

## **Banks: Is Big Beautiful or Do Good Things Come in Small Packages?<sup>1</sup>**

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**Presentation for the Session:**  
**Is it Time to Break Up the Big Banks: Addressing Structural Issues about the Size and Concentrations of Power in the U.S. Financial System**

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### **Executive Summary**

This session poses the question: is it time to break up the big banks? Breaking up the banks to make them smaller in size has been suggested as a solution to banks being viewed as “too-big-to-fail” (TBTF).<sup>2</sup> TBTF is an insidious problem because it undermines the ability of private-sector investors to provide market discipline. Indeed, TBTF has been an issue that U.S. regulators have struggled with since the failure of Continental Illinois in 1984, and that experience suggests that once market discipline is undermined, it takes time to reestablish it.<sup>3</sup>

When creditors believe that the government will not allow an institution to fail and therefore they will be fully protected, their ex ante incentive to monitor the firms’ risk-taking is undermined. The market discipline creditors could impose on the firm is potentially even greater than that of equity holders, since unlike equity holders, they do not share in any of the upside benefits from risk-taking. Yet, when creditors believe they will be bailed out ex post should the institution get into trouble, they have little incentive to provide discipline. To the extent that trouble at one of these institutions has spillovers to others and the potential to create a systemic event, the institution’s risk-taking imposes an externality. However, left to their own devices, the firms do not internalize the impact of their risk-taking on the likelihood of a systemic event. This suggests a role for government policy; however, the recent financial crisis suggests that the pre-crisis bank supervisory apparatus was not adequate to solve the problem.

If some banks are TBTF, then it seems reasonable to ask whether breaking them up will solve the problem. My answer is no, for two reasons. First, I am skeptical that such an approach can adequately address the concerns that the policy is intended to solve. Second, the approach ignores the costs that would be associated with breaking up the banks. To evaluate such a potential solution, it is important to

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<sup>1</sup> The views expressed here are those of the author and do not necessarily represent those of the Federal Reserve Bank of Philadelphia or the Federal Reserve System.

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<sup>2</sup> Stern (2009) and Flannery (2010) cite a number of advocates of the break-up-the-banks approach, including Robert Reich in his blog, and George Shultz and Gerald O’Driscoll in the *Wall Street Journal*.

<sup>3</sup> Flannery and Sorescu (1996) show that after Continental Illinois’s failure in 1984, banks’ debt spreads began reflecting default risks around 1989.

know *why* banks have gotten so large. Research suggests that some institutions have grown in size, not to game the system, but for reasons of efficiency. The globalization of financial markets has led to larger markets, and better performing banks will grow in size. The systemic risk posed by large, complex institutions might still outweigh the efficiencies gained by scale, but without estimating the risks and these efficiencies, it is impossible to compare costs against benefits. Moreover, the effectiveness of size limits depends on knowing the market pressures on banks that encourage growth. Effective regulation needs to work with market forces, not against them. I believe that there are better strategies for addressing TBTF that focus on the externalities created by systemically important institutions. In particular, I believe a more effective approach to TBTF would be to institute a credible and less discretionary resolution method for systemically important financial institutions and to impose higher costs on firms that impose more systemic risk on the financial system.

In the remainder of this discussion, I present some information on the size and complexity of banking firms and some new results on the scale economies in banking. I discuss other approaches to addressing TBTF that I believe would be more effective than breaking up the banks. I conclude with some suggestions for future research that would help us evaluate policies.

### **Bank size and complexity and systemic risk**

The past 30 years have seen a striking amount of consolidation in the banking industry in both the U.S. and abroad. In the U.S. the number of commercial banks has fallen from about 14,500 in 1984 to fewer than 7,000 today.<sup>4</sup> Banks have grown larger over time, and the industry has become more concentrated. Figure 1 shows the mean and median total consolidated assets, in 2011 dollars, of U.S. commercial banking organizations over time.<sup>5</sup> Since 1984, there has been a seven-fold increase in mean consolidated real assets and almost a three-fold increase in median consolidated real assets.<sup>6</sup> Figure 2 shows total assets (in 2011 dollars) and the share held by the 50 largest bank holding companies. Figure 3 shows the three-firm and five-firm concentration ratios, and the Herfindahl index for U.S. banking organizations from 1984 through 2011. The top 5 bank holding companies hold 50 percent of industry assets, compared to 20 percent in 1984, and the top 3 bank holding companies hold 37 percent of industry assets, compared to 14 percent in 1984. Figure 4 shows the number and the market share of assets held by the top 50 banking organizations across size categories (in 2011 dollars) in 1984 and 2011. As shown, there has been a strong shift in the distribution toward larger institutions.

Complexity is also an issue. The organizational hierarchy of Bank of America takes 161 pages to list.<sup>7</sup> Herring and Carmassi (2010) present data on organizational complexity at banking organizations at year-end 2007. These data indicate that systemically important firms have very complex organizational structures (see Table 1). The 15 institutions identified by the Bank of England and the IMF as large complex financial institutions operate, on average, in 44 countries, and they have an average of 1,005 subsidiaries. Even if we drop Citigroup, which at year-end 2007 had the largest number of subsidiaries at 2,435 and operated in 84 countries, the numbers are still large.

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<sup>4</sup> See the Federal Deposit Insurance Corporation's *Historical Statistics on Banking* at <http://www2.fdic.gov/hsob/HSOBRpt.asp> and Mester (2010).

<sup>5</sup> The data shown in charts 1 and 2 treat a bank and all of its subsidiaries as a single banking organization. Nominal data are deflated by the GDP deflator to put the data into 2011 dollars.

<sup>6</sup> In nominal dollars, there has been an 11-fold increase in mean consolidated assets and a 5-fold increase in median consolidated assets.

<sup>7</sup> See the National Information Center's organizational hierarchy data ([www.ffiec.gov/nicpubweb/nicweb/nichome.aspx](http://www.ffiec.gov/nicpubweb/nicweb/nichome.aspx)).

While size and complexity are likely correlated with systemic risk, they need not be the only criteria. Some institutions are small in size but very interconnected (or thought to be very interconnected), like Bear Stearns. Rajan (2009) discusses several factors other than size that can make an institution systemically important, including how important the institution is in a particular market, interconnections with other systemically important firms, and the extent to which the firm's interconnections are not transparent. For example, an institution that plays a central role in payment services can be systemically important without necessarily being large. Under Dodd-Frank, several factors, in addition to size, will be considered as metrics of financial stability.<sup>8</sup>

When an institution of *any* size becomes distressed, there can be contagion to other institutions if the creditors conclude that the firms are sufficiently similar in terms of the assets they hold or their business strategy. For example, the failure of Northern Rock, a medium-sized bank concentrated in residential mortgages, caused financial instability in Britain as investors became concerned about real estate assets on the books of other banks. Financial instability can result if firms take on correlated risks even if no firm is too big to fail (see Stein, 2009, for further discussion).

This suggests that size is not enough to focus on. Thus, proposed remedies of TBTF that focus only on size and advocate breaking up large banks are likely going to miss important issues and give a false sense of security – aptly described as a Maginot line of defense by Foer (2009) and Stern (2009).

### **There are scale economies in at the largest banking institutions**

Another problem with such a policy is that it fails to recognize that there are significant scale economies in banking – that is, size confers efficiency. Many people continue to cite the older research that used data from the 1980s, which didn't find these economies. But the more recent work using data from the 1990s and 2000s finds significant scale economies at banks of all sizes.<sup>9,10</sup> Table 2 indicates estimates of

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<sup>8</sup> The Dodd-Frank Act requires the Board of Governors to impose enhanced prudential supervision on BHCs with total consolidated assets of \$50 billion or more and on nonfinancial financial companies designated by the Financial Stability Oversight Committee (FSOC). The FSOC has proposed using six factors to make the determination. Three factors pertain to the potential for spillovers from one institution's financial distress to the financial system and economy: size, lack of substitutes for the firm's products and services, and interconnectedness with other financial companies. The other three factors pertain to the firm's potential to become distressed: leverage, liquidity risk and maturity mismatch, and current regulatory scrutiny (see Federal Register, 2011). In addition, the Dodd-Frank Act now authorizes the Board of Governors to consider whether a proposed merger will have an adverse effect on financial stability when considering BHC merger applications. In the Capital One acquisition of ING Bank, fsb (2012), which was approved, the Board considered the following factors in determining the effect on financial stability: size of the resulting firm, availability of substitute providers for any critical products and services offered by the resulting firm, interconnectedness of the resulting firm, the extent to which the resulting firm contributes to the complexity of the financial system, and the extent of cross-border activities of the resulting firms.

<sup>9</sup> Partly this reflects improvements in the methods used for measuring scale economies — use of more flexible functions forms, taking into account risk and financial capital in empirical models, incorporation of off-balance-sheet activities into the models of banking. But it likely also reflects a real change in the scale of efficient production of banking services. This change possibly reflects changes in regulation — removal of geographic restrictions on competition and elimination of regulatory ceilings on deposit interest rates, as well as improvements in physical technology and applied financial management techniques.

<sup>10</sup> For example, Berger and Mester (1997) estimate the efficiency of almost 6,000 U.S. commercial banks in continuous existence over the six-year period 1990-95 and found that about 20 percent of banking coasts were lost due to scale inefficiencies, similar to the loss of resources due to X-inefficiencies (or waste). In every bank size class from less than \$50 million in assets to more than \$10 billion, we found scale economies for more than 90 percent of the firms in the size class. In each class the typical bank would have to be 2 to 3 times as large as its current size in order to maximize cost scale efficiency for its product mix and input prices. Other studies

scale economies from Hughes and Mester (2011) across different sized banks. Our sample includes 842 top-tier banking holding companies in the U.S. in 2007; these institutions range in asset size from \$72 million to \$2.2 trillion. Using a model that takes into account bank managers' decisions about risk-taking and that isolates the scale economies due to better diversification of liquidity and credit risk, technological progress, and other scale advantages, we find significant economies scale at all sizes of banks in the sample, including those with assets over \$50 billion, which are now subject to stricter prudential standards. Our results indicate that breaking up the largest financial institutions would significantly increase the cost of producing their current set of financial products.<sup>11,12</sup>

We provide additional results that show that these scale economies are driven by bank production technology and not by TBTF considerations (e.g., lower funding costs).<sup>13</sup> This is not to say that TBTF banks do not enjoy a funding advantage, only that the model controls for this and still uncovers scale economies. Nor does it imply that all bank mergers are value enhancing. Hughes, Lang, Mester, Moon, and Pagano (2003) show that corporate governance issues matter. We find that at banks without entrenched management, both internal growth and growth by acquisition are associated with improved performance, but at banks with entrenched management, growth by acquisition is associated with worse performance.

Larger scale means lower cost per unit of risk – a scale economy – but it also means that banks have the capacity to take on more risk – risk is endogenous. That is, a larger, better diversified institution faces a better risk-expected-return frontier but it might choose a higher level of risk on that frontier than a bank facing a worse risk-expected-return frontier. Thus, scale economies need not mean that larger institutions are less risky than smaller institutions.

These results suggest that in the cost-benefit analysis of the break-up-the-banks proposal, one needs to consider the cost of lost efficiency were such a size restriction imposed. To the extent that economic considerations drive size and a financial firm's choice of activities, strict size and activity limits would prevent the economy from realizing the benefits of growth and diversification. And if the U.S. were to impose such a restriction while other countries did not, it might have competitive implications as well (see Tarullo, 2011). (The concentration limit included in the Dodd-Frank Act and the current antitrust

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summarized in Mester (2008) and Hughes and Mester (2010) find that risk-management and revenue effects are correlated with bank size. Large banks may choose to take on larger amounts of risk because the cost of managing additional risk decreases with bank size. The standard analysis, which was used in earlier studies, might not detect scale economies that actually exist because standard analysis does not account for risk. Holding risk and capital-asset ratios constant, large scale economies are found even for the largest banks and bank holding companies.

<sup>11</sup> The estimates in Hughes and Mester (2011) imply that if the 17 institutions in their sample with assets over \$100 billion were broken up into smaller banks, each with \$100 billion in assets, the costs of production would increase by 2.4 times, or \$990 billion, which is about 11 percent of the total assets at these 17 institutions.

<sup>12</sup> Other recent studies have also found significant scale economies. Using data from 1984-2006, Wheelock and Wilson (2009) find that banks had increasing returns to scale even in 2006, when the largest banks had nearly \$1 trillion in assets. Feng and Serletis (2010), using data from 2000-2005 for large U.S. banks, also find scale economies at the largest banks.

<sup>13</sup> The model already controls for input prices, including the cost of funds, which could be lower at large institutions that are considered TBTF. Thus, cost is conditioned on the cost of funds that the institutions actually pay, so the scale estimates are likely not driven by a TBTF cost of fund subsidy. Also, the estimated scale economies are significant at banks that are too small to be considered TBTF under any reasonable definition. In addition, we ran two robustness tests. First, we re-estimated the model replacing the cost of funds at large banks with that of smaller banks. Next, we estimated the model dropping the banks with assets over \$100 billion, and then we calculated what scale economies for these banks would have been based on the estimated model. In both cases, scale economies estimates are very similar to the original estimation.

guidelines would help prevent large BHCs from exercising market power.<sup>14</sup>) These costs must be weighed against benefits that might arise from limiting size.<sup>15</sup>

Limits on size would also be difficult to maintain. They would work against market forces and would not alleviate the spillovers and the incentives for risk-taking, which are at the heart of the problem. Indeed, if the scale economies are large, size restrictions would create great incentives for firms to try to evade the restrictions by moving activities outside of the more regulated sector without necessarily reducing systemic risk. That is, the risk would migrate elsewhere but would not be eliminated. We should avoid policies that would merely push risk-taking outside of the regulated financial sector where it is more difficult to monitor.<sup>16</sup>

### **Potential remedies**

This discussion suggests that any remedy to the TBTF problem needs to address (1) the incentives for institutions to take on risk that is excessive from society's viewpoint and to create spillovers to other institutions, and (2) the incentives for regulators to bail out institutions that get into trouble because they fear that imposing losses on creditors will create a systemic event.

Regarding the incentives of institutions: Since TBTF is an externality, regulators need to get institutions to internalize some of the cost of taking on excessive risk by pricing it or else impose quantity restrictions. One could interpret the limit on bank size as a quantity restriction, but it is a very blunt one as it isn't targeted at activities that increase systemic risk. My preference is to use pricing so that firms can reduce risk in an efficient way. That is, institutions that raise the probability of systemic problems when they are under distress should be charged a higher price, which will provide incentives to reduce their systemic importance. To the extent that larger institutions are thought to create more systemic problems, they would face a surcharge – this could be in terms of insurance premia, supervisory oversight, and/or higher capital requirements. But size would not be the only metric for determining systemic risk. Indeed, the FDIC is charging higher insurance premia not only for banks that are larger but also for those that have a high-risk asset concentration, less stable balance-sheet liquidity, and lower unsecured debt. The Swiss Financial Market Supervisory Authority (FINMA) has proposed a system of measures aimed at increasing the cost to institutions for becoming or remaining systemically relevant. Dodd-Frank's enhanced prudential supervision and risk-based capital surcharges for systemically important institutions are likely to have such an effect at the margin. Dodd-Frank also imposes fees on systemically important firms to fund implementation of their enhanced supervision. These have potential, but they will be hard to calibrate unless we estimate the value of the implicit government support of being TBTF.

Similarly, contingent capital can lower the probability of spillovers. By giving institutions a way to raise capital in circumstances when it is typically difficult to do so, contingent capital can lower the probability

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<sup>14</sup> The Dodd-Frank Act's concentration limit prevents any financial company from conducting a merger or acquisition that would result in the financial company accounting for more than 10 percent of the liabilities of the financial sector.

<sup>15</sup> Boyd and Heitz (2011) present calculations suggesting that the scale efficiency gains are outweighed by the costs of increased systemic risk of TBTF banks. Note, though, that their analysis would overstate the benefits of a policy of breaking up the banks to the extent that such a policy fails to adequately address the systemic risk inherent in TBTF.

<sup>16</sup> This has been the trend. In 1960, depository institutions (commercial banks, savings and loans, and credit unions) held 60 percent of the assets held by the financial sector. By 2009, this share had fallen to 30 percent. See Mester (2010).

of failure and limit the loss given default. This gives regulators a way to restructure the firm with capital that is already available on the firm's balance sheet.<sup>17</sup>

Regarding the incentives of regulators to close banks: What is needed is a credible way to resolve the failures of systemically important institutions – especially those that operate across different countries. Ironically, we will have a more stable financial system if we have a system that allows failing firms to fail and less regulatory intervention to prevent closure of these firms. That is why a credible resolution mechanism for failing financial institutions is crucial. The recent financial crisis has underscored that in the face of serious distress at a large financial firm, governments could either rescue the firm and create future moral hazard problems or allow the firm to fail at the risk that it would cause a cascade of other failures. Policymakers faced a classic dynamic inconsistency problem. A third option is needed – a credible resolution mechanism that lowers the chance of spillovers and imposes losses on creditors as well as equity holders in a consistent manner so they will expect this ex ante.

Dodd-Frank Act provides for an orderly liquidation regime for systemically important financial institutions, which is based on resolution methods in the Federal Deposit Insurance Act. It allows for some discretion on the part of regulators. Jackson and Skeel (2010) make a fairly compelling case that modified bankruptcy can work even for large, complex financial firms and that it might work better than the application of the FDIC resolution that works well for small banks.<sup>18</sup> However, we would have to work toward harmonizing our laws with those of foreign countries.<sup>19</sup> Resolution plans for systemically important banks that require actions on the part of banks and supervisors to remove impediments to allowing a firm to fail could be useful as well. These require more preemptive actions than bank living wills, which lay out actions to be taken once the firm is in trouble (see Feldman, 2010). Credibility is increased by making the resolution method and the resolution plans less discretionary, rule-based, and transparent.<sup>20</sup> (See Mester, 2010, Wallison, 2009, and Flannery, 2010, for further discussion.) Barth,

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<sup>17</sup> The Dodd-Frank Act calls for a study of contingent capital.

<sup>18</sup> Jackson and Skeel (2010) argue that the special treatment in bankruptcy of qualified financial contracts, or QFCs (like repos, swaps, and other derivatives), is largely unjustified. In their view, repos should be “treated as terminated as of the commencement of the bankruptcy case, with claims and collateral value determined as of that date. Swaps, other derivatives, and similar ‘hedge-like’ QFCs should be treated as executory contracts subject to assumption and rejection, albeit within a constrained time period” p. 47. Cash-like collateral in the hands of the counterparty or its agent should be “available for recoupment and setoff, probably without the permission of the bankruptcy courts.” Collateral posting that occurs due to the underlying master contract should be given a partial safe-harbor from preference law. (Right now all QFCs are exempted from preference law [i.e., fraudulent conveyance provisions] – the trades done immediately prior to any bankruptcy filing won't be unwound by the filing.) The argument made by the ISDA for the current exemption is that without the safe-harbor protections, market participants would be reluctant to enter into transactions with a weakening party in order to avoid transactions (receiving payments or taking collateral) within the Bankruptcy Code's time periods relating to preferences and fraudulent conveyances.

<sup>19</sup> A bilateral agreement between the U.S. and Britain might be a place to start, rather than trying to make all countries' laws consistent. As Jackson and Skeel (2010) explain, when Lehman failed, one of the issues was that its cash management system swept the cash balances of all its subsidiaries each day into the holding company in New York and then sent out the cash to the respective subsidiaries the next day. When the holding company failed, this cash was initially considered to be assets of the holding company and not the subsidiary. As a result, in Asia, many Lehman subsidiaries failed because of loss of access to funds. The fact that there may be a question about whose cash it is or that there can be a delay in determining this are both problems. Jackson and Skeel argue that an international treaty between the U.S. and the U.K., given their importance as global financial centers, could solve much of this problem.

<sup>20</sup> Barth, Caprio, and Levine (2006) study banking regulatory structures in more than 150 countries and find that transparency and public accountability lead to better banking sector performance than reliance on supervisory discretion.

Caprio, and Levine (2006) point out this very insightful quote from James Madison in the Federalist Papers, Number 51: “If men were angels, no government would be necessary. If angels were to govern men, neither external nor internal controls would be necessary. In framing a government which is to be administered by men over men, the great difficulty lies in this: you must first enable the government to control the governed; and in the next place oblige it to control itself.”

### **Further research and data are needed**

At what size or in what type of organizational form of potentially TBTF institutions do the externalities imposed on the financial system outweigh the scale economies conferred by that size or organizational form? In order to do the cost-benefit analysis to answer this question, we need to be able to measure systemic risk, scale efficiencies, and the value of government guarantees – both explicit and implicit. In order to monitor systemic risk, one needs to be able to measure it. Yet developing metrics is at an early stage. It seems clear that more work needs to be done on identifying the interlinkages among institutions and on developing metrics that can then be monitored over time.

We need to be able to quantify the social and private costs and benefits of explicit and implicit government guarantees and how they vary with the level of systemic risk. One of the issues I have run into with my own research on scale economies in banking is the difficulty of getting the micro data needed for the studies. For example, although bank call reports provide a lot of data, it is very hard to get data on prices of bank activities. Data on nonbank firms, especially those that have been subject to less regulation, are harder to find. Yet such data are needed in order to measure an institution’s contribution to systemic risk and then to price that contribution so that the institution internalizes the externality. One positive development is that the Office of Financial Research has been assigned the task of improving the quality of financial data available for analysis of financial stability. This is a huge undertaking, but an important one, given the potential benefit of improved policymaking.

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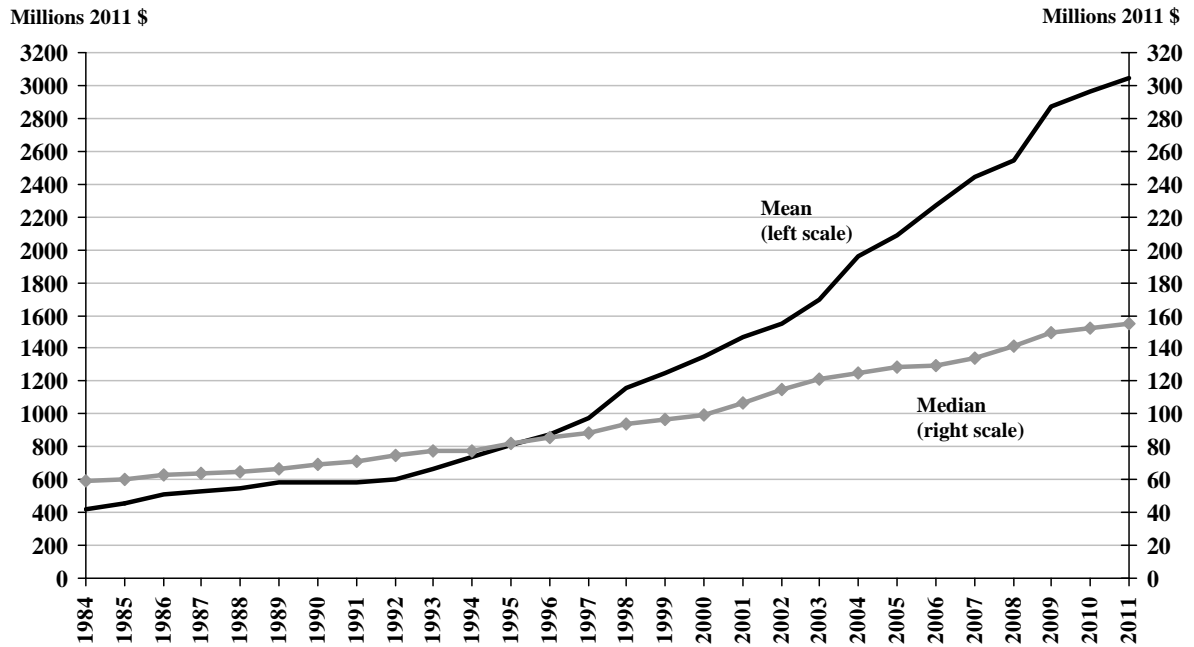
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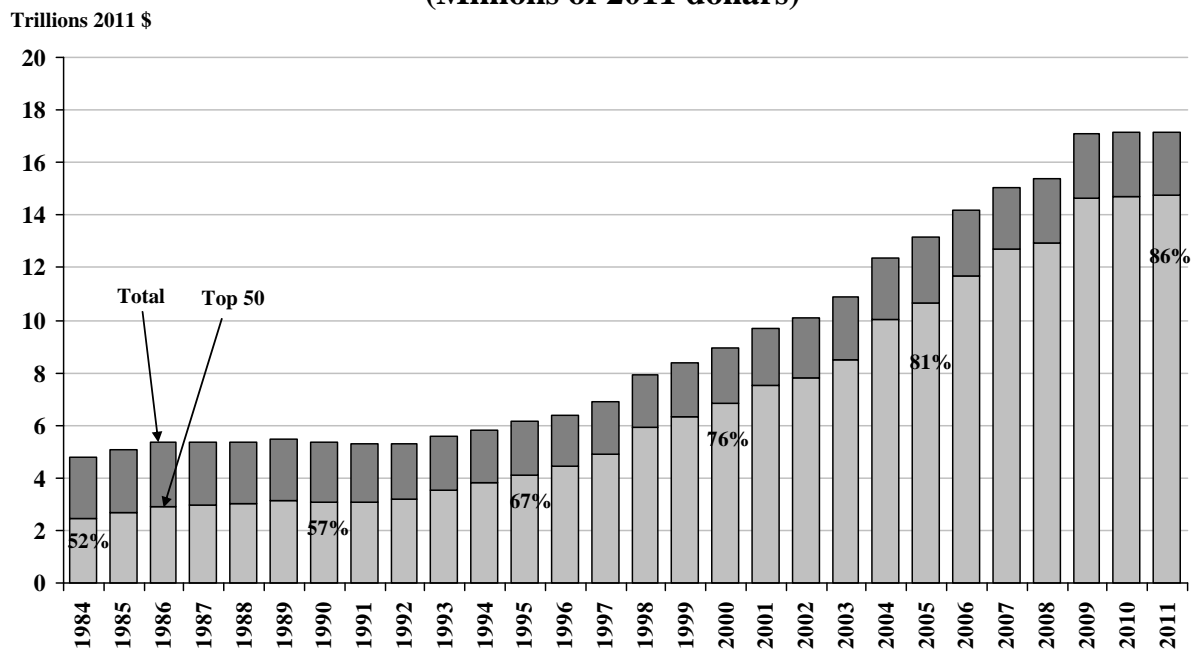
**Figure 1. Mean and Median U.S. Consolidated Bank Holding Company Assets  
(Millions of 2011 dollars)**



Source: Bank Holding Company Y-9C data

Bank holding company assets on a consolidated basis as of December 31 of each year

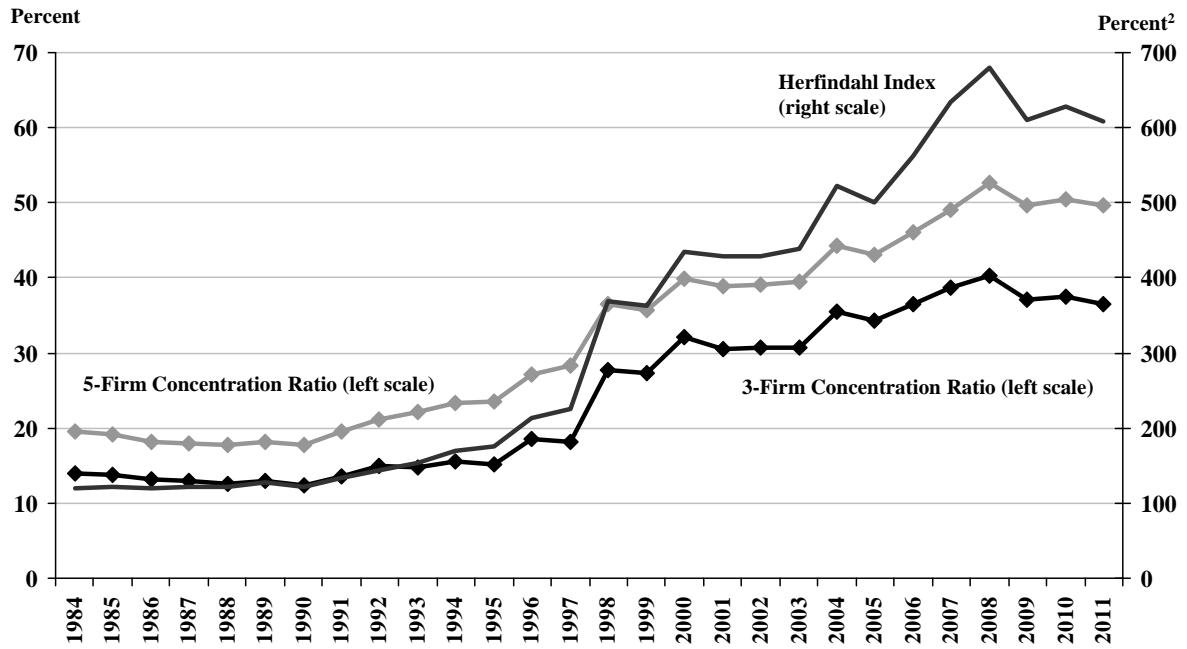
**Figure 2. Total Consolidated Bank Holding Company Assets in the U.S. and Assets of the Top 50 Bank Holding Companies (Millions of 2011 dollars)**



Source: Bank Holding Company Y-9C data

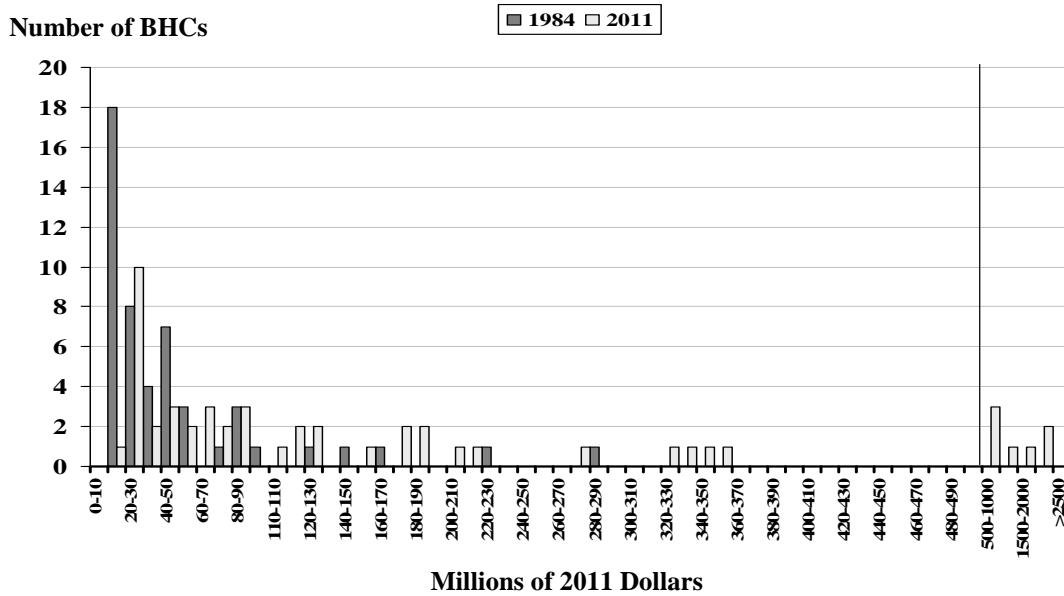
Bank holding company assets on a consolidated basis as of December 31 of each year

**Figure 3. Asset Concentration of the U.S. Banking Industry**



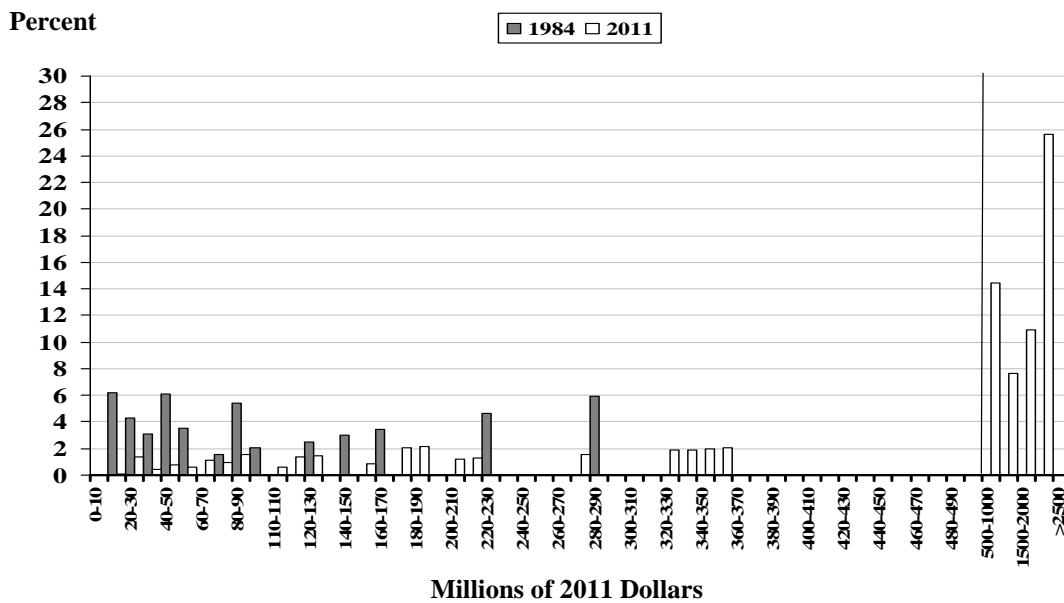
Source: Bank Holding Company Y-9C data  
 Bank holding company assets on a consolidated basis as of December 31 of each year

**Figure 4a. Number of Bank Holding Companies in the Top 50 by Asset Size by Size Category**



Source: Bank Holding Company Y-9C data  
 Bank holding company assets on a consolidated basis as of December 31 of each year

**Figure 4b. Asset Market Shares of Top 50 Bank Holding Companies by Asset Size by Size Category**



Source: Bank Holding Company Y-9C data  
 Bank holding company assets on a consolidated basis as of December 31 of each year

**Table 1. Organizational Complexity of Financial Institutions<sup>a</sup>**

<b>Organizational Complexity</b>	<b>Average</b>	<b>Median</b>	<b>Average w/o Citi</b>	<b>Min</b>	<b>Max</b>
Average No. of Countries	44	43	41	16 (RBS)	84 (Citi)
Average No. of Subsidiaries	1005	1003	903	267 (Merrill Lynch)	2435 (Citi)
Avg. No. of Bank Subs	47	32	43	7 (Goldman Sachs)	101 (Citi)
Avg. No. of Insurance Subs	20	17	19	2 (UBS AG)	74 (BNP Paribus)
Avg. No. of Mutual Funds and Special Purpose Entities	227	168	193	48 (Goldman Sachs)	706 (Citi)
Avg. No. of Other Financial Subs	270	270	248	63 (Credit Suisse)	584 (Citi)
Ave. No. of Nonfinancial Subs	440	387	399	68 (Merrill Lynch)	1009 (Citi)

<sup>a</sup> These statistics are based on data presented in Herring and Carmassi (2010) on 15 financial institutions as of year-end 2007 that were classified as large, complex financial institutions by the Bank of England and the IMF. (Note that Herring and Carmassi included data on 16 institutions, but I have dropped Lehman here.) Cumming and Eisenbeis (2010) also summarized the data. I have augmented these data with calculations dropping Citigroup, which has the maximum value in all but one category shown.

**Table 2. Estimated Mean Scale Economies<sup>b</sup>**

<b>Total Assets</b>	<b>Mean Scale Economies</b>	<b>Estimated Increase in Cost from a 10% Increase in Output</b>
<b>Full sample</b> 842 top-tier BHCs	1.1490* (0.0095)	8.7%
<b>&lt; \$0.8 billion</b> 328 top-tier BHCs	1.1364* (0.0087)	8.8%
<b>\$0.8 billion – \$2 billion</b> 299 top-tier BHCs	1.1421* (0.0093)	8.8%
<b>\$2 billion – \$10 billion</b> 155 top-tier BHCs	1.1549* (0.0103)	8.7%
<b>\$10 billion – \$50 billion</b> 31 top-tier BHCs	1.1782* (0.0135)	8.5%
<b>\$50 billion – \$100 billion</b> 12 top-tier BHCs	1.2330* (0.0177)	8.1%
<b>&gt; \$100 billion</b> 17 top-tier BHCs	1.3478* (0.0295)	7.4%

<sup>b</sup> These estimates are from Hughes and Mester (2011). Scale economies are calculated as the mean of the estimated scale economies at each point in the sample or size category. The data, obtained from the Y9-C Call Reports filed quarterly with regulators, include 842 top-tier U.S. bank holding companies in 2007. A top-tier company is not owned by another company. The model incorporates the managers' most preferred profit function and input demand functions, which reflect the bank's risk-expected-return trade-off.

An estimate greater than one implies scale economies.

All means are significantly different from zero and from one at the 1 percent level.