



University of Pennsylvania  
**ScholarlyCommons**

---

Summer Program for Undergraduate Research  
(SPUR)

Wharton Undergraduate Research

---

2016

## Effects of Bank Mergers on Risk Leading Up to the 2007-2008 Mortgage Crisis

JinAh Kim  
*University of Pennsylvania*

Follow this and additional works at: <https://repository.upenn.edu/spur>

 Part of the [Business Commons](#)

---

### Recommended Citation

Kim, J. (2016). "Effects of Bank Mergers on Risk Leading Up to the 2007-2008 Mortgage Crisis," *Summer Program for Undergraduate Research (SPUR)*. Available at <https://repository.upenn.edu/spur/9>

This paper is posted at ScholarlyCommons. <https://repository.upenn.edu/spur/9>  
For more information, please contact [repository@pobox.upenn.edu](mailto:repository@pobox.upenn.edu).

---

## Effects of Bank Mergers on Risk Leading Up to the 2007-2008 Mortgage Crisis

### Abstract

Recent highly-publicized bank mergers following the home mortgage crisis of 2007-2008, often the result of bank failure or insolvency, brought attention to the issue of consolidation within the banking industry. The banking system has seen increases in consolidation at national levels, with the largest banks gaining increasingly greater proportions of market share. This merger activity and the existence of such “too big to fail” institutions has attracted concern about potential moral hazard due to perceptions about government bailouts and dangers posed by under-capitalized banks. Literature on the topic has found connections between merger activity and increased leverage, as well as a positive association between risk-taking and leverage, exacerbated in larger banks; together, this suggests that mergers may indirectly have an effect on risk-taking behavior in financial firms. This paper explores a possible link between M&A and risk in the context of the financial crisis of 2007-2008.

### Keywords

mergers and acquisitions, banking, risk, leverage

### Disciplines

Business

# **Effects of bank mergers on risk leading up to the 2007-2008 mortgage crisis**

## **JinAh Kim**

Student of Business Economics and Public Policy  
The Wharton School, University of Pennsylvania  
3730 Walnut Street, Philadelphia, PA 19104  
Email: [kimjinah@wharton.upenn.edu](mailto:kimjinah@wharton.upenn.edu)  
Phone: +1.832.964.5078

## **Katja Seim**

Associate Professor of Business Economics and Public Policy  
The Wharton School, University of Pennsylvania  
1457 Steinberg Hall-Dietrich Hall  
3620 Locust Walk, Philadelphia, PA 19104  
Email: [kseim@wharton.upenn.edu](mailto:kseim@wharton.upenn.edu)  
Phone: +1.215.898.8213

# **Effects of bank mergers on risk leading up to the 2007-2008 mortgage crisis**

## **Abstract**

Recent highly-publicized bank mergers following the home mortgage crisis of 2007-2008, often the result of bank failure or insolvency, brought attention to the issue of consolidation within the banking industry. The banking system has seen increases in consolidation at national levels, with the largest banks gaining increasingly greater proportions of market share. This merger activity and the existence of such “too big to fail” institutions has attracted concern about potential moral hazard due to perceptions about government bailouts and dangers posed by under-capitalized banks. Literature on the topic has found connections between merger activity and increased leverage, as well as a positive association between risk-taking and leverage, exacerbated in larger banks; together, this suggests that mergers may indirectly have an effect on risk-taking behavior in financial firms. This paper explores a possible link between M&A and risk in the context of the financial crisis of 2007-2008.

**Keywords:** mergers and acquisitions, banking, risk, leverage

## **INTRODUCTION**

The mortgage crisis of 2007-2008 was, as its name suggests, largely driven by defaults on home loans; following the peak of the crisis, much discussion centered on the extremely risky nature of many of those loans, such as so-called “NINA” (No Income No Asset) or Income (No Income No Job No Assets) loans which would apocryphally be given to anyone with a pulse. An empirical study by Wang and Cox (2013) found that bank failures in the recent crisis were significantly associated with risky loans in real estate and construction, as well as lower quality loans as indicated by higher loan loss allowances, chargeoff rates, proportions of non-performing loans, and foreclosures, as well as higher leverage rates, indicating possible under-capitalization. More surprisingly, larger banks were more likely to fail during 2007-2008. While the failure of larger institutions like that of Washington Mutual in 2008 may receive greater press, typically the economies of scale and diversified portfolios of large banks make them better able to weather financial turmoil; this advantage appears to have been absent during the recent crisis.

The failure of major institutions like Washington Mutual, Bear Sterns, Fannie May and Freddie Mac, and Lehman Brothers and the bailout of major insurer AIG, as well as concerns over potential insolvency of other major banks, has led to greater scrutiny of so-called “Systemically Important Financial Institutions,” or SIFIs. The largest US bank failure prior to 2007 was the failure of the Continental Illinois Bank and Trust in 1984, brought on by the Savings and Loan Crisis of the 1970s-80s. That \$40 billion (\$83 billion adjusted to 2008 dollars), while massive at the time, pales in comparison to the failure of Washington Mutual, 24 years later and nearly four times greater, at \$307 billion. The acquisition of Merrill Lynch by Bank of America and of Wachovia by Wells Fargo led to further consolidation within the banking industry, and indicated to what degree the sector had been hurt by the crisis.

In the years after the crisis, there has been extensive literature on the reasons for bank failure, ranging from empirical studies on variables associated with probability of failure to psychological analyses of the management structure of firms. Significant attention has been given to the issue of misaligned incentives, with some attributing excessive-risk-taking behavior to an “IBGYBG” (“I’ll be gone you’ll be gone”) mentality (Prager 2012) as well as more intrinsic principal-agent problems within the practice of banking itself. This paper focuses on the relationship between risk-taking and moral hazard, focusing on how merger activity can create moral hazard through distorting the risk carried by banks. Part I provides a rough overview of the history of US bank mergers, summarizing recent trends and consolidation. Part II expands on concerns over SIFIs, beginning the theme of moral hazard which is continued in Part III in the context of leverage. While links between risk-taking and leverage have been demonstrated (Papanikolaou and Wolff 2015) links between merger activity and risk do not appear to have received much focus except in the context of larger discussions on the dangers of over-consolidation. This paper aims to elucidate some of the ways by which mergers and acquisitions may be linked to or incentivize excessive risk-taking behavior by banks.

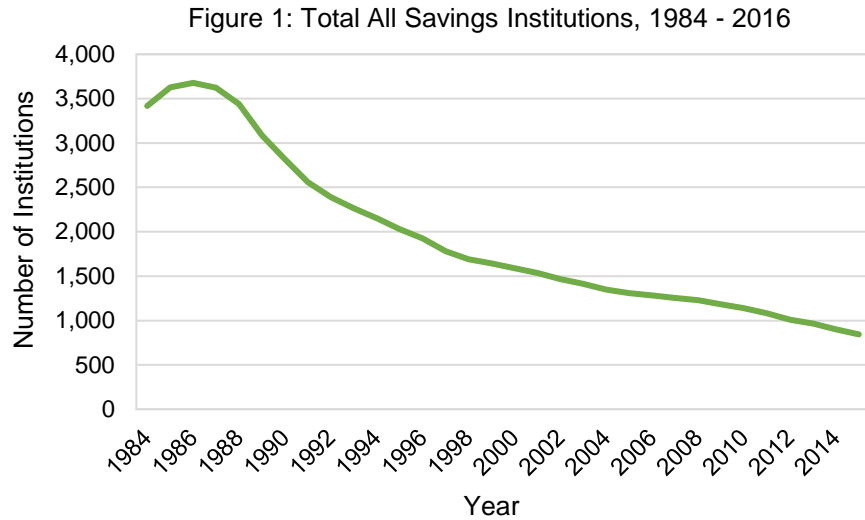
## **I. Overview of the History of US Bank Mergers: the “Bank Merger Wave”**

While traditional explanations for bank mergers focus on efficiency gains through economies of scale, Gary DymSKI (1999) argues that the “bank merger wave” cannot be explained through such reasons alone, pointing to evidence that bank mergers often failed to create such gains or even generated increased costs. Bank mergers in the late 1900s through the 2000s seem less driven by the desire for economies of scale than by changes in regulation, other

aspects of banking strategy, and, Dymski suggests, an excess of enthusiasm for bank mergers in the form of Wall Street capital for financing.

Following the Great Depression and World War II, antitrust laws expanded in the 1960s to cover banks, with the goal of protecting customers from excessive costs. The Savings and Loan Crisis, however, triggered bank deregulation. High short-term interest rates often meant that thrifts were forced to pay much higher rates of interest than they received from borrowers; the Garn-St. German Depository Institutions Act of 1982 allowed banks to provide adjustable-rate mortgage loans and removed their previous interest rate ceiling in an attempt to prop up the banking thrift industry. It also gave federal agencies the power to approve bank mergers, and such mergers were often encouraged as ways for stronger banks to absorb and protect weaker ones. Accordingly, new merger guidelines in 1982 allowed for much higher rates of the Herfindahl-Hirschman Index (HHI) than previously permitted.

Deregulation continued in the 1990s. The Riegle-Neal Interstate Branching and Efficiency Act of 1994 allowed banks to expand across state lines, while also imposing a limit on the Federal Reserve that prohibited them from approving bank merger applications that would result in any single company having greater than 10 percent of all insured deposits. The Gramm Leach-Bliley Act of 1999 allowed banks to provide additional financial services, eroding the previous divide between commercial and investment banks. High-profile “megamergers” like those of the acquisition of First Republic Bank of Texas by NationsBank and Chicago’s Continental Bank by BankAmerica (now Bank of America-Merrill Lynch) brought further attention to the “bank merger wave.”



Since 2000, bank mergers have held at an approximately steady rate of at least 200 per year, except between 2008-2010, when poor banking sector valuation resulted in slightly lower rates (195, 158, and 180 respectively) (Adams 2012). The average size of merger per year fluctuates depending on the presence of big mergers, resulting in spikes in 2001, 2004, 2006, and 2007, but median size stays fairly stable at between \$109 and \$196 million in assets. Most bank mergers occur in small or medium-sized institutions, with few mergers requiring divestment. Interestingly, Adams (2012) found that mergers were not primarily used to expand into other states, implying that mergers are not primarily motivated by geographic concerns.

Figure 2: Mergers by year, count

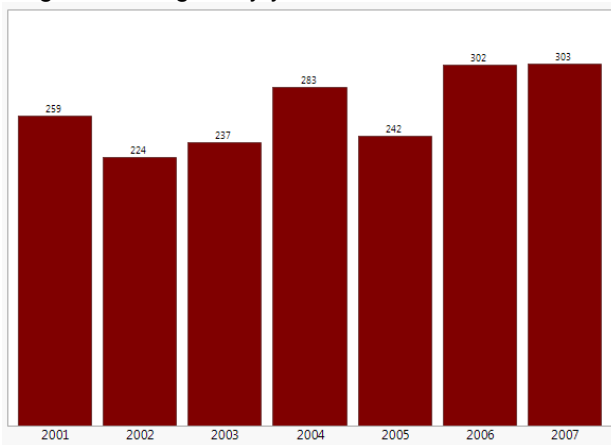
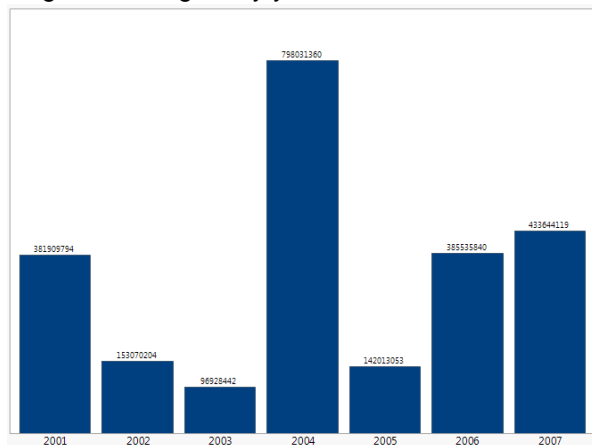


Figure 3: Mergers by year, total value





Regulatory approaches to bank mergers view the relevant markets as local, assuming that banking markets are metropolitan statistical areas, micropolitan areas, and rural counties; this remains true for many retail and small business banks. However, bank concentration has increased sharply for the top 10 banking organizations, with similar, but less drastic, increases for the top 50 and top 100, while overall the industry has seen a larger decrease in the number of banks with less than \$100 million in assets. Despite the Riegle-Neal Act's prohibition on bank mergers that would result in any single company holding greater than 10 percent of all insured deposits, Bank of America is currently above the deposit cap at 12.04 percent, while Wells Fargo and JP Morgan Chase are just under it at 9.78 and 9.07 percent respectively.

## **II. "Too Big To Fail": Systemically Important Financial Institutions and Moral Hazard**

Bank of America, JP Morgan Chase, and Wells Fargo are among those considered "Too Big to Fail," or TBTF. Such large institutions are considered to receive certain implicit subsidies by virtue of their size. The top 10 largest US banks pay less for funds than smaller banks, operate with lower capitalization ranks, and are less sensitive to changes in bond ratings (DeYoung, Evanoff, and Molyneux 2009). Additionally, DeYoung et. al argue that the significant premiums paid in "megamergers" to acquire larger banks may be due to the belief that such SIFIs are "too big to fail," and that they hold an implicit bailout guarantee. If so, SIFIs carry an exaggerated version of the moral hazard that some argue are present inherently in institutions that carry insured deposits. After the Savings and Loan Crisis, some argued that the presence of deposit insurance distorts the risk burden that banks and thrifts face, as they are not fully liable to their creditors in the case of insolvency or failure; if a bank believes that its size guarantees it a bailout from the government, the effect is compounded.

The presence of extremely large banks has resulted in significant consolidation of the banking market at the national level. The largest institutions account for less than one percent of transactions but over 50 percent of assets (Adams 2012). This consolidation has correlated with an increase in systemic risk, though not necessarily causatively; DiNicolo and Kwast (2002) argue that systemic risk has increased, looking at correlations of stock returns for various US companies, but that this is not necessarily due to industry consolidation. Following the shock of the mortgage crisis, however, when instability in the banking system sent most American industries into shock, greater concerns have been directed at the impact of bank M&As on systemic risk and the outsize influence that SIFIs may hold.

### **III. Risk-taking in highly leveraged banks**

The mortgage crisis raised concerns about the under-capitalization of banks. Highly leveraged firms found themselves unable to absorb the cost of defaults, leading to insolvency and failure. Koudstaal and Wijnbergen (2012) found that risk taking is valued by shareholders when leverage is high, and argue that excess risk later in the 2007-2008 crisis was driven by poor loan portfolio performance and drops in share value. While their study particularly focuses on the banking industry following the collapse of Lehman Brothers, they conclude from an analysis of US banks between 1993 and 2010 that the banking system has differentiated into two broad sectors, one highly leveraged and pursuing greater risk and the other less leveraged and pursuing higher liquidity and lower risk. Papanikolaou and Wolff (2015) also link higher leverage to greater risk taking, arguing that high leverage ratios resulted in liquidity shortages that helped to worsen the crisis. In particular, they point to newer financial instruments and “shadow” banking

systems that allowed banks to move their debt off-balance-sheet, allowing them to use equity capital to acquire greater on-balance-sheet debt.

Higher leverage, and thus lower capital equity to debt ratios, can result in the incapacity of banks to recover from defaulting or nonperforming loans. Additionally, literature on the Savings and Loan Crisis points to high leverage in thrifts during the period as not only a source of instability but as a potential driver for greater risk-taking due to a distortion of the burden of risk via limited liability (White 2004). DeAngelo and Stulz (2014) argue that high leverage is nevertheless optimal for banks “in the absence of distortions in an idealized world” which excludes moral hazard and other agency problems, reaching-for-yield behavior, and return-on-equity based compensation, or other similar discretionary motives. Unlike operating firms, they argue, banks have greater resources in place to manage risk and, through the relatively safe nature of deposited assets, can act as producers of safe/liquid debt. They stress, however, that risk management is necessary for such highly leveraged banks to remain successful, which is concerning considering the links that have been drawn between leverage and risk-taking. The two have consistently been found to be linked, with greater leverage and risk-taking also associated with investment over commercial banking.

Mergers are associated with increases in leverage in financial firms, largely the result of increases in debt capacity (Ghosh and Jain 2000), although some of this increase may be the result of the utilization of previously unused debt capacity. Ghosh and Jain (2000) found that merger announcements create wealth gains, and argue that such announcements serve as a proxy for changes in capital structure that result in increased leverage. Prior to and during the mortgage crisis (pre-2009) size has been shown to be similarly correlated with risky behavior (Bhagat, Bolton, and Lu 2015), lending credence to the theory that “too big to fail” banks are taking on

excessive risk at the cost of greater systemic instability. If M&A activity, leverage, and risk-taking are all positively correlated, this raises concerns about the systemic stability of the financial system and the risk taken on by larger institutions.

## **METHODOLOGY AND DATA**

### **Scope**

This paper looks primarily at data from 2000 - 2007; after the merger “wave” of the 1990s, but before M&A decisions would have been significantly impacted by knowledge of the impending financial crisis. It covers specifically US banks, as differing histories of bank regulation as well as differing financial climates internationally could result in inconsistencies across countries.

Due to the possible confounding effect of size, this paper focuses on the largest 3000 American banks, thrifts, and similar such deposit-bearing institutions. Publicly held institutions like the Federal Reserve, Fannie Mae, and Freddie Mac have been excluded, as incentive structures may differ across privately and publicly held institutions.

To determine risk, both after-the-fact measures like failure rates as well as predictive measures were used. Return on equity, return on assets, and ratios of nonperforming loans have been shown to be predictive of future failure (Tong 2015), and were thus used as proxies to indicate risk. Due to the difficulty of calculating off-sheet leverage, this paper focuses on on-balance-sheet leverage, through gross balance sheet leverage (ratio of total assets to the book value of total equity capital), the ratio of total equity to total liability, and short term leverage (ratio of current borrowing to total equity).

## Data sources

Following previous papers like Adams (2012) and Pilloff (2004), this paper uses a private proprietary data source, SNL Financial ([www.snl.com](http://www.snl.com)) to identify mergers. Actual consummation date of the merger as reported by SNL rather than the date of approval or announcement is listed as the date of the merger. Unlike Pilloff (2004) but like Adams (2012), failed and failing institutions have been included in the data, as the legal processes for the approval of a merger are similar, and because particularly in the context of risk-taking behavior, insolvent or failing banks may be quite relevant to the data. SNL Financial has also been used for industry-wide and aggregate data.

Specific financial information for individual institutions was obtained from the private proprietary service Bankscope, from Bureau van Dijk. FDIC databases and FFIEC Call Reports were also used for supplemental data.

## Findings

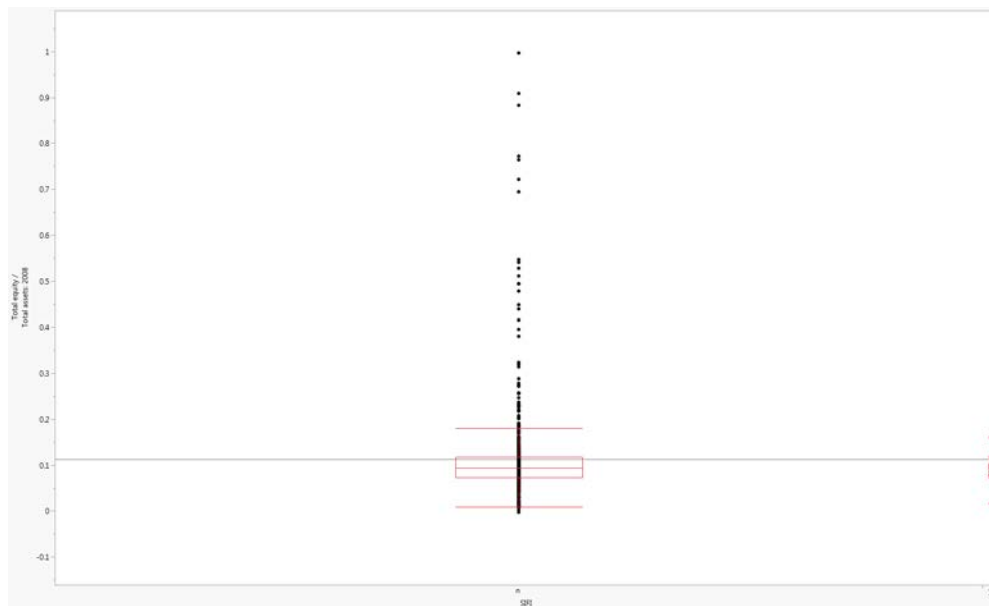


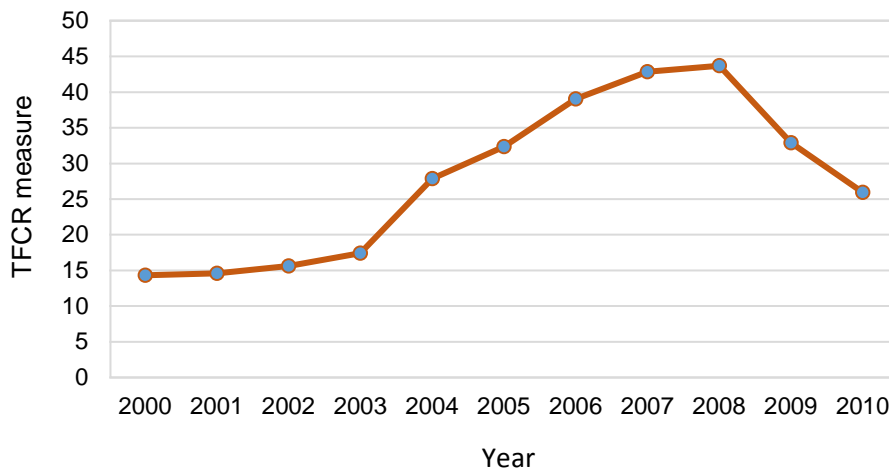
Fig 4: Comparison of leverage distribution (total equity / assets for year 2008) for SIFIs vs non-SIFIs, calculated using the largest ten private deposit institutions in the US

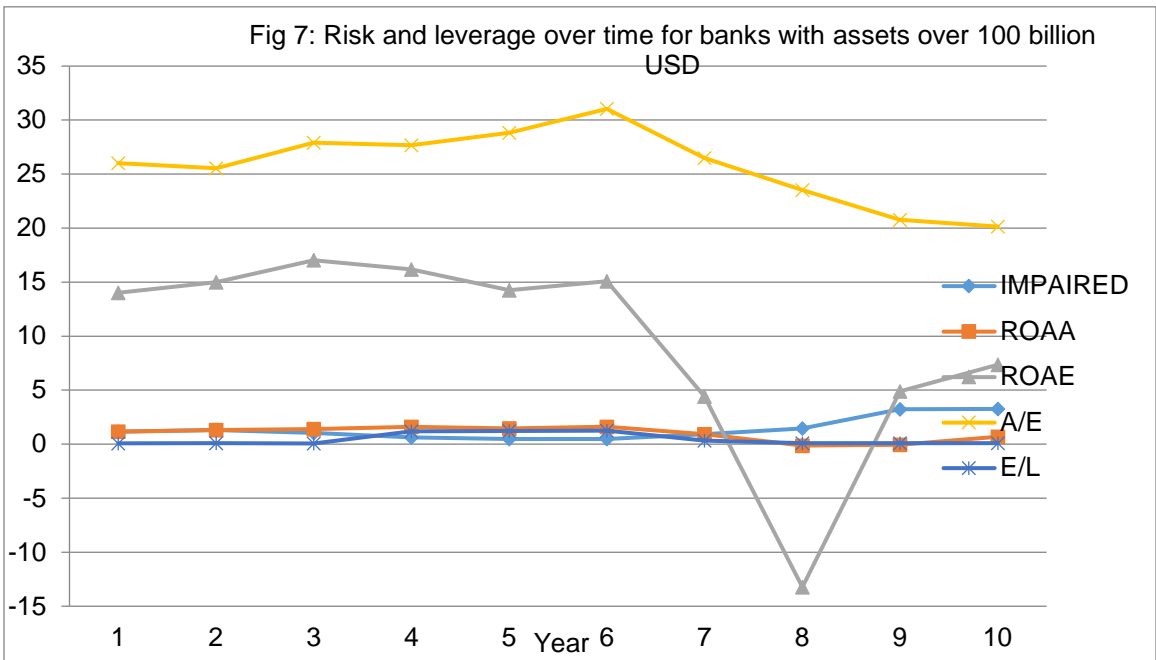
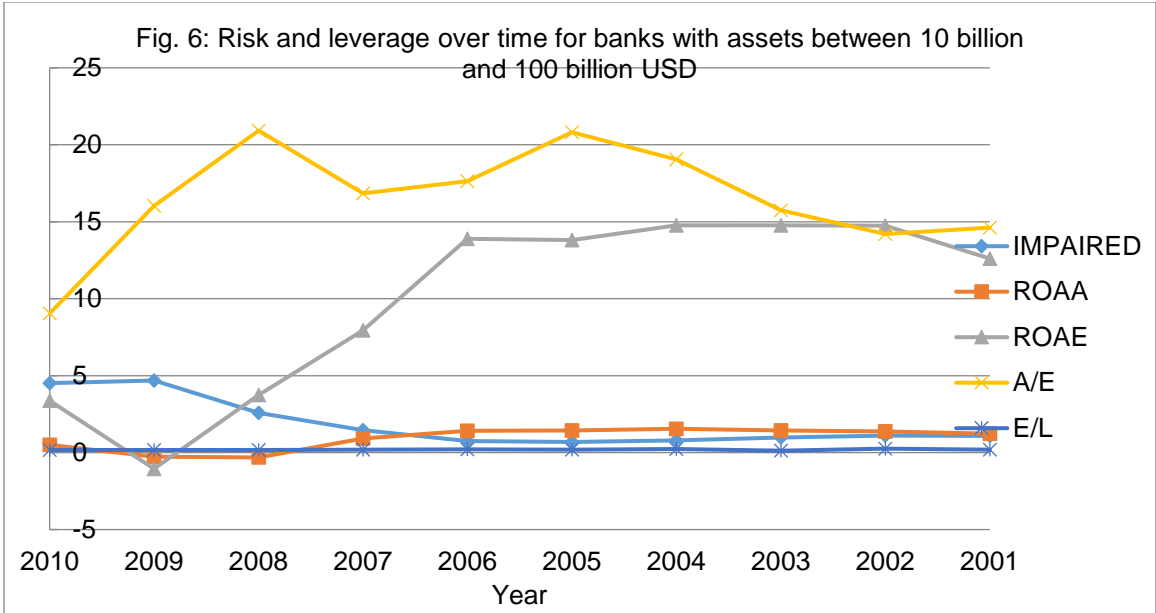
A brute comparison of SIFIs vs non-SIFIs shows no significant difference in median rates of leverage between the two groups. The much larger number of non-systemically important institutions results in a much larger spread, but median and quartile levels appear similar.

To examine market consolidation at the national level due to M&A activity among the largest financial firms, this paper uses a 10-firm concentration ratio (TFCR) that looks specifically at the ten largest private deposit institutions in the United states (Appendix 1). Using the proportion of deposits by institution to the value of all FDIC-insured deposits for the year, this measure of market consolidation demonstrates increases in consolidation through the past ten years.

Although the levels are not high enough to raise typical concerns about market concentration they show steadily raising levels until 2008, where they reach a peak and decline. However, 2010 levels still show a level of concentration significantly higher than in previous years, with a recovery only to slightly under 2004 levels.

Figure 5: 10-firm concentration ratio, 2001 - 2010





Banks with deposits above 10 billion show, unsurprisingly, declines in Return on Average Equity (ROAE) and increases in impaired accounts through 2006 – 2008, with improvement following the height of the recession in 2008. Banks with deposits above 10 billion show a decline in the asset-equity ratio (A/E) from 2006 at levels higher than those exhibited by smaller

banks. This indicates that these banks were more highly leveraged, with less capital in comparison to deposits or other assets and liabilities, than banks of smaller size.

## **CONCLUSION**

The 2007-2008 crisis has brought much attention to the issue of risk and financial institutions. The “Great Recession” has drawn comparisons both to the Great Depression and to the Savings and Loan Crisis of the 1970s-80s, which it resembles in several ways: both were driven by defaults on loans, both led to significant and unprecedented bank failures, both were associated with excess risk, and both frequently resulted in the acquisition of failing or failed banks by other firms in mergers sanctioned, encouraged, or even funded by the federal government. While deregulation in the 1990s in combination with a shift in antitrust policy from “competitiveness” to “contestability,” bank mergers surged before reaching a relatively stable rate; while such mergers are generally approved and do not require divestment, concern has recently emerged about consolidation within the banking system, particularly in the case of “systemically important financial institutions.”

Previous literature on the topic demonstrates links between excessive risk-taking behavior of the type responsible in great part for the recent financial crisis, firm size, and leverage. The research suggests that the behavior that led to the crisis may have been in part due to incentives for risk-taking caused by excess leverage associated with merging firms. An analysis of concentration within the banking sector by so-called “SIFIS” and their behavior shows that the rise of SIFIS, marked by increasing concentration at top levels of the banking industry, was associated with a greater increase in leverage and lower capital levels.



Since the crisis, attempts to “break up the big banks” as championed by reformist politicians have largely failed; banks now face slightly greater capital requirements, but not enough to significantly change their behavior and to make a less highly leveraged position more appealing. Further research on this topic may examine the ways that the banking industry has and has not changed in response to financial regulation passed in the wake of the mortgage crisis. Deregulation of financial institutions in previous decades may have contributed to an increase in risk-taking behavior by increasingly conglomerated firms; attempts to avoid the dangers of that risk should look at this conglomeration and the dangers that it may prove to the macroeconomy.

## Acknowledgment

Thank you to Cathy Ogur at Lippincott Library and Wharton’s SPUR program for undergraduate research for your assistance with this paper.

## Appendix 1

$$TFCR = \Sigma \frac{\text{institution deposits}}{\text{total insured deposits}} \cdot 100$$

A table showing relevant data below. Percent per year per institution is shown in addition to total deposits per year (in billions) and total TFCR (ten firm concentration ratio) score.

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
JP Morgan Chase & Co	3.660	3.036	2.804	2.458	4.389	4.221	4.994	5.145	8.340	5.755	4.253
Bank of America Corporation	2.436	2.070	2.204	2.574	5.554	7.178	7.269	8.049	6.896	5.924	4.359
JP Morgan Chase Bank, NA	0.914	1.309	1.627	1.461	3.282	3.321	4.275	4.648	7.631	5.814	4.133
Wells Fargo & Company	0.422	0.489	0.547	0.621	0.672	0.756	0.605	0.859	3.505	2.546	2.055
Citigroup Inc	3.188	4.129	4.502	5.562	6.874	7.034	10.072	11.264	6.138	3.835	3.121
Bank of America, National Association	2.225	1.724	1.722	2.018	3.120	5.259	5.470	5.918	6.237	4.798	3.586
Wells Fargo Bank, NA	0.082	0.114	0.191	0.359	0.713	0.764	0.607	0.829	0.926	0.834	1.999
Citibank NA	0.929	1.151	1.285	1.567	2.025	1.907	3.217	4.251	3.652	2.881	2.040
Goldman Sachs Group, Inc	0.064	0.068	0.111	0.092	0.113	0.342	0.416	0.629	0.175	0.205	0.224

Morgan Stanley	0.398	0.501	0.631	0.711	1.139	1.576	2.112	1.249	0.196	0.304	0.191
Total insured deposits (bil USD)	3055	3217	3384	3453	3622	3891	4154	4292	4751	5408	6302
TFCR	14.317	14.591	15.625	17.423	27.881	32.357	39.037	42.841	43.697	32.896	25.961

## References

Adams, R.M. 2012. Consolidation and Merger Activity in the United States Banking Industry from 2000 through 2010. Finance and Economics Discussion Series, DRS, Governors of the Federal Reserve System.

Bhagat, S., B. Bolton, and J. Lu. 2015. Size, leverage, and risk-taking of financial institutions. *Journal of Banking and Finance* 59: 520-537

Boyd, J.H., S.L. Graham, and R.S. Hewitt. 1993. Bank holding company mergers with nonbank financial firms: Effects on the risk of failure. *Journal of Banking and Finance* 17: 43-63.

DeAngelo, H. and R.M. Stulz. 2014. Liquid-claim production, risk management and bank capital structure: Why High leverage is optimal for banks. Fisher College of Business Working Paper Series.

DeYoung, R., D.D. Evanoff, and P. Molyneux. 2009. Mergers and Acquisitions of Financial Institutions: A Review of the Post-2000 Literature. *J Financ Serv Res* 36: 87-110.

Dymski, G. 1999. *Book Title*. Armonk, NY: M.E. Sharpe.

Ghosh, A. and P.C. Jain Jain, Prem C. 2000. Financial leverage changes associated with corporate mergers. *Journal of Corporate Finance* 6, 377-402.

Harada, K. and T. Ito. 2011. Did mergers help Japanese mega-banks avoid failure? Analysis of the distance to default of banks. *Journal of the Japanese and International Economies* 25: 1-22.

Koudstaal, M., and S. van Wijnbergen. 2012. On Risk, Leverage, and Banks: Do highly Leveraged Banks take on Excessive Risk? Duisenberg School of finance - Tinbergen Institute Discussion Paper.

Papanikolaou, N.I., and C. Wolff. 2015. Leverage and risk in US commercial banking in the light of the current financial crisis. Center for Economic Policy Research Discussion Paper No. 10890.

Prager, J. 2012. The financial crisis of 2007/8: Misaligned incentives, bank mismanagement, and troubling policy implications. For presentation at the Austrian Colloquium.

Samad, A., and L.M. Glenn. 2012. Determinants of bank failures? Evidence from US failed banks. *International Research Journal of Applied Finance* 3(4): 452-462.

Tong, X. 2015. Modeling Banks' Probability of Default. *Applied Economics and Finance* 2(2): 29-51.