond its authority and will curtail campus banking products and unduly restrict the manner in which banks can serve students—ultimately hurting student access to safe and convenient banking services. Congress should stop the Department of Education from implementing this harmful rule that will hurt student access to affordable, safe, and reliable financial services.

**COMMENTS REGARDING THE “GAO REPORT ON LARGE BANK
HOLDING COMPANIES”, BY ALLAN H. MELTZER**

The GAO Report on Large Bank Holding Companies

By: Allan H. Meltzer

The GAO Report studies the cost of bonded debt to learn whether the largest banks have an advantage. The study may or may not be well done, but it is irrelevant to the issue.

All of the largest banks, as well as many others, finance a large part of their operations by borrowing in the overnight and other very short-term markets. It is there, not the bond market, that the largest banks by virtue of too-big-to-fail (TBTF) are able to borrow at a lower rate than other banks. The reason is that TBTF lowers the risk that lenders face if they lend to the very largest banks. These banks gain an advantage over their competitors that must pay a higher cost to borrow in the overnight market. The GAO report does not discuss this benefit. so the study is not relevant to the issue they were asked to study.

One unfortunate result of the advantage that TBTF gave to the very largest banks is the increased concentration of banking assets in the very largest banks. The lower cost of borrowing in the overnight market gave the largest TBTF banks a competitive advantage over the banks that were large, but not large enough to be considered TBTF. Many of these banks merged with the largest banks, increasing banking concentration.

A few examples illustrate the much increased concentration. JP Morgan acquired Chase National after Chase acquired Chemical Bank. Then JP Morgan Chase acquired Bank One.

Wells Fargo acquired Norwest Corp in 1998 and Wachovia in 2008. Bank of America merged with Nations Bank. The merged bank kept the Bank of America name.

All of the banks in these mergers are large banks. And these are just examples of the growing concentration in the U.S. banking industry.

Finally, there is broad consensus that Dodd-Frank legislation did not eliminate TBTF.