

Too Big to Fail: Causes, Consequences, and Policy Responses

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Abstract

Governments cannot credibly commit to eschew bailouts of creditors when large financial institutions become distressed. This too-big-to-fail (TBTF) problem distorts how markets price securities issued by TBTF firms, thus encouraging them to borrow too much and take too much risk. TBTF also encourages financial firms to grow, leading to competitive inequity and potential misallocation of credit. This review discusses evidence that such distortions are empirically relevant and also discusses the policy efforts to limit them. In the wake of the Financial Crisis of 2007–2008, it seems increased concentration in the financial industry has worsened the TBTF problem. Nevertheless, markets price the risks of large financial firms more now than before the Financial Crisis.

1. TOO BIG TO FAIL IS A CREDIBILITY PROBLEM

The too-big-to-fail (TBTF) problem, perhaps better called the too-big-to-*let*-fail problem, follows from market expectations that governments or central banks may protect the creditors (and possibly managers and shareholders) of large failing financial institutions from bearing the full losses that they would otherwise face absent what I refer loosely to as bailouts.¹ This article reviews theoretical and empirical research on the causes and consequences of this problem and briefly discusses policy responses that might help reduce its costs.

Markets allocate resources efficiently only when prices send accurate signals to consumers and producers (Hayak 1944). In financial markets, if investors expect government bailouts, then the price of financial instruments issued by TBTF firms will not fully reflect their risk. Thus, incentives become distorted, changing the investments that financial institutions make, how they finance those investments, and the size and complexity of the firms themselves. Because financial institutions invest in financial assets that in turn pay for real projects by nonfinancial companies, TBTF leads to misallocation of resources in the broader economy.

The TBTF problem distorts price signals in debt markets because governments cannot credibly commit to forgo bailouts (or other interventions) that protect the creditors of large financial institutions. TBTF is thus a credibility problem. Attempts to encourage *ex ante* discipline from investors will fail if governments and central banks prefer bailouts. Gormley, Johnson & Rhee (2011) study the financial problems of the Korean chaebols and the government's response to those problems. They show that the chaebols continued borrowing at low cost during the 1997 Asian Financial Crisis despite their high leverage and large losses, and despite repeated statements by officials reiterating the government's no-bailout policy. In the end, market expectations were validated, as bondholders were protected from losses. This review offers very direct evidence that markets often ignore noncredible statements by officials regarding TBTF firms.

Why would governments prefer bailouts? There are two main reasons. First, many policy makers, in good faith, believe that the short-run benefits of bailing out large, distressed financial institutions exceed the long-run costs. I discuss in detail below the nature of the long-run (moral hazard) costs of bailouts (and expectations of bailouts). The short-run benefits stem first from spillovers that would harm a financial firm's own customers in the event of failure. Diamond & Dybvig (1983) present the seminal model of banks as liquidity suppliers in which failures harm borrowers. In their model, banks pool depositor savings to enable investment in mostly illiquid, but high-return, projects that would be expensive to finance by individual depositors (because they would otherwise need to self-insure against liquidity risk). The model is characterized by multiple equilibria, however, in which a run can occur merely because depositors expect other depositors to withdraw funds. In this panic equilibrium, the bank must liquidate the project early (that is, call the loan for cash), leading to real destruction of resources for borrowers.

Flannery (2010) points out, more broadly, that many creditors of financial institutions are also their customers. For example, depositors of banks are not only customers—receiving payment and liquidity services from the bank—but also creditors. Hedge funds purchase prime brokerage services from investment banks but also act as major creditors because brokers often use their assets as collateral to finance the balance sheet (Singh & Aitken 2010). Even suppliers of funds in the repurchase-agreement market, such as money market mutual funds, are similarly customers interested in holding very short-maturity liquid assets but are, at the same time, creditors of large banks and broker-dealers (Gorton & Metrick 2012). As a consequence, bankruptcy of financial

¹This credibility problem is also sometimes called a time consistency problem.

firms prevents them from continuing to offer liquidity and other services to their customers, unlike nonfinancial firms, where a bright line separates customers (the flying public, car buyers, etc.) from creditors (commercial paper investors, bondholders, etc.). General Motors can still produce cars and United can still fly planes even in bankruptcy.

Policy makers may also bail out large financial institutions because their failure can harm other financial firms, potentially leading to contagion and crisis. Allen & Gale (1990) present a model of financial contagion in which small liquidity shocks can propagate across the financial system because the interbank market dries up, forcing firms to dump assets. More recently, Brunnermeier & Pedersen (2009) present a model of trading that is similarly characterized by a normal equilibrium, in which assets have high market liquidity and traders can borrow easily (by using high-liquidity assets as collateral), and a panic equilibrium, in which assets have low market liquidity and traders cannot borrow easily. Small shocks can create liquidity spirals, moving the markets rapidly toward the panic equilibrium as speculative traders are forced to unwind positions that they can no longer finance. These and other models of crisis share the idea that small disturbances can lead to a bad equilibrium because suppliers of short-term debt—depositors, other banks in the interbank market, or providers of funds to traders in the repurchase-agreement (repo) market—lose confidence and demand cash. As a result, asset prices fall, liquidity dries up, and credit shrinks abruptly, leading to real losses in the economy. Failures of large, complex, and interconnected institutions, by creating confusion about additional insolvencies or the value of assets, can trigger such panics; in contrast, small-firm failures are much less likely to trigger panics, both because the cause of their problems is less likely to be viewed as systematic (and thus correlated with the problems of others), and because fewer firms are exposed to them as counterparties.

Consistent with these arguments, historical evidence suggests that financial crises indeed have had large real resource costs. In their seminal book, Friedman & Schwartz (1963) argue that declines in the money stock related to bank runs and failures, and the associated conversion of deposits to specie, led to a collapse in the stock of money in the 1930s. They blame the US Great Depression on the Federal Reserve's failure to expand the money stock and offset these developments. Bernanke (1983) provides further empirical support for their general view, although he emphasizes declines in credit, the asset side of the banking system's balance sheet, as the key cause. More broadly, Aliber & Kindleberger (1978) and Reinhart & Rogoff (2011) document the high costs of financial crises for the real economy using evidence across many countries and over many centuries. Much empirical evidence has also emerged from case studies using micro data that failures of individual financial firms (insolvencies) or withdrawal of funds (runs) can be very costly to borrowers.²

There is a second, agency-based, reason to expect that promises to eschew bailouts will not be viewed as fully credible. Policy makers may put their own interests ahead of overall welfare, or they may be corrupted by influence from the financial industry. Thus, government agents may support bailing out a large failing firm to avoid short-run downside risks to themselves, even if the long-run moral hazard cost of such decisions outweighs the expected short-run benefit. Kane (1990) emphasizes this “not on my watch” mechanism in describing why accounting rules were changed in the early 1980s to hide the losses of savings institutions, which had become market-value insolvent when short-term interest rates spiked above 20%. Brown & Dinç (2009) explore the response of governments to banking problems across a large sample of countries and find that governments are more likely to close failed banks (as opposed to prop them up with central bank support) after elections, when new leaders can blame losses on an earlier set of policy makers. The

²This literature is too large to review here. Some especially well-done and influential studies include Slovin, Sushka & Polonchek (1993), Peek & Rosengren (2000), Ashcraft (2005), Paravisini (2008), and Khwaja & Mian (2010).

same pattern was evident in the US Savings and Loan Crisis, which was not faced in full until the George H.W. Bush Administration came to power in 1989.³

Credibility problems are not limited to large financial firms. Whenever a firm fails, there will be pressure to bail it out. For example, we have seen two waves of bailouts of the auto industry in the United States, one in the 1980s and another in 2009. Auto companies are very large and heavily unionized; thus, as with banks, their insolvency puts tremendous pressure on the political system for bailouts. After Lehman was allowed to file Chapter 11 bankruptcy, a European Central Bank official criticized the US officials by saying, “[In Europe], we don’t let banks fail. We don’t even let dry cleaners fail” (Wessel 2009). Such pressure to bail out, however, increases with the potential spillovers associated with failure and with the degree of political muscle. Both of these increase with firm size. The extent of spillovers is likely greater for financial firms than nonfinancial firms, and it likely increases with the size, complexity, and interconnectedness of a financial firm.

Within finance, the distinction between banks and other financial firms has become less relevant over time. Early analysts viewed TBTF as a banking problem because banks were at the heart of the financial system and because most of the liquidity risk resided there. Today, much liquidity provision occurs in less regulated portions of the financial system (sometimes called the shadow banking system), making nonbank financial firms vulnerable to panics and contagious runs and thus making it hard for governments and central banks to commit to forgo bailouts or other interventions for troubled financial firms such as American International Group (AIG) and Bear Stearns in 2008 and Long-Term Capital Management (LTCM) 10 years before that.

To summarize, two attributes substantially worsen the TBTF credibility problem. First, size in general plays into the agency-based motivation of politicians to push for bailouts. Second, large spillovers—to customers, counterparties, and ultimately to the real economy—exacerbate the problem. These concerns are greatest for large financial firms with a high level of short-term debt or that bear substantial liquidity risk. Elimination of TBTF, as politicians claimed in hailing passage of the Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank), would require eliminating investor expectations about the likelihood of bailouts. It is not enough for government agents—politicians and regulators—to claim to eschew bailouts. Such pronouncements must move investor expectations to reduce distortions.

In the remaining sections, I first describe the theoretical distortions and long-run moral hazard costs of the TBTF problem. Second, I argue that the body of evidence supports the idea that these distortions are quantitatively significant. After describing why the potential TBTF problem has grown worse over time, I end with a brief overview of ways to limit the problem.

2. FOUR DISTORTIONS FROM THE TOO-BIG-TO-FAIL PROBLEM

If investors place a positive probability that creditors will be protected from losses in the event of failure, then prices of financial instruments will be distorted—the greater the probability, the greater the distortion. In the extreme, where investors view a full bailout as a certainty, prices would not reflect risk at all. As we have seen, bailouts become more likely as political pressure increases and as the size of spillovers to customers, counterparties, and the economy increases; each of these factors increases with size, complexity, and interconnectedness and is greater for financial than for nonfinancial firms. Putting these ideas together suggests that TBTF distorts incentives in four ways.

³Using detailed information on directors of Pakistani banks, Khwaja & Mian (2005) show that board members’ political connections affected credit allocation.

First, TBTF financial firms borrow too much because expectations of bailouts reduce their cost of borrowing. The TBTF problem thus distorts financing decisions in favor of debt over equity.⁴ Large, complex, and interconnected financial institutions will tend to be more highly levered and more subject to financial distress following small losses than they otherwise would be. When dominated by such firms, the financial system itself becomes more fragile.

A related distortion is that creditors have weaker incentives to monitor and manage their exposure to counterparties viewed as TBTF. This kind of distortion could, for example, help explain why many large banks and broker-dealers extended substantial credit with very low margin requirements to the hedge fund LTCM without fully understanding the positions and strategies of the fund or its overall degree of leverage (Edwards 1999). Similar absence of monitoring seems to have occurred in the more recent case of AIG, where its large one-way bets on housing prices were not well understood either by its major counterparties or the ratings agencies (until too late). So, TBTF not only distorts prices in debt markets, it also affects how carefully firms use nonprice, risk-mitigating strategies such as credit rationing, enforcement of covenants, and the use of margin and collateral.

Second, turning to the other side of the balance sheet, TBTF firms take on too much risk. This distortion changes investment decisions, encouraging lenders to make riskier loans and traders to invest in riskier capital market assets than otherwise. The incentive for excess risk occurs partly because TBTF firms do not bear the full cost of risk taking; at the margin, their borrowing costs will increase less with risk than would otherwise occur. To a first approximation, this second distortion is more costly than the first because it causes credit misallocation. But, the high leverage stemming from the first distortion strengthens the incentive to take too much risk because leverage leaves the upside returns to equity holders while shielding their losses on the downside (Jensen & Meckling 1976).

Third, the lower borrowing costs enjoyed by TBTF firms encourage them to grow beyond what would otherwise be justified by economic fundamentals such as scale or scope economies. Because TBTF firms have a competitive advantage over smaller firms, they have an incentive to grow, not only to reap the rewards of scale economies (to the extent that these exist), but merely to take advantage of financing subsidies associated with greater size. Similarly, financial firms may choose to become more interconnected and complex, thereby increasing investor perception of the value of government protection, again because the root cause of the problem is fear of spillovers absent bailouts.

Fourth (and related to excessive growth), the TBTF problem creates a competitive advantage for large and interconnected financial firms relative to smaller ones. Numerous studies suggest that small banks provide lending services based on relationships with borrowers more effectively than large banks, and that they may also have greater incentives to invest in local knowledge about borrowers (Stein 2002, Berger et al. 2005, Loutskina & Strahan 2011, Cortés 2012, Gilje 2012). The TBTF problem, by leading to a financial architecture with too many resources in large institutions and too few in small ones, thus may reduce the supply of credit to small firms (and increase its price), relative to what would otherwise occur. This implication, however, is very hard to document because we do not see the counterfactual world without a TBTF problem. That said, below I discuss briefly some mechanisms to reduce the problem.

Fannie and Freddie together offer an extreme real-world example of how these four distortions affect firm behavior and market structure. These two so-called government-sponsored enterprises (GSEs) had the strongest implicit guarantees of their debt of any privately owned financial firms due to their history (Frame & White 2005, Lucas & McDonald 2006). As a consequence, they

⁴This argument presupposes that debt holders are more likely to receive government support than equity holders, which has typically been the case historically.

could borrow at rates nearly the same as the US Treasury. In response, Fannie and Freddie had the highest leverage of any financial firm. For example, Fannie Mae's ratio of regulatory capital to assets in the mid-2000s was approximately 3% (compared to 8–12% for banks), and well below 2% when off-balance sheet credit guarantees are included. Second, starting in the middle of the 2000s, the two also increasingly invested in high-risk, subprime mortgages. Third, they grew rapidly (and unsustainably) to maximize the value of subsidized debt—between 1990 and 2007, these two firms grew at an annualized rate of approximately 12.5%. Fannie's balance sheet ballooned from \$130 billion in 1990 to \$1 trillion in 2004; Freddie's balance sheet grew even faster, though starting from a smaller level. The two also provided credit guarantees of similar magnitude to mortgages held by others. And fourth, Fannie and Freddie together dominated the market for prime mortgages, driving out competition from other financial institutions with weaker (but certainly not zero) expectations of government support (Fed. Hous. Finance Agency 2010).

So, to conclude, financial firms have incentive to borrow too much, to grow too large and to take too much risk. The financial system as a whole is, as a result, excessively dominated by large, complex, and interconnected and highly levered firms. Credit supply is distorted, with borrowing costs to high-risk projects reduced, thus passing the risk-taking incentive to the broader economy. With fewer small institutions, credit to small and young businesses that require investments in relationships will be more expensive than otherwise. Such an economic and financial system will be both less efficient in allocating resources (implying lower long-run growth) and more vulnerable to small shocks than otherwise (implying higher short-run volatility). These are the theoretical long-run consequences of the TBTF problem. In the next section I discuss studies that attempt to measure these costs.

3. TOO BIG TO FAIL: HISTORY AND EVIDENCE

3.1. A Brief History of the Financial Distress at Large Financial Institutions

The TBTF problem was first recognized and discussed explicitly by policy makers and academics in the wake of the failure of Continental Illinois in 1984. In testifying to Congress, Todd Conover, the then Comptroller of the Currency, admitted that “had Continental failed and been treated in a way in which depositors and creditors were not made whole, we could very well have seen a national, if not an international, financial crisis the dimensions of which were difficult to imagine” (Barth, Prabha & Swagel 2012). He further admitted that this practice would apply to all of the largest 11 banks. This fear of macro-spillovers in Conover's statement reflects exactly the TBTF credibility problem of pronouncements to eschew bailouts. The *Wall Street Journal* subsequently published the list of the top 11 banks and anointed them TBTF. Using an event study on the basis of this publication, O'Hara & Shaw (1990) find that the stock prices of the 11 anointed TBTF banks increased, both relative to the market and to other smaller banks, and the size of the wealth increase grew as measures of solvency fell.

In the latter half of the 1980s, large money center banks such as Citicorp became distressed from their exposure to the Latin American Debt Crisis and may have been insolvent on a market-value basis. These banks were supported by market expectations of government backing and thus never had funding problems, so no explicit bailout or crisis occurred. However, these banks could continue to finance their position because creditors believed in the government's unwillingness to allow them to fail. The Bank of New England did fail in January of 1991 due to its heavy exposure to commercial real estate. In resolving the failure, the Federal Deposit Insurance Corporation (FDIC) protected all of its depositors, including those above the then statutory maximum of \$100,000 (FDIC 1997).

Following the large costs associated with resolving the Savings and Loan industry in the late 1980s, Congress passed the FDIC Improvement Act of 1991 (FDICIA), hoping to reduce the incentive problems of deposit insurance and TBTF. FDICIA directed the FDIC to resolve failed banks in the way least costly to taxpayers, thereby implicitly directing the insurer to impose losses on all but fully insured depositors and creditors. But the law also implicitly addressed the credibility problem that underlies TBTF by creating a systemic risk exception to so-called least-cost resolution procedures. Under the exception, all creditors could be protected if not doing so threatened the integrity of the wider financial system. Even the architects who attempted to reduce moral hazard problems understood the impossibility of legislating away the credibility problem.

The 1990s and 2000s were generally characterized by high profits for the financial services industry as the economy boomed in the wake of the emergence of high technology and the Internet. The collapse of LTCM in the wake of the Russian Debt Crisis of 1998 (henceforward, Russian Debt Crisis), however, again strengthened expectations of TBTF bailouts, undoing some of the positive effects of FDICIA. In this instance, the hedge fund received no public monies, but policy makers took very strong actions to encourage LTCM's creditors to restructure the fund and avoid a disorderly liquidation, which would have been unavoidable in bankruptcy (Edwards 1999). So, as in the earlier cases, government officials took actions to avoid possible short-run consequences of failure due to LTCM's large scale and interconnectedness. This case illustrates dramatically that the TBTF problem is less about banking than perceived spillovers associated with failure. LTCM was large, was connected to many other large counterparties, and held concentrated positions in illiquid assets; thus, officials rationally feared that a fire sale could reduce prices and liquidity further and thus threaten the broader financial system, particularly because market conditions were already stressed in the wake of the Russian Debt Crisis.

Government actions surrounding the Bear Stearns and Lehman failures further illustrate the nature of the TBTF credibility problem. In March of 2008, the Federal Reserve and Treasury attempted to broker a purchase of Bear Stearns by JPMorgan, as they had with LTCM. This intervention happened because officials feared that Bear's failure could lead to contagion at other firms such as Lehman Brothers and Morgan Stanley, which held similar positions and similarly relied on short-term wholesale credit markets. In fact, the Federal Reserve agreed to guarantee a portion of the assets acquired to facilitate the transaction. According to Fed Chairman Bernanke, "[I]t was very difficult and in many ways distasteful intervention that we had to do on the grounds that we needed to do that to prevent the system from collapsing" (Censky 2012). Later that year, Lehman faced a similar situation. In this latter case, the Fed again attempted to find a buyer but failed, allowing Lehman to enter Chapter 11 bankruptcy (Sorkin 2009). This decision surprised and confused investors, who had become accustomed to large-firm bailouts, and it led first to investor runs on the money market industry and then spread financial chaos globally (Brunnermeier 2009; Kacperczyk & Schnabl 2010, 2012; Strahan & Tanyeri 2012).

On seeing the wreckage left in Lehman's wake, governments across the world extended blanket bailouts to all financial firms, large and small. In the United States, the statutory maximum on insured deposits doubled to \$250,000, 100% of money market mutual funds and transactions deposits were guaranteed, and all bank liabilities were guaranteed on a temporary basis. The temporary expansion of full insurance for transactions deposits was extended in 2009 and again in 2010. Moreover, the government forced the 19 largest banks to receive capital injections under the Troubled Asset Relief Program (TARP) (Wessel 2009). It seems this last move was interpreted by markets as the government's credible statement that the largest institutions were indeed TBTF—liquidity in the interbank markets improved immediately following the announcement of this move, as the uncertainty about TBTF was resolved.

3.2. Evidence

Although no single study paints a complete and convincing picture of the TBTF problem, collectively the literature presents a compelling case that the problem is real and affects behavior in ways consistent with the distortions outlined in Section 2.

First, yields on large-bank issued debt seem distorted. Several studies suggest that TBTF distorts prices for both less than fully insured deposits and other subordinated debt instruments issued by large banks. Studies focus both on how borrowing costs vary with size after controlling for measures of risk (a level effect), as well as how the sensitivity of borrowing costs to measures of risk vary with size (a slope effect). TBTF ought to shift down the whole level of borrowing rates and reduce the sensitivity of those rates to risk as size increases. Some studies also test for threshold effects, such as crossing the \$100 billion asset-size line or attaining a certain market share of the banking industry's assets to measure discrete increases in market expectations of a firm's likelihood of being bailed out. Most studies focus on banks, although as I have argued the problem goes beyond banking.

Early studies find little sensitivity of rates on uninsured certificates of deposit (CDs) to risk measures for large banks and that large-bank-issued CDs had lower yields than those issued by smaller banks (Avery, Belton & Goldberg 1988; Hannan & Hanweck 1988), consistent with TBTF. Ellis & Flannery (1992), however, find that yields on uninsured CDs issued by banks exhibit some risk sensitivity based on data from the 1980s. Using a longer time series, Flannery & Sorescu (1996) study subordinated bank-issued debt, finding a weaker link between risk measures and bond yields in the 1980s compared with the early 1990s. During the 1990s they find a positive sensitivity of yields to risk that falls with bank size. These results suggest that TBTF was less severe in the 1990s, consistent with the idea that FDICIA had a positive impact in reducing moral hazard distortions.

Bailout expectations also affect credit rating agency assessments of the risk of bank-issued debt. Fitch disaggregates its ratings of banks into a stand-alone component and a separate rating that embeds the value of support from both holding companies and governments. Using these data, Rime (2005) shows that the component of the rating that measures external support increases with plausible measures of TBTF status, such as asset size or measures of size relative to GDP (using data from many countries). Morgan & Stiroh (2001) compare ratings and yields on debt issued by banks with nonfinancial firms, based on the idea that the TBTF problem is worse for banks than others. They find that the relationship between credit ratings and yields is similar across types, but that links between portfolio measures of risk are more strongly related to yields for smaller banks than large ones, consistent with the idea that being TBTF flattens the link between risk and market risk premiums.

Second, large banks take higher risk than smaller ones. Both leverage ratios and the share of assets invested in risky assets increase with size (Demsetz & Strahan 1997). Large banks hold a greater fraction of assets in loans relative to safer government securities, and they are more active in risky trading activities than small banks. Capital-to-assets ratios are also consistently negatively associated with size (Strahan 2003). These relationships are very strong empirically, but they are hard to pin on TBTF. For example, large banks are better diversified than smaller ones and so their higher leverage could simply result from the risk-reducing effects of diversification. The strong correlation between size and asset risk, however, is less easily explained.

Third, evidence surrounding bank mergers supports the dynamic implication that banks will grow to exploit TBTF subsidies. Kane (2000) finds that acquirer stock prices increase at the announcement of megabank mergers (mergers where both target and acquirer are large), whereas for other bank mergers acquirer returns are negative on average, as is the standard result in the merger literature. Penas & Unal (2004) show that bond yields tend to decline when banks merge

and that the declines are greatest when two medium-sized banks merge such that the resulting entity exceeds a threshold of 2% of all banking assets, drawing the inference that by crossing this margin, investor expectations of bailouts increase. Brewer & Jagtiani (2013) regress merger premiums—a clean measure of a bank’s willingness to pay for growth—on the extent to which a deal would increase TBTF expectations. They find a \$15 billion excess payment for mergers that would exceed the \$100 billion threshold for the combined entity. These studies present concrete evidence that part of the motivation for mergers is to gain access to or increase the value of TBTF and its consequent subsidies to financing costs.

Fourth, TBTF distorts competitive dynamics. In a recent paper focusing on the effects of the Financial Crisis, Gropp, Hakenes & Schnabel (2011) find that expectations of government bailouts affect the risk-taking behavior of competing banks, whose franchise value will tend to fall when their competitors receive implicit TBTF subsidies. These kinds of dynamics arguably played out in the growth of the US subprime mortgage business, when unregulated investment banks, unable to compete effectively with Fannie and Freddie (who were viewed as most likely to be TBTF) in the prime mortgage markets, expanded aggressively into high-risk, subprime mortgage lending and securitization during the 2000–2006 housing boom.

Variation over time in measures of TBTF effects also seems consistent with actions taken by policy makers and legislators. As noted earlier, O’Hara & Shaw (1990) find that stock prices increased in the wake of statements by the Comptroller of the Currency that the 11 largest banks would not be allowed to fail. Such a statement likely increased investor expectations about the likelihood of bailouts, thereby raising equity values. Flannery & Sorescu (1996) find that the extent to which bank-issued bonds reflect individual failure risk increased after passage of FDICIA, which attempted to reduce the likelihood that failed bank creditors would be fully protected under its least-cost resolution provision. Furfine (2006) studies the LTCM collapse and finds that borrowing costs of large financial institutions fell after the LTCM rescue, suggesting the market perception of TBTF increased as a result of the Fed’s intervention in 1998.

Following the extension of blanket guarantees in 2008, it seems that the potential for TBTF effects has strengthened again. Yet, as I discuss in the final section of the review, risks seem to be priced more today than prior to the Financial Crisis.

4. THE TOO-BIG-TO-FAIL PROBLEM IN THE POSTCRISIS ENVIRONMENT

I have argued that TBTF is a credibility problem. When government officials proclaim “the end of TBTF,” will markets believe or dismiss such pronouncements?

4.1. Do Changes in US Financial Markets Worsen Too Big to Fail?

Two developments in the banking industry over the past thirty years seem to have worsened the credibility problem. First, finance as a share of the overall economy has grown sharply. Second, the financial system itself has become more concentrated and interconnected over time. The credibility problem exists because of short-run costs associated with allowing large institutions to fail without government intervention. As finance becomes more important and more concentrated, spillovers (or concerns about spillovers) almost certainly worsen, thereby exacerbating the credibility problem. Political pressure for bailouts may also worsen with the importance and concentration in the financial industry. Yet in the wake of the Financial Crisis, concern about the TBTF problem has become widespread, leading to pressure for tighter international capital rules as well as changes within the United States that attempt to curb the problem. As we will see at the end of the review, despite potentially worsening TBTF problems, risks are priced now more than before the Financial Crisis.

Figure 1 illustrates the increasing share of finance in the US economy over time. In the 1950s, value added in the financial sector represented slightly more than 2% of total GDP. This share rose steadily over time, peaking locally in 2006 at 8.2%, dropping somewhat during the Financial Crisis, and then rising again through 2010. **Figure 2** illustrates the growing concentration in finance by plotting the share of total assets in the banking system held by the largest 10 bank holding companies. As recently as 1990, this share was less than 25%; by 2010, the share had reached nearly 70%.

There are several drivers of the long-run trend toward greater size and complexity of financial firms. First, better information technologies have reduced transportation and communication costs. Credit scoring and securitization, for example, allow lenders to extend their reach well beyond the branch network for many products such as mortgages, credit card loans, and deposits. Thus, the costs for customers are now lower than in the past for using banks and other financial services firms located farther away from them (Petersen & Rajan 2002). Often branches seem superfluous, with online billing and electronic payments gaining increasing ground. Whether technology has led to sharp increases in scale economies, however, remains a contentious issue. Much of the early empirical literature on costs in banking finds roughly constant returns to scale above a fairly small size, with possible diseconomies of scale for very large banks [see Berger, Demsetz & Strahan (1999) for a survey]. However, accounting for diversification effects of size changes the conclusion because larger banks can offer deposit services and credit with less risk than can smaller banks, all else equal. In fact, Hughes & Mester (2011) find that scale economies may even extend to the very largest banks based on data from 2007. Wilson & Wheelock (2012) reach similar conclusions using nonparametric estimation strategies.

Second, regulatory constraints on the geographical extension of banks in the United States have been relaxed gradually, starting in the 1970s with state-level relaxation of restrictions on branch banking (Jayaratne & Strahan 1996, Kroszner & Strahan 1999), continuing in the 1980s with state-level relaxation of ownership restrictions by bank holding companies across state lines, and culminating with legislation passed in 1994 that allowed full interstate banking and branching (Rice & Strahan 2010). This deregulation was followed by a merger boom that increased

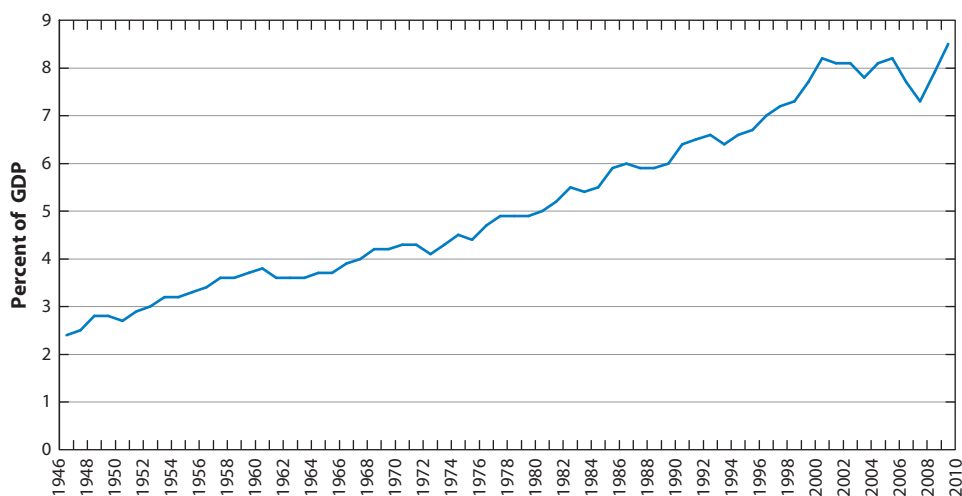


Figure 1

Share of GDP in finance and insurance.

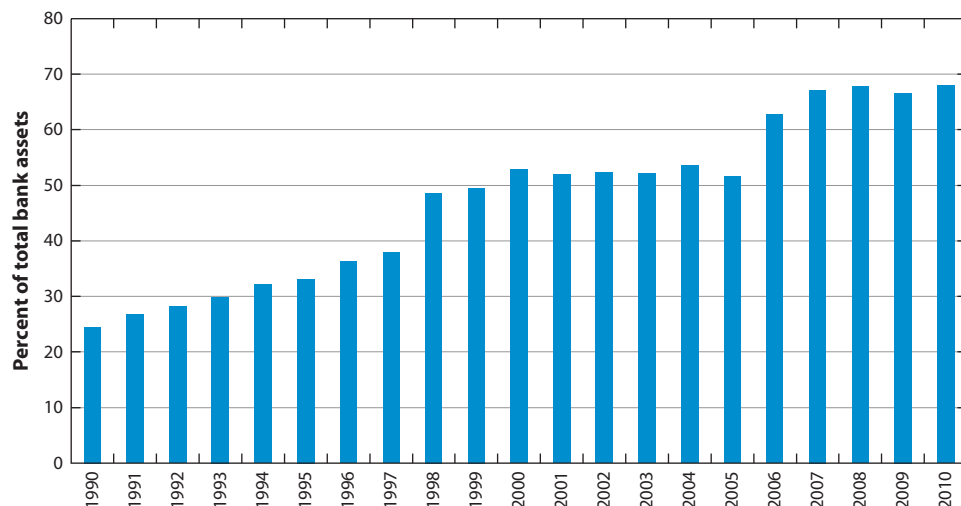


Figure 2

Total asset share of 10 largest bank holding companies (BHCs) relative to all BHCs.

concentration in banking quite sharply in the 1990s (recall **Figure 2**). Even with roughly constant returns, open markets no longer fettered by regulations may come to be dominated by a few large firms due to scarce managerial talent. In fact, Jayaratne & Strahan (1998) and Stiroh & Strahan (2003) find strong evidence that better-run and more-profitable banks before deregulation gain substantial market share over their weaker rivals after deregulation.

The increase in the competitiveness and contestability of markets that came with deregulation can play an independent role in worsening TBTF distortions, even absent changes in banking concentration. Competition erodes access to rents, so banks have less to lose now than in the past, thereby potentially worsening incentives to add leverage and take risk. In fact, Keeley (1990) and Demsetz, Saidenberg & Strahan (1996) find that banks with higher market value, which incorporates franchise value, reduce both investment risk and leverage. Thus, greater market openness and competition may work to worsen two of the key distortions of TBTF.

Third, regulatory constraints on product mix have also been dramatically relaxed over time, leading to the emergence in the United States of financial conglomerates such as Bank of America, Citigroup, and JPMorgan. Starting in the late 1980s, bank holding companies began to compete with investment banks in underwriting debt and equity securities. This move began with regulatory changes initiated by the Federal Reserve and then culminated with the near dismantling of Glass-Steagall's restriction on financial conglomeration in 1999 with passage of the Financial Modernization Act. The Act facilitated the merger of Citicorp with Travelers Insurance, which owned a large investment bank (Solomon-Smith Barney) beyond its traditional insurance business. As with the earlier episodes of deregulation, following the 1999 law many large bank holding companies expanded aggressively into the securities underwriting business by buying stand-alone investment banks.

Combining commercial banking with underwriting of corporate debt and equity securities—so-called universal banking—permits a synergy stemming from information scope economies. Gande et al. (1997) find a net certification effect that banks establish by forming lending relationships with lower credit-rated firms. They argue that banks' unique information advantage with respect to these firms results in relatively higher prices (lower yields) on underwritten debt

securities. Yasuda (2005) reaches the same conclusion; she finds that client-specific relationship capital is a unique (commercial) bank advantage in underwriting when banks have strong prior lending relationships with the issuing company. Schenone (2004) finds smaller IPO underpricing when an issuer's underwriter was also its main lender prior to going public, consistent with better information and certification. Although a universal banks' information advantage in principle could create conflicts of interest, the empirical research suggests that banks do not abuse their information to mislead the market (Kanas & Qi 1998). Indeed, research on bank underwriting prior to Glass-Steagall suggests that debt securities underwritten by banks had a better default record than those underwritten by investment banks (Kroszner & Rajan 1994, 1997; Puri 1996; Ang & Richardson 1994).

The fourth and final push to financial consolidation occurred in the wake of the Financial Crisis of 2007–2008 as failed institutions merged with healthier ones, often with government assistance. For example, JPMorgan (the largest bank holding company) purchased Bear Stearns (one of the top five stand-alone investment banks at the time) in March 2008 and WaMu (the largest thrift at the time) in October 2008; Bank of America purchased Countrywide in January 2008 (the biggest mortgage lender at the time) and Merrill Lynch in September 2008 (the largest investment bank at the time); Wells Fargo purchased Wachovia (the fourth largest bank at the time) in October 2008. So, restructuring of the financial system, designed to mitigate the immediate costs of the Financial Crisis, ironically, led to a more concentrated financial system potentially more prone to TBTF distortions.

4.2. Strategies to Mitigate Too Big to Fail

There are several potential strategies that may help roll back the TBTF problem. First, as emphasized by Stern & Feldman (2004), spillovers lie at the heart of the credibility problem of eschewing bailouts. Thus, their policy prescriptions focus on ways to minimize spillovers to customers, markets, and the economy when a large financial firm fails. If achieved, such changes would mitigate the TBTF credibility problem; if spillovers are small, government promises not to bail out become more credible, and market prices begin to reflect risk more accurately. With risks priced, distortions would be reduced. Dodd-Frank attempts to address TBTF in exactly this way by creating new resolution authority. Under the law, the FDIC may close and liquidate distressed financial institutions in ways that avoid costs associated with bankruptcy. The idea is to introduce a third option for regulators, relative to the two bad choices faced by Bernanke and Paulson on September 15, 2008—the “rock” of a full-on bailout (AIG) versus the “hard place” of potentially disruptive bankruptcy (Lehman).

Dodd-Frank's new resolution approach directs the FDIC to impose losses on uninsured creditors, shareholders, and managers and thus, in principle, ought to help mitigate TBTF by increasing the *ex ante* belief that creditors would bear losses in default. The problem, however, comes back to credibility. In fact, Dodd-Frank allows the FDIC to differentiate among creditors in determining losses, and the pressure to differentiate will be hard to resist, especially in stressed markets (Sprayregen & Hesler 2010). For example, failure to protect creditors holding collateral backing repurchase agreements could lead to asset fire sales; in fact, this is precisely what we saw during the Financial Crisis of 2007–2008 (Gorton & Metrick 2012). Committing to impose losses on providers of long-term capital (equity and long-term subordinated debt holders) can thus encourage more short-term debt and work against financial stability.

Dodd-Frank also requires systemically important institutions to develop a resolution plan, which may help reduce uncertainty about failure resolution (Kashyap 2009, Kroszner & Shiller 2011). These living wills are intended to provide road maps for how funds would flow and how

creditors, counterparties, and customers would be dealt with as an institution begins to experience difficulty. They would provide guidance to market participants and supervisors about how a large complex institution might be dismantled, and thus in principle could advance the ball in lowering the spillover costs of failure.

Recall that both size and interconnectedness worsen the TBTF problem. One potentially effective way to improve and simplify connections between large firms and improve market transparency is to bring derivative contracts onto platforms with centralized clearing counterparties. In such arrangements, the clearinghouse becomes the counterparty to all derivatives transactions. Uncertainty about performance and about the identity of the counterparties is reduced given that the clearinghouse acts as the guarantor of all contracts, thereby alleviating the difficulty of determining counterparty risk exposures during a crisis. In contrast, with bilateral over-the-counter markets, firms may find it difficult to monitor the market-risk exposure of their counterparties. AIG Financial Products, for example, made a series of one-way bets on housing and corporate solvencies, but this exposure was not evident to AIG's counterparties. With a clearinghouse, information about exposures to market risk is aggregated and thus can be closely monitored by the clearinghouse as well as regulators. Thus, potentially destabilizing concentrations of market risk among one or a handful of institutions and funding runs due to uncertainty about counterparty exposure are less likely to occur.

The Dodd-Frank Act creates a new regulatory framework to encourage derivatives to be centrally cleared. Naturally, the central counterparty will improve financial stability only if it can withstand the failure of key players (Kroszner & Melick 2013, Kroszner & Strahan 2013). Dodd-Frank does provide a new framework for the regulation, oversight, and governance of the clearinghouses themselves, and clearinghouses have more than a century of success in dealing with wars, depressions, crises, and failures of important players (Kroszner 1999, 2010). That said, a crucial challenge going forward will be to ensure that clearinghouses deal effectively with greater risk management challenges of new products traded in large volumes being centrally cleared.

Direct regulatory constraints offer a second means to correct distortions of TBTF toward excessive leverage and risk taking. Dodd-Frank addresses the concern about excessive risk taking through the so-called Volker Rule, which attempts to peel off proprietary trading from deposit-taking institutions. This approach, however, has several weaknesses. First, it does not address the root cause of the TBTF distortion, which lies in the ex post cost of allowing financial firms to fail. These costs have more to do with the size and interconnectedness of a financial firm than with whether it uses deposits. For example, neither Bear Stearns nor AIG took deposits, yet both were bailed out when they ran into trouble; earlier, the hedge fund LTCM attracted Fed actions even though all of its investments were financed by sophisticated investors. Second, drawing a clear line between (speculative) proprietary trading and market making is problematic. Many concerns have been raised that a too-aggressive interpretation of the Volker Rule could harm market liquidity by reducing the ability of large banks to take positions in bond markets.

In many cases, legitimate hedging activities may look superficially like proprietary trades, particularly if firms use macro-hedges that are not tied to specific positions, further complicating effective implementation of the Volker Rule. The problems of the German energy firm Metallgesellschaft (MG) in the early 1990s illustrate the difficulty of identifying hedging strategies reliably. In this case, MG hedged its long-term forward contracts to sell oil and gas to customers with long positions in short-term futures contracts. MG marked its futures contracts to market, but did not recognize changes in the value of its long-term forward contracts. Thus, when energy prices fell sharply in 1993, the firm had to recognize huge losses on its hedges in futures, most of which were offset by unrecognized gains in its forward contracts. The huge cash losses in futures led to confusion about whether or not the firm had been speculating. Under pressure, MG's board fired

management and closed out its hedges, leaving the firm vulnerable to rising energy price. No longer able to hedge, MG decided to buy out of its long-term forward arrangements, at great cost to the firm's shareholders (Edwards 1995). Thus, ironically, the Volker Rule runs the risk of squashing legitimate hedging strategies, just the opposite of its intent.

Risk-based capital requirements are a third tool to mitigate TBTF distortions. The Basel Capital process, which began in the late 1980s, ties required capital to risks taken by banks in lending, trading, and off-balance sheet positions. Over the past 20 years, the rules have evolved to try to keep pace with changes in financial markets. Much of the push away from traditional banking and the emergence of so-called shadow banking came as firms worked to minimize the burden of these regulations. Securitization offers a good example. Although there are good effects of securitization, such as better diversification and liquidity, efforts to avoid regulatory capital no doubt encouraged too much securitization, which many argue played a key role in the erosion of lending standard during the late 2000s (Acharya & Richardson 2009). The original Basel I framework encouraged securitization of low-risk loans because it treated all loans to businesses equally for the purposes of required capital. Thus, it became attractive to securitize loans to highly rated creditors and to hold on to balance sheet loans to lower-rated creditors.

Despite real concern about regulatory arbitrage, the ongoing Basel III process may impose tighter capital requirements across all banks, although many critics argue that the proposals do not go far enough (Admati et al. 2011). Basel III also may introduce an additional capital surcharge for systemically important financial institutions (known as the SIFI surcharge). Some have criticized this approach because, by designating explicitly some firms as systemically important, investors will perversely increase their expectations that these firms would not be allowed to fail. The current approach may not provide strong incentives at the margin for these large financial firms to become smaller. Perhaps a better approach would be to have required capital, and other restrictions, increase progressively with firm size, just as tax rates increase progressively with income. A graduated, progressive capital requirement would protect the system better (even holding constant average capital), while offsetting some of the existing incentives for firms to grow large merely to expand the value of government guarantees.

The fourth and most radical means to reduce TBTF would be to impose hard size constraints on financial firms. For example, Johnson & Kwak (2010) suggest limiting the size of any one bank's liabilities to 4% of GDP (approximately \$600 billion, or 30% of JPMorgan's current balance sheet). This strategy would be difficult to implement in practice, as it would require breaking up existing firms. It would face strong political resistance and would create long-run costs by constraining competition in the financial system. There is a large body of research in the finance and development literatures providing evidence that competitive and open financial markets foster more economic dynamism and faster growth (King & Levine 1993, Jayaratne & Strahan 1996, Rajan & Zingales 1998).

4.3. What Does the Market Tell Us About Too Big to Fail Today?

Since the Financial Crisis of 2007–2008, the market seems to price risk over time and across banks more than before. **Figure 3** plots the mean and interquartile range of the spread on five-year credit default swaps (CDSs) for the 10 largest US banks from 2001 to 2012. Prior to 2008, CDS spreads were low and stable, both over time and across banks; such a pattern is consistent with very limited pricing of risk. After the Financial Crisis, the average level of CDS spreads seems permanently higher. Moreover, the average time variation increases, as does cross-sectional dispersion. These postcrisis patterns suggest that risk takers now face (some) costs of their actions in higher borrowing rates. To take a specific example, Morgan Stanley's five-year CDS spread rose from

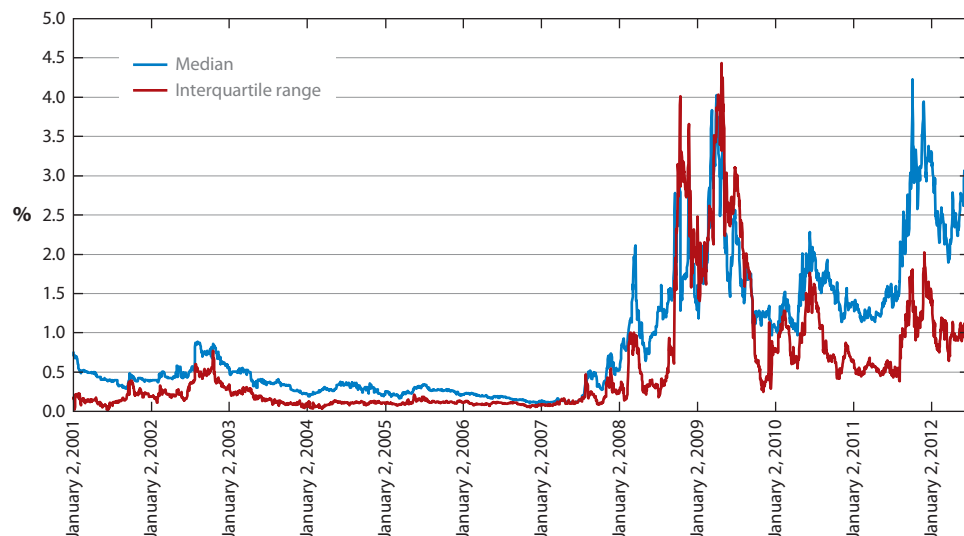


Figure 3

Spread on five-year credit default swap for 10 largest banks.

approximately 1.5% at the beginning of 2011 to 5% during the fall of that year, when concern about its exposure to the Euro peaked. Morgan had a high exposure to the Euro, but seemed to respond to its high borrowing costs by reducing that exposure in the spring of 2012; as a result, its CDS spread fell to 3.5% (Moore 2012).

So, now markets seem to price risk, even for the largest financial firms. This is good news. The question is why. One possibility is that bailouts have become less likely for political reasons, such as the rise of the Tea Party and the backlash against TARP, thus making it harder for agents of the government to bail out large banks even if they want to. Or, it could be that Dodd-Frank has worked as intended; by constructing mechanisms to soften the blowback of a large failure, perhaps markets now believe that losses are more likely to be imposed on creditors in the event of distress. A third possibility is that large banks have become “too big to save,” at least in relation to resources available to governments and central banks facing long-run fiscal imbalances. In fact, Demirgüç-Kunt & Huizinga (2013) use recent data to separate absolute size from size relative to GDP, finding that this latter measure of systemic size seems to increase sensitivity of funding costs to risk; this latter result seems consistent with large firms becoming potentially too big to save. Whatever the cause, the fact that markets are now pricing risk should tend to mitigate the distortions toward excessive leverage and risk. Whether such risk pricing will continue remains to be seen.

DISCLOSURE STATEMENT

The author has acted as an academic visitor at the Federal Reserve Bank of New York.

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