The Journal of Economic Perspectives

A journal of the American Economic Association

Spring 2015

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Editorial offices:
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American Economic Association Publications
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The *Journal of Economic Perspectives* gratefully acknowledges the support of Macalester College.
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Composed by American Economic Association Publications, Pittsburgh, Pennsylvania, USA.
Printed by R. R. Donnelley Company, Jefferson City, Missouri, 65109, USA.

THE JOURNAL OF ECONOMIC PERSPECTIVES (ISSN 0895-3309), Spring 2015, Vol. 29, No. 2. The *JEP* is published quarterly (February, May, August, November) by the American Economic Association, 2014 Broadway, Suite 305, Nashville, TN 37203-2418. Annual dues for regular membership are $20.00, $30.00, or $40.00 depending on income; for an additional $15.00, you can receive this journal in print. E-reader versions are free. For details and further information on the AEA go to https://www.aeaweb.org/. Periodicals postage paid at Nashville, TN, and at additional mailing offices.
POSTMASTER: Send address changes to the *Journal of Economic Perspectives*, 2014 Broadway, Suite 305, Nashville, TN 37203. Printed in the U.S.A.

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A Retrospective Look at Rescuing and Restructuring General Motors and Chrysler[†]

Austan D. Goolsbee and Alan B. Krueger

The rescue of the US automobile industry amid the 2008–2009 recession and financial crisis was a consequential, controversial, and difficult decision made at a fraught moment for the US economy. Both of us were involved in the decision process at the time, but since have moved back to academia. More than five years have passed since the bailout began, and it is timely to look back at this unusual episode of economic policymaking to consider what we got right, what we got wrong, and why.

We are pleased and a bit surprised by how well the last five years have played out for the domestic auto industry. At a critical point in the internal debate over the auto industry bailouts in March 2009, Larry Summers, at that time director of the National Economic Council, assembled members of the Obama administration's economic and autos team around his cramped table in the West Wing of the White House. He held a straw vote on whether the advisors believed Chrysler would survive for five years if a government-supported merger with Fiat went through. A narrow majority, including us, voted no. Five years on, both General Motors and Chrysler have survived, rebounded, and, by many metrics, appear healthy.

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[†] To access the Data Appendix and disclosure statements, visit
http://dx.doi.org/10.1257/jep.29.2.3

doi=10.1257/jep.29.2.3

Economic analysis contributed throughout the process of deciding how to respond to the auto companies' requests for extraordinary support, and President Obama weighed the economic arguments as well as the political and social realities. We agreed with others in the administration that it was essential to rescue General Motors to prevent an uncontrolled bankruptcy and the failure of countless suppliers, with potentially systemic effects that could sink the entire auto industry. Our analysis suggested that a failure of the much smaller Chrysler, however, would probably not have systemic effects for the whole industry and that rescuing the company would make it more difficult and more costly for taxpayers to rescue GM, although we recognized that a failure of Chrysler would cause considerable hardship to its workers and their families and communities. In the end, the president made the decision to rescue both General Motors and Chrysler and to put them through a tough restructuring via bankruptcy.

It is hard to argue that this decision did not deliver important economic benefits to the recovery and country, although the government did not recover the full amount of TARP funds it invested. If GM and Chrysler had been allowed to fail, in all likelihood the Great Recession would have been deeper and longer, and the recovery that began in mid-2009 would have been weaker. The rescue has been more successful than almost anyone predicted at the time. Some of this success resulted from actions the auto companies took; some happened because the rebound in consumer demand for autos has been especially strong during the last five years. The auto industry has turned out to be one of the drivers of the economic recovery. Yet we suspect that the conditions that led the auto bailout to be a success were fairly unique in American economic history, and, we hope, unlikely to be repeated anytime soon.

In this article, we describe the events that brought two of the largest industrial companies in the world to seek a bailout from the US government, the analysis that was used to evaluate the decision (including what the alternatives were and whether a rescue would even work), the steps that were taken to rescue and restructure General Motors and Chrysler, and the performance of the US auto industry since the bailout. We close with some of the general lessons to be learned from the episode.

How the US Auto Industry Imploded

In the run-up to the 2009 bailout, the "Big Three" US automakers recorded some of the worst corporate performances in American history. General Motors alone lost almost $40 billion in 2007 and another $31 billion in 2008. Ford lost $3 billion and then $15 billion. Chrysler was a privately held company that did not disclose earnings publicly, but was losing comparable amounts of money. The Great Recession that began in late 2007 had a catastrophic impact on the automakers. Auto sales plummeted in 2008 and again in 2009 to below 10 million, from a peak of more than 17 million just a few years earlier.

By fall 2008, the financial situation of the domestic automakers was so dire that they would soon be unable to make their wage and supplier payments. In November 2008, the chief executive officers of Ford, General Motors, and Chrysler came before the House and the Senate to request a $25 billion working capital "bridge loan" from the US government to enable them to make these payments and to help keep them out of bankruptcy and avoid possible liquidation. In the auto executives' view, the crisis they were facing centered on macroeconomic forces outside of their control. Chrysler CEO Robert Nardelli (2008) explained at the outset of the hearing, "We are asking for assistance for one reason: To address the devastating automotive industry recession caused by our Nation's financial meltdown." He said that buyers' and dealers' lack of access to credit was preventing them from buying vehicles and wrecking the automakers' business. They were asking for capital to tide them over, with no conditions attached, until the economy returned to normal so that they could avoid bankruptcy or liquidation.

Of course, no one knew if the 17 million annual sales rates achieved earlier in the 2000s would ever return. Auto credit had been unsustainably inflated by the same housing and credit bubble that led to the economic crisis in 2008. The ratio of cars-to-population and the fraction of auto buyers stretching their credit by using subprime auto loans were both at record highs. If demand rebounded only partway toward its previous high after the recession ended, it was not clear that all of the "Big Three" automakers could survive.

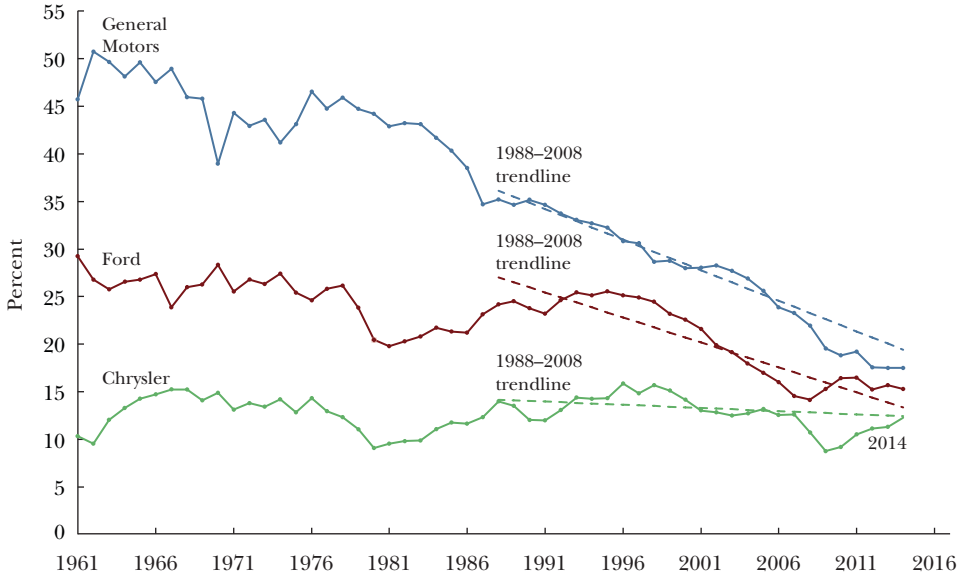
When critics highlighted the US auto industry's decades-old problems of high cost, questionable quality, and the like as factors contributing to the industry's troubles during the financial crisis, the executives argued that they had already done the restructuring necessary to fix those problems, so that they were no longer an issue. In reality, the Big Three automakers' problems had built up over many years and were certainly not solely a result of the economic downturn.

Falling demand was a persistent and severe problem for the Big Three. Market share trends weighed heavily against them. Figure 1 plots the US market share of each of the Big Three automakers in the decades running up to the crisis as a percentage of total auto sales. There was a sustained and substantial downward trend in demand of more than 2 percentage points per year for the Big Three combined. The Big Three's share in 1998 was 71 percent; by 2008, it was 47 percent. These negative trends were especially severe for GM, the largest of the domestic companies.

If anything, these declines in market share understate the severity of the dwindling demand facing the manufacturers. The Big Three had been engaged in substantial price discounting relative to the competition. By 2008, the Big Three were discounting comparable cars by $2,000 to $3,000 (Helper 2010). A number of factors had taken a toll on the demand for cars from the Big Three manufacturers over time: the widespread perception of perennial quality and reliability issues, lower resale values, poorly received new models, and a lack of low-gas-mileage cars at times of rising fuel costs.

Moreover, the "transplant" car factories—that is, domestic US production of foreign-owned companies like Honda, Toyota, Nissan, and others—were expanding

Figure 1
"Big Three" Automakers' Shares of US Total Vehicle Sales



employment and production in the United States using predominantly nonunion plants in the American South, even as the Big Three automakers struggled. For example, from 2000 to 2013, employment at the domestic transplant carmakers almost doubled to 163,000, while Big Three employment fell steadily and was cut nearly in half to 253,000, according to *Automotive News* data reported in Kurylko (2013). This pattern suggested that the problems of the Big Three legacy US automakers were perhaps particular to those firms, not to the national automobile manufacturing industry.

A common refrain among industry analysts and critics in Congress was that US automakers were uncompetitive versus their foreign counterparts as well as against the transplant factories. Estimates of the hourly compensation of the Big Three automakers put hourly compensation almost 25 percent higher than in the transplants (Leonhardt 2008). After including the legacy costs of retirees, average labor costs for the Big Three were almost 45 percent higher. In addition, a surprisingly large share of labor compensation for the Big Three automakers was a fixed cost, rather than a variable one. Pension and health care costs for retirees are obvious fixed costs, but the United Automobile Workers (UAW) had also negotiated for workers to be paid 95 percent of their salary when they were on layoff, which in effect turned mostly variable labor compensation into a fixed cost. Under these conditions, it was hard to see how a rescue could make the Big Three more cost competitive with rivals at home and abroad for more than a short time, unless it reduced the fixed costs associated with retirees, the uncompetitive compensation levels for existing workers, and the crushing interest payments owed to bondholders.

To summarize, the problems facing the automakers included long-term falling market share, compounded by a massive short-term drop in aggregate demand, with large fixed costs. This combination resulted in huge short-term losses. But even if the automakers could reduce their fixed costs and even if the recession ended and aggregate demand returned to normal levels in the short-run, unless they could stop their persistent decline in market share, these automakers would soon be back in trouble.

By December 2008, regardless of what one thought the sources of the Big Three's problems were or what should or should not have been done in the preceding years, General Motors and Chrysler faced an existential threat. Congress could not agree to provide the automakers emergency financing and adjourned for the holidays at the end of 2008, leaving the Big Three scrambling. The Bush administration decided to tap into Troubled Asset Relief Program (TARP) funds authorized under the Emergency Economic Stabilization Act (that had been signed into law on October 3, 2008). It lent GM and Chrysler more than $20 billion to keep them afloat into early 2009. Of that amount, $17.5 billion went directly to the automakers. The rest went to the financing arms of these firms, the General Motors Acceptance Corporation (GMAC) and Chrysler Financial. Ford decided not to take government support. Ford had large losses but had borrowed a significant amount of money in 2006 and begun restructuring before the financial crisis struck, so the company was able to withstand the cash crunch.

GM and Chrysler received these loans with the condition that they develop plans to make themselves "viable" as ongoing enterprises. The firms were given until February 2009 to come up with the plans. The Obama administration took office in late January.

The viability plans that the companies submitted in February 2009 were summarily rejected as unrealistic and inadequate, which sent the effort back to the drawing board. The gap in time between the granting of the loans in December 2008 and agreement on a workable plan for restructuring the companies and making them financial viable meant that the interim $20 billion in loans made to keep the companies afloat while they prepared the original viability plans was unlikely ever to be repaid.

A first obvious consideration was whether General Motors and Chrysler could just enter one of the standard paths for companies in dire financial trouble. For example, one common approach is for the troubled firm to borrow funds using so-called "Debtor-in-Possession" financing. This new source of financing is allowed to be senior (that is, it would be paid first) to all existing company debt. In the meantime, a distressed company can sell off key pieces to acquire cash, perhaps on the way to finding a full buyer in the intermediate term. But in early 2009, these options were merely fantasy. The financial crisis raged. To be sure, there were speculations early in 2009 that perhaps a large Chinese or other national sovereign wealth fund would be willing to buy major portions of the companies but there was, realistically, no chance of these outcomes happening in the requisite timeframe—if they ever would have happened at all. Even if such a buyer had materialized, scrutiny of these kinds of transactions by antitrust authorities, along with the Congress and its

Committee on Foreign Investment in the United States, would have taken months and faced a high chance of falling through. There was speculation about a merger of GM and Chrysler, but it was unclear that a merger of two failing companies would solve either of their problems.

Later, during the presidential election of 2012, critics of the rescue argued that private lenders should have been allowed to fund the General Motors and Chrysler restructurings in bankruptcy. In early 2009, however, such funding simply did not exist. At that moment, for better or for worse, it was government money or bust. Without government funds, GM and Chrysler were on a path to disorderly bankruptcy, which, by all accounts, would take years for resolving the myriad disputes among thousands of creditors, suppliers, and so on, and would likely mean liquidation.

The Costs of Not Rescuing

What were some of the more likely outcomes if the government had not acted in early 2009 to extend further assistance to GM and Chrysler? As we and others in the Obama administration investigated this question, the answers we heard were not comforting. The companies themselves would lay off their workers immediately. There would be widespread spillovers into supplier industries and auto dealerships, as well as knock-on macroeconomic effects through a *reverse* multiplier. The Congressional Oversight Panel (2009) called the companies' possible collapse "a potentially crippling blow to the American economy that Treasury estimated would eliminate nearly 1.1 million jobs."[1] Other contemporary estimates suggested that the near-term jobs at risk from a disorderly liquidation could reach as high as 2.5 to 3.3 million jobs (Zandi 2008; Cole et al. 2008; Scott 2008).

It was easy to question the methodology of some of the more extreme job loss estimates. For example, although we believe that a bankruptcy reorganization of GM and Chrysler under Chapter 11 would have been so disorderly as to be economically wasteful and destructive, presumably some proportion of the assets of the firms would have been put to use. However, we felt confident that a collapse of both companies would have resulted in the immediate loss of at least 500,000 to 1 million jobs. Total job losses from a messy liquidation of Chrysler by itself, in our estimation at the time, would have been in the neighborhood of 300,000 jobs.

Setting aside the costs to the individuals involved, we knew that job losses of this scale would impose sizable costs on various levels of government through the need for additional spending on safety net, health care, unemployment insurance, and other programs, and we sought to quantify some of these costs. In addition, because the company pension funds would probably also be bankrupted, tens of billions of dollars in pension liabilities would be transferred to the Pension Benefit Guaranty Corporation, which was itself already in a precarious financial position. In

[1] Actually, the original job estimates came from the Council of Economic Advisers under Edward Lazear rather than Treasury.

considering the costs and benefits of a rescue plan for GM and Chrysler, one had to acknowledge that the alternative of letting the companies proceed into a disorganized bankruptcy would not be "free."

Of course, this is not to say that government should try to keep all large companies alive because their failure would be painful. We certainly had no desire to put the US economy on the path we perceived that Japan had followed in the preceding decades, where stagnation had continued for years as the government propped up "zombie firms" that were not viable companies. Further, the auto industry is highly capital-intensive compared with other industries, so if one measures jobs saved on a bang-for-the-buck basis, using money to support other industries might have a larger employment impact. Moreover, public opinion polling suggested that large majorities opposed bailouts for any firms, including auto companies.

As the policy team grappled with these issues, a consensus emerged that allowing *both* companies into uncontrolled bankruptcy was ill-advised. We heard numerous experts opine that a failure of General Motors, in particular, would level a major blow to supply chains and to consumer confidence that would have an outsized negative impact on spending as well as the argument that this was the equivalent of negative stimulus precisely when the fiscal and monetary policy authorities were attempting to provide positive stimulus. The negative aggregate impact of a disorderly failure of GM would be too great at exactly the wrong moment for the economy. Thus, the question arose of whether we should rescue GM but let Chrysler, the smaller and weaker of the two firms, go into a disorderly bankruptcy.

We had several concerns about the merits of a Chrysler bailout. First, auto sales had plummeted from 16.5 million units in 2006 to 9.5 million in 2009. Our forecasts at the time, and those of many industry analysts, suggested that US auto sales in the steady state would be around 15 to 15.5 million a year. We thought that Chrysler and GM, which had been losing market share for decades, were viable restructured businesses if the market was over 16 million cars, but would there be sufficient demand for *both* Chrysler and GM to be profitable in the long run? Trying to keep each of the Big Three in operation with such a low rate of sales might endanger them all.

Second, our internal research and reading of the industrial organization literature on demand elasticities in the auto industry indicated that consumers who buy from Chrysler would likely turn to Ford or GM if their preferred Chrysler model was not available. Table 1 illustrates this point with sales data from 2008 by market segment. About 75 percent of Chrysler's sales were concentrated in large cars, minivans, SUVs, and trucks. This was almost double the share of sales in those segments in the full passenger vehicle market. Non-Chrysler demand in those segments was heavily domestic: two-thirds of non-Chrysler sales in these Chrysler-heavy segments went to GM or Ford. Even these numbers understate the degree of overlap among the domestic firms by not including minivans and full-size pickup trucks such as the Toyota Sienna, Honda Odyssey, or Toyota Tundra that were not made by the Big Three, but were still domestically produced in the transplant factories. If consumer demand starts with choosing a segment (that is, the kind of car you wish to buy like a minivan or a sports car) and then a particular model, Chrysler's failure might have

Table 1
Sales by Market Segment

Segment	*Share of total Chrysler sales*	*Share of total market sales*	*GM + FORD share of non-Chrysler sales*
Full-size pickup	22.2	12.3	87.4
Minivan	21.5	4.5	11.7
Mid-size SUV	10.5	10.1	48.3
Full-size SUV	9.6	4.8	77.6
Full-size	8.8	5.5	83.1
Sports car	1.9	1.8	66.7
	74.5	**39.0**	**65.8**
Compact	12.3	18.8	30.3
Mid-size	7.1	16.4	23.2
Compact SUV	3.3	7.9	42
Mid-size pickup	2.4	2.5	22.3
	25.1	**45.6**	**29.3**
Entry luxury	0	4.1	0
Subcompact	0	2.9	14.7
Mid-size luxury SUV	0	2.5	13.7
Mid-size luxury	0	2	34.9
Full-size luxury	0	1	45.7
Full-size luxury SUV	0	1	70
Compact pickup	0	0.5	98.1
Sports car luxury	0	0.5	1.8
MPV	0	0.4	0
Compact luxury SUV	0	0.3	0
	0	**15.2**	**20.5**
TOTAL	**100**	**100**	**41.4**

Note: The model-level sales data were compiled by *Automotive News*, and we obtained them from the *Good Car Bad Car* archives at http://www.goodcarbadcar.net/2013/02/2008-america-auto-sales-rankings-by-model.html, and then summed them by the segment definitions in the Wikipedia Car Classification page.

a much smaller impact on the economy than people feared. Chrysler's failure might, for example, simply mean that Dodge Ram buyers would, instead, buy another full-sized pickup, and all of those models are produced domestically. Nationwide net employment loss from Chrysler's liquidation in this type of situation would be much smaller than the national estimates suggested, as consumers would switch to other domestically produced cars in the absence of Chrysler. Also, letting Chrysler fail would have substantially reduced the amount of money needed to rescue GM and would have increased the profitability outlook for GM and Ford.

Third, Chrysler had been acquired and restructured twice before without success. The merger between Daimler-Benz and Chrysler that took place in 1998, but was dissolved in 2007, had proved unsuccessful in a more favorable economic environment. The buyout by private equity company Cerberus in 2007

had been unable to stem the problems and instead added more years of malaise and mismanagement. We saw little prospect that a purchase of Chrysler by Fiat would provide more synergies or a more reassuring brand name for American consumers. Furthermore, automobiles are a business with large economies of scale and Chrysler operated at a notably smaller scale than the largest car companies like GM, Toyota, Ford, and others—even with Fiat as a partner.

From a hard-nosed triage view, it was unclear why Chrysler should receive special treatment, especially given that public bailout money could probably save more jobs in a less-capital-intensive industry and a liquidation of Chrysler did not seem to pose a systemic threat. Even if our fears were accurate that the failure of Chrysler would cause 300,000 workers employed there and in the auto supply chain to lose their jobs (assuming no substitution to other domestic producers in the short run), the US labor market in early 2009 was in miserable shape. Job separations at this time were running at 4 to 5 million per month in the private sector workforce according to data from the Job Opportunities and Labor Turnover Survey (JOLTS), and net job losses at this time (after hiring was taken into account) were running around 700,000 per month. Indiscriminate carnage from the financial crisis existed in virtually *every* industry, not just the auto industry.

Of course, there were also economic arguments in favor of rescuing Chrysler. First, although we expected that shortfalls in supply caused by the failure of Chrysler could in time be picked up by an expansion of the other auto manufacturers, and that viable segments of Chrysler's business—such as its minivan unit or Jeep division—would eventually be acquired by other auto companies, "eventually" could take a long time. A messy liquidation of Chrysler would make the transition costs higher.

Another important factor in the decision related to the nature of the auto industry itself, which threatened a kind of negative contagion because of company interdependence. Over the preceding decades, a larger and larger fraction of the value-added in the auto industry had migrated to auto suppliers. Large suppliers of seats, electrical systems, and other components normally supplied multiple car companies, and many of the largest auto suppliers such as Lear, American Axle, and Visteon were in dire financial shape. Hundreds of suppliers were known to be teetering on the edge (Stoll and McCracken 2009; Kiley 2009; Helper 2010).

The Motor and Equipment Manufacturers Association (2009) submitted data showing that 66 percent of Chrysler suppliers were also suppliers to GM and 54 percent were suppliers to Ford. In previous years, even some seemingly modest supplier disruptions or specific parts shortages resulting from strikes or natural disasters had caused widespread disruption to the production lines of car manufacturers. If auto suppliers failed because of lost demand from a Chrysler liquidation, it could easily disrupt the other US producers, both in Detroit and in the transplant firms elsewhere. Ford itself was arguing, publicly, for their competitors GM and Chrysler to receive bailouts on the grounds that their failure would endanger Ford's own production. We feared a chain reaction.

As the academic legal debate over bankruptcy law has observed, bankruptcy is largely a micro solution, aimed at reorganizing the assets and liabilities of a

single firm (Warren 1987; Baird 1987). It is not a macro solution. It does not take cross-industry spillovers or broader government or social costs into account. The auto taskforce attempted to quantify and weigh many of these factors, though there was much disagreement on the details and magnitudes. For example, our early estimates of job losses and supplier impacts often came from the industry's own representatives, who had an incentive to exaggerate their estimates. One of our roles, for instance, was to note that about half of the employees in the auto supply chain were involved in manufacturing replacement parts, which still would have been in demand even with a failure of domestic automakers.

The Decision and the Aftermath

President Obama heard the analysis on all sides of the issue. He concluded that the economy should not risk the failure of both companies in 2009 and opted to rescue both General Motors and Chrysler. Rattner (2010, p. 120) notes, "The case for saving Chrysler was based more on political and social reality." President Obama made the decision to reject the viability plans the companies submitted from the first round of loans in February 2009 and ordered a new and more serious restructuring effort, led by a team of private sector turnaround experts that he brought into the administration. Separate from the efforts made to reorganize the car manufacturers, the rescue effort also included providing money to the affiliated finance companies and auto suppliers, and guaranteeing warranties to customers.[2]

In an industry with high fixed costs, annual profitability is largely determined by total market demand—known in the auto trade as the Seasonally Adjusted Annual Rate (SAAR) of lightweight vehicle sales—along with market share and price. Price depends on perceived quality and resale value. We examine developments in costs, product quality, prices, market share, and SAAR below.

Massive Restructuring and Cost Reduction

We knew that a lasting restructuring of General Motors and Chrysler would likely require a number of steps: reducing their legacy costs (payments to bondholders and retirees), reducing their number of dealers, cutting capacity and weaker brands, and expanding a two-tier structure where newly hired workers were paid less than incumbents. In March 2009, President Obama instructed his auto team, "I want you to be tough and I want you to be commercial" in regards to setting terms for an alliance between Chrysler and Fiat and restructuring GM (Rattner 2010, p. 132). The funds that the US Treasury provided to Chrysler and GM came with strict requirements on their restructuring. Because of their different financial positions, most of the support provided to GM took the form of equity, while support for Chrysler was

[2] A clever market-based mechanism was used to extend credit to critical suppliers by giving automakers access to funds to use to keep their critical suppliers afloat. However, only $413 million of $5 billion allocated to this program was lent to suppliers; all of it was eventually repaid to Treasury.

in the form of debt that needed to be repaid. One could justify the less-generous terms of support for Chrysler in part because Chrysler was in more precarious financial shape than GM in 2009, and in part because Chrysler was less-pivotal for the near-term course of the auto industry and economy given its smaller size.

As a condition of the earlier government loans, General Motors agreed to cut its debt by $30 billion by converting existing debt into equity. It also agreed to cut employment from 96,000 to 45,000 by 2012; bring its labor costs in line with those of the transplants by 2012; sell its Saab, Saturn, and Hummer divisions; and reduce its number of models from 45 to 40. GM failed to meet the full conditions of the bailout, and its chief executive officer, Rick Wagoner, was replaced in March 2009. On June 1, 2009, GM filed for bankruptcy with $173 billion in liabilities and $82 billion in assets. The company closed a dozen plants and eliminated more than 20,000 jobs. Stockholders were wiped out and bondholders were issued new stock worth much less than the value of their bonds. More than 1,100 of 6,100 dealerships would eventually close. GM emerged from bankruptcy quickly, on July 10, 2009, as two separate companies. About half of the members of the board of directors were replaced, and several top executives were dismissed or reassigned. The old company retained the liabilities, and a "Shiny New GM" held the assets and soon became profitable, earning its first annual profit in ten years in 2010. Retiree health benefits, funded by an entity known as a voluntary beneficiary benefits association (VEBA), were cut for GM's more than 330,000 retirees and surviving spouses in the United States, and the VEBA was funded primarily with an equity stake in the company.

Chrysler filed for bankruptcy on April 30, 2009. The company closed 789 of its 3,200 dealerships as part of its bankruptcy reorganization. More than a dozen plants closed. Under agreement with the United Autoworkers union, the two-tier wage system was expanded, with wages for new hires cut to about half of the $29 per hour that longtime union members earned (although these wages were then raised to $17 an hour in 2011). Defined benefit pensions were eliminated for new hires and replaced with 401(k) plans. Overall wage and benefit costs at Chrysler and GM were brought down to be roughly in line with those at Honda and Toyota plants operating in the United States. Benefits provided by Chrysler's voluntary beneficiary benefits association (VEBA) were also slashed, and the VEBA received a 55 percent equity stake in the company. Fiat gained minority ownership and corporate control of the restructured Chrysler.

Restructuring the two failing auto companies reduced their fixed and variable costs at the expense of much pain for their creditors, workers, managers, and dealers.[3] Just as importantly for their long-run success, the new management of the companies sought to improve the culture of their organizations and introduce better business

[3] Anticipating that restructuring the companies would cause much pain and disruption, we recommended that the President establish a Director of Recovery for Auto Communities and Workers to coordinate agencies and resources across the federal government to ease the transition for hard-hit communities and workers. Economist Edward Montgomery, now at Georgetown University, ably served in this capacity.

practices to produce higher-quality cars. From brakes, wheels, and suspension to styling and advertising—including popular commercials featuring Eminem and Clint Eastwood launched during the 2011 and 2012 Super Bowls—an attempt was made to improve the culture and quality of work at Chrysler, in particular. Chrysler posted a profit in the first quarter of 2010. When asked what had changed at Chrysler, Fiat chief executive officer Sergio Marchionne (2014) recently responded: "The culture; the technology that's in place; the way in which the cars are manufactured; the attitude of the workforce; the efficiency; the land speeds; the output of the system has completely changed. I mean, if you took a Japanese guy into our plant today he'd be impressed." Marchionne also offered a simple explanation for why Chrysler was able to change so quickly: "I know that when you're broke you change your ways a lot faster."

Price Discounts and Perceived Quality

In the longer term, we knew that for the auto companies to survive they needed also to deal with the falling demand for their products. Prior to the financial crisis, General Motors and Chrysler concentrated on producing larger, less-fuel-efficient, and more-costly-to-produce models than their competitors, and offered aggressive price discounts to consumers.

Since the restructuring, there are some signs that quality has improved and that price discounting has become less aggressive, though the jury is still out. Figure 2 reports the JD Power quality rating for Chrysler, GM, and Ford, and for all other automakers combined. JD Power's Initial Quality Study provides information on new-vehicle quality based on a survey of a nationally representative sample of car buyers (results weighted to reflect sales). The questionnaire asks car owners to indicate which, if any, problems they have experienced from a list of 228 possible items, and they can write in any additional problems not included on the list. Figure 2 reports the number of problems per 100 vehicles. A lower figure indicates fewer problems and higher quality. Although this measure is crude (one reason is that some problems are worse than others), it is a common metric of quality in the industry.

In 2010 and earlier years, owners of new General Motors and Chrysler vehicles reported a higher incidence of problems than owners of other cars. Starting in 2011, however, this measure of quality improved considerably for both firms, with the number of problems reported per new car about on par with that of the other auto manufacturers.

However, in 2014 General Motors agreed to pay the US Department of Transportation the maximum civil penalty of $35 million for failing to report and delaying a recall of 2003–2011 cars with defective ignition switches and airbags that failed to deploy, a problem that GM reportedly was aware of at least as early as November 2009. In total, GM recalled 29 million cars in North America as of the middle of 2014, breaking the record for most recalled cars in any full year. Chrysler has launched its own recalls for ignition switches. These recalls point to clear quality problems. Overall, the extent to which quality has improved since 2010 remains an open question.

Data that allow quality-adjusted price comparisons among cars are sketchy, but indicate that the Detroit brands continued to offer steeper discounts than

Figure 2
JD Power Quality Rating
(problems per 100 vehicles)

Notes: Figure 2 reports the JD Power quality rating for Chrysler, GM, and Ford, and for all other automakers combined. The rating is based on the JD Power's Initial Quality Study, which provides information on new-vehicle quality from a survey of a nationally representative sample of car buyers (results weighted to reflect sales).

other automakers after 2009; nonetheless, their discounts and incentives relative to the industry average fell by about 10 percent from 2002–2008 to 2009–2011. Chrysler's CEO Sergio Marchionne, in particular, has waged a campaign against price discounting, emphasizing, "Unprofitable volume is not volume I want." He reportedly berated Chrysler's head of sales, who was dismissed shortly afterwards, for seeking to offer price rebates along with "Cash for Clunkers," the colloquial name for the Car Allowance Rebate System that the federal government operated in July and August 2009 to give people an incentive to trade in their older cars for more fuel-efficient models (Linebaugh and Bennett 2010). General Motors had reduced its sales incentives below those of Chrysler and Ford by February 2014, but the company subsequently sharply increased discounts to counteract a drop in demand due to adverse publicity over the recalls in spring 2014 (Kessler and Vlasic 2014).

Market Share

The market share of each of the Big Three automakers was presented earlier in Figure 1. As a benchmark, the graph also shows the trend projected from a linear

regression over the period 1988–2008. General Motors' market share has been on a downward trajectory for the past 50 years, falling from 50.7 percent of the market in 1962 to 40.4 percent in 1985, 30.6 percent in 1997, and 19.6 percent in 2009. Ford's market share has also trended down from 29 percent in 1961 to 14 percent in 2008, with a notable reversal in the period from 1981 to 1995, and then a sharper decline through 2008. Chrysler's market share, by contrast, fluctuated between 10 and 15 percent from 1961 to 2008, and fell to an all-time low of 8.8 percent in 2009.

After 2009, Chrysler's share of the market rose for five consecutive years, its best performance since the early 1990s. Chrysler's market share stood at 12.3 percent in the first half of 2014, which was 3.5 percentage points, or 40 percent, above its 2009 level. These gains have been widely attributed to the improved management and higher-quality product initiated by Sergio Marchionne. The drop in gasoline prices at this time also probably boosted the Big Three's market shares above what they otherwise would have been by raising demand for larger vehicles.

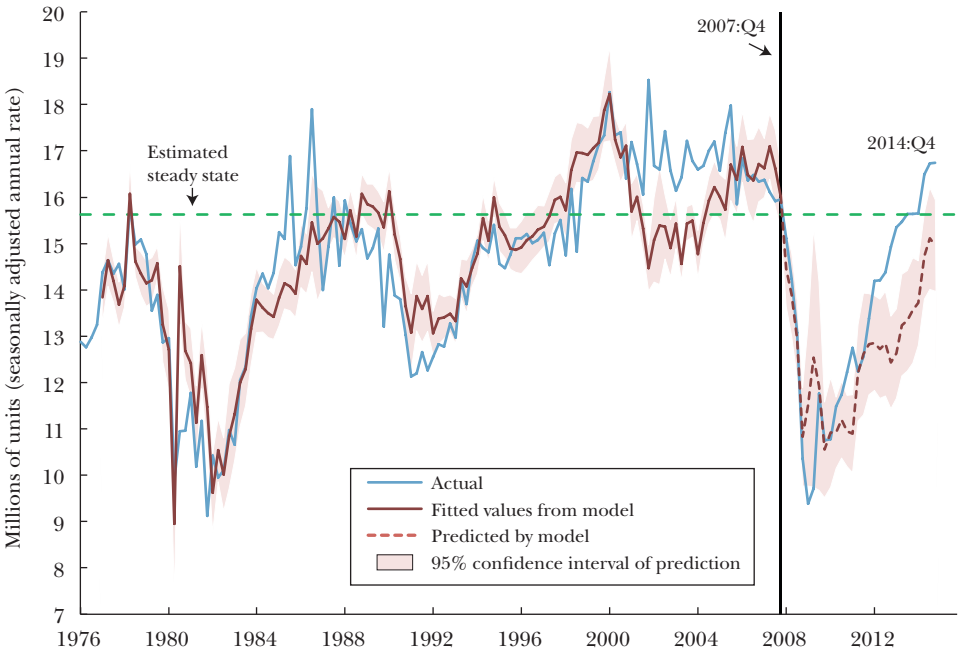
One of our main concerns about the auto rescue was that the domestic brands to a considerable degree compete with each other, and so rescuing Chrysler, the weakest and smallest of the three firms, would make it harder (and more expensive for taxpayers) for General Motors to survive. There appears to be some support for this view, as GM's market share continued to decline after 2009, and its decline was at least as quick as it was over the preceding two decades. The fact that GM eliminated four unprofitable brands—Saturn, Pontiac, Hummer, and Saab—also undoubtedly contributed to its decline in market share after 2009.

It is impossible to know what would have happened to GM's market shares had Chrysler been liquidated in 2009, but the data in Figure 1 show a notably strong rebound in Chrysler's market share, from a historically low base, and a continuation of GM's decades of long decline. The market share of the Big Three combined stood at 45.1 percent in the first half of 2014, above their 2009 combined low of 43.7 percent in 2009, but well below their share of 50.5 percent on the eve of the economic crisis in 2007. These figures suggest that, to some extent, Chrysler's gains did come at the expense of the other domestic firms.

Rebound in Aggregate Auto Demand

The biggest factor contributing to the positive recovery of the automakers, however, has been the rapid rebound of consumer demand for autos more generally. Auto sales are normally procyclical. Figure 3 shows auto sales each quarter since 1976. We see that nationwide sales plummeted during the Great Recession, falling to their lowest quarterly level since the deep 1981 recession. Many factors affect car sales, in addition to the state of the economy, such as population growth, credit availability, and the age and durability of the existing fleet. We and many industry analysts expected sales to bounce back to around 15 to 15.5 million a year when the economy normalized. In its submission to the government in February 2009, GM's baseline forecast of annual sales was 16 million units in 2012 and market share of 20 percent. (GM was too optimistic: in 2012, actual sales were 14.4 million and GM's market share was just 17.6 percent.)

Figure 3
Lightweight Vehicle Sales: Actual and Modeled Results
(millions of units; seasonally adjusted annual rate)



Note: The figure shows fitted values from a regression model to predict lightweight vehicle sales (the "seasonally adjusted annual rate" or SAAR) for 1976–2007, and the projected values from 2008 forward. (See Table 2 for the regression results).

To compare actual sales to what one would predict from a forecasting model, we regressed quarterly sales of lightweight vehicles (adjusted to the "seasonally adjusted annual rate" or SAAR) on real GDP growth, the unemployment rate, population growth, the Federal Reserve's Senior Loan Officers' Survey (SLOOS) measure of willingness to lend to consumers, the logarithm of the average real price of a gallon of gasoline in the previous quarter, and the standard deviation of gas prices over the preceding four quarters, using a sample from 1977:Q1 to 2007:Q4. (The sample begins in 1977 because gasoline price data from the Energy Information Administration are available starting in 1976.) The regression results are presented in Table 2, and Figure 3 shows the fitted values during the sample period and the projected values from 2008 forward. The explanatory variables account for 72 percent of the variability in quarterly car sales.

Most of the coefficients associated with the explanatory variables have their expected signs. For example, sales are stronger when the economy is stronger (that is, faster GDP growth or lower unemployment) and when credit conditions are looser. Higher gas prices are associated with lower sales, although the relationship is weak and statistically insignificant. Greater variability in gas prices, however, is

Table 2
Regression Model to Predict Lightweight Vehicle Sales, 1977–2007
(quarterly sales adjusted to the "seasonally adjusted annual rate" or SAAR)

	Mean of variable (standard deviation)	*Coefficient (standard error)*
Real GDP Growth (%)	3.20 (3.10)	0.099 (0.025)
Unemployment Rate (%)	6.12 (1.41)	−1.150 (0.093)
Population Growth (%)	1.28 (0.58)	0.226 (0.116)
SLOOS credit availability	109.24 (16.57)	0.044 (0.009)
log gasoline price (lagged)	0.63 (0.24)	−0.027 (0.808)
Standard deviation of log gasoline price over previous four quarters	0.056 (0.036)	8.657 (4.033)
Constant	—	15.948 (1.357)
R^2		0.716

Notes: We present results from a regression of quarterly sales of lightweight vehicles (the "seasonally adjusted annual rate" or SAAR) on real GDP growth, the unemployment rate, population growth, the Federal Reserve's Senior Loan Officers' Survey (SLOOS) measure of willingness to lend to consumers, the logarithm of the average real price of a gallon of gasoline in the previous quarter, and the standard deviation of gas prices over the preceding four quarters, using a sample of 124 quarterly observations from 1977:Q1 to 2007:Q4. Real GDP Growth, Unemployment Rate, and Population Growth are seasonally adjusted and at an annual rate. The log of the real price of gasoline is for the previous quarter, and gas prices were deflated by the Personal Consumption Expenditures deflator. The standard deviation of log real gas prices is computed over the preceding four quarters. The mean (standard deviation) of the dependent variable is 14.8 million (2.0 million) SAAR. In the second column, in parentheses, are Newey-West standard errors with four lags.

associated with higher sales, as households may adjust their model of car in response to recent movements in gas prices.

The model effectively captures the collapse in auto sales during the Great Recession, and predicts most of the rebound since the recession officially ended in mid-2009, although it underpredicts actual sales in 2012–14 (see Figure 3). In the last quarter 2014, actual sales were 1.8 million above the level the model would predict at a seasonally adjusted annual rate. Part of the rebound in car sales appears to represent overshooting of actual sales relative to the prediction of the simple model. This pattern is not wholly unexpected given the pent-up demand that accumulated during the Great Recession, and the fact that the parsimonious regression

model used here ignores dynamics. There was some significant overshooting of sales early in two of the three previous recoveries as well.

In early 2009, the respected economic forecasting firm Macroeconomic Advisers, which had expected a strong economic recovery (GDP growth of 3.9 percent and unemployment rate of 5.8 percent in 2013), predicted that auto sales would reach 15.4 million in 2013. The fact that auto sales slightly exceeded that amount at 15.5 million, despite their overly optimistic assumptions about the state of the economy, is a sign that the rebound in auto sales exceeded expectations given the actual path of the recovery.

To gauge the importance of the rebound in sales for the fate of the auto rescue, suppose that domestic auto sales had remained at 9.5 million instead of rebounding to 16.5 million in 2014:Q2. In this scenario, Chrysler would have needed to raise its market share by 12.4 percentage points to achieve the actual volume of sales it registered in 2014:Q2. Thus, Chrysler's impressive 3.5 percentage point gain in market share was far less significant than the overall rebound in market demand.

We can use the coefficients from the regression model in Table 2 to derive an estimate of "steady state" car sales. Specifically, we assumed the values of the explanatory variables would equal the forecast of real GDP growth and unemployment used by the Obama administration for the "out year" forecasts in 2023, which are best understood as an estimate of long-run underlying trends. Specifically, we assume a 2.3 percent rate of GDP growth and an unemployment rate of 5.4 percent, which correspond to the 2023 forecasts in the administration's FY2015 Budget (Table 2-1). We assume a growth rate for the civilian non-institutional population of 0.9 percent, corresponding to the 2023 baseline forecast in CBO's February 2014 "Budget and Economic Outlook." For the SLOOS credit availability variable, log of real gas prices, and standard deviation of log gas prices, we use the average values over the period 2002:Q1 to 2007:Q4. This calculation suggests that steady state annual car sales will be around 15.6 million.

If our estimate of steady state car sales is correct, sales may slip by about 7 percent from their current level. For Chrysler, this amounts to about a quarter of their post-restructuring gain in market share. Given the restructuring of costs, we suspect that there will be sufficient demand to sustain the Big Three at their current level of market share. In addition, there is room for GM potentially to raise its profitability by implementing some of the tough measures that Chrysler has implemented. But steady state market demand is probably just large enough to sustain the existing domestic firms, although there is little margin for the companies to be viable ongoing concerns if they are mismanaged in the future.

Autos and Industrial Recovery

Even in the information age, the auto industry remains a major contributor to the US economy. Moreover, modern automobiles are advanced manufacturing products. We were told by Ford, for example, that the value of electronics, software, and intellectual property accounts for about 30 percent of the average vehicle's price.

Manufacturing played a critical role in the recovery from the Great Recession, and autos played an outsized role in the manufacturing recovery. Five years after the start of the recovery, the rise in motor vehicles and parts production accounted for more than 25 percent of the rise in total manufacturing industrial production, even though motor vehicles and parts account for only about 6 percent of total manufacturing value added. Although it is not unusual for the auto industry to punch above its weight early in a recovery, it has played an unusually large role relatively long into the current recovery. At the same point in the last four recoveries, motor vehicles and parts accounted for only 11 percent of the rise in manufacturing production, on average.

Since bottoming at 623,300 jobs at the trough of the recession in June 2009, employment in the motor vehicles and parts manufacturing industry has increased by 256,000 jobs (as of July 2014). This is a stark contrast from the previous recovery, when jobs in the industry steadily declined. The increase in the number of jobs in motor vehicles and parts manufacturing accounted for nearly 60 percent of the total rise in manufacturing jobs in the recovery's first five years. In addition, some 225,000 jobs have been added at motor vehicle and parts dealers. Counting both manufacturers and dealers, auto-related jobs accounted for 6 percent of the total 8.1 million jobs that were added, on net, in the first five years of the recovery—triple the sector's 2 percent share of total employment. Although the auto sector played an outsized role in the recovery, it should also be apparent that given the relatively low share of total employment in autos and related jobs, there is a limit to how much the auto rebound could have driven a jobs recovery.

Exit Strategy

The US Treasury Department provided roughly $80 billion in assistance to the auto industry: $51 billion to GM, $12.5 billion to Chrysler, and $17.2 billion to what is now Ally Financial, but was formerly GMAC Finance (US Department of the Treasury 2015). By the end of 2014, the government had closed all three of these positions.

At the urging of Larry Summers, the Obama administration established principles for its role as majority owner of General Motors. These included: setting upfront business goals and selecting executives and a strong board of directors; only voting as a shareholder on major corporate governance issues or major transactions; letting the board and management run the company; and selling the government's shares as soon as practical to recover taxpayer money and return the company to private ownership. A similar approach was taken to Chrysler. From the outset, we were determined to avoid the problem that had worsened Japan's stagnation in the 1990s and 2000s of propping up zombie companies for long periods of time when they should have ceased to exist. As President Obama (2009) put it, his goal was "to get GM back on its feet, take a hands-off approach and get out quickly."

On December 9, 2013—much sooner than virtually anyone expected—the government fully exited its investment in General Motors by selling its remaining shares, and critics could no longer say that GM stood for Government Motors. The

US Treasury recovered a total of $39.7 billion from its investment of $51.0 billion in GM. By the end of 2014, Treasury sold its remaining stake in Ally Financial, recovering $19.6 billion from the original $17.2 billion investment in Ally, for a $2.4 billion gain for taxpayers. In May 2011, Chrysler repaid its outstanding loans from the Troubled Asset Relief Program (TARP) six years ahead of schedule. Chrysler returned $11.2 billion of the $12.5 billion it received through principal repayments, interest, and cancelled commitments, and the Treasury fully exited its connection with Chrysler. In January 2014, Fiat purchased the shares in Chrysler owned by the voluntary employee's benefits association (VEBA) that funded retiree health benefits and took full ownership of Chrysler.

For the most part, the Obama administration adhered to its goals and avoided political meddling. There were some notable exceptions, however. For example, when GM's Chief Executive wanted to move the company's headquarters from the Renaissance Center in Detroit to its Tech Center in Warren, Michigan, to be closer to the workforce—which made some business sense—the administration blocked the move. Congress and the administration both set restrictions on executive compensation for companies that had received Troubled Asset Relief Program funds (for example, the annual compensation for chief executive officers was capped at $9.5 million). The administration included a "vitality commitment" as a condition of receiving funding, which prevented the companies from moving work at US plants to other countries. Members of Congress frequently attempted to intervene to prevent unnecessary and inefficient dealerships from being closed, to the administration's consternation.

Some have argued that the rescue improperly paid unsecured union workers ahead of unsecured bondholders due to political pressures. The wider debate about what is permitted and encouraged by bankruptcy law and how those rules might have applied to this specific rescue situation is beyond our scope, but we have a few observations. First, as a legal matter, a large majority of bondholders voted for the deal and a bankruptcy judge approved it. That is why it proceeded. The agreement was not unilaterally imposed by the Obama administration. Second, there were legitimate business reasons why one might need to pay some unsecured creditors so the firms would be able to continue operating. Guaranteeing the warrantees of car owners, for example, also prioritized unsecured creditors. But if consumers did not trust the warranties, demand for cars likely would drop precipitously. Likewise, if workers refused to accept the deal or shirked on their duties, the automakers' viability as an ongoing concern was in jeopardy. Similar payments were made to workers in the bankruptcies of the steel companies in the 1980s, where there was not a government rescue. Third, despite their haircut, bondholders almost certainly received well more than they would have under the alternative scenario in which the government did not intervene in the depths of the crisis. Finally, despite insinuations to the contrary, incumbent workers took dramatic cuts to their benefits and bore substantial risk when the voluntary beneficiary benefits association (VEBA) that funded retiree health benefits for a time held a substantial equity share of the firms.

Conclusion

Economists and economic analysis had a key seat at the table in the decision to rescue and restructure General Motors and Chrysler. The decision was risky. Those of us involved gathered all the information we could find and tried to put, finally, the companies on a sustainable footing. We did not know if it would work. In particular, we had reservations about the long-run viability of the Chrysler–Fiat merger. In an interview in the *Detroit News* (Shepard 2015), President Obama explained his decision this way: "There was clear-eyed recognition that we couldn't sustain business as usual. That's what made this successful. If it had been just about putting more money in without restructuring these companies, we would have seen perhaps some of the bleeding slowed but we wouldn't have cured the patient."

To their credit, the two companies restructured to a greater degree than they had ever done before and under extreme pressure, and—after shedding much legacy debt—returned to profitability in 2010. They also were fortunate that the economy began to turn around and that consumer demand for autos rebounded strongly.

It is fair to say that no one involved in the decision to rescue and restructure General Motors and Chrysler ever wanted to be in the position of bailing out failed companies or having the government own a majority stake in a major private company. We are both thrilled and relieved with the result: the automakers got back on their feet, which helped the recovery of the US economy. Indeed, the auto industry's outsized contribution to the economic recovery has been one of the unexpected consequences of the government intervention. The automakers' future success will depend on their own managerial decisions in the years to come. The fact that Ford was able to weather the economic downturn and financial crisis because it had taken precautionary steps and efforts to restructure before calamity hit, while GM and Chrysler could not have survived without extraordinary government support, is a stark reminder of the importance of good managerial decisions for the survival of businesses.

■ *The authors are grateful to Anthony Casey, Steve Rattner, Harry Wilson, Timothy Taylor, David Autor, and Chang-Tai Hsieh for helpful comments and to David Cho and Loullya Saney for excellent research assistance.*

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Journal of Economic Perspectives—Volume 29, Number 2—Spring 2015—Pages 25–52

The Rescue of Fannie Mae and Freddie Mac[†]

W. Scott Frame, Andreas Fuster, Joseph Tracy, and James Vickery

The imposition of federal conservatorships on September 6, 2008, at the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation—commonly known as Fannie Mae and Freddie Mac—was one of the most dramatic events of the financial crisis. These two government-sponsored enterprises play a central role in the US housing finance system, and at the start of their conservatorships held or guaranteed about $5.2 trillion of home mortgage debt.

Fannie Mae and Freddie Mac are publicly held financial institutions that were created by Acts of Congress to fulfill a public mission: to enhance the liquidity and stability of the US secondary mortgage market and thereby promote access to mortgage credit, particularly among low- and moderate-income households and neighborhoods. Their federal charters provide important competitive advantages that, taken together, implied US taxpayer support of their financial obligations. As profit-maximizing firms, Fannie Mae and Freddie Mac leveraged these advantages over the years to become very large, very profitable, and very politically powerful. The two firms were often cited as shining examples of public-private partnerships—that is, the harnessing of private capital to advance the social goal of expanding homeownership. But in reality, the hybrid structures of Fannie Mae and Freddie Mac were destined to fail at some point, owing to their singular exposure to residential real

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[†] To access the Appendix and Data Appendix, visit http://dx.doi.org/10.1257/jep.29.2.25

doi=10.1257/jep.29.2.25

estate and moral hazard incentives emanating from the implicit guarantee of their liabilities (for a detailed discussion, see Acharya et al. 2011). A purposefully weak regulatory regime was another important feature of the flawed design. While the structural problems with Fannie Mae and Freddie Mac were understood by many, serious reform efforts were often portrayed as attacks on the American Dream of homeownership, and hence politically unpalatable.

In 2008, as the housing crisis intensified, Fannie Mae and Freddie Mac became financially distressed. Their concentrated exposure to US residential mortgages, coupled with their high leverage, turned out to be a recipe for disaster in the face of a large nationwide decline in home prices and the associated spike in mortgage defaults. As financial markets in the summer of 2008 turned against Fannie Mae and Freddie Mac, the federal government initially responded by passing the Housing and Economic Recovery Act (HERA), signed into law on July 30, 2008, which among many other provisions temporarily gave the US Treasury unlimited investment authority in the two firms. Less than two months later, their new regulator, the Federal Housing Finance Agency (FHFA), placed Fannie Mae and Freddie Mac into conservatorship, taking control of the two firms in an effort to curtail the risk of financial contagion and to conserve their value. Concurrently, the Treasury entered into senior preferred stock purchase agreements with each institution. Under these agreements, US taxpayers ultimately injected $187.5 billion into Fannie Mae and Freddie Mac.

This paper begins by describing the business model of Fannie Mae and Freddie Mac and their role in the US housing finance system. Our focus then turns to the sources of financial distress experienced by the two firms and the events that ultimately led the federal government to take dramatic action in an effort to stabilize housing and financial markets. We describe the various resolution options available to US policymakers at the time and evaluate the success of the choice of conservatorship in terms of its effects on financial markets and financial stability, on mortgage supply, and on the financial position of the two firms themselves. Our overall conclusion is that conservatorship achieved its key short-run goals of stabilizing mortgage markets and promoting financial stability during a period of extreme stress. However, conservatorship was intended to be a temporary fix, not a long-term solution. More than six years later, Fannie Mae and Freddie Mac still remain in conservatorship and opinion remains divided on what their ultimate fate should be.

Background

By law, Fannie Mae and Freddie Mac are limited to operating in the secondary "conforming" mortgage market. This terminology means that the two firms can neither lend money to households directly in the primary market, nor deal in mortgages with balances above a certain size—the "conforming loan limits." The conforming loan limits have been adjusted over time, and for 2015 the national limit for single-family properties is $417,000, but can be as high as $625,500 in high-housing-cost areas. Mortgages with principal balances above the conforming loan limits are referred to as "jumbo" loans. Fannie Mae and Freddie Mac are further

limited by law to dealing in mortgages with a downpayment of at least 20 percent, or that maintain equivalent credit enhancement via private mortgage insurance or other means. The two firms otherwise define their own underwriting standards in terms of acceptable credit scores, debt-to-income ratios, and documentation.[1]

Fannie Mae and Freddie Mac's activities take two broad forms. First, their "credit guarantee" business involves the creation of residential mortgage-backed securities by purchasing a pool of conforming mortgages from originators—typically banks or mortgage companies—and then issuing a security that receives cash flows from the mortgage pool. For these "agency" mortgage-backed securities, Fannie Mae or Freddie Mac promise investors timely payments of principal and interest, even if there are defaults and losses on the underlying loans. In return for this guarantee, the firms receive a monthly "guarantee fee," effectively an insurance premium coming out of the borrower's interest payment.

Second, the firms' "portfolio investment" business involves holding and financing assets on their own balance sheets, including whole mortgages, their own agency mortgage-backed securities, nonagency mortgage-backed securities, and other types of fixed income securities. Fannie Mae and Freddie Mac largely fund these assets by issuing "agency" debt. The two firms have historically been highly leveraged, with book equity consistently less than 4 percent of total assets. The firms use financial derivatives, such as interest rate swaps, to help manage the market risk associated with their investment portfolios.

Fannie Mae's and Freddie Mac's federal charters provide a range of benefits that result in lower operating and funding costs (see Frame and White 2005 in this journal), such as a line-of-credit with the US Treasury. These advantages, coupled with two past episodes in which the federal government assisted troubled government-sponsored enterprises (US Government Accountability Office 1990, pp. 90–91), served to create a perception in financial markets that agency debt and mortgage-backed securities were implicitly government guaranteed—despite explicit language on these securities stating that they are not US government obligations. As a result, Fannie Mae and Freddie Mac have been able over the decades to issue debt and mortgage-backed securities at lower yields than their stand-alone financial strength ratings would otherwise warrant, by 20 to 40 basis points (Nothaft, Pearce, and Stevanovic 2002; Ambrose and Warga 2002; Passmore 2005).

This funding advantage was partially passed on to borrowers in the form of lower mortgage rates. Econometric studies find that, prior to the financial crisis, conforming mortgages had lower interest rates than jumbo mortgages, with estimates of the gap ranging from 10 to 30 basis points depending on the sample period and estimation approach (for example, Kaufmann 2014; DeFusco and Paciorek 2014; see McKenzie 2002 for a review of earlier literature).

[1] Some mortgages not meeting Fannie Mae or Freddie Mac's underwriting standards may alternatively be financed using government insurance programs (operated by the Federal Housing Administration or Department of Veterans Affairs). Such loans may be securitized with a public credit guarantee to investors via the Government National Mortgage Association (Ginnie Mae) operated by the US Department of Housing and Urban Development.

In 1992, Congress created a two-part regulatory structure to monitor Fannie Mae and Freddie Mac for compliance with their statutory missions and to limit their risk-taking. Mission regulation was assigned to the US Department of Housing and Urban Development (HUD), while safety-and-soundness regulation became the purview of a newly created Office of Federal Housing Enterprise Oversight (OFHEO) as an independent agency within HUD. Congressional placement of OFHEO within HUD can be viewed as a signal that the housing mission goals were the more important priority.

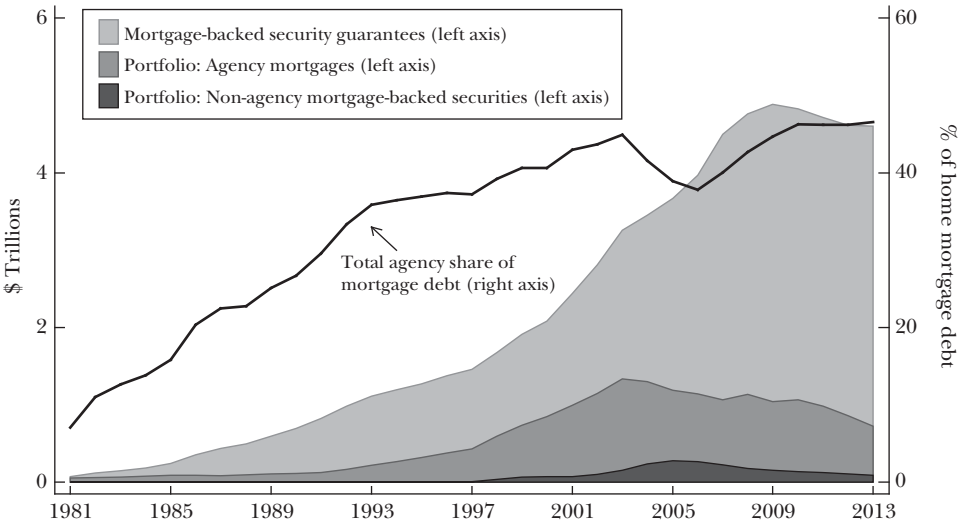
The principal manifestation of mission regulation for Fannie Mae and Freddie Mac was the establishment of affordable housing goals. These goals stipulated minimum percentages of mortgage purchases that finance dwellings in underserved areas and for low- and moderate-income households (see Bhutta 2012 for more details). The goals were progressively increased between 1996 and 2007; for example, the target purchase percentage for low-and-moderate income households was raised from 40 percent to 55 percent during this period. This provided political cover for Fannie Mae and Freddie Mac to expand their business and take on greater risk.

As the safety-and-soundness regulator, OFHEO was authorized to set risk-based capital standards (subject to important statutory limitations), conduct financial examinations, and take certain enforcement actions. However, OFHEO lacked the authority to adjust minimum capital requirements, which were set by statute at very low levels: the sum of 2.5 percent of on-balance sheet assets and 0.45 percent of credit guarantees for agency mortgage-backed securities held by outside investors. The new regulator did not have receivership authority in the event of a failure of either Fannie Mae or Freddie Mac. Finally, OFHEO was subject to the Congressional annual appropriations process and therefore periodically fell victim to political meddling. These and other regulatory deficiencies became clear to many observers (for example, Frame and White 2004 and references therein) but were not addressed until the passage of the Housing and Economic Recovery Act in July 2008.

Figures 1 and 2 highlight the remarkable growth of Fannie Mae and Freddie Mac in recent decades. Figure 1 plots the expansion of the two firms' single-family mortgage credit guarantee and investment portfolios, while Figure 2 plots their cumulative total equity returns compared to the overall market. The stock of agency mortgage-backed securities issued and guaranteed by the two firms (excluding those held by Fannie Mae and Freddie Mac) increased from just $20 billion in 1981 to $3.4 trillion by 2007, the year prior to the start of the conservatorships. Fannie Mae's and Freddie Mac's single-family mortgage investment portfolio holdings (agency mortgages plus nonagency mortgage-backed securities) increased twenty-fold over the same period, from $50 billion to $1.1 trillion. Although the investment portfolios of the two firms have shrunk significantly since they were placed in conservatorship, their total market share inclusive of their mortgage guarantees has continued to grow. The two firms owned or guaranteed 47 percent of single-family mortgage debt outstanding in 2013, compared to 40 percent in 2007 and only 7 percent in 1981. (These figures exclude cross-holdings and ownership of government-guaranteed mortgage assets.)

Fannie Mae and Freddie Mac's share of the mortgage market grew quite steadily between the early 1980s and the early 2000s, although the volume of mortgages they owned or guaranteed accelerated in dollar terms due to overall market growth. The

Figure 1
The Growing Role of Fannie Mae and Freddie Mac in the US Mortgage Market



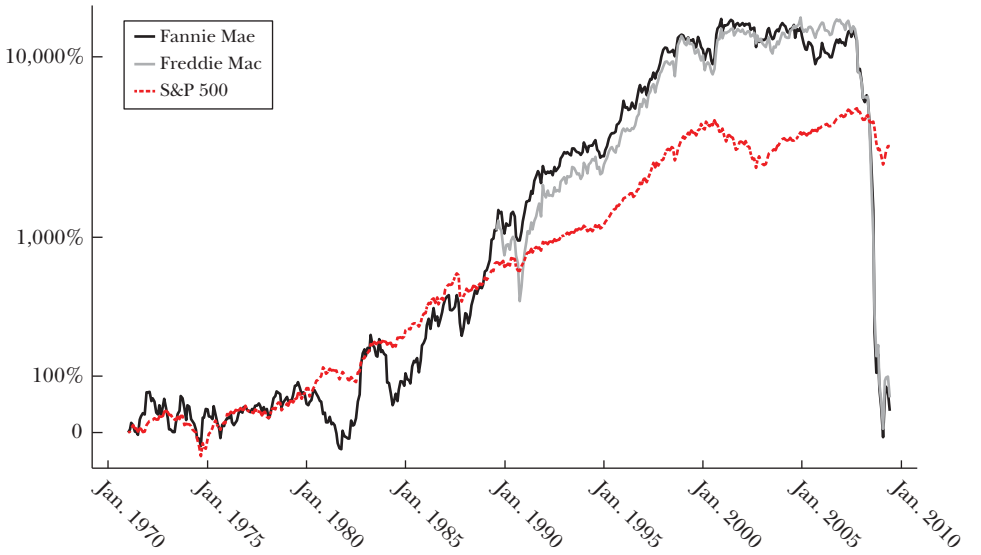
Sources: US Federal Housing Finance Agency (2014) Annual Report to Congress, Federal Reserve Flow of Funds.
Notes: Figure 1 plots the expansion of the two firms' single-family mortgage credit guarantee and investment portfolios. Statistics reflect single-family mortgages only. The category "Mortgage-backed security guarantees" measures agency mortgage-backed securities held by third parties. To avoid double counting, portfolio holdings exclude cross-holdings (that is, securities issued by either of Fannie Mae or Freddie Mac that are owned by the other). They also exclude government-guaranteed FHA loans. The online Appendix to this paper at http://e-jep.org contains more details about figure construction.

two firms' portfolios of retained mortgage assets, which generate significant additional interest income, grew particularly rapidly from the mid 1990s until the accounting scandals that befell the two firms in 2003 (Freddie Mac) and 2004 (Fannie Mae).

The two firms' growing size and profitability was also reflected in their cumulative stock returns shown in Figure 2. Fannie Mae's stock did not outperform the market in the 1970s and 1980s, and experienced a period of high volatility in the early 1980s due to the high interest rate environment that also triggered the demise of many savings and loan associations (or "thrifts"). (Freddie Mac became publicly traded in 1989.) Both firms significantly outperformed the overall stock market in the 1990s, however. These stock price gains reflected expectations and realizations of rapid, profitable growth, achieved through a combination of mortgage market growth, changes in senior management strategy, a greater understanding of how to leverage their existing funding advantage, and the very low statutory capital requirements established in 1992.[2] The two firms also started competing more directly. Historically,

[2] Demand-side forces likely also played a key role. For example, Basel I risk-based capital regulations gave some banks an incentive to swap their mortgages for agency mortgage-backed securities and encouraged other banks to sell mortgage assets outright. This helped spur the firms' credit guarantee and investment portfolio businesses, respectively (Frame and White 2005).

Figure 2
Cumulative Total Equity Returns of Fannie Mae and Freddie Mac Relative to S&P 500



Source: Center for Research in Security Prices.
Notes: Figure 2 plots the natural logarithm of cumulative returns, inclusive of dividends and other distributions, over the period from January 1971–June 2009. The cumulative return for Freddie Mac is set to be at the same level as Fannie Mae's in August 1989, when our total return series for Freddie Mac starts.

Freddie Mac had securitized mortgages originated by savings and loan institutions, whereas Fannie Mae tended to hold mortgages purchased from mortgage banks, but this segmentation broke down over time.

Fannie Mae and Freddie Mac's stock returns became lower and more volatile after 2002 (recall, the figure shows cumulative returns, so a flat line means essentially zero return). Their accounting scandals resulted in increased capital requirements (so-called capital surcharges) that dampened profitability and triggered legislative reform efforts that created additional uncertainty about the firms' future charter values. The firms also faced greater competition from the rapidly growing nonagency securitization market. Figure 2 also illustrates the rising concerns about financial distress at Fannie Mae and Freddie Mac in 2007 and 2008, and shows how the imposition of the federal conservatorships virtually eliminated the value of common shares of the two firms. We focus on this period in the next section.

While Fannie Mae and Freddie Mac traditionally held or guaranteed prime conforming mortgages with low historical default risk, the activities of the two firms were influenced during the 2000s by the rapid growth in the higher-risk "subprime" mortgage market (for a description of this market, see Ashcraft and Schuermann 2008; Mayer, Pence, and Sherlund 2009, in this journal). Although pools of subprime mortgages were generally turned into securities by investment banks rather than by Fannie Mae and Freddie Mac, the two firms were significant investors in these

"nonagency" mortgage-backed securities, which were viewed as profitable investments that also helped satisfy affordable housing goals. By the end of 2007, the two firms owned over $300 billion of nonagency mortgage-backed securities.

There is also some evidence that the riskiness of conforming mortgages owned or guaranteed by Fannie Mae and Freddie Mac increased leading up to 2008, perhaps due to competition from nonagency securitization. For example, at Fannie Mae the percentage of newly purchased loans where the loan amount was 90 percent or more of the appraised property value increased from 7 percent in 2003 to 16 percent by 2007; for Freddie Mac, the corresponding share rose from 5 percent in 2003 to 11 percent in 2007. These statistics likely understate true borrower leverage, due to unreported second loans or "piggyback" mortgages, which became common during the housing boom. The share of loans guaranteed by Fannie Mae and Freddie Mac with nonstandard (and risky) features such as an interest-only period also increased substantially. Subsequent mortgage defaults suffered by the two firms were highly concentrated in the 2005–2008 mortgage vintages.[3]

A range of observers had voiced concerns about the systemic risk posed by Fannie Mae and Freddie Mac some years prior to the financial crisis (for example, Greenspan 2004, 2005), although others suggested the likelihood of an insolvency or liquidity crisis from these firms was very low (for example, Hubbard 2003; Stiglitz, Orszag, and Orszag 2002). The concerns focused on the firms' concentration and hedging of mortgage-related interest rate risk, which seemingly magnified shocks to Treasury and interest rate derivatives markets in the early 2000s (see Eisenbeis, Frame, and Wall 2007 and the references therein).

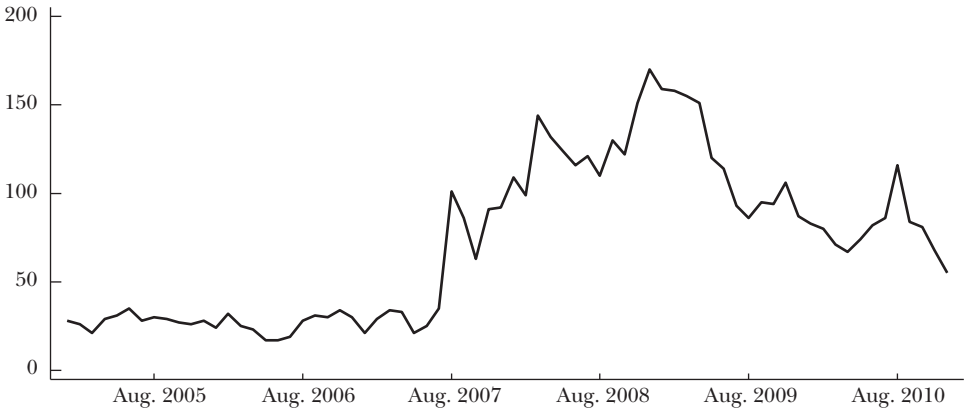
Instead, the two firms were ultimately imperiled by mortgage credit risk, primarily associated with their guarantee activities. The limited attention that policymakers paid to credit risk at Fannie Mae and Freddie Mac was perhaps due to a history of low credit losses on their past guarantees, reflecting both relatively conservative underwriting and a long period of stable or rising home prices. Relatively few observers highlighted the firms' rising exposure to credit risk or anticipated the possibility of a large nationwide decline in home prices.

Events Prior to Conservatorship

US housing and mortgage markets became increasingly stressed during 2007 and 2008 as a result of significant house price declines and the weakening economy. A large number of borrowers found themselves in a situation where the balance on their mortgage exceeded the value of their homes (that is, "negative equity"), which is often a precursor of mortgage default (for example, Foote, Gerardi, and Willen 2008). The tremendous wave of defaults and subsequent foreclosures imperiled many financial institutions with significant exposure to US residential real estate—including Fannie Mae and Freddie Mac. Below, we describe the key events that led

[3] An online Appendix available with this paper at http://e-jep.org, contains statistics about the characteristics of mortgages held or guaranteed by Fannie Mae and Freddie Mac, as well as default rates.

Figure 3
Jumbo–Conforming Spread
(basis points)



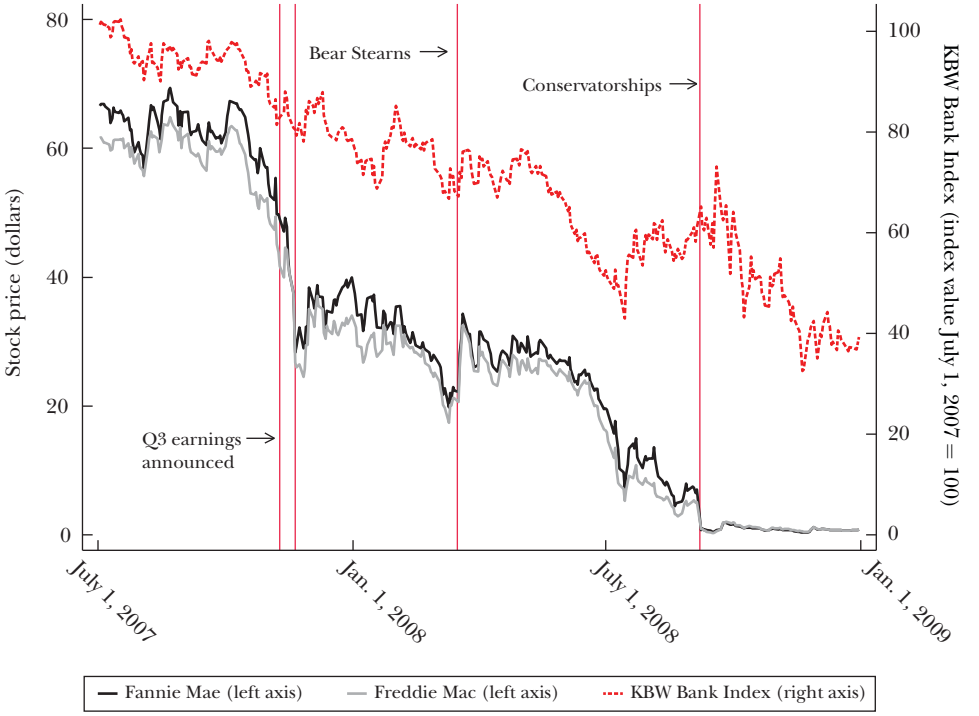
Source: Bankrate, Bloomberg Finance L.P.
Notes: Figure 3 shows the unconditional difference in 30-year fixed rate mortgage interest rates between prime jumbo mortgages and conforming mortgages (monthly averages). Jumbo mortgages have a loan amount exceeding the conforming loan limit, making them ineligible for purchase or securitization by Fannie Mae and Freddie Mac.

to the conservatorships at these two firms; a detailed chronology is provided in an online Appendix available with this paper at http://e-jep.org.

In summer 2007, as subprime mortgage defaults escalated, issuance of nonagency mortgage-backed securities essentially came to a halt, and other financial markets such as the asset-backed commercial paper market similarly dried up (for discussions of these events, see Brunnermeier 2009, in this journal; Dwyer and Tkac 2009). This period is now widely considered to mark the beginning of the financial crisis. As issuance of nonagency mortgage-backed securities froze, interest rates on prime, but nonconforming, "jumbo" mortgages increased significantly—from about 25 to 100 basis points above those for conforming loans eligible for securitization via the still-liquid agency mortgage-backed securities market, as shown in Figure 3. This historically wide spread between jumbo and conforming mortgages persisted throughout the financial crisis, reflecting both the greater liquidity of conforming mortgages, and the heightened value of the agency credit guarantee. The volume of new jumbo mortgages declined, and the role of Fannie Mae and Freddie Mac expanded as commercial banks became increasingly unwilling or unable to hold new mortgages on their balance sheets (Calem, Covas, and Wu 2013; Fuster and Vickery 2015).

Losses at Fannie Mae and Freddie Mac started mounting: they reported a combined net loss of $8.7 billion during the second half of 2007, reflecting both credit losses on the mortgages they had guaranteed or were holding in portfolio, and mark-to-market losses on their investments. Nevertheless, the two firms' role in the mortgage market further expanded following a temporary increase in conforming loan limits to as high as $729,750 under the Economic Stimulus Act

Figure 4
Fannie Mae and Freddie Mac Stock Prices, July 2007—December 2008



Source: Bloomberg Finance L.P.
Note: Vertical lines mark November 9 and 20, 2007 (when Fannie Mae and Freddie Mac announced their earnings for the 3rd quarter of 2007); March 16, 2008 (Bear Stearns acquisition); and September 7, 2008 (conservatorship announcement).

passed in February 2008 (for details, see Vickery and Wright 2013). Furthermore, during the first quarter of 2008, the Office of Federal Housing Enterprise Oversight removed limits on the size of the investment portfolios at Fannie Mae and Freddie Mac and lowered surcharges to each firm's capital requirements so that they could purchase or guarantee additional mortgages. These portfolio limits and capital surcharges had been imposed by the OFHEO between 2004 and 2006 due to concerns about accounting practices at the two firms.

By mid-2008, after adding over $600 billion in mortgage credit exposure over the previous four quarters, the two firms had expanded to almost $1.8 trillion in combined assets and $3.7 trillion in combined net off-balance sheet credit guarantees. But over the year to June 2008, Fannie Mae and Freddie Mac together posted $14.2 billion in losses and saw their capital recede to $41.2 billion (Fannie Mae) and $12.9 billion (Freddie Mac). At this point, their combined capital amounted to only about 1 percent of their exposure to mortgage risks, a tiny cushion in the face of large expected losses.

Investors became increasingly concerned about the financial condition of Fannie Mae and Freddie Mac during summer 2008. Figure 4 illustrates how their

share prices first fell sharply during fall 2007 after both firms reported losses for the third quarter of 2007, and then fell from $25–30 in April 2008 to below $10 in mid-July. Debt investors also increasingly sought clarity from the federal government about whether bondholders would be shielded from losses.

Against this backdrop, and in an effort to calm markets, Treasury Secretary Henry Paulson proposed a plan in July 2008 to allow the Treasury to make unlimited debt and/or equity investments in Fannie Mae and Freddie Mac. (It was in a Senate Banking Committee hearing at this time when Paulson famously stated that "If you've got a bazooka [in your pocket] and people know you've got it, you may not have to take it out" (Paulson 2010).) This plan was incorporated as part of the Housing and Economic Recovery Act, which was signed into law later in July 2008. The law also created the Federal Housing Finance Agency (FHFA), and for the first time granted the new supervisor the authority to place a distressed government-sponsored enterprise into receivership. Immediately following the passage of the new housing legislation, the Treasury began a comprehensive financial review of Fannie Mae and Freddie Mac in conjunction with the FHFA, the Federal Reserve, and Morgan Stanley (Paulson 2010). The Housing and Economic Recovery Act required that FHFA consult with the Treasury and Federal Reserve on any resolution of Fannie Mae or Freddie Mac.

Fannie Mae and Freddie Mac released their second quarter earnings in early August 2008. As shown in Table 1, at this time the two firms were both technically solvent, in the sense that the book value of their equity capital was positive, and indeed exceeded statutory minimum requirements. However, there was a compelling case that, when viewed on an economic basis, both firms were actually insolvent. First, both firms were recognizing large "deferred tax assets" to offset future income taxes ($20.6 billion for Fannie Mae and $18.4 billion for Freddie Mac). Arguably these assets had little immediate value in light of the firms' extremely weak near-term earnings prospects. Excluding these assets, as would have been done for regulatory capital purposes if the two firms had been treated like banks, reduces their measured net worth to $20.6 billion (Fannie Mae) and −$5.5 billion (Freddie Mac). Second, the reported fair market value of their assets (net of liabilities) was significantly lower than book equity, and in Freddie Mac's case was actually negative. Even these fair values may have understated the firms' financial problems, since there is evidence that their accounting reserves against expected future credit losses were also insufficient (US Financial Crisis Inquiry Commission 2011, p. 317). These facts, together with continued deteriorating mortgage market conditions and potential near-term difficulties in rolling over the firms' significant short-term debt (shown in Table 1), created a keen sense of urgency for the US government to take action.

Resolution: Issues, Options, and Actions

Why Was Action Needed?

Our view is that it was appropriate to provide temporary public support for Fannie Mae and Freddie Mac in September 2008. We now present the case

Table 1
Balance Sheet Composition as of June 2008

	Accounting value ($ billions)	
	Fannie Mae	*Freddie Mac*
Assets		
Cash, federal funds, and repurchase agreements	$49.4	$58.8
Investment securities, at fair value	$344.8	$684.7
Agency mortgage-backed securities	$220.4	$490.2
Private-label mortgage-backed securities & revenue bonds	$96.1	$181.6
Other investment securities	$28.3	$12.9
Whole mortgage loans	$418.2	$89.1
Deferred tax assets	$20.6	$18.4
Other assets	$52.9	$28.1
Total assets	**$885.9**	**$879.0**
Liabilities		
Short-term debt (Maturity < 1 year)	$240.2	$326.3
Long-term debt	$550.3	$505.0
Subordinated debt	$9.0	$4.5
Other liabilities	$45.0	$30.2
Total liabilities	**$844.5**	**$866.0**
Equity		
Common stock, other paid-in capital, retained earnings	$32.5	$27.1
Preferred stock	$21.7	$14.1
Treasury stock	($7.3)	($4.1)
Accumulated other comprehensive loss	($5.7)	($24.2)
Total Equity	**$41.2**	**$12.9**
Memo: Off balance sheet credit guarantees (net)	$2,289.9	$1,409.9

Notes: This table provides summarized balance sheet information for Fannie Mae and Freddie Mac as of June 30, 2008. Balance sheet measures are presented at historical cost according to generally accepted accounting principles as reported in each firm's 10-K. Off-balance sheet credit guarantees are from each firm's "monthly summary" and net of their own mortgage-backed securities held on balance sheet. They are contingent liabilities. A more detailed balance sheet is presented in the online Appendix at http://e-jep.org.

for public intervention, drawing on economic theory and information about conditions at the time.

A key argument in favor of intervention was to support the supply of conforming mortgages during a period of severe financial stress. As already discussed, the sharp rise in the spread between jumbo and conforming mortgage interest rates during 2007–2008 was prompted by a freeze in private jumbo securitization, generally attributed to heightened asymmetric information and uncertainty about mortgage credit risk (Leitner 2011). The freeze did not extend to agency mortgage-backed securities because of their implicit government guarantee. Public support of Fannie Mae and Freddie Mac maintained these guarantees and allowed agency securitization to continue and thereby support the supply of conforming mortgages. Theory provides support for the use of public guarantees as a crisis response; as one

example, Philippon and Skreta (2012) present a model in which such guarantees are an optimal intervention in markets subject to adverse selection. Securitization was likely particularly important for mortgage supply during this period because of the limited capacity of banks and other financial intermediaries to hold additional mortgages on their balance sheets due to falling capitalization and the failure of several large lenders (see Shleifer and Vishny 1992 for a model studying the effects of limited industry balance sheet capacity).

Was it important to promote mortgage supply during this period given the already high levels of outstanding US mortgage debt? We would argue "yes," for two reasons.

First, mortgage origination was necessary to enable refinancing of existing mortgages. The overall policy response to the financial and economic crisis involved a significant easing of monetary policy, which works in part by lowering interest rates on existing debt contracts. Such a decrease in rates has been found to lower mortgage defaults (Fuster and Willen 2012; Tracy and Wright 2012; Zhu, Janowiak, Ji, Karamon, and McManus forthcoming) and to stimulate consumption (Keys, Piskorski, Seru, and Yao 2014; Di Maggio, Kermani, and Ramcharan 2014). Interest rates on fixed-rate mortgages, which make up the vast bulk of the stock of US mortgage debt, only respond to lower market rates if borrowers can refinance. Even with the rescue of Fannie Mae and Freddie Mac, lower yields on mortgage-backed securities were only partially transmitted to primary mortgage interest rates during this time (Fuster et al. 2013; Scharfstein and Sunderam 2014). But refinancing would almost certainly have been even more difficult without Fannie Mae and Freddie Mac, considering the tight lending standards for nonconforming mortgages at the time.

Second, continued mortgage supply enabled at least some households to make home purchases during a period of extreme weakness in the housing market.[4] A large body of theory models how changes in credit availability can lead to a negative spiral among asset prices, collateral values, and credit availability (for a prominent example, see Kiyotaki and Moore 1997). Consistent with the spirit of such models, Kung (2014) finds empirically that the local increases in the conforming loan limit in 2008, which made more loans eligible for agency securitization, raised home prices by around 6 percent for homes in San Francisco and Los Angeles that were most likely to be purchased with these newly eligible loans.

These arguments support the use of government guarantees in 2008 to help finance new mortgages. But what about the legacy securities issued by Fannie Mae and Freddie Mac prior to September 2008? In our view, if explicit government support of the firms had not been forthcoming, market perceptions of a material credit risk embedded in existing agency debt and mortgage-backed securities could have substantially destabilized the broader financial system given the sheer volume of such securities outstanding, the large holdings of leveraged institutions such as commercial banks, insurance firms, and securities broker-dealers (an online Appendix available with this paper at http://e-jep.org provides statistics about these holdings) and their widespread use as collateral in short-term funding markets.

[4] RealtyTrac (2014) estimates that around 60–65 percent of single-family home purchases in 2009 involved a new mortgage loan, with the remainder going to all-cash buyers.

Credit losses on agency securities would have exacerbated the weak capital and liquidity position of many already-stressed financial institutions and raised the possibility of forced asset sales and runs (as in the models posited by Diamond and Rajan 2011 or Diamond and Dybvig 1983). Finally, Fannie Mae and Freddie Mac held large positions in interest rate derivatives for hedging. A disorderly failure of these firms would have caused serious disruptions for their derivative counterparties.

A further consideration was that almost $1 trillion of agency debt and mortgage-backed securities was held by foreign official institutions, mainly central banks. Allowing these securities to default would likely have had significant international political ramifications.[5] Furthermore, as emphasized by Paulson (2010) and Acharya et al. (2011), given the widespread perception that agency debt and mortgage-backed securities were implicitly government guaranteed, a default by Fannie Mae or Freddie Mac would potentially raise the risk of questions about creditworthiness of the US government, disrupting the US Treasury debt market and increasing the government's funding costs.

Summing up, Fannie Mae and Freddie Mac were too large and interconnected to be allowed to fail, especially in September 2008 given the deteriorating conditions in US housing and financial markets and the central role of these two firms in the mortgage finance infrastructure. Our view is that an optimal intervention would have involved the following elements:

1) Fannie Mae and Freddie Mac would be enabled to continue their core securitization and guarantee functions as going concerns, thereby maintaining conforming mortgage credit supply.
2) The two firms would continue to honor their agency debt and mortgage-backed securities obligations, given the amount and widely held nature of these securities, especially in leveraged financial institutions, and the potential for financial instability in case of default on these obligations.
3) The value of the common and preferred equity in the two firms would be extinguished, reflecting their insolvent financial position.
4) The two firms would be managed in a way that would provide flexibility to take into account macroeconomic objectives, rather than just maximizing the private value of their assets.
5) The structure of the rescue would prompt long-term reform and set in motion the transition to a better system within a reasonable period of time.

Later in the paper, we evaluate actions taken relative to these five objectives, concluding that the path taken was quite successful on the first three, but less successful on the last two.

[5] Paulson (2010, p. 160) discusses learning on his trip to the 2008 Summer Olympics in Beijing that Russian officials had approached the Chinese government about a joint plan to dump a large portion of their holdings of Fannie Mae and Freddie Mac in an effort to create a financial crisis that would force US authorities to support the firms explicitly. For details on these holdings of agency securities, see the online Appendix to this article available with the paper at http://e-jep.org.

What Action Was Taken?

On September 7, 2008, Director of the Federal Housing Finance Agency James Lockhart, Secretary of the Treasury Hank Paulson, and Chairman of the Federal Reserve Ben Bernanke outlined a plan to stabilize the residential mortgage finance market. This included: 1) placing both Fannie Mae and Freddie Mac into conservatorship; 2) having the Treasury enter into senior preferred stock purchase agreements with both firms; and 3) establishing two new Treasury-operated liquidity facilities aimed at supporting the residential mortgage market—a mortgage-backed securities purchase facility and a standing credit facility. We discuss these steps in turn.

By becoming a conservator, the Federal Housing Finance Agency assumed the responsibilities of the directors, officers, and shareholders of both Fannie Mae and Freddie Mac with the purpose of conserving their assets and rehabilitating them into safe-and-sound condition. Hence the two institutions would continue as going concerns, carry out their usual market functions, and continue to pay their financial obligations. The boards of Fannie Mae and Freddie Mac consented to the appointment of the conservator, although the chief executive officers and directors of each firm were then immediately replaced.

The US Treasury's senior preferred stock purchase agreements sought to ensure that Fannie Mae and Freddie Mac maintained positive net worth going forward. Under the agreements, if the Federal Housing Finance Agency determines that either institution's liabilities exceed their assets under generally accepted accounting principles (GAAP), the Treasury would contribute cash capital equal to the difference, in exchange for senior preferred stock. (Specifically, this preferred stock is senior to the prior existing common and preferred equity of the two firms, but junior to their senior and subordinated debt and mortgage-backed securities.) Each agreement was initially for an indefinite term and for up to $100 billion, although the maximum was raised by subsequent amendments to $200 billion per enterprise in February 2009, then in December 2009 to an unlimited amount through the year 2012. As we discuss in more detail later, under these agreements the two firms jointly ended up drawing a total of $187.5 billion over the course of 2008 to 2011.

The senior preferred stock accrued dividends at 10 percent per year. The senior preferred stock purchase agreements also required both Fannie Mae and Freddie Mac to provide the Treasury with: 1) $1 billion of senior preferred shares; 2) warrants that would allow the purchase of common stock representing 79.9 percent of each institution on a fully diluted basis;[6] and 3) a quarterly commitment fee to be determined by the Treasury and the Federal Housing Finance Agency (as conservator) in consultation with the Federal Reserve.[7] To date, the Treasury has not exercised the warrants

[6] The 79.9 percent ownership stake was selected to avoid the necessity to consolidate the assets and liabilities of Fannie Mae and Freddie Mac onto the government's balance sheet. See Swagel (2009, p. 37).

[7] The senior preferred stock purchase agreements also included various covenants. Specifically, Treasury approval is required before: 1) purchasing, redeeming or issuing any capital stock or paying dividends;

to purchase common stock. In accordance with the terms of the agreement, Treasury waived the commitment fee each period, and then suspended this provision in 2012.

The senior preferred stock purchase agreements also required Fannie Mae and Freddie Mac to begin winding down their retained investment portfolios, starting in 2010, at a rate of at least 10 percent per year until they each fall below $250 billion. This provision was intended to assuage policymaker concerns that these investment portfolios might pose future systemic risk to the financial system.

In September 2008, the US Treasury also created a Government Sponsored Enterprise Credit Facility in which Fannie Mae, Freddie Mac, and the Federal Home Loan Bank System could borrow on a short-term collateralized basis from the Treasury. The facility was never used and expired on December 31, 2009. The Treasury furthermore introduced a temporary Mortgage-Backed Securities Purchase Program under which it could purchase agency mortgage-backed securities in an effort to support the mortgage market. It ultimately acquired $225 billion of these securities, which were subsequently sold in 2011 and 2012.

In August 2012, an amendment to the senior preferred stock purchase agreement was announced, in which the fixed 10 percent dividend on the senior preferred stock owned by Treasury was replaced with a "full income sweep." This implied that all profits made by the two firms would be remitted to Treasury, preventing them from building up positive capital (except for a small net worth "buffer" capped at $3 billion per firm and declining over time). Furthermore, the amendment accelerated the reduction of their investment portfolios, going from a wind-down rate of 10 percent per year to 15 percent. When announcing the amendment, the US Department of Treasury (2012) was explicit that a main goal was to "expedite the wind down of Fannie Mae and Freddie Mac."

Why Conservatorship? What Were the Alternatives?

As "federal instrumentalities," Fannie Mae and Freddie Mac are exempt from the bankruptcy code. However, since its creation in 1992, the Office of Federal Housing Enterprise Oversight had the authority to place Fannie Mae or Freddie Mac into "conservatorship" in an effort to conserve their assets and restore them to a safe-and-sound financial condition. The 1992 law, though, did not provide OFHEO either with any funding to assist with a conservatorship, or with a mechanism to fully resolve financial distress at either firm by apportioning losses to shareholders and creditors (Wall, Eisenbeis, and Frame 2005). Under these constraints, a conservatorship ends up looking a lot like "regulatory forbearance"—that is, allowing distressed firms to violate regulations in order to maintain their operations in the hope that they will grow back to financial health.

The Housing and Economic Recovery Act enacted in July 2008 expanded the supervisory options available. First, the law granted receivership authority to the

2) terminating conservatorship other than in connection with receivership; 3) increasing debt to greater than 110 percent of that outstanding as of June 30, 2008; or 4) acquiring, consolidating, or merging into another entity.

newly created Federal Housing Finance Agency.[8] This authority extends those of a conservator by allowing the supervisor to liquidate assets and/or restructure the firm in an effort to limit taxpayer losses. However, formally extinguishing the firms would require Congress to revoke their charters. Absent Congressional action, receivership for either firm would require the creation of a limited life entity (a "bridge entity" akin to a "bridge bank" used when the Federal Deposit Insurance Corporation puts a bank into receivership) that would be financially viable and could maintain the Congressional charter.[9]

Second, as mentioned above, the Housing and Economic Recovery Act of 2008 provided the US Treasury with authority to make unlimited investments in securities of Fannie Mae and Freddie Mac conditional on an "emergency determination" by the Treasury Secretary and agreement from the firm(s) on the terms and conditions of the investment. This investment authority was provided temporarily, through the end of 2009.

Once the federal government decided to rescue Fannie Mae and Freddie Mac and to invest public money, the choice was whether to utilize receivership or conservatorship. This choice became principally about which classes of creditors or shareholders would be made to suffer losses. (For the reasons outlined at the beginning of this section, it seemed unwise in the middle of a financial crisis to follow a course of action that would impose losses on holders of agency debt or mortgage-backed securities.) In the case of conservatorship, US Treasury purchases of common equity would restore the two firms to financial health but would represent a public bail-out of all claimants. Alternatively, the Treasury could purchase a more senior class of securities, which would benefit holders of even more senior obligations but largely wipe out the value of junior obligations. With a receivership, government funding could be used to capitalize the "bridge" entity in an effort to support senior creditors and any other claimants that the government wanted to protect. Subsequently, the Treasury would be expected to hold an initial public offering for the bridge entity in an effort to monetize the taxpayers' investment. Indeed, the Housing and Economic Recovery Act required that the bridge entity

[8] The idea of providing the supervisor of Fannie Mae and Freddie Mac with receivership authority had been debated in the years prior to the financial crisis. Some policymakers, including those at the Federal Reserve and Treasury Department, viewed this as a way to impose greater market discipline on Fannie Mae and Freddie Mac by exposing their bondholders to potential loss. Of course, this increased market discipline would be conditional on receivership being viewed as a credible alternative by the markets. Many legislators, however, were concerned that such supervisory authority would raise the cost of housing finance.

[9] In the absence of any government funding, a receivership utilizing a "bridge" structure would generally work in the following way. The Federal Housing Finance Agency would first evaluate the current and expected performance of the assets and off-balance sheet credit guarantees. "Good assets" expected to perform would then be transferred to the new bridge entity, with the "bad assets" remaining with the original institution. The difference in value between the good and bad assets plus the amount of required capital would represent the amount of loss to be apportioned to claimants in order of priority within the original capital structure: that is, common stockholders, preferred stockholders, subordinated bondholders, and senior bondholders. Mortgage-backed securities investors would maintain their interest in the underlying loans with any shortfall treated as a senior unsecured claim.

be sold within two years of creation (although it includes an option to extend this period by up to three years).

If the US Treasury had not received financing authority in the Housing and Economic Recovery Act, receivership would likely have provided the better opportunity for ultimately stabilizing the mortgage market. However, given the depth of the problems at Fannie Mae and Freddie Mac, receivership would likely have involved some losses being borne by senior creditors (that is, holders of agency debt and mortgage-backed securities) and a breach of the implicit government guarantee. Conditional on Treasury financing, there were several reasons why the conservatorship was preferable to receivership.

First, in the summer of 2008, there was significant uncertainty about the housing market and future losses at Fannie Mae and Freddie Mac. The presence of this uncertainty meant that, given the time frame allowed, restructuring the two firms via receivership would entail some risk that they could potentially fail again. Hence, receivership might not have solved the critical near-term problem.

Second, the business model of the government-sponsored enterprises had been the subject of intense debate in the years leading up to their failure. The structure of the conservatorship agreements essentially placed Fannie Mae and Freddie Mac in a "time-out." Receivership, by contrast, would have reorganized and released the two firms (at least within five years). The thinking at the time was that conservatorship would force Congress to address the problems of this business model, or else face the long-term prospect of government control of the US housing finance system.

Third, receivership raised an operational concern relating to the treatment of derivatives as "qualified financial contracts" (as discussed by Paulson 2010). Receivership required a determination within one business day about the status of individual counterparties: specifically, whether their claims would be transferred to the "good" entity or remain with the "bad" entity. Depending on that determination, counterparties held the option to terminate net positions. Under law, however, the conservatorship did not trigger these termination options in derivatives contracts (US Federal Housing Finance Agency 2008). Thus, receivership would have created greater uncertainty about business continuity and derivatives counterparty actions.

Finally, conservatorship still allowed for the receivership option to be chosen in the future if a subsequent administration felt that it was a better course of action.

Another alternative option was to nationalize Fannie Mae and Freddie Mac, by buying more than 80 percent of the firms' equity and thereby taking a controlling interest. However, as Paulson (2010) describes in his book, the Bush administration was opposed to nationalization or anything that looked like open-ended government involvement. Relative to conservatorship, nationalization would have given the administration more direct control over Fannie Mae and Freddie Mac but would have required the firms to be put on the government's balance sheet. The 2012 "full income sweep" amendment discussed above effectively narrows the difference between conservatorship and nationalization by transferring essentially all profits and losses from the firms to the Treasury.

Could the US Treasury, instead of taking control of (or liquidating) Fannie Mae and Freddie Mac, have calmed financial markets by simply buying up large quantities of agency debt and mortgage-backed securities? Direct purchases could have removed material risk from the financial institution balance sheets. However, a resolution of the financial distress at Fannie Mae and Freddie Mac would still have been necessary in order to ensure continued mortgage credit availability. The sheer quantity of agency securities outstanding, around $5 trillion in total, would also have made a repurchase program challenging or impossible to implement in practice, given the limited time frame. Such a program would have needed to be much larger than the Troubled Asset Relief Program later used to recapitalize banks.

Effects of the Conservatorship

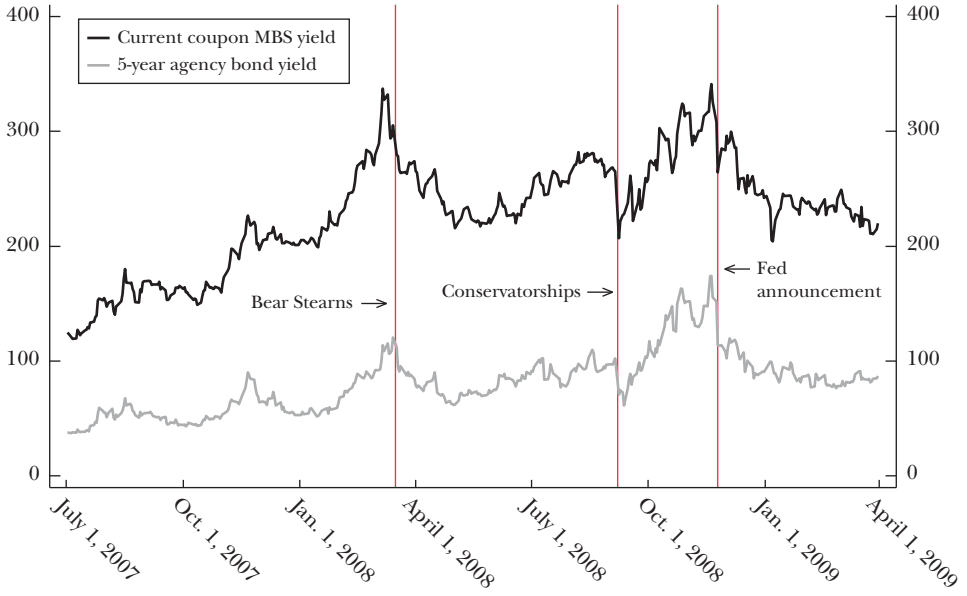
Effects on Financial Markets

The intent of the senior preferred stock purchase agreements and Treasury liquidity facilities was to maintain the firms' operations and to provide assurances to holders of Fannie Mae's and Freddie Mac's debt and mortgage-backed securities. By extension, these actions were expected to both lower and stabilize the cost of mortgage finance. Figure 5 illustrates the announcement effect of the actions taken by looking at the yields of Fannie Mae five-year debt and "current coupon" mortgage-backed securities, both in terms of spreads to five-year Treasury bonds. On the first trading day following the conservatorship announcement, these spreads fell by about 30 basis points (five-year debt) and 50 basis points (mortgage-backed securities). In turn, the fall in mortgage-backed securities yields was followed by a decline in conforming mortgage rates by about 40 basis points within one week. Thus, in the months prior to the announcement, the risk of a potential default by Fannie Mae and Freddie Mac seems to have substantially increased their funding costs and the cost of mortgage credit. At least in the short run, the conservatorship announcement calmed the fears of investors.

As would be expected, the agreements through which the government received preferred stock had significant negative consequences for the existing stockholders. Fannie Mae and Freddie Mac common shares quickly fell below $1 (down from $60 just 12 months earlier), and the Federal Housing Finance Agency subsequently directed both firms to delist from the New York Stock Exchange. Preferred shares suffered a similar fate. Indeed, several community banks became financially distressed as a result of having to write-down the value of their holdings of preferred stock in the two firms (Rice and Rose 2012). Perhaps surprisingly, the two firms maintained their payments on the relatively small amount of subordinated debt that they had outstanding.

The positive bond market reaction, coupled with a relatively smooth operational transition, suggested that the conservatorships at Fannie Mae and Freddie Mac were a success, at least initially. However, as the financial crisis intensified later in the fall of 2008 in the wake of the Lehman Brothers bankruptcy and other events,

Figure 5
Yields on Fannie Mae Debt and Mortgage-Backed Securities (MBS), July 2007–March 2009
(spread in basis points relative to five-year Treasury bonds)

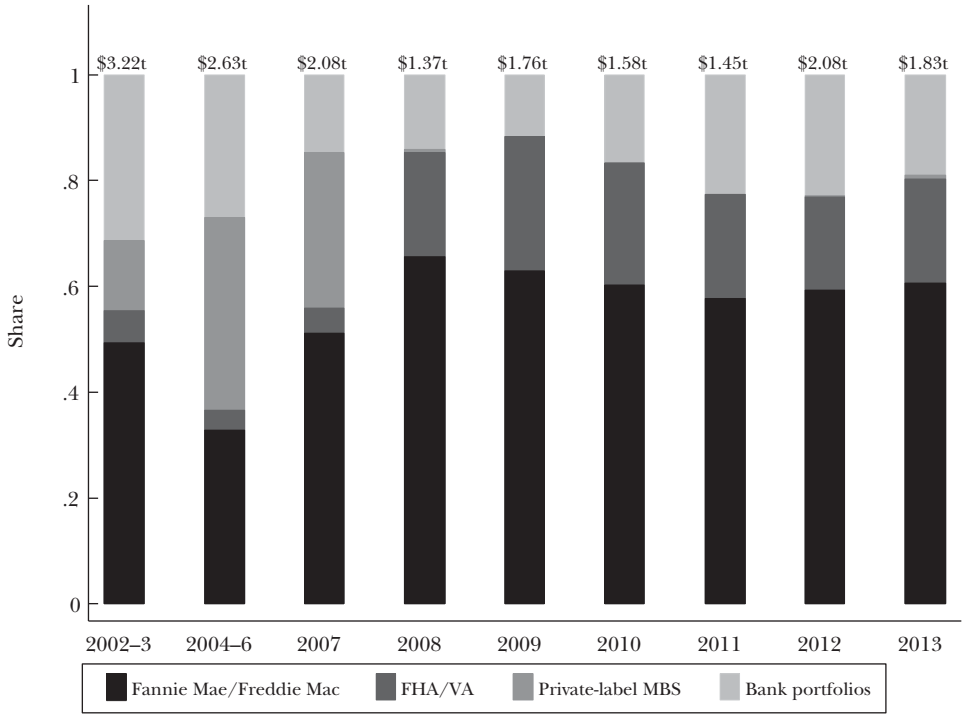


Sources: J.P. Morgan Chase, FRED (Federal Reserve Bank of St. Louis).
Notes: Figure 5 shows the yields of Fannie Mae five-year debt and "current coupon" mortgage-backed securities, both in terms of spreads to five-year Treasury bonds. Vertical lines mark March 16, 2008 (Bear Stearns acquisition); September 7, 2008 (conservatorship announcement); and November 25, 2008 (Fed asset purchase announcement). "Current Coupon MBS" refers to yield of hypothetical mortgage-backed security (MBS) trading at par (see Fuster et al., 2013, for details). The gap between MBS yields and Treasury or swap yields after accounting for the value of the embedded prepayment option (the "option-adjusted spread") displayed qualitatively similar patterns over this period (not shown).

yields on Fannie Mae and Freddie Mac obligations climbed back and soon exceeded their pre-conservatorship levels. This increase appears to have resulted primarily from a general flight to liquidity as well as tight financing conditions during the fall of 2008, rather than a reassessment by the market of what conservatorship would imply for the credit risk of the two firms' bonds going forward (as Krishnamurthy 2010 explained in this journal).

Regardless of the cause, the attendant increase in mortgage rates worried policymakers and became an important contributor to the Federal Reserve's decision to engage in a "large-scale asset purchase program"—commonly referred to as "quantitative easing." On November 25, 2008, the Fed announced that it would purchase up to $500 billion of agency mortgage-backed securities and up to $100 billion of agency debt. As shown in Figure 5, this announcement substantially reduced yield spreads for agency securities, which subsequently normalized over the first quarter of 2009. (For discussions of the channels through which the large-scale

Figure 6
Shares of Different Funding Channels for Newly Originated Mortgages



Source: Inside Mortgage Finance.
Notes: Numbers at the top of each bar indicate total first-lien issuance for the year in trillions of dollars (in case of 2002–2003 and 2004–2006, these are annual averages). "FHA/VA" stands for Federal Housing Administration and the Veterans Administration, which are government agencies that insure loans that are then securitized in Ginnie Mae mortgage-backed securities. "MBS" stands for mortgage-backed securities.

asset purchases affected financial markets, see Gagnon, Raskin, Remache, and Sack 2011; Hancock and Passmore 2011; or Krishnamurthy and Vissing-Jorgensen 2011.) Even though the Fed intervention appears to have lowered yield spreads, this does not mean that, had it come earlier, such an intervention would have stabilized Fannie Mae and Freddie Mac, as the underlying solvency issue would not have been addressed. Indeed, it seems likely that restoring the financial condition of Fannie Mae and Freddie Mac was an important precondition for the Federal Reserve to have been willing to purchase agency securities in the first place.

Effects on Mortgage Lending

Following the decrease in conforming mortgage rates in late 2008, mortgage originations (primarily refinancings) surged, as did issuance of agency mortgage-backed securities, since the conservatorship enabled the credit guarantee businesses of Fannie Mae and Freddie Mac to continue uninterrupted. As shown in Figure 6, since 2008, Fannie Mae and Freddie Mac have guaranteed around

60 percent of originated mortgages, the Federal Housing Administration and the Veterans Administration have insured about 20 percent (securitized by Ginnie Mae), with the remainder held as whole loans by commercial banks. Private-label residential mortgage securitization, which funded more than one-third of mortgages over 2004–2006, has remained close to zero since 2008. Fannie Mae and Freddie Mac's market share is thus higher than ever and almost twice what it was during the height of the housing boom.

The credit profile for Fannie Mae and Freddie Mac's new business has improved since the crisis, as illustrated by the fact that the average credit score on newly guaranteed single-family mortgages increased from below 720 in 2006–2007 to around 760 since 2009 on a scale from 300 to 850 (US Federal Housing Finance Agency 2013). An important reason for this increase in credit scores is that Fannie Mae and Freddie Mac in early 2008 introduced "loan level price adjustments," which are risk-based up-front fees determined by the loan-to-value ratio and the borrower's credit score. These up-front fees have contributed to a steady increase in the overall guarantee fees for new mortgages. For example, Fannie Mae's average effective guarantee fee on new loans tripled from 21 basis points in the first quarter of 2009 to 63 basis points in the first quarter of 2014. Of this increase, 10 basis points was mandated by Congress to fund the 2012 payroll tax reduction.

The Composition of Losses and the Return to Profitability

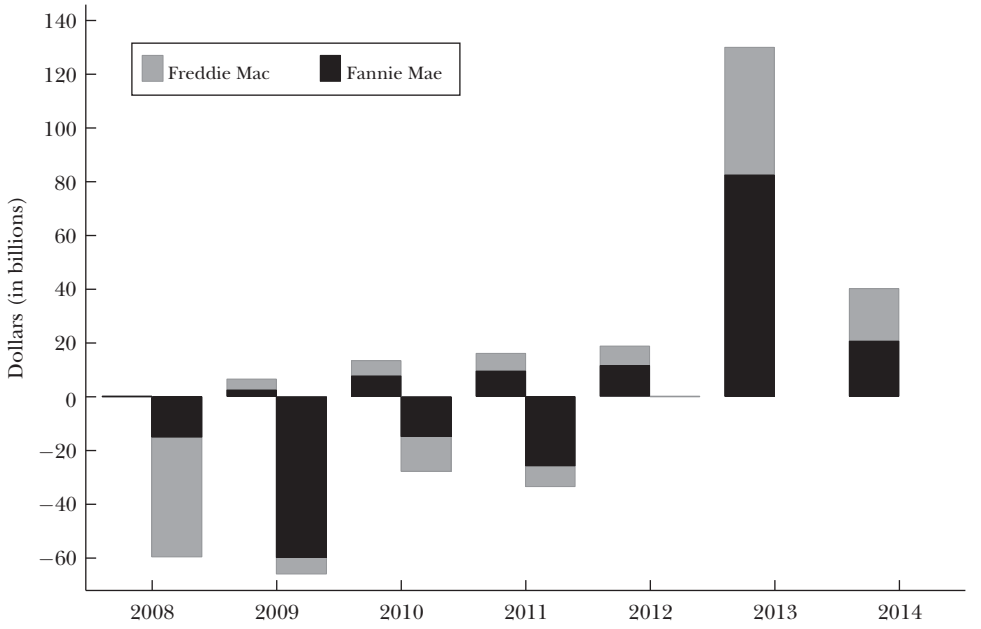
Figure 7 shows the financial consequences of the rescue for the US Treasury. The negative bars show the annual draws by Fannie Mae and Freddie Mac under the senior preferred stock purchase agreements, while the positive bars show the dividends paid. Over the first years of the conservatorship, both firms required very substantial support, but more recently, they have remitted large dividend payments back to the US Treasury.

From 2008 to 2011, Fannie Mae and Freddie Mac posted total combined losses (in terms of comprehensive income) of $266 billion and required $187.5 billion of Treasury support. The biggest contributor to these staggering losses was single-family credit guarantees, which generated about $215 billion in losses over this period, almost all due to provisions for credit losses (US Federal Housing Finance Agency 2011).[10] A second contributor was the dividends on the senior preferred stock held by the US Treasury (paying 10 percent per year), which totaled $36 billion over this period. Perhaps surprisingly, Fannie Mae's and Freddie Mac's investment portfolios, which at first had suffered large losses ($83 billion in 2008), actually generated $2 billion in comprehensive income over this entire period.

In 2012, as house prices stabilized and delinquency rates declined, both Fannie Mae and Freddie Mac stopped losing money on their credit guarantees. Given that their investment portfolios were again profitable, the firms together earned $16 billion

[10] Single-family credit guarantees reflect both guarantees of the firms' agency mortgage-backed securities and whole loans retained on their balance sheets. While losses on the former exceeded the latter, exactly quantifying the two is difficult due to a change in accounting rules in 2010 (US Federal Housing Finance Agency, Office of Inspector General 2012).

Figure 7
Annual Treasury Draws and Dividend Payments, 2008–2014



Source: Fannie Mae and Freddie Mac Financial Results Releases, 3rd quarter of 2014.
Notes: Negative numbers represent draws by Fannie Mae and Freddie Mac, positive numbers represent dividends paid to Treasury. Draws and dividend payments occur one quarter after profits or losses are made.

(after dividend payments to the Treasury). This money was subsequently remitted to the Treasury under the full income sweep amendment to the senior preferred stock purchase agreements noted earlier, which became effective in January 2013.

One consequence of the firms' return to profitability was that their deferred tax assets (which are used to offset taxable income) became useable, and were revalued. As a result, Fannie Mae posted a record profit of $58.7 billion in the first quarter of 2013, and the same happened for Freddie Mac in the third quarter ($30.4 billion). The firms jointly paid dividends of $130 billion to the Treasury during 2013. As of end-2014, the cumulative Treasury dividend payments by Fannie Mae and Freddie Mac have now exceeded their draws: specifically, Fannie Mae has paid $134.5 billion in dividends in comparison to $116.1 billion in draws, while Freddie Mac has paid $91.0 billion in dividends in comparison to $71.3 billion in draws.

Should these figures be interpreted to mean that the Treasury, and therefore taxpayers, have been "repaid" by Fannie Mae and Freddie Mac, and that the two firms should now pay dividends to their regular shareholders again? The answer is no. As an economic matter, one cannot simply compare nominal cash flows but must also take into account that the Treasury took on enormous risk when rescuing the two firms in 2008 and should therefore earn a substantial risk premium, similar

to what private investors would have required at the time, in addition to the regular required return (Wall 2014). Furthermore, the effective guarantee has lowered funding costs for Fannie Mae and Freddie Mac and thereby directly contributed to their profits. The US Congressional Budget Office (2010) took these factors into consideration when calculating the total subsidy provided to the firms. Finally, as indicated earlier, the Treasury never collected its commitment fee, which if fairly priced and paid would have significantly reduced the earnings of the two firms. That said, there is some controversy surrounding these issues. In particular, several shareholder lawsuits are contesting the legality of the "sweep" amendment, although with little success to date.[11]

Evaluating the Conservatorships

Earlier, we outlined five desirable objectives of an optimal intervention in response to Fannie Mae and Freddie Mac's financial distress. We believe that the conservatorships largely accomplished the first three objectives, relating to short-run financial stability and credit supply. First, the conservatorships, and particularly the financial support provided by the US Treasury, enabled Fannie Mae and Freddie Mac to support mortgage supply through the crisis and its aftermath. Second, holders of agency debt and mortgage-backed securities did not suffer credit losses (despite the substantial defaults by individual mortgage borrowers), insulating the broader financial system from contagion effects due to the failure of the two firms. Third, both common and preferred equity holders were effectively wiped out, consistent with market discipline. Inconsistent with this objective, however, subordinated debt did not experience losses. While this debt represented only a small part of the liability structure of the two firms, allowing subordinated debt holders to suffer losses may have been desirable in signaling that such debt is indeed risky, thereby curbing moral hazard in similar institutions going forward.

The conservatorship structure was arguably less successful on the fourth objective of aligning the activities of Fannie Mae and Freddie Mac with broader macroeconomic objectives during the Great Recession. The key mission of the conservatorships is to return the two firms to financial health. One year into the conservatorships, Federal Housing Finance Agency Director Lockhart (2009) noted: "We recognize that FHFA's duties as conservator means just that, conserving the Enterprises' assets. This is our top goal."

This focus on the financial performance of the two firms conflicted to some degree, however, with other public policy objectives during this period. One example of this ongoing tension is that, following conservatorship, Fannie Mae and

[11] At the time of this writing, the most recent relevant judgment was that on September 30, 2014: Judge Royce Lamberth of the US District Court for the District of Columbia dismissed several of these claims, based on the view that the Housing and Economic Recovery Act of 2008 empowered Treasury and the Federal Housing Finance Agency to change the terms of the senior preferred stock agreements in this manner. Lamberth's Memorandum Order is at https://ecf.dcd.uscourts.gov/cgi-bin/show_public_doc?2013mc1288-46.

Freddie Mac aggressively enforced "representations and warranties" made by entities that had sold mortgages to them. In practice, the two firms tried to "put back" defaulted mortgages to the originator or seller of the loan, forcing that entity to bear the credit losses.[12] This action was typically justified by flaws in the original documentation or loan underwriting, although importantly, it is not required that the defect be shown to have contributed to mortgage defaults. A consequence of this approach is that the fear of violating representations and warranties on new loans has been cited (especially by originators) as a contributing factor behind tight underwriting standards and higher costs of mortgage lending since the financial crisis (Goodman and Zhu 2013). This tightening of mortgage credit supply has not been helpful to the ongoing recovery of the housing market.

A second example is the role of "principal writedown" (a certain percentage of the borrower's mortgage balance is forgiven) as a policy tool. By the fourth quarter of 2009, an estimated 11.3 million mortgages or 24 percent of borrowers were in negative equity (First American CoreLogic 2010). Borrowers with negative equity are more likely to default, and to produce larger default losses. Such defaults can generate negative externalities, such as reducing prices of nearby properties (Campbell, Giglio, and Pathak 2011). In addition, many argued that the larger issue of debt overhang contributed to lower consumption and created a persistent headwind to economic growth (for example, Mian and Sufi 2014). Absent an explicit policy to address mortgage-related negative equity, this debt overhang would only unwind slowly over time through foreclosures, debt amortization, and any future home price appreciation.

The primary federal program for assisting mortgage borrowers at risk of default was the Home Affordable Modification Program (HAMP), introduced in 2008. Initially, HAMP focused on reducing mortgage payments through reducing interest rates and extending loan terms. Some argued, however, that principal writedown could be a more effective intervention for underwater borrowers (Haughwout, Okah, and Tracy 2010; for an alternative view, see Adelino, Gerardi, and Willen 2014; Eberly and Krishnamurthy 2014). In June 2010, the Treasury expanded HAMP to include a "principal writedown alternative," known as HAMP-PRA. The Federal Housing Finance Agency decided that Fannie Mae and Freddie Mac would not participate in this program, however, due to moral hazard concerns (Fannie Mae 2012). Putting aside the relative merits of principal writedown as a policy tool, what is instructive is the contrast between the broader housing policy perspective of the Treasury versus the FHFA's narrower financial performance goals. In his book, former Treasury Secretary Geithner (2014) recalls: "It was amazing how little actual authority we had over Fannie and Freddie, considering they were entirely dependent on Treasury's cash to stay alive."

[12] Fannie Mae estimates that 3.7 percent of single-family loans acquired between 2005 and 2008 were put back to lenders (source: Fannie Mae 10-K 2013, p. 143). The Federal Housing Finance Agency has also reached a number of settlements with financial institutions related to securities law violation or fraud involving private-label securities purchased by Fannie Mae and Freddie Mac during the boom, totaling more than $16 billion as of mid-2014 (http://www.fhfa.gov/Media/PublicAffairs/Pages/FHFAs-Update-on-Private-Label-Securities-Actions.aspx).

The conservatorships to date have also strikingly failed in relation to our fifth and final objective of producing long-term mortgage finance reform. As Paulson (2010) writes in his book, "We described conservatorship as essentially a 'time out,' or a temporary holding period, while the government decided how to restructure the [government-sponsored enterprises]." However, starting the conservatorships turned out to be easier than ending them, and the "time out" has now stretched into its seventh year.

On February 11, 2011, the US Treasury and Department of Housing and Urban Development (2011) issued a joint white paper on residential mortgage reform. In a press release, Treasury Secretary Geithner described the white paper as follows: "This is a plan for fundamental reform to wind down the [government-sponsored enterprises], strengthen consumer protection, and preserve access to affordable housing for people who need it." But the white paper was only a plan to develop a plan. While the paper outlined three broad possible alternatives for reform, it offered only options without specifics.

Although there appears to be broad consensus that Fannie Mae and Freddie Mac should be replaced by a private system—perhaps augmented by public reinsurance against extreme tail outcomes—substantial disagreement remains about how to implement such a system. The many legislative proposals to date all reflect the cross-currents of trying to protect the taxpayer, preserve support for the 30-year fixed rate mortgage, and keep homeownership affordable to a wide spectrum of borrowers.[13] As yet, there is still no agreed-upon plan for the future of residential mortgage finance.

Conclusions and the Road Ahead

The public actions taken to support Fannie Mae and Freddie Mac were successful in their short-term aims of supporting the housing market and removing the two firms as an immediate source of systemic risk to the financial system. However, the conservatorships have not yet achieved the goal of reforming the system of residential mortgage finance.

The path forward for reform of Fannie Mae and Freddie Mac does not look promising. As time passes since September 2008, the perceived urgency for reform seems to recede. Delay prolongs the uncertainty over the government's future role in residential mortgage finance, which in turn is a deterrent to private capital re-entering the market, and makes the government's role appear more difficult to replace. Delay also raises the likelihood that deeper reform will be judged as too difficult to accomplish, and raises the risk that the conservatorships are ended by returning Fannie Mae and Freddie Mac to private status with only minor changes to

[13] In the US Senate in 2014, the Housing Finance Reform Act of 2013 (S.1217) sponsored by then-Banking Committee Chairman Tim Johnson (D-SD) and Ranking Member Mike Crapo (R-ID) passed through the Banking Committee. However, it is unclear whether this bill can provide the framework for a future reform bill. The current Banking Committee Chairman Senator Richard Shelby (R-AL) voted against the bill, and it is unclear how much support the bill would find in the House of Representatives.

their charters. That is, the key recommendation of the US Treasury and US Department of Housing and Urban Development (2011) white paper—that Fannie Mae and Freddie Mac should be wound down—would in fact not come to pass. This outcome would be a colossal missed opportunity to put US residential mortgage finance on a more stable long-term footing.

■ *The views expressed here are those of the authors and not necessarily those of the Federal Reserve Bank of Atlanta, the Federal Reserve Bank of New York, or the Federal Reserve System. We thank our discussant Amir Sufi and participants at the symposium held by the Journal of Economic Perspectives at the University of Chicago for their thoughtful comments. We also received helpful suggestions from many others, including Adam Ashcraft, David Autor, Mike Fratantoni, Kris Gerardi, Laurie Goodman, Joseph Gyourko, Chang-Tai Hsieh, Wayne Passmore, David Scharfstein, Timothy Taylor, Larry Wall, Larry White, Paul Willen, and Joshua Wright. We also thank Karen Shen and Ulysses Velasquez for research assistance. Any remaining errors are the authors' responsibility.*

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Journal of Economic Perspectives—Volume 29, Number 2—Spring 2015—Pages 53–80

An Assessment of TARP Assistance to Financial Institutions

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How should economists and policymakers evaluate the assistance provided to financial institutions during the recent financial crisis, and in particular the assistance provided through the 2008 Troubled Asset Relief Program, commonly known as TARP? We examine that question in five parts: 1) What did policymakers do? 2) What are the proper objectives of interventions like TARP assistance to financial institutions? 3) Did TARP succeed in those economic objectives? 4) Were TARP funds allocated purely on an economic basis, or did political favoritism play a role? 5) Would alternative policies, either alongside or instead of TARP, and alternative design features of TARP, have worked better?

In assessing the TARP, we distinguish between the assistance provided to very large banks and that provided to other banks. The largest banks were treated very differently: they were pressured to participate in the initial TARP program, and some were also pressured to participate (through stress testing) in various second-stage programs. Furthermore, the second-stage investments made into these large institutions (which were justified by a belief that these institutions were special because they were "too big to fail") sometimes took very different and riskier forms from the preferred stock and warrant investments made in other banks under the first phase of TARP.

TARP was not a single approach to assisting weak banks but rather a variety of changing solutions to a set of evolving problems. Understanding and evaluating it as

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http://dx.doi.org/10.1257/jep.29.2.53 doi=10.1257/jep.29.2.53

such produces a healthy respect for the political constraints that bailout programs face and also points to shortcomings in the ways economists account for the costs of such programs. The political constraints that TARP confronted limited its structure and effectiveness and encouraged it to employ implicit options as a means of assistance, which made the costs of TARP assistance higher than conventional cost calculations have recognized.

Six years after the passage of TARP, it remains hard to measure the total social costs and benefits of the assistance to banks provided under TARP programs. TARP's passage was associated with significant improvements in financial markets and the health of financial intermediaries, as well as an increase in the supply of lending by recipients. However, a full evaluation must also take into account other factors: the risks borne by taxpayers in the course of the bailouts; moral-hazard costs that could result in more risk-taking in the future; and social costs related to the perceived unfairness of the bailouts and the evidence of corruption in the administration of TARP. These effects are difficult to measure. In addition, the TARP experience offers some lessons about how best to assist financial institutions when such assistance is deemed necessary. Going forward, it may be advisable to design a bank assistance program in advance so that its design features can reflect more thoughtful and less politicized judgments about optimal structure and about the social costs and benefits of mitigating systemic risk in the banking system.

The Crisis of 2007–2009 and the Creation of TARP Assistance for Financial Institutions

Policymakers initially responded to the financial crisis in late 2007 and into 2008 with various emergency initiatives: for example, new Federal Reserve lending facilities for banks and other financial institutions; Fed-assisted bailouts of the investment bank Bear Stearns in March 2008; the conservatorship and Treasury "bazooka" bailout of Fannie Mae and Freddie Mac in the summer of 2008; and the bailout of the insurance company AIG in September 2008.[1] The decision in September 2008 not to bail out another investment bank, Lehman Bros., coincided with the continuing deepening of the crisis, which was visible in the price declines suffered by risky assets and bank stocks. That deepening reflected a process of ongoing learning about the extent to which many financial institutions held positions related to deeply troubled assets—"subprime" and "Alt-A" mortgages and the securities backed by them.

By late September 2008, market prices for the shares of the largest banks, including Citigroup, Goldman Sachs, Morgan Stanley, and JPMorgan Chase, had fallen dramatically. The implied market equity ratios (the ratio of market value of equity to the market value of assets) of these banks had fallen so much that

[1] For an overview of the financial crisis of 2007–2009 and the various government responses to it, see Calomiris, Eisenbeis, and Litan (2011).

in some cases those ratios indicated market perceptions of potential insolvency (Calomiris and Herring 2013). As perceptions of default risk rose, banks found it hard to roll over their uninsured debts. Amounts and maturities shrank in markets involving overnight lending between large banks, like the federal funds and LIBOR (London Interbank Offered Rate) markets, and banks hoarded increasing amounts of cash (Heider, Hoerova, and Holthausen forthcoming; Gorton and Metrick 2012; Covitz, Liang, and Suarez 2013).

Amidst this turmoil, as the net worth of banks plummeted, some of the largest financial institutions succumbed to failure or acquisition, and the surviving ones scrambled to pay off maturing debts and restore confidence. Federal Reserve and Treasury officials became convinced that a systematic approach to financial system solvency risk was needed—not just expanded Fed lending programs and bailouts in response to some individual failures—to maintain confidence in the financial system and to ensure that banks continued to supply loans and other essential financial needs of the economy.

Treasury Secretary Henry Paulson and Fed Chairman Ben Bernanke testified numerous times together before Congress in mid- to late-September 2008 in favor of shoring up the banking system with additional measures to prevent a systemic collapse. Paulson proposed government assistance to banks in the form of support for selling troubled mortgage-related assets at prices that were more reflective of their long-term earnings potential, which he argued were far in excess of their current prices. The discussion in Congressional hearings of options for assistance was narrowly confined to the Secretary's proposal; independent voices with alternative views on whether or how to provide systemic assistance to the banking system were not invited to testify before Congress in the weeks it deliberated over TARP.[2]

Secretary Paulson appeared repeatedly to defend what became known as the Troubled Asset Relief Program (TARP). It took about three weeks for Congress to approve TARP. Some of the initial Congressional resistance to the bailout plan was eroded by the adverse stock market reaction to the failure to win passage of TARP on September 29. On October 3, 2008, the Emergency Economic Stabilization Act (EESA) of 2008, which established up to $700 billion (outstanding at any one time) in TARP assistance, passed both houses of Congress and was signed by President Bush. On October 13, the Treasury announced a new plan to invest in bank capital via the Capital Purchase Program (CPP). On October 14, nine large

[2] Some alternatives were proposed, including Senator Charles Schumer's proposal, presented in a mid-September speech, in which he advocated the use of bank preferred stock purchases by the government alongside mortgage relief for homeowners. Schumer referenced the 1933 preferred stock purchases of the Reconstruction Finance Corporation. In his follow-up op-ed in the *Wall Street Journal* (October 14, 2008), he also advocated the prohibition of common stock dividends to banks receiving government preferred stock assistance, and for providing assistance in a way that would "encourage private investors to make similar investments." These proposals echoed the views of some academic policy advocates, including one of us (Calomiris 2008). Not all members of Congress were receptive to the shift in TARP from asset purchases to the capitalization of banks; the US Government Accountability Office (2009, p. 10) describes the reaction as a "backlash" and used it to support its recommendations of enhanced transparency and communications throughout its early oversight of TARP.

financial institutions (under the coordination and reportedly also the pressure of the Treasury), which together accounted for 55 percent of US banks' assets, announced that they would subscribe for a total of $125 billion of TARP assistance (GAO 2012a, p. 7). The nine institutions were Bank of America, Citigroup, JP Morgan Chase, Wells Fargo, Morgan Stanley, Goldman Sachs, Bank of New York Mellon, State Street, and Merrill Lynch. Other publicly traded financial institutions were eligible to apply until November 14, 2008 (all of which presumably participated on a purely voluntary basis).

Secretary Paulson's initial vision of TARP was a mechanism through which the government would support the sale of the "troubled" assets of banks to the government through a complex process, or by having the government guarantee the value of the assets at prices in excess of crisis-affected market values. By raising the asset values of banks, TARP would restore market confidence in bank solvency, and allow debt and lending markets to be restored to normalcy. But the Treasury soon abandoned that approach in favor of direct government injections of capital into banks in the form of preferred stock purchases. Preferred stock purchases had been authorized under TARP almost as an afterthought; indeed, the authority for purchases of bank preferred stock is a bit hard to discern from reading the statute. Any purchases of securities (such as preferred stock) had to be accompanied by the granting of warrants (which allow future purchases of stock from the firm at a pre-established price) to ensure that taxpayers shared in the upside potential of recipient institutions, and those warrants should also include anti-dilution provisions "of the type employed in capital market transactions."

TARP's Conflicting Goals and Constraints

Although the first stated purpose for TARP (under Section 2 of the Act) was "to immediately provide authority and facilities that the Secretary of the Treasury can use to restore liquidity and stability to the financial system of the United States," its other stated purpose was "to ensure that such authority and such facilities are used in a manner that—(A) protects home values, college funds, retirement accounts, and life savings; (B) preserves homeownership and promotes jobs and economic growth; (C) maximizes overall returns to the taxpayers of the United States; and (D) provides public accountability for the exercise of such authority."

Items (A) and (B) presented special challenges, especially if the Treasury acquired troubled assets through direct asset purchases under Section 101 of the law. Any acquisition of mortgages or mortgage-backed securities by the Treasury would put it in the position of having to determine the extent of relief to homeowners, which would require weighing the direct financial costs to taxpayers against the benefits to homeowners and the economy (and the consequent indirect benefits to taxpayers). Under Section 109, the Secretary was charged with implementing a plan that both "seeks to maximize assistance for homeowners" while "considering net present value to the taxpayer." No wonder the Treasury opted to abandon direct asset purchases. Not only was it impossible to establish fair prices for such assets, but doing so would have put Treasury directly in charge

of mortgage restructuring, while facing an impossible mandate to meet an amorphous objective of "maximizing assistance" while minimizing costs to taxpayers.

The constraints contained in items (C) and (D) of Section 2 were also serious, and they applied to all forms of TARP assistance. In reaction to Lehman's failure, Warren Buffett had just purchased a substantial amount of Goldman Sachs preferred stock and had received warrants to purchase equity in addition to the promised coupon payments on the preferred stock. Item (C) seems to have been intended in part to ensure that taxpayers' investments in preferred stock were treated as similarly profit-making investments. Purchases of assets under TARP were supposed to be priced to maximize taxpayers' returns (broadly defined). Government guarantees of assets under Section 102(c) were even more constrained by an explicit requirement to earn an actuarially fair market insurance premium. TARP also included limits on executive compensation, designed to prevent profiteering from government assistance (especially with respect to golden parachutes for executives), and those compensation limits were tightened over time.

The Emergency Economic Stabilization Act of 2008, which established TARP, did not require that purchases of preferred stock assistance be provided on market terms, as it allowed the Secretary of the Treasury, under Section 113(a), when minimizing the "long-term negative impact on the taxpayer" to take into account not only "the direct outlays, [and the] potential long-term returns on assets purchased," but also "the overall economic benefits due to improvements in economic activity and the availability of credit, the impact on the savings and pensions of individuals, and reductions in losses to the Federal Government." In other words, the Secretary was told to take into account the positive externalities taxpayers accrued through expanded credit and economic activity.

TARP took the unusual step of requiring the Office of Management and Budget (OMB) and the Congressional Budget Office (CBO) to perform a *true economic cost accounting* for TARP (under Section 202) that "shall be calculated by adjusting the discount rate . . . for market risks" (Section 123). The conclusions of that accounting had to be included in federal budgetary accounts as supplementary materials (Section 203). In other words, any subsidies provided to banks would be explicitly estimated using economic measures of opportunity cost, and under Section 113(a), it would be the obligation of the Secretary of Treasury to ensure that indirect benefits to taxpayers equaled or exceeded those costs.

In this politicized environment, operating under these conflicting and unclear mandates, the Treasury focused on preferred stock purchases. Doing so allowed it to avoid the zero-subsidy constraint applicable to asset guarantees and the potential problems associated with buying troubled mortgages at defensibly fair prices and managing them under the conflicting mandates of the law. As of the end of 2009, a total of 707 financial institutions received a total of $205 billion under the Capital Purchase Program.

The Treasury set uniform terms for preferred stock purchases under the Capital Purchase Program, requiring a 5 percent initial coupon on preferred stock, rising to 9 percent after five years, and demanding 15 percent of preferred stock infusions

be in the form of 10-year warrants to purchase common stock. It limited participation to "qualifying" banks, which in practice meant banks that were not so deeply troubled that they were likely to fail even after receiving preferred stock assistance. Investments under the CPP initially were limited to between 1 and 3 percent of a bank's risk-weighted assets and were capped at $25 billion (US GAO 2012a, p. 4).[3]

Although the banks may have felt the Treasury's preferred stock investment terms were expensive, the terms Warren Buffett negotiated with Goldman Sachs for Berkshire Hathaway, in a deal announced on September 23, 2008, allowed Berkshire an even higher return. Berkshire Hathaway, had received 100 percent of the $5 billion preferred stock issue in warrants with a five-year term, and a 10 percent coupon on the preferred stock. The Goldman Sachs preferred stock offered to Berkshire was callable at any time at a 10 percent premium.[4]

Government preferred stock purchases required participating issuers to freeze their common stock dividends, but issuers were not forced to shrink dividends as a requirement for participating in the Capital Purchase Program (implying that recipient banks were effectively able to subordinate preferred stock through the payment of common stock dividends). Limits on dividends have been shown to be very useful in limiting abuse of government protection (Calomiris and Mason 2004; Hovakimian, Kane, and Laeven 2012), but these limits reportedly were not feasible in light of the desire to encourage all large banks (including those not in need of the assistance) to participate. Secretary Paulson effectively forced the largest US banks to participate in the CPP (Veronesi and Zingales 2010; Kim and Stock 2012), and those that did not need the assistance balked at any limit on their dividends. Paulson may have agreed to permit the continuing payment of common stock dividends in order to achieve the policy goal of uniform participation, arguably a symbolic victory.

Phase Two: The SSFI, AGP, CAP, and TIP Programs

After the 2008 election, TARP assistance changed. Attention turned to evaluating and addressing the circumstances of particular large institutions whose financing structure remained problematic, and the nature of assistance was more varied. Although funding through the Capital Purchase Program continued, new sources of funding were designed to deliver customized assistance, alongside the more general approach. The four parts of the second phase included: the Systemically Significant Failing Institutions (SSFI) Program, the Asset Guarantee Program (AGP), the Targeted Investment Program (TIP), and the Capital Assistance Program (CAP).

[3] In May 2009, this provision was amended so that qualifying financial institutions with total assets less than $500 million would receive investments between 3 and 5 percent of risk-weighted assets.

[4] In fact, the preferred stock was called by Goldman Sachs in March 2011. Rather than exercising its warrants, Berkshire ended up making a settlement in March 2013, exchanging its warrants for roughly 13 million shares of Goldman Sachs common stock (2.8 percent of the company). All told, from September 2008 to March 2013, Berkshire Hathaway made roughly $3.7 billion in income on its $5 billion initial investment in preferred shares Information about the Berkshire Hathaway purchase of Goldman Sachs securities is from Goldman Sachs (2008). Returns on this investment are based on various news stories and on authors' calculations.

The SSFI, AGP, and TIP were created to meet the needs for what the Treasury termed "exceptional assistance" by three institutions: AIG, Citigroup, and Bank of America.

Assistance remained controversial during this second phase of TARP, and growing public resentment over high compensation in assisted banks led to stricter limits on executive compensation for TARP recipients. This not only resulted in greater reluctance of banks to apply for TARP funding, it also resulted in substantial repurchases of preferred stock as a means of exiting from the discipline of the increasingly stringent compensation regulations that were attached to government investments.

By the end of 2009, $70.7 billion of $204.6 billion disbursed under the Capital Purchase Program had been repurchased by participating banks. Five of the large banks that were among the nine original participants repurchased their CPP securities in June 2009 (GAO 2009, pp. 8, 13). The CPP was closed to new investments at the end of 2009, and as of September 20, 2010, two years after TARP had been passed, the Capital Purchase Program had been largely wound down with $152 billion of investments under that program having been repaid (GAO 2011b, p. 13). Participants that did not exit TARP by 2012 were relatively weak, had larger loan losses, and increasingly displayed problems in paying dividends and maintaining profitability (GAO 2013b, p. 5). In November 2013, the Treasury estimated the eventual nominal gains on all CPP investments would be roughly $16 billion (GAO 2014, pp. 1–5). The program had succeeded in improving banks' capital levels, thereby enhancing their ability to borrow and lend.

The first new program under the post-election phase of TARP was the Systemically Significant Failing Institutions plan, announced on November 10, 2008, to purchase AIG preferred stock (the only use ever made of SSFI; SSFI was later renamed the AIG Investment Program). The AIG situation is discussed in the paper by Robert McDonald and Anna Paulson in this symposium. Total Treasury and Fed exposure to AIG reached an astounding $172.4 billion at the end of 2009—nearly equal to the entire amount disbursed under the Capital Purchase Program. Its form changed over time from relatively senior obligations (preferred stock) to junior ones (common stock). The changing structure of that assistance is so complex that it took a 70-page report by the General Accountability Office just to describe the program's evolution. On December 14, 2012, the Treasury announced that it had received the proceeds from its final sale of AIG stock, ending the government's complex program of assistance to AIG, and resulting in a slight income of $2.3 billion over its funds invested in AIG (US GAO 2013a, p. 5).

Citigroup was the only financial institution to participate in the Treasury's Asset Guarantee Program, although Bank of America also considered participating. On January 15, 2009, Citigroup arranged for loss protection on a $301 billion portfolio of assets, which created a potential exposure of $5 billion for the Treasury, and paid for that protection with preferred shares and warrants. Over its lifetime, the total net income the Treasury gained under this guarantee program was $3.9 billion.

Citigroup and Bank of America were the only banks to receive assistance under the Targeted Investment Program, under agreements finalized, respectively, on

December 31, 2008, and on January 15, 2009. Under TIP, the Treasury invested $20 billion in each and received preferred stock and warrants. TIP imposed looser standards for approval than the Capital Purchase Program and was directed toward banks with special systemic importance. Consistent with the targeted nature of this assistance, receiving TIP assistance was also associated with "stringent regulations regarding executive compensation, lobbying expenses, and other corporate governance requirements" (US GAO 2009, p. 73). The Treasury's TIP investment in Citigroup was converted into common stock in September 2009. The ultimate recoveries from the various TIP-related investments exceeded the cost basis of Treasury TIP investments by $4.0 billion (GAO 2013a, p. 5).

Treasury Secretary Timothy Geithner assumed office under the Obama administration in January 2009 and initiated a Financial Stability Plan, which established new stress tests to gauge the fragility of the largest banks and linked TARP assistance to the results of those stress tests. On February 17, 2009, Title VII of the American Recovery and Reinvestment Act (ARRA) amended the Emergency Economic Stabilization Act of 2008 to establish new compensation rules for TARP assistance to financial institutions and to permit those that had received Capital Purchase Program assistance to buy back preferred stock and warrants with the approval of their regulators. The Capital Assistance Program was established February 25, 2009, mandating that banks with assets in excess of $100 billion accept government injections of capital (issuing preferred stock convertible into common stock) if privately raised capital proved inadequate in light of new forward-looking loss assessments usually called the "stress tests." Banks that had previously received CPP assistance were permitted to convert those issues into the new convertible preferred shares.

Under the Capital Assistance Program, it was announced on May 7, 2009, that 10 of the 19 banks subjected to stress tests needed to raise additional capital (of approximately $75 billion in total). They were given six months to do so privately; if they were unable to do so, they had to accept government injections of convertible preferred stock to cover the gap identified by the stress test. Setting up a contingent source of government funding ensured that markets would not be rattled too much by any announced deficiencies, which also made the stress tests more credible as an exercise, as regulators would be more likely to honestly identify deficiencies if doing so was unlikely to roil markets.

No funds were actually disbursed under the Capital Assistance Program, and the program was terminated in November 2009, but the capital deficiencies identified by the May 7, 2009, stress test announcement did produce additional capital raising in private markets and also were associated with major restructuring of the Treasury's investment in Citigroup. In June 2009, Citigroup and Treasury agreed to swap $20 billion in cumulative perpetual preferred stock (issued under the Targeted Investment Program and the Asset Guarantee Program) for a form of preferred stock (so-called trust preferred securities) that counts for regulatory purposes as providing more protection to deposits than other preferred stock, which had the effect of raising Citigroup's tier-1 capital ratio. Citigroup also agreed to swap $25 billion in its Capital Purchase Program preferred stock for an equal amount

Table 1
Cumulative Income by Program, 2008–2013
($billions)

Program	*Maximum exposure*	*Income*[a]
Capital Purchase Program (CPP)	204.6	16.0
Systemically Significant Failing Institutions (SSFI)/AIG[b]	172.4	15.0
Asset Guarantee Program (AGP)	5.0	3.9
Targeted Investment Program (TIP)	40.0	4.0
Total	**422.0**	**38.9**
Total for only Citigroup and AIG	222.4	28.4
Total subtracting Citigroup and AIG	199.6	10.5

Sources: US Government Accountability Office (various).
[a] Cumulative income on CPP includes estimates on income and losses expected for outstanding investments.
[b] Includes some non-TARP programs.

of various interim securities, which were converted into common stock shares on September 3, 2009, making the US government a major junior stakeholder in Citigroup. The Treasury Department sold its common stock in Citigroup in 2010, with the last of those sales completed in December 2010. It auctioned its Citigroup warrants in January 2011, and liquidated the last of its Citigroup-related securities (subordinated notes it had received from the Federal Deposit Insurance Corporation in 2012 as part of the compensation for Citigroup's Asset Guarantee Program coverage) on February 4, 2013. All told, the Treasury received $58.4 billion from its $50 billion investments in Citigroup.[5]

How "Junior" Was Born: Bagehot's Rule Meets "Too-Big-To-Fail"

During the post-election phase of TARP, common stock became an important part of the Treasury's portfolio of investments in financial institutions. Interestingly, the returns earned on the common stock investments in AIG and Citigroup were similar to the returns on the Capital Purchase Program investments made in other financial institutions. As Table 1 shows, total cumulative income on investments in AIG and Citigroup were 12.8 percent of maximum exposures ($28.4 billion relative to $222.4 billion), while the income on the remaining investments (which did not include common stock) were only 5.3 percent of maximum exposures ($10.5 billion relative to $199.6 billion). On an annualized basis, the returns for these two subsets of investments were similar, reflecting the fact that the durations of the Citigroup and AIG common stock investments were longer than the roughly one-year average

[5] The Treasury improperly refers to its return relative to a $45 billion investment in Citigroup, which omits its $5 billion of loss exposure on the AGP program. For the details of the timing of the various Treasury sales of Citigroup's shares, warrants, and debt, see Braithwaite and Guerrea (2010), Griffen (2011), and US Treasury (N.d.).

duration of the portfolio of CPP investments in other banks. The duration of the Treasury's investments in Citigroup were more than two years, and the average duration of the government's investments in AIG was even longer. However, neither of these returns compares favorably with Berkshire Hathaway's 74 percent cumulative return over 4.5 years on its preferred investment in Goldman Sachs.

Of course, the success of TARP should not be measured solely or even primarily on the basis of realized returns. Realized returns on common stock investments generally should be higher than realized returns on preferred stock investments, but in the case of TARP, that was not true because investments in common stock were made *selectively*. Preferred stock and debt investments were converted into common stock in Citigroup and AIG precisely because of the continuing weak financial condition of these firms in 2009 and 2010. Thus, it is no surprise that realized returns on their common stock were meager. In other words, any TARP investment in a too-big-to-fail bank *had always been* an implicit contingent common stock investment, which would convert to common stock as needed to preserve the "too-big-to-fail" institution. It was unlikely that the government would use its preferred status in the states of the world where it would be financially useful to do so (in bankruptcy or receivership) because the government would convert to common stock in order to prevent bankruptcy or receivership.

This contingent equity aspect of TARP investments in too-big-to-fail institutions highlights one of the respects in which TARP differed from conventional debt or preferred stock programs of bank assistance like, for example, collateralized lending by a central bank under "Bagehot's Rule," or the Reconstruction Finance Corporation's (RFC) preferred stock program initiated in March 1933.[6] Collateralized lending to banks relies upon the use of relatively high-quality assets to make government loans less risky to the central bank or taxpayers. This form of assistance can be effective in resolving pure liquidity problems (where banks lack cash but their problems do not reflect a significant increase in their risk of insolvency). Collateralized lending does not work, however, when bank illiquidity is a symptom of substantially increased default risk of the bank. In such circumstances, the use of collateralized lending can actually exacerbate the liquidity problems of a bank by effectively subordinating the bank's depositors to the central bank or government lender (as depositors' claims become effectively junior to the new lender and are backed by relatively risky assets). Under such circumstances, a collateralized loan that raises the riskiness of deposits might even cause a depositor run rather than prevent one.

With that specific problem in mind, the Roosevelt administration implemented a preferred stock program for assistance to financial institutions as part of the Emergency Banking Relief Act of March 9, 1933. Investments of preferred stock were not

[6] For studies of policies of the Reconstruction Finance Corporation and their effects on bank survival and lending see Mason (2001), Calomiris and Mason (2004), Calomiris, Mason, Weidenmier, and Bobroff (2013), and additional references in these studies. On theory of preferred stock as an effective tool, see Philippon and Schnabl (2013).

collateralized, were junior to all bank debt, including deposits, and failure to pay a preferred stock coupon did not force a bank into conservatorship. Thus, preferred stock added protection to deposits. At the same time, preferred stock was senior to common stock, which served as a buffer against losses on assets.

Preferred stock investments in banks, however, are not appropriate for assisting all banks. As fixed income investments that are senior to common stock, they contribute to highly leveraged banks' risk-management incentive problems, which are also known as the "debt overhang" problem (Jensen and Meckling 1976; Myers 1977; Hoshi and Kashyap 2010). The existing shareholders/managers of a bank that is close to insolvent or actually insolvent see little gain to themselves from limiting the risk of bank investments or finding good loan customers that would raise the bank's revenues as reductions in risk or expansions of cash flow would mainly accrue to other (senior) bank claimants. Providing more preferred stock to such a bank will add to its debt overhang problem and further discourage efforts to raise common stock, identify good loan customers, and manage risk properly and therefore may be socially wasteful.[7]

What can the government do when debt overhang makes preferred stock an undesirable means of assistance? One option is to force the bank to become a target in an assisted merger. This approach is often taken by the Federal Deposit Insurance Corporation for undercapitalized or insolvent banks, but it may not be feasible for a large bank given the difficulty in finding a large acquirer quickly (a problem further complicated by concerns about the increased concentration of banking in an already highly concentrated banking system). It is important to emphasize the speed with which resolution of a financial institution should occur. Global banks are counterparties in numerous short-term transactions; in order to avoid disruption to their operations and the operations of their counterparties, a bank must be resolved immediately upon any regulatory intervention that places it into conservatorship. Another option would be to place the bank into receivership and liquidate its assets without trying to find an acquirer. But institutions like Citigroup or AIG were regarded as "too big to fail," owing to their global scope, the complexity of their subsidiary structures, and their widespread linkages throughout the global financial system.

Still another option in the presence of debt overhang would be to purchase the institution's assets at above-market values, or to provide a subsidy to the institution in a way that guarantees those assets' values. Either of those actions would raise the market value of the equity of the institution, thereby alleviating its debt overhang problem. In a similar vein, the government could attach guarantees (effectively offering a put option) to public offerings of common stock issues by the institution,

[7] The debt-overhang problem can be solved in some cases by requiring issues of subsidized preferred stock to be matched by new common stock issues (Calomiris 1998, 2008). However, when banks are in a very severe debt overhang situation, the ability to offer subsidies on preferred stock to encourage such matching is limited by the zero-coupon bound (the maximum subsidy that can be given for issuing preferred stock), and severely indebted banks may not be willing or able to satisfy such matching requirements.

which would raise the price of those offerings to an extent that would make offerings of new equity appealing to existing shareholders. In a later section, we assess these sorts of interventions. When neither speedy acquisition nor liquidation seem appropriate, and when subsidized put options on assets or new stock offerings are unappealing for some reason, government common equity investments become the path of least resistance for providing assistance to an insolvent, or nearly insolvent, "too-big-to-fail" institution like Citigroup or AIG.

The Objectives of Government Intervention to Assist Financial Institutions

Given the financial costs and design challenges of assisting banks, what prospective benefits may justify such costs? During the Depression, Irving Fisher and John Maynard Keynes articulated various channels through which weak banks can amplify macroeconomic downturns through reduced lending and asset price declines. This thinking became more integrated into macroeconomic thinking (not coincidentally) during the 1980s, particularly as the result of Bernanke's (1983) work on the Great Depression and his and others' empirical work on the macroeconomic consequences of US banks' losses of bank capital in the 1980s (for example, Bernanke and Lown 1991).[8]

Banks are highly leveraged entities that act as repositories of private information about borrowers and securities issuers. Theories of financial intermediation show why their role as information repositories tends to be associated with high leverage (Diamond 1984; Calomiris and Kahn 1991; Krasa and Villamil 1992; Diamond and Rajan 2009). High leverage, however, also means that banks play a central role in propagating economic downturns (Bernanke and Gertler 1989). When shocks to banks' borrowers produce loan losses, some banks fail and survivors' capacity to bear risk declines, forcing cuts in lending.

As Adrian and Shin (2009) show, the real effects of intermediaries' behavior are not confined to declines in lending. Because intermediaries play central roles in asset markets, their shrinkage can have dramatic effects on the prices of risky assets. For example, when hedge funds specializing in emerging market securities

[8] For an early review of the literature on financial factors during the Depression, see Calomiris (1993). Bernanke's (1983) time series study of the links between bank distress and economic activity has been criticized, but subsequent work, using panel data at the level of states or counties, confirms the importance of banking distress as a propagator of shocks during the Depression and also confirms the positive role that assistance to banks via the Reconstruction Finance Corporation played in mitigating the consequences of bank distress (Calomiris and Mason 2003; Calomiris, Mason, Weidenmier, and Bobroff 2013). In addition to the effects of bank condition on lending and securities pricing, Anari, Kolari, and Mason (2005) point to another channel through which bank distress magnified the economic downturn during the 1930s: the protracted process of liquidating the assets of banks that were placed into receivership. Liquidating assets depresses asset values in local markets. Those asset-pricing consequences created an incentive for postponing liquidation, which resulted in protracted delays in depositors' ability to receive repayment of their deposits in failed banks.

lost money during the Russian crisis of 1998, Brazilian international bonds held by these funds were sold off massively. Because other investors not specializing in emerging markets had limited knowledge and consequently limited capacity for bearing emerging market risks, Brazilian sovereign debt prices fell dramatically. These connections between "funding liquidity" of intermediaries and "market liquidity" of securities have been formalized in Brunnermeier and Pedersen (2009).

Many of the debt instruments that banks rely upon for funding require them to maintain near-zero default risk. Because financial intermediaries depend upon risk-intolerant debt instruments (such as interbank deposits, repo, and commercial paper), they are especially vulnerable to adverse shocks to their asset values, which makes shocks to the value of banks' assets (as in the case of subprime mortgages) especially likely to produce sudden declines in credit and in risky asset prices. These channels of transmission were visible in the recent crisis (Gorton 2009; Schwarz 2015; Calomiris 2009a; Heider, Hoerova, and Holthausen forthcoming; Ivashina and Scharfstein 2010; Gorton and Metrick 2012; Covitz, Liang, and Suarez 2013).

If the condition of financial intermediaries is an important propagator of shocks, then it may be useful to shore up the condition of intermediaries as part of a program of combating a recession caused by a major shock to the banking system. There is empirical evidence identifying favorable consequences for lending, asset pricing, and economic activity from assistance to financial intermediaries, policies that seek to improve the financial condition of intermediaries indirectly (for example, through debt re-denominations), or interventions to improve the liquidity of markets in the wake of bank failures (for example, government-sponsored asset management companies).[9] Of course, this argument was used by Paulson and Bernanke in support of Congressional approval of TARP.

The debates over TARP, however, did not *only* reflect economic concerns and arguments, but also other considerations, which affected the process of approving TARP. Deep resentment toward banks—precisely because of their central role in precipitating the crisis—constrained public willingness to assist them. Deep suspicion of government policies to assist banks, which reflected legitimate concerns that government policies may serve special interests rather than the public interest,[10] complicated any attempt by the government to assist banks. Nor was it obvious that government assistance to banks would actually be implemented wisely. For example, it is hard to make sense of the government's decisions to bail out

[9] For a general review, see Calomiris, Klingebiel, and Laeven (2005), who discuss the relative advantages of different policy approaches in different economic environments. See also the aforementioned studies of the operation of the Reconstruction Finance Corporation as a particular example of the effects of preferred stock assistance to banks, and Kroszner (1999) and Calomiris (2007) on the positive macroeconomic consequences of redenomination. Bayazitova and Shivdasani (2012) show that capital injections into banks can be useful as a signal of favorable private information, which can reduce asymmetry of information in public markets.

[10] History confirms that government regulations and government assistance should be understood as political outcomes reflecting the creation of coalitions sufficiently powerful to enact programs, not as the politically neutral application of economic ideas (Calomiris and Haber 2014, chap. 6–8).

Bear Stearns, AIG, and Citigroup, but to refuse to bail out Lehman. Furthermore, it is far from obvious that "too-big-to-fail" bailouts always make sense, especially when one considers the hard-to-measure moral-hazard costs in the future that come from such bailouts today.

The Economic Consequences of TARP

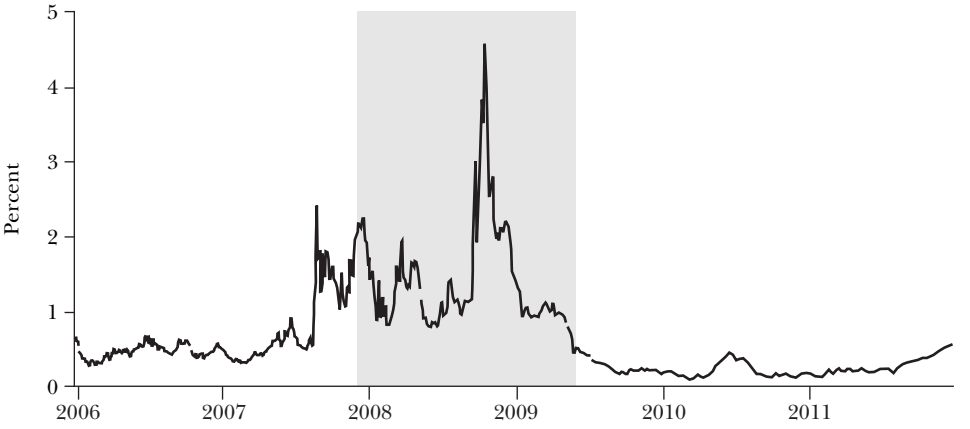
To fulfill TARP's statutory requirements, the Office of Management and Budget and the Congressional Budget Office estimated the costs of TARP's asset purchases and guarantees using procedures similar to those specified in the Federal Credit Reform Act of 1990 with an adjustment for "market risk," as required by the authorizing legislation. The agencies interpreted market risk to be the premium that a private investor would require as compensation for the risk of the cash flows of the underlying transaction. Nominally, there were profits. As of March 12, 2014, the CBO estimated the net cost of TARP to the federal government, measured on the basis of nominal outlays and receipts, to be $27 billion.[11] For the most part, the transactions with the banks, the focus of this paper, yielded a net cash flow gain. The net cash flow costs were largely from the assistance provided to AIG, the automotive industry, and the programs aimed at avoiding home mortgage foreclosures. The net cash flow gain estimated for the Cash Purchase Program was $16 billion with only $2 billion of preferred stock remaining outstanding. The CBO estimated a net cost of $15 billion to the Treasury for the assistance provided to AIG under the Systemically Significant Failing Institutions program. All of the supplementary support provided to Citigroup and Bank of America through the Targeted Investment Program had been paid back and resulted in a net gain of roughly $4 billion dollars to the federal government. Finally, the loss-sharing agreement with Citigroup through the Asset Guarantee Program yielded a net gain of $3.9 billion.

But in evaluating the costs and benefits of TARP, as the authorizing legislation recognized, it is important both to adjust cash flows for the risk borne by taxpayers and to look beyond the net risk-adjusted cash flows received by taxpayers to examine the impact of TARP on the broader economy. After all, the first stated purpose of the program was "to restore liquidity and stability to the financial system of the United States." But measuring risk adjustment on TARP funds (and the implied subsidy received by TARP recipients) and gauging the benefits to the economy from TARP are challenging, to say the least.

The most relevant measure of the subsidy received by TARP recipients is the estimate made at the time the funds were disbursed. The Congressional Budget Office used the market yields on actively traded preferred stock to gauge the size of the subsidy received by preferred stock issuers, and used the Black–Scholes option

[11] The White House Office of Management and Budget estimated the cost of TARP to be $39 billion. The additional estimate of $12 billion from the Congressional Budget Office largely related to CBO's higher projection of costs for the mortgage programs under TARP.

Figure 1
TED Spread



Source: Federal Reserve Bank of St. Louis.
Notes: The TED spread is defined as the difference between the three-month LIBOR and the three-month Treasury bill yield. The shaded area marks the 2007–2009 financial crisis..

pricing model to value warrants. When no preferred stock was available for the issuer, it used a market index. On the first $247 billion of TARP disbursements to banks, the implied subsidy received by program participants, estimated as of the end of 2008, was $64 billion (Congressional Budget Office 2009, p. 1). The Office of Management and Budget's methods for calculating the implied subsidy arrive at comparable numbers. Veronesi and Zingales (2010) calculate a subsidy of between $21 billion and $44 billion on the first $130 billion of TARP disbursements, which implies a comparable proportional value of the subsidy.

One would arrive at a higher subsidy cost estimate if one appropriately recognizes that TARP investments in the largest banks never were just preferred stock. As the experience of Citigroup and AIG show, taxpayers were effectively forced to convert preferred stock to junior equity positions in those institutions because their prospects were slow to improve. In that sense, taxpayers were effectively receiving a fixed income instrument but bearing the risk of losing their senior status on an as-needed basis.

Did the passage of TARP have positive effects on the financial system? Leading up to its passage, market credit spreads had increased to unprecedented levels as investors became increasingly risk-averse due to worries about the health of the banking system and the economy in general. Figure 1 shows the TED spread: that is, the difference between the bank-to-bank overnight lending rate embodied in the London Interbank Offered Rate (LIBOR) and the Treasury bill rate, which captures the extent to which the banking system experienced a crisis of confidence and a reduction in liquidity. The spread increased to 450 basis points, at its highest, in the aftermath of the bankruptcy of Lehman Brothers. Following the announcement

of the Capital Purchase Program on October 14, 2008, the first program of TARP announced in the pre-election phase, there were broad improvements in the credit markets. Between Friday, October 10 and Tuesday, October 14, the Standard and Poor's 500 rose by 11 percent and the common stock prices of the nine large financial institutions that were the very first participants of TARP increased by 34 percent (Veronesi and Zingales 2010). From October 13, 2008 (before the announcement of the CPP) to September 30, 2009, the LIBOR rate fell by 446 basis points and TED spread fell by 434 basis points. Costs of credit and perceptions of risk declined significantly in corporate debt markets as well. By the end of September 2009, the Baa bond rate and spread had fallen by 263 and 205 basis points, respectively (US GAO 2009, p. 37).

A specific goal of the Capital Purchase Program was to improve the banks' balance sheets by infusing banks with capital and thereby enhance the ability of banks to borrow and lend. The US Government Accountability Office (2009) reports that capital ratios at institutions that received CPP investments rose more than the ratios at nonparticipating institutions. Between December 31, 2008, and March 31, 2009, the Tier 1 risk-based capital ratio increased by, on average, 300 basis points in bank holding companies receiving CPP assistance relative to an increase of only 40 basis points in nonparticipating bank holding companies. The evidence also suggests that participating banks were more willing and able to increase lending than nonparticipating banks (US GAO 2009; Taliaferro 2009; Ng, Vasvari, and Wittenberg-Moerman forthcoming; Berger and Roman forthcoming; Li 2013). The 21 largest CPP recipients reported extending almost $2.3 trillion in new loans as of July 31, 2009, since receiving CPP investments of $160 billion.

How can one weigh and compare the costs and benefits associated with TARP to arrive at a net benefit estimate? Using an event study analysis of bank enterprise values, Veronesi and Zingales (2010) analyze the effect of the initial announcement of TARP assistance to the financial sector. They estimate that the October 13, 2008, announcement resulted in a net social benefit to financial intermediaries, after subtracting the cost to taxpayers, of between $86 billion to $109 billion, perhaps capturing the benefit of avoiding costly liquidation of financial intermediaries, among other things. This is a lower bound estimate of the social gains from TARP. The authors include in their measure of costs the $125 billion preferred equity infusion in the nine largest US commercial banks via the Capital Purchase Program and a three-year government guarantee on new unsecured bank debt issues provided by the Federal Deposit Insurance Corporation. They find that banks that were more at risk of experiencing a sudden outflow of funding benefited the most from the government's intervention. More specifically, enterprise bank value increased the most for the three former investment banks (Goldman Sachs, Morgan Stanley, and Merrill Lynch) and Citigroup following the October 13 announcements, while the relatively healthy JP Morgan—which stood to gain from the continuing weakening of its troubled rivals—experienced the largest decrease.

The most important limitation of the Veronesi and Zingales (2010) calculation of the net gains from TARP is the authors' assumption that the only anticipated

costs to taxpayers under TARP as of October 14, 2008, were the outlays announced under the Capital Purchase Program (and the Federal Deposit Insurance Corporation debt-guarantee). In the event, as initial assistance proved inadequate for Citigroup, AIG, and Bank of America, several more assistance programs were announced by the federal government. To the extent that the potential weakness of these banks was known, and to the extent that the potential additional expenditures in response to that weakness were also forecastable, Veronesi and Zingales (2010) underestimate the expected costs of TARP as of October 13, 2008. The first round of assistance provided to the big banks effectively committed the government to a "whatever it takes" approach to keep AIG, Citigroup, and Bank of America alive, and therefore, the continuing cost to taxpayers actually experienced in 2008–2012 was predictable, at least to some degree. In other words, if TARP assistance would be forthcoming (and more junior in form over time) in response to worsening bank condition, the recipients effectively possessed a put option from the government to issue equity in addition to the explicitly recognized preferred stock investments made by the government. Veronesi and Zingales (2010) do not include the value of this put option in their measure of cost (Kane 2014).

With regard to TARP's gross benefits, a credible evaluation of the impact of TARP assistance to financial institutions remains elusive. First, it is difficult, if not impossible, to isolate the effects of TARP from other initiatives of the Federal Reserve, Federal Deposit Insurance Corporation, and other financial regulators, or from other influences on the economy unrelated to government programs. For example, on October 14, 2008, the Capital Purchase Program was announced jointly with the Fed's Commercial Paper Funding Facility Program and FDIC's Temporary Liquidity Guarantee Program. Furthermore, it is hard to know to what extent the financial markets would have stabilized and the economy would have recovered in the absence of an activist government response. Some have argued that government support for financial institutions during the crisis confused and frightened market participants and was itself possibly a net negative for the economy. For example, Taylor (2010 p. 170; see also 2009) argues that the initial proposed structure of TARP was a further source of shock to markets as many people "were skeptical about how [the buying up of toxic assets] would work and government officials had difficulty explaining how it would work" (p. 171), but he concludes by conceding that after it became clear that TARP would take the form of capital injections, "conditions began to improve" (p. 172). Others point out that the failure of Lehman affected markets primarily by changing perceptions of the scale of loss associated with exposures to subprime and Alt-A mortgages. Lehman's derivatives were liquidated in an orderly fashion, and no major intermediary actually failed as the result of interconnections with Lehman. From that perspective, Secretary Paulson's view that the economy was teetering at the edge of Armageddon may have been a gross exaggeration.

Finally, it is possible to argue that there were additional social costs associated with the way TARP was administered and that alternative policies might have produced greater gross benefits. These questions are the topics of the next two sections.

Was TARP Administered Properly?

Corruption is a social cost, as it entails both a misallocation of resources and a diminution of justice. Did TARP adhere to objective eligibility requirements and a credibly fair and impartial process of allocation funds, or did it also reflect political influences that were unrelated to objective criteria?

The Capital Purchase Program was the first and primary initiative under TARP through which the Treasury made preferred stock purchases in qualified financial institutions. The final decision to make CPP investments rested with the Treasury, but federal banking regulators also played an important and influential role in the CPP application and approval process. The approval process began with the interested financial institution consulting with its primary federal bank regulator about being included in the CPP. The regulator assessed the applicant's strength and viability based on bank examination ratings, financial performance ratios, and other factors.[12] Institutions that were deemed to be the strongest, received presumptive approval and their application was forwarded to the Treasury's Investment Committee. Institutions deemed to be less strong required further review and were referred to the CPP council, which was comprised of representatives from the four primary banking regulators with Treasury officials as observers. Following the CPP council's evaluation, institutions that were approved by a majority of the council members were recommended to the Treasury's Investment Committee.[13] The institutions with the lowest banking ratings and poor financial ratios were deemed ineligible for participation in the CPP, received a presumptive denial recommendation, and were not forwarded to the Investment Committee.

The Office of Financial Stability reviewed documentation of applications recommended by the regulators or the CPP Council and at times collected additional information about the applicants before submitting the applications to the Investment Committee. The Investment Committee made recommendations to the Assistant Secretary for Financial Stability for final approval after completing its review (US GAO 2010). Clearly, discretionary judgments played a significant role in the approval process.[14]

[12] Six performance ratios were identified to evaluate applicants. Three related to regulatory capital levels: the Tier 1 risk-based capital ratio, total risk-based capital ratio, and Tier 1 leverage ratio. The quality of assets was assessed using the ratio of classified assets, nonperforming loans, and construction and development loans to capital and reserves.

[13] The Treasury provided guidance to the Capital Purchase Program council to use in assessing applicants that allowed consideration of additional factors (such as signed merger agreements, confirmed investments of private capital beyond, and others) beyond examination ratings and financial ratios (US GAO 2010, pp. 11–147).

[14] The nine largest financial institutions that were included in the Capital Purchase Program at the time of its establishment did not follow the application process described above. These were Bank of America, Bank of New York Mellon, Citigroup, Goldman Sachs, JP Morgan Chase, Merrill Lynch, Morgan Stanley, State Street, and Wells Fargo. They were offered assistance by virtue of their systemic importance and were asked to participate in the program even if they did not want to do so.

The US Government Accountability Office's (2010) review of the approval process for participation in the Capital Purchase Program revealed that almost all of the reviewed institutions had satisfactory or better overall ratings. However, a quarter of the examination ratings used for making approvals were more than one year old, 5 percent were more than 16 months old, and 104 of 567 reviewed applications lacked a date of the most recent bank examination. Several approved institutions also exhibited weaker characteristics that made their viability doubtful. The Government Accountability Office discovered that 12 percent of the approved cases reviewed (66 institutions) either: 1) did not meet the performance ratio guidelines; 2) had an unsatisfactory bank examination rating; or 3) had a formal regulatory enforcement action involving safety and soundness concerns. This could partly be a result of limited communication and guidance from the Treasury to the CPP council regarding how to assess viability during the early stages of the CPP. A 2009 audit of the CPP review and approval process by the Federal Reserve's Inspector General found that applicants would have been analyzed consistently and completely if the Treasury had provided formal and detailed procedures to evaluate applicants (Board of Governors 2009).

Marginal cases that were approved for the Capital Purchase Program displayed more financial weaknesses than others. The US Government Accountability Office (2010) reports that 39 percent of the 66 approved institutions with marginal characteristics missed at least one CPP dividend payment. In comparison, only 20 percent of all CPP participants had missed at least one dividend payment. By August 2010, several marginal cases also had received formal enforcement actions.

Not all of the administrative shortcomings of TARP can be attributed to innocent oversights or incompetence, and political connections seem to have played a part in the approval and allocation of TARP funds.[15] Congressional campaign contributions from the financial services industry were associated with a higher likelihood of voting in favor of the Emergency Economic Stabilization Act of 2008 (Mian, Sufi, and Trebbi 2010). Institutions that employed ex-regulators or federal government employees, or were headquartered in the election districts of House members on key finance committees were more likely to be approved for participation in the Capital Purchase Program (Duchin and Sosyura 2012; Blau, Brough, and Thomas 2013). For example, Duchin and Sosyura (2012) report that banks employing a director who worked at the Treasury or one of the banking regulators were 9.1 percentage points more likely to be approved for participation in CPP. Campaign contributions and lobbying expenditures by institutions increased the likelihood of receiving CPP investments. Political connections also influenced the amount and timing of investments under TARP. Politically connected institutions received a greater amount

[15] Some readers will remember the infamous Keating Five, a previous example where it appeared that there had been political interference in financial regulation. Five US Senators were accused of improperly intervening in 1987 on behalf of Charles H. Keating, Jr., Chairman of the Lincoln Savings and Loan Association. Lincoln was a target of regulatory investigation by the Federal Home Loan Bank Board (FHLBB). Following the intervention of the Senators, FHLBB backed off from taking action against Lincoln and subsequently it failed in 1989 at a cost of $3 billion to the taxpayers.

of TARP support, and it was provided earlier, relative to firms that lacked political connections. Politically connected recipients subsequently underperformed unconnected firms based on both stock returns and on accounting-based performance measures (Duchin and Sosyura 2012).

Alternative Policies, Inefficiencies, and Political Constraints

TARP was crafted in a volatile political and economic environment, in the middle of a financial crisis, and just prior to a major election (Swagel 2009). Its architects were in a hurry to enact TARP and knew that it was not going to be easy to get agreement on a blank check for hundreds of billions of dollars to assist "fat cats" on Wall Street. TARP's main design challenge was to balance the often conflicting objectives of shoring up banks while ensuring "social justice" by limiting how much banks' owners, creditors, and employees would benefit personally at taxpayers' expense. Here we consider several of the alleged shortcomings of TARP's design that gave rise to inefficiencies relative to alternatives, and also consider the extent to which those shortcomings were the product of political compromise.[16]

Should the Structure of TARP Have Been Debated More Broadly?

One of us suggested to a senior Congressional staff member in September 2008 that Congress should invite economists to offer views on how TARP might be structured. This could have been accomplished very quickly, as many knowledgeable people were interested in participating. The staffer explained that an election was coming. Democrats anticipated control of both houses of Congress and the White House. They had little to gain, and much to lose, from becoming vocal proponents of a new plan or vocal opponents of Secretary Paulson's plan. Although the Democratic leadership had serious doubts about the asset purchase plan, they did not want independent testimony to put them "on the spot." They did not want to have to create or politically "own" new ideas about assisting banks. The path of least political resistance was to let Secretary Paulson take the lead and the responsibility. This explains why no independent testimony or substantive public policy debate over the structure of TARP occurred during the crucial days from mid-September until early October 2008. It may also explain the Treasury's ill-fated advocacy of the asset purchase approach—an idea that was untested and viewed by many as unworkable. In contrast, capital injections had been used successfully in the United States in the 1930s and in Scandinavia in the 1990s. Problems in Japan's implementation

[16] We consider broad design features below. There are also several narrower design issues that have been considered in the literature. For example, Wilson (2013) finds that permitting some banks to issue noncumulative preferred stock was associated with a greater probability of missing a dividend payment.

of capital injections were also well known (Calomiris 1998; Calomiris and Mason 2004; Hoshi and Kashyap 2010).[17]

Those experiences provide evidence in favor of the efficacy of capital injections, and identify some design errors in TARP's capital injection program that might have been corrected. Specifically, we consider: 1) the requirement that warrants be issued alongside preferred stock, 2) permitting common dividends to be maintained by recipients of TARP assistance, 3) debt overhang problems (which ultimately led to the government's common stock holdings in Citigroup and AIG), and 4) compensation limits for recipients of assistance.

Should Warrants Have Been Required?

Requiring recipients of TARP assistance to issue warrants alongside preferred stock had political appeal as it allowed taxpayers to participate in the upside once the crisis ended. But did the use of warrants make economic sense as part of TARP assistance? The purpose of TARP was not to create profit opportunities for taxpayers, but to stabilize the banking system and the economy. From that perspective, requiring warrants was not helpful because the inclusion of warrants discouraged private stock issuance by taking away some of the upside available to stockholders (Calomiris 1998, 2009a, b; Calomiris and Mason 2004). A much better approach would have been to reward banks that received preferred stock assistance for raising new common stock in the market (for example, by making coupons on preferred stock fall with new common stock issues). That approach would have magnified the effects of TARP preferred stock through higher common stock offerings, resulting in greater bank stability and more protection against loss to taxpayers. It would have meant an even larger subsidy on the preferred stock coupon, but subsidy is the essence of government assistance—that subsidy would have been directly linked to the economic improvements that were the goal of TARP. Warrants were a popular tool for politicians who wanted to make speeches about how bankers' profiteering would be limited, but they also were an impediment to encouraging the more rapid private recapitalization of banks, which would have reduced taxpayers' risks and increased banks' stability and lending capacity.

Should Common Stock Dividends of TARP Recipients Have Been Reduced?

Participants in the Capital Purchase Program should not have been permitted to pay common stock dividends. If banks are undercapitalized enough to warrant taxpayer-funded recapitalization, then they should be forced to accumulate capital through retained earnings. Also, the protection taxpayers enjoy through the seniority of preferred shares is lessened, and debt overhang problems are exacerbated, by paying dividends.

This feature of TARP is generally explained as the result of a political deal between the Treasury and the healthy large banks (such as JP Morgan Chase) which

[17] For a summary of some of the literature on crisis-management policies, see Calomiris, Klingebiel, and Laeven (2005).

otherwise would not have bent to Treasury's pressure to participate in TARP. But that explanation raises a deeper question: what was the presumed advantage from getting healthy banks to participate in TARP? One explanation is the desire to mask differences among banks so that weak banks are not identified by virtue of their participation. But the market was well aware of the differences in the relative strength of various financial institutions. The 90-day moving average of Citigroup's market equity-to-asset ratio fell to about 2 percent in late 2008 and reached 1 percent in early 2009, while JP Morgan Chase's market equity-to-asset ratio consistently remained several times as high (Calomiris and Herring 2013). Having JP Morgan Chase sign up for assistance did nothing to make Citigroup seem stronger.

Should Compensation Limits Have Been Less Onerous?

Limits on participating banks' compensation rules were part of TARP from the beginning and the limits became more binding with the passage of ARRA in February 2009. Like the use of warrants, compensation limits served the political purpose of building support for TARP assistance programs, but increasingly binding limits encouraged strong banks to avoid TARP. That policy generated the early exodus from TARP by many big banks in mid-2009 and reduced other relatively strong banks' willingness to apply for assistance in the program (Bayazitova and Shivdasani 2012; Cadman, Carter, and Lynch 2012), which lessened the impact of TARP in increasing the supply of lending. Cadman, Carter, and Lynch (2012) find that increasing compensation from the 25th to the 75th percentile of banks was associated with a doubling of a bank's unwillingness to accept TARP funds. They also find that TARP recipients tended to suffer larger managerial turnover and the presence of severance agreements made banks hesitant to participate in TARP, consistent with concerns about a talent drain related to compensation limits.[18] Bayazitova and Shivdasani (2012, p. 390) find that the presence of highly compensated CEOs reduced the chance of being approved for TARP: "A one-standard-deviation increase in the log of CEO compensation in excess of $500,000 is associated with an 11.4-percentage point reduction in Treasury approval, or roughly one-sixth of the size of the unconditional approval probability."

Better Ways of Addressing Debt Overhang?

The debt overhang problem arises when debts are so large that any gains to banks are likely to benefit only debtholders rather than shareholders. In the cases of AIG and Citigroup, the debt overhang problem ultimately led to the transformation of government assistance into common stock ownership. Might better alternative solutions have avoided such a high degree of taxpayer exposure to potential loss? At least three viable alternatives were known and discussed. The problem with each of

[18] Cadman, Carter, and Lynch (2012) do not find any difference in lending between TARP recipients and other banks, but as they recognize, this likely reflects selectivity bias; TARP recipients likely would have cut lending if they had not received TARP. Li (2013) finds that TARP funding did in fact increase the supply of lending.

them is that they would have required an explicit payment of a subsidy rather than the implicit payment associated with TARP's more politically palatable willingness to bear downside risk.

One approach would have used out-of-the-money guarantees to boost the value of distressed assets, thereby raising the value of banks' assets and overcoming the debt overhang. One of us proposed such an approach for especially weak banks in late 2008 and early 2009 (Calomiris 2009b), and argued that such subsidies could be combined with requirements that banks receiving such guarantees raise common stock to bolster their resiliency and enable them to expand their lending. To be concrete, in late 2008, as the result of the collapse of market liquidity, many portfolios of subprime and Alt-A mortgages were being priced very low (in rarely observed market transactions) compared to their expected recovery values. If the government had offered a free put option on, say, Citigroup's entire portfolio of subprime and Alt-A mortgages and mortgage-backed securities (to prevent cherry picking) at 50 percent of face value, that would have substantially raised the market value of Citigroup's shares. Even if 50 percent of the mortgages underlying that portfolio had gone to foreclosure with a loss, given default, of 50 percent, the recovery value of the portfolio would have been 75 percent, implying no cash flow cost to taxpayers from providing a put option at 50 percent of face value. Of course, if this guarantee had been priced on market terms, there would have been no subsidy, and also no effect on Citigroup's stock price.

A second approach would be to attach put options to new stock offerings. The government could offer buyers of new shares a put option at, say, 30 percent below the price paid for those shares in the market. This step would raise the price of new offerings, substantially improving the ability of banks to raise common stock, and would limit taxpayers' exposure to extremely unlikely states of the world (where cumulative losses on shares exceeded 30 percent).

A third approach would be to copy Mexico's "Punto Final" program of 1999, which helped to end the Mexican banking system's financial gridlock (Calomiris, Klingebiel, and Laeven 2005; Calomiris 2009b). The Mexican government matched loan write-downs that were agreed between creditors and debtors so long as they were agreed quickly (within six months). For example, the US government could have agreed to pay 30 cents to a creditor for every dollar that the creditor decided to forgive in troubled mortgages, leaving it to the creditor to decide which mortgages to include in the subsidized write-down program. Value-maximizing creditors would have used this subsidy to write down mortgages that were close calls—those for which (absent the subsidy) foreclosure was the best strategy for the creditor, but for which a subsidy would make it worthwhile for the creditor to agree to a moderate write-down. A Punto Final approach not only would have raised bank asset and equity values, it would have improved the wealth of many mortgage holders and eliminated some of the uncertainty that plagued the housing and mortgage markets.

Despite discussions of all three approaches, including by Secretary Geithner in early 2009, political opposition to subsidizing the big banks blocked these subsidy

proposals. Ricardo Caballero, a vocal proponent of using subsidized out-of-the-money guarantees of bank assets or stock offerings, complained in frustration in an article published in February 2009: "Politics require that a 'good deal for taxpayers' is added to . . . [the] . . . principles [guiding TARP], but the truth is that the best deal for taxpayers, once one considers the endogenous response of the economy, is anything that works to stabilize the financial system . . ."

Should Assistance to Banks Have Been More Generous or More Selective?

Li (2013) shows that TARP recipients increased the supply of credit they provided to the economy. Local markets in which a higher proportion of banks received TARP funds experienced improved economic conditions (Berger and Roman 2015). Croci, Hertig, and Nowak (2015) argue that more forgiving standards for TARP assistance to voluntary participants would have reduced resolution costs for the Federal Deposit Insurance Corporation, and that on net, this would have been desirable.

These analyses tend to support the view that TARP should have been more generous. However, there are some counterbalancing considerations. Financial institutions that can reasonably expect to receive assistance if they take risks that could lead to insolvency, will have a moral hazard incentive to engage in riskier behavior, which means that the costs of providing such incentives are potentially large (Duchin and Sosyura 2014). Furthermore, the ability to survive the crisis after receiving assistance sets too low a standard because it neglects the long-term social gains that come from transferring poorly performing banks to relatively efficient management. Berger and Roman (forthcoming) find that TARP funds were a source of major competitive advantage in local markets, and as such they could be used inappropriately to offset the disadvantages that come from poor management. Cornett, Li, and Tehranian (2013) found that relatively weak banks that received TARP tended not to make as much high-quality loans in response to receiving funding, or to reduce expenses as much, and were less likely to repay their funding. Bayazitova and Shivdasani (2012) found no evidence of certification gains from receiving Capital Purchase Program infusions, indicating little belief among those out in the market that government selections conveyed useful positive private information about bank quality.

With respect to large banks, counterfactual resolution costs from allowing failure are hard to gauge. It is hard to find an acquirer for a global behemoth, and liquidation is particularly costly for complex organizations with cross-border reach (which substantially complicates regulatory jurisdictional challenges). On the other hand, moral-hazard costs from predictable too-big-to-fail protection may be especially great (Black and Hazelwood 2013).

Conclusion

Six years after the passage of TARP, it remains hard to measure the total social costs of the assistance to banks provided under TARP programs. While TARP's

passage was associated with significant improvements in financial markets and the health of financial institutions, from an economic perspective TARP could have been better designed to achieve more benefits at lower costs. Several of the design choices made under TARP—the lack of strict limits on common dividend payments, the use of strict limits on executive compensation by participants, the contingent use of common stock investments to replace preferred stock investments in especially weak, too-big-to-fail banks instead of subsidized guarantees for troubled assets or new stock issues—all reflected fundamental political obstacles that constrained the mechanisms that were chosen.

Any evaluation of TARP must look beyond its effects on GDP and recognize that democracies also value justice, which further complicates any evaluation of TARP's design. Beyond its economic costs and benefits, TARP clearly entailed other social costs. Many found assistance to bankers unjust, or insisted on attaching conditions to that assistance that weakened its effectiveness. Evidence of corruption in choosing which banks received TARP funds also added to the noneconomic social cost.

The implementation of TARP was hasty and heavily influenced by the immediate political backlash produced by the financial crisis, especially in the crucial weeks between Lehman's failure and the election. From that perspective, perhaps the clearest lesson from TARP is that it would be useful to evaluate TARP and reach agreement within our democracy about the difficult tradeoffs involved in designing crisis assistance to banks *before* another crisis is upon us. That way, our discussion of the myriad economic and noneconomic costs and benefits can be more complete, informed, and thoughtful. This is particularly important in light of the new limits that the Dodd–Frank Act of 2010 has placed on Federal Reserve assistance to troubled financial institutions under Section 13(3) of the amended Federal Reserve Act. The Fed was actively involved throughout the financial crisis in taking on risk through guarantees, purchases, and loans. In the future, the ability of the Fed to do so will be substantially more constrained. Although it is reasonable and appropriate to limit Fed discretion on fiscal matters, having done so, it is all the more necessary to plan ahead transparently and wisely for the next crisis. The United States has suffered 17 major banking crises since 1792; it is unlikely that the subprime mortgage crisis will be our last.

■ *The authors would like to thank David Autor, Allen Berger, Jerry Caprio, Stijn Claessens, Richard Herring, Chang-Tai Hseih, Edward Kane, Luc Laeven, Allan Meltzer, Phillip Swagel, and Timothy Taylor for thoughtful comments and suggestions on earlier drafts of this paper.*

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Journal of Economic Perspectives—Volume 29, Number 2—Spring 2015—Pages 81–106

AIG in Hindsight[†]

Robert McDonald and Anna Paulson

The near-failure on September 16, 2008, of American International Group (AIG) was an iconic moment of the financial crisis. AIG, a global insurance and financial company with $1 trillion in assets, lost $99.3 billion during 2008 (AIG 2008, p. 194) and was rescued with the help of the Federal Reserve, the Federal Reserve Bank of New York, and the US Treasury. The rescue played out over many months and involved the extension of loans, the creation of special purpose vehicles, and equity investments by the Treasury, with the government assistance available to AIG ultimately totaling $182.3 billion. The decision to rescue AIG was controversial at the time and remains so. AIG's fate also provided an important touchstone in discussions of financial reform. AIG motivated the enactment of new rules governing nonbank financial institutions, as well as rules about the treatment of financial derivatives.

In this paper, we begin with an overview of AIG's main corporate financial indicators from 2006–2009. However, most of the attention paid to AIG—and our focus—concerns the two main activities that caused the insurance company to be driven to the edge of bankruptcy by falling real estate prices and mortgage foreclosures: AIG's securities lending business and its credit default swap business. Although much of the discussion concerning AIG has centered on its credit default swap business, we will show that losses from its securities lending business

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[†] To access the Appendix, Data Appendix, and disclosure statements, visit http://dx.doi.org/10.1257/jep.29.2.81

doi=10.1257/jep.29.2.81

were of a similar magnitude. On September 16, 2008, the cumulative losses from these two activities were on the order of $50 billion, and both appear to have played important roles in AIG's near-failure (as also emphasized by Pierce 2014; Taibbi 2011, chap. 3).

We then turn to a description of the government rescue of AIG, including the special purpose vehicles "Maiden Lane II" and "Maiden Lane III" that the New York Fed created to deal with the assets related to AIG's securities lending and credit default swap operations, respectively. In particular, we examine the write-downs on the assets in these portfolios from each asset's inception to October 2014. AIG's real estate positions were apparently motivated by the belief that these investments would not default. The analysis sheds light on a claim often made by AIG executives that their mortgage-related investments might have suffered a decline in their market value in the short-term, but that they would pay off over time. This claim implicitly attributes any price decline in such securities to short-term illiquidity. The head of the AIG Financial Products subsidiary, Joseph Cassano, often referred to the mortgage-related securities that AIG insured through credit default swaps as "money good" (for example, see American International Group Investor Meeting 2007). Mark Hutchings (2010), who ran AIG's securities lending business, made similar statements about the real estate–related investments financed by securities lending. However, this stark claim that assets were "money good" is not borne out: a number of AIG's mortgage-related investments suffered principal write-downs. In our concluding section, we discuss the question of how to think about AIG as a financial firm.

It is important to be clear about what we do not do in this paper. We do not analyze AIG's regulatory oversight prior to the crisis. We discuss what happened in the AIG rescue, but we do not analyze alternative policies or capital structures for a rescue. We discuss the specific parties who benefited most from the rescue, but we do not address the broad question of what might have happened to the financial system had AIG failed. There was certainly reason for concern: In testimony about the AIG rescue, Federal Reserve Chairman Ben Bernanke noted that AIG had $20 billion of commercial paper outstanding and $50 billion of exposure to other banks via loans, lines of credit, and derivatives. Lehman Brothers had around $5.7 billion in commercial paper, and its failure wreaked havoc on money market mutual funds (FDIC 2011). Policymakers and academics have written extensively about potential systemic consequences from the failure of a large, interconnected financial firm like AIG: for example, Acharya, Gale, and Yorulmazer (2011), Brunnermeier and Pedersen (2009), Kacperczyk and Schnabl (2010), Duarte and Eisenbach (2014), and Ellul, Jotikasthira, Lundblad, and Wang (2014), among many others.

AIG Financials: 2006–2009

AIG was an international insurance conglomerate with four main lines of business: 1) General Insurance, including property/casualty and commercial/industrial

Table 1
AIG Financial Indicators by Operating Segment, 2006–2009
(billions of dollars)

Item	*2006*	*2007*	*2008*	*2009*
Revenues	113.39	110.06	11.10	96.00
Earnings	14.05	6.20	−99.29	−12.31
Realized capital gains	0.11	−3.59	−55.48	−6.86
Unrealized CDS losses (AIGFP)	0	−11.47	−28.60	1.42
Operating Income				
General Insurance	10.41	10.53	−5.75	0.17
Life Insurance & Retirement Services	10.12	8.19	−37.45	2.04
Financial Services	0.38	−9.52	−40.82	0.52
Asset Management	1.54	1.16	−9.19	NA
Assets				
General Insurance	167.00	181.71	165.95	154.73
Life Insurance & Retirement Services	550.96	613.16	489.65	553.49
Financial Services	202.49	193.98	167.06	132.82
Asset Management	78.28	77.27	46.85	NA

Sources: AIG 2008 10-K, pp. 71, 194, and 225 and AIG 2009 10-K, pp. 72, 195, and 230.
Notes: In 2009, results from asset management activities were included in the Life Insurance & Retirement Services category. Revenue is composed of premiums and other income, net investment income, realized capital gains (or losses), and unrealized credit default swap (CDS) losses. Earnings are equal to net income (or losses) as reported on AIG's consolidated statement of income. Realized capital gains are primarily comprised of sales of securities and other investments, foreign exchange transactions, changes in the fair value of non-AIGFP derivative instruments that do not qualify for hedge accounting treatment, and other-than-temporary impairments on securities. Unrealized CDS losses are the unrealized market valuation loss on AIGFP's super senior credit default swap portfolio. Operating income is equal to pre-tax income (or loss) for each business segment. Assets are equal to year-end identifiable assets for each business segment.

insurance; 2) Life Insurance and Retirement, including individual and group life insurance and annuities; 3) Asset Management, including private banking, brokerage, and investment advisory services; and 4) Financial Services, including a capital markets division, consumer finance, and aircraft leasing. Looking at that list of lines of business, it is not at all obvious why AIG had significant exposure to risks from falling real estate prices and default rates on subprime mortgages.

Each year, public firms must file a 10K report with the Securities and Exchange Commission with an in-depth presentation of their financial position. In its 2007 10K report, AIG listed $1.06 trillion in assets (AIG 2007b, p. 130). Table 1 presents financial indicators for 2006–09, which help to put AIG's 2008 performance into perspective. The firm was showing some reasons for concern in 2007, including losses in the Financial Services division and unrealized losses in its credit default swap business. But in 2008, AIG lost money in all of its main lines of business, with the largest losses in the Life Insurance and Financial Services divisions. In both cases, the losses stemmed from heavy bets on real estate–related financial products.

The Life Insurance division lost money primarily because of securities lending ($21 billion in losses), where life insurance company assets were loaned in exchange for cash that was used to invest in mortgage-related securities. In the case of financial services, AIG had written credit default swaps on mortgage-related bonds, losing $28.6 billion in 2008 (AIG 2008, p. 265). The securities lending business will be discussed in the next section; the credit default swap business will be discussed in the section after that. AIG's reported 2008 revenue of $11.1 billion incorporates the losses from securities lending, credit default swaps, and other sources.

AIG's Securities Lending Business

During 2008, AIG's life insurance subsidiaries lost approximately $21 billion from securities lending, in which the life insurance subsidiaries loaned out assets and invested the proceeds in risky assets, including assets backed by subprime residential mortgage loans. In this section, we discuss AIG's securities lending activity, which created unique problems because of its links to AIG's state-regulated life insurance subsidiaries. Recently, Pierce (2014) has examined the securities lending business in detail. We argue that it is impossible to evaluate the potential consequences of an AIG failure without understanding AIG's life insurance and securities lending activities.

What Is Securities Lending?

In a securities lending transaction, one party borrows a security from another and deposits collateral, typically cash, with the securities lender. The borrower may use the security as part of a short-selling strategy or to deliver a particular security to a customer. The securities lender invests the cash collateral and earns a yield from these investments, less a rebate paid to the securities borrower. Absent default, the lender remains the economic owner of the security that is on loan, earning its return including any dividend or coupon payments. The cost to the security borrower is the difference between the return the borrower could have earned investing the cash collateral and the rebate fee, which is a market price determined by the scarcity of the security on loan. The term of a securities lending transaction may extend for various periods up to several months, but in many cases either party can terminate the transaction early. The borrower can end the transaction by returning the security to the lender, at which time the lender must also return the cash deposit to the borrower. A problem can arise if many borrowers simultaneously decide to end transactions and the securities lender does not have, or cannot raise, sufficient cash to meet these demands in a timely fashion.[1]

[1] Securities lending transactions are very similar to repurchase agreements, as discussed in Adrian, Begalle, Copeland, and Martin (2013). For additional background on securities lending, see Aggarwal, Saffi, and Sturgess (2012) and Bank of England (2010).

Characteristics of AIG's Securities Lending

AIG's securities lending activities were conducted "primarily for the benefit of certain AIG insurance companies" (AIG 2007b, p. 108). These activities were centralized in a noninsurance subsidiary, AIG Global Securities Lending (GSL), which served as an agent for AIG's subsidiary life insurance companies. The life insurance companies provided securities, primarily corporate bonds, to GSL. These securities were loaned to banks and broker-dealers in return for cash collateral that was invested by GSL. The investment proceeds were used to fund the rebate to the security borrower, and the remainder was split 50–50 between GSL and the insurance companies. Nearly all of AIG's security loans had a one-month term (Hutchings 2010).[2]

AIG expanded its securities lending rapidly in the run-up to 2008. At the end of 2003, the firm had less than $30 billion in securities lending outstanding. At the peak in 2007Q3, AIG had securities lending outstanding of $88.4 billion (AIG 2007a, p. 2). AIG had securities lending of $70 billion during the second quarter of 2008, which then fell almost to zero by the fourth quarter of 2008.

AIG consistently lent more than 15 percent of its domestic life insurance assets: in 2007, for example, the figure was 19 percent. By comparison, Metlife, another active insurance securities lender, never had more than 10 percent of its domestic life insurance assets on loan.

Typically, securities lending collateral is invested in short-term, highly liquid securities: A firm cannot easily lend its securities for cash collateral if possible borrowers of those securities fear that their cash collateral may not be secure. However, AIG invested a substantial portion of the cash collateral it received from securities borrowers in longer-term, illiquid instruments, including securities dependent on the performance of subprime residential mortgages. At the end of 2007, 65 percent of AIG's securities lending collateral was invested in securities that were sensitive either directly or indirectly to home prices and mortgage defaults. These securities included some backed by residential and commercial mortgages, as well as others backed by credit card, auto, and home equity loans. It also included collateralized debt obligations (CDOs), which are structured financial instruments that are backed by a pool of financial assets, often the riskier tranches of mortgage-backed securities. Cash flows to collateralized debt obligations are divided into tranches ranked from junior to senior. Any losses are first allocated to the more junior tranches until their value is exhausted, a structure which offers a degree of protection to senior tranches.

Of the remainder of AIG's securities lending collateral, 19 percent was invested in corporate bonds and 16 percent was in cash or other short-term investments (AIG 2007b, p. 108). For comparison, a Risk Management Association (2007) survey of securities lenders shows that on average 33 percent of lending proceeds was invested

[2] Term arrangements can be fixed or indicative. If they are indicative, they can be terminated early without penalty (Bank of England 2010). We do not have information about whether AIG's arrangements were fixed or indicative.

in mortgage-backed securities, asset-backed securities (a broad category of securities backed by credit card receivables, auto loans, and the like), and collateralized debt obligations, with the remainder invested 42 percent in corporate bonds and 25 percent in cash and short-term investments.

AIG's use of securities lending collateral to purchase residential mortgage-backed securities and collateralized debt obligations is similar to the broader phenomenon described in Krishnamurthy, Nagel, and Orlov (2014) of financial firms using short-term funding like repurchase agreements and securities lending to fund assets that had previously been funded through insured bank deposits. AIG's investments of securities lending collateral in real estate–related instruments accelerated after 2005. On the other hand, the AIG Financial Products (AIGFP) subsidiary decided to stop increasing its exposure to real estate–related risk near the end of 2005. It took some time to implement this decision, however, and deals that were in the pipeline were completed, and as a result AIGFP's real estate exposure continued to grow. In addition, some of the collateralized debt obligations that AIGFP insured were "actively managed," which meant that the manager of the security could replace maturing, refinanced, and defaulting mortgages with new ones, including the particularly default-prone mortgages that were made in 2006 and 2007.

The AIG securities lending business was characterized by a large liquidity and maturity mismatch. Securities borrowers can demand the return of their cash collateral on short notice. However, AIG was investing this cash in long-term assets whose market values and liquidity could vary substantially in the short run. As long as AIG could make new security loans when existing ones came due, it could maintain its investments in long-run, illiquid assets. But an arrangement based on a liquidity and maturity mismatch, like this one, is clearly vulnerable to bank-run dynamics. The security borrowers have incentives that are similar to bank depositors who lack deposit insurance. Depositors will rush to withdraw cash when they are concerned about their bank's solvency. They want to make sure that they get their funds before the bank runs out of money. Similarly, security borrowers who are worried about the AIG's ability to return their cash on demand are likely to ask for it to be returned. Efforts to satisfy these demands will further erode AIG's liquidity and generate losses that will prompt other securities borrowers to demand the return of their cash collateral.

Indeed, before AIG was rescued on September 16, 2008, securities lending counterparties began to terminate these lending agreements. Standard and Poor's, Moody's, and Fitch all lowered AIG's credit rating in May or June 2008. AIG announced large second-quarter losses on August 6, 2008. The possibility of further losses and still-lower credit ratings appears to have accelerated the efforts of counterparties to reduce their securities lending exposure to AIG. Because the combination of falling real estate prices and higher mortgage foreclosures had reduced the market price of securities tied to these underlying assets, and because it did not have access to other sources of liquidity, AIG was unable to generate sufficient funds to meet redemption requests and to return the cash collateral. Moreover, its losses on securities lending threatened the regulatory capital positions of AIG's life insurance subsidiaries, a point we discuss later and one that is also emphasized by Pierce (2014).

Like many episodes during the crisis, AIG's securities lending problems can be viewed through the lenses of both liquidity and solvency. AIG (2008, p. 4) summed up its dilemma with respect to securities lending with considerable understatement in its 2008 10K report: "During September 2008, borrowers began in increasing numbers to request a return of their cash collateral. Because of the illiquidity in the market for RMBS [residential mortgage-backed securities], AIG was unable to sell RMBS at acceptable prices and was forced to find alternative sources of cash to meet these requests." On Monday, September 15, 2008, alone, AIG experienced returns under its securities lending programs that led to cash payments of $5.2 billion (AIG 2008, p. 4).

On September 16, 2008, AIG received "alternative sources of cash" from the Federal Reserve Bank of New York. The cash was initially in the form of loans. However, the New York Fed soon set up several limited liability companies as financial vehicles to handle its rescue of AIG. In December 2008, one of these companies called Maiden Lane II purchased AIG's remaining portfolio of residential mortgage-backed securities, in which it had invested securities lending collateral, for $20.5 billion—a 48 percent discount relative to their par value of $39.3 billion. According to the Congressional Oversight Panel report (2010, p. 45), AIG's securities lending counterparties demanded the return of $24 billion in cash collateral between September 12 and September 30, 2008. Ultimately, AIG reported losses from securities lending in excess of $20 billion in 2008.

Securities Lending and Bankruptcy

What would have happened to AIG's insurance companies and securities lending counterparties in the event of an AIG bankruptcy? Generally, if a securities lender seeks bankruptcy protection, the borrower simply takes ownership of the security that it borrowed; any additional claims associated with the transaction would be resolved in bankruptcy. The value of the security on loan is marked to market daily, and the collateral is adjusted accordingly, so any additional claims if a security lender goes bankrupt would typically be small. Because securities lending transactions are exempt from the "automatic stay" provisions of the bankruptcy code—that is, the rule that once bankruptcy has been declared, creditors cannot move to collect what they are owed—resolving these securities lending transactions should be fast and straightforward.

However, AIG's securities lending was conducted largely on behalf of its life insurance companies, which were regulated at the state level. If AIG had declared bankruptcy, the resolution of claims related to securities lending would likely have depended on the actions of state insurance regulators. When a life insurance company cannot meet its financial obligations, a state insurance commissioner will take control of the company's operations and place it in receivership.[3] Federal

[3] The state receivership process has three stages: 1) conservation, 2) rehabilitation, and 3) liquidation. The receivership process can involve transfers of blocks of assets and liabilities to other companies. If the company cannot be rehabilitated or sold, it is declared insolvent and the commissioner liquidates the company and distributes assets or the proceeds from asset sales to approved claimants in the manner prescribed by the state's receivership laws.

bankruptcy law does not apply to insurance companies, although the actions taken under state receivership statutes are generally patterned after federal bankruptcy. However, certain important exceptions to this practice may have been material for AIG in 2008.

If AIG had sought bankruptcy protection, state insurance commissioners would probably have seized AIG's insurance subsidiaries (Dinallo 2010). In these circumstances, the status of securities lending transactions might have varied depending on where a particular AIG insurance subsidiary was located. As of 2008, of the ten states where AIG's life insurance subsidiaries were located, only Texas had passed a version of the Insurer Receivership Model Act (IRMA) written by the National Association of Insurance Commissioners (NAIC), which allows securities lending and other qualified financial contracts to receive the same exemption from the automatic stay provisions in an insurance resolution that would apply in bankruptcy.[4] Texas-domiciled companies supplied the securities for 58 percent of AIG's securities lending. However, the legal treatment of counterparties to the remaining 42 percent of the securities supplied by life insurers located in other states would have been uncertain in an insurance insolvency. AIG's 2007 10K points out that "the securities on loan as well as all of the assets of the participating companies are generally available to satisfy the liability for collateral received" (AIG 2007b, p. 108).

An additional protection for some securities borrowers would have arisen from a unique aspect of AIG's lending program. Rather than the typical practice of requiring collateral of 102 percent of the value of the security being lent, AIG began lending securities with less than 100 percent collateral, with the AIG parent company making up the difference to the insurance subsidiary (AIG 2008, p. 3). AIG seems to have accelerated this practice as its liquidity issues grew more acute. For example, in an August 14, 2008, email, a Federal Reserve Bank of New York employee noted that "CSG [Credit Suisse Group] does not need the securities it borrows but instead AIG is using the deals to raise cash. As such CSG is looking to take a haircut on AIG's securities as opposed to posting cash to AIG in excess of the securities value which is the market standard" (available at http://fcic-static.law.stanford.edu/cdn_media/fcic-docs/2008-09-12%20FRBNY%20Email%20re%20AIG%20Meeting%20with%20OTS.pdf). By 2008, AIG had also boosted rebate fees paid to securities borrowers and was making losses on securities lending arrangements but felt this was warranted in order to avoid a "run on the bank" scenario (Hutchings 2010).

When the borrowing firm does not post enough cash to fund "substantially all of the cost of purchasing replacement assets," then from an accounting perspective, the transaction will be treated as a sale, rather than as a securities lending transaction. AIG (2008, p. 166) reported losses of $2.4 billion on securities lending transactions that had to be reclassified as "sales" in 2008.

Overall, this analysis suggests that losses for AIG's securities lending counterparties would have been small had AIG sought bankruptcy protection and if the

[4] See Fitch Ratings (2006) and "Expanding Insurance Regulation One State at a Time," available at http://www.law360.com/articles/295760/expanding-insurance-regulation-one-state-at-a-time.

counterparties were able to take possession of the securities that they had borrowed. Securities borrowers who held securities worth more than the cash they were due from AIG would not have suffered losses in an AIG bankruptcy, barring uncertainties associated with state insurance law. Note that this conclusion only takes into account the potential for direct losses. Counterparties needing to unwind or liquidate positions quickly might have suffered indirect losses as well.

Impact of Securities Lending on AIG's Domestic Life Insurance Subsidiaries

The losses for life insurance companies engaged in securities lending can be attributed to two factors: losses on sales of assets incurred when those securities were sold for cash when borrowed securities were being returned, and unrealized mark-to-market losses on similar assets that had not yet been sold. Together, these losses put AIG's domestic life insurance companies under considerable regulatory pressure. Life insurance regulators establish minimum levels of capital that take into account each company's asset risk, insurance risk, market risk, interest rate risk, and business risk (along with an adjustment to account for the fact that these risks are not perfectly correlated). When capital falls below a certain threshold, state insurance regulators are required to intervene to protect policyholders.

Looking at their official end-of-the-year balance sheets, AIG's life insurance subsidiaries appear to have made it through 2008 with a comfortable cushion of capital relative to regulatory minimums. However, these figures include over $19 billion in capital infusions in the third and fourth quarters of 2008 that were only possible because of the rescue of AIG. Table 2 shows the capital positions of the eleven AIG life insurance subsidiaries that had more than $5 billion in assets at the end of 2007. For each company, the table shows 2007 assets and the share of those assets that were on loan through AIG's securities lending business, securities lending losses in 2008, and the company's regulatory capital as of the end of 2008, both with and without the capital infusions made possible by the rescue. Eight of these eleven companies would have had negative capital without the capital infusions. The rescue funds recapitalized the life insurance companies and kept them solvent, despite their securities lending losses. This ultimately benefited AIG's life insurance policyholders.

The urgency of the problems in AIG's life insurance subsidiaries is reflected in the rapidity with which they were recapitalized: by September 30, 2008, just 14 days after the initial loan to AIG, $13.3 billion of the loan proceeds from the Federal Reserve Bank of New York had already gone toward recapitalizing the life insurance subsidiaries (Congressional Oversight Panel 2010, p. 84). Ultimately, at least $58 billion of the total government assistance to AIG went to addressing problems related to securities lending: $19 billion in capital infusions to the life insurance subsidiaries to address securities lending losses; $36.7 billion to repay collateral to securities lending counterparties ($19.5 billion from Maiden Lane II plus $17.2 billion from the revolving credit facility that the New York Fed established in the initial stages of the rescue) as well as an additional $3.1 billion from the revolving credit facility to repay securities obligations (Congressional Oversight Panel 2010, p. 237).

Table 2
The Role of the Rescue in Recapitalizing AIG's Life Insurance Subsidiaries

		2007		2008			
Company	*State*	*Assets ($ millions)*	*% of Assets in securities lending*	*Realized securities lending losses ($ millions)*	*Post-rescue capital infusions ($ millions)*	*Regulatory capital with rescue ($ millions)*	*Regulatory capital without rescue ($ millions)*
ALICO	DE	101,632	4.5%	470	967	4,332	3,365
VALIC	TX	63,999	15.1%	3,563	3,621	2,940	−681
AIG Annuity	TX	50,553	39.7%	7,109	6,048	3,242	−2,806
American General Life	TX	33,682	31.3%	3,790	3,084	2,844	−240
SunAmerica Life	AZ	39,455	27.1%	2,281	1,366	4,805	3,439
AIG SunAmerica Life	AZ	35,072	6.1%	425	281	1,317	1,036
AIG Life	DE	10,790	23.6%	870	679	465	−214
American General Life & Accident	TN	9,134	33.9%	977	786	594	−192
First SunAmerica	NY	6,479	30.3%	654	947	550	−397
American International	NY	7,093	35.1%	771	801	458	−343
United States Life	NY	5,315	25.1%	395	456	305	−151
Total: AIG Life		**364,770**	**19.0%**	**21,305**	**19,036**	**22,393**	**3,357**

Sources: Authors' calculations from insurance regulatory filings accessed through SNL Financial and March 5, 2009, Hearing before the Senate Committee on Banking, Housing, and Urban Affairs, http://www.gpo.gov/fdsys/pkg/CHRG-111shrg51303/pdf/CHRG-111shrg51303.pdf (page 43). Table includes details for active securities lending participants with assets of at least $5 billion. The "Total: AIG Life" row includes all AIG life insurance subsidiaries.

AIG's Credit Default Swap Portfolio

We now turn to AIG's credit default swap business, with the goal of understanding the position in which AIG and its counterparties found themselves on September 16, 2008.

Credit Default Swaps

A credit default swap is a derivative financial instrument that behaves like an insurance contract on a bond or a similar financial security. The writer of the credit default swap, who is the insurance seller, promises to pay to the buyer of a credit default swap the difference between the market value and the par value of the insured bond if a "credit event" occurs. For present purposes, setting aside the sometimes arcane details of these contracts, it is sufficient to think of a credit event as the failure of the bond to make a promised payment, as in a default. There are two ways that the writer of a credit default swap like AIG can suffer a loss. Obviously, a loss can occur if a credit event means that the bond or security no longer makes its promised payments. But in addition, a loss can occur when the probability of a future credit event rises, and so the price of buying a new credit default swap for protection against that loss also rises. In this case, the firm that originally sold the credit default

swap at a lower price has suffered a loss on a mark-to-market basis, and that loss is incorporated in its accounting statements. The use of mark-to-market accounting was controversial during the financial crisis (Heaton, Lucas, and McDonald 2010), but it is standard practice for most derivatives. Mark-to-market losses on AIG's credit default swap contracts were $28.6 billion in 2008 (AIG 2008, p. 265).

AIG's Credit Default Swaps

As of December 31, 2007, AIG had written credit default swaps with a notional value of $527 billion. Due to accounting conventions, the credit default swaps do not directly show up on AIG's balance sheet. These swaps were written on corporate loans ($230 billion), prime residential mortgages ($149 billion), corporate debt/collateralized loan obligations ($70 billion), and multisector collateralized debt obligations ($78 billion) (AIG 2007b, p. 122). (AIG also had an additional $1.5 trillion of other derivative exposures, including over $1 trillion in interest rate swaps.) The credit default swaps written on multisector collateralized debt obligations proved the most troublesome. Again, a collateralized debt obligation is a financial security backed by an underlying stream of debt payments, which can be from mortgages, home equity loans, credit card loans, auto loans, and other sources. The payments on this security are then divided into tranches, so that junior tranches will bear losses before senior tranches do—allowing the senior tranches to receive a higher credit rating. It is even possible to create a new collateralized debt obligation by combining tranches of other collateralized debt obligations, a so-called "CDO-squared." AIG insured collateralized debt obligations backed by a variety of assets, but including a substantial share backed by mortgages—both residential and commercial as well as prime, subprime, and Alt-A (which fall between prime and subprime on the risk spectrum) (AIG 2008, p. 139).[5] It is important to realize that AIG's credit default swap exposure resulted in a "one-way" bet on real estate: that is, a decline in real estate prices and a rise in foreclosures would impose costs on AIG, but AIG had no offsetting hedging position that would show gains if real estate prices fell. In contrast, market-making financial firms (like a stockbroker-dealer) typically seek to hedge any significant directional exposure, so that they make profits regardless of whether the price of the underlying asset (say, the price of a stock) rises or falls.

AIG (2007b, p. 122) characterized $379 billion of its credit default swaps (out of $527 billion)—those on corporate loans and prime residential mortgages—as used for "regulatory capital relief rather than risk mitigation," primarily by European banks. These do not appear to have been especially risky; in its 2008 10-K, AIG (2008, p. 118) reported a mark-to-market loss of $379 million on this portfolio, 0.1 percent of the notional value. Moreover, AIG (2007b, p. 122) expected that the swaps would be terminated by the counterparties once they were operating under the Basel II capital

[5] Details of AIG's insured multisector collateralized debt obligations and others are available online at http://fcic.law.stanford.edu/resource/staff-data-projects/cdo-Library.

rules. This suggests that the counterparty banks considered themselves compliant with Basel II, although they were not yet regulated under those rules.

AIG began originating multisector credit default swaps in 2003, at a time when the firm was rated AAA. Over half of AIG's cumulative issuances of credit default swaps, however, occurred after the firm's credit rating was downgraded twice in 2005. The AIG Financial Products subsidiary reportedly decided to stop originating credit default swaps in December 2005, at which point it still had $80 billion of commitments (Polakoff 2009, p. 5).

Collateral and Variation Margin

AIG's credit default swap contracts were traded over-the-counter—that is, directly with counterparties—as opposed to being traded on an exchange and cleared through a clearinghouse. The standard master agreement for over-the-counter derivatives is provided by the International Swaps and Derivatives Association and includes a credit support annex, which specifies how counterparty credit risk will be addressed. Both the master agreement and annex can be customized when negotiating a deal.

By construction, many derivatives contracts have zero market value at inception; this is generally true for futures, swaps, and credit default swaps. When a position has zero market value, the two parties to a contract can, by mutual consent, exit the contract without any obligation for either to make any further payment to the other. Note that one or both parties may be using the contract to hedge a position, in which case exiting would leave at least one party with some unhedged risk to consider.

As time passes and prices move, a contract initiated with zero market value will generally not remain at zero market value: fair value will be positive for one counterparty and negative by an exactly offsetting amount for the other. In such cases, it is common for the negative value party to make a compensating payment to the positive value counterparty. Such a payment is referred to as *margin* or *collateral*; in this context, the two terms mean the same thing.[6] Collateral can flow back and forth as market values change. It is important to note that this transfer of funds based on a market value change is classified as a change in collateral and not as a payment. The reason is that the contract is still active, so collateral is held by one party against the *prospect* of a loss at the future date when the contract matures or makes payment on a loss. If the contract ultimately does not generate the loss implied by the market value change, the collateral is returned. The accounting treatment of collateral recognizes this description, and the reporting of collateral on the balance sheet depends upon the existence of a master netting agreement. When full variation margin is regularly exchanged, the value of the contract is in effect regularly reset

[6] Technically, payments due to market value changes are *variation margin*. Another use of collateral is to protect against possible future market value changes. This kind of collateral, called "initial margin" or the "independent amount," was typically not used in over-the-counter markets in dealer-to-dealer transactions prior to the crisis and is not relevant for discussing AIG.

to zero, meaning that the counterparties can agree to exit the contract without any further payments.

AIG's Collateral Practices

The post-crisis investigation shed light on AIG's collateral arrangements with various counterparties. Most of the credit default swap contracts written by AIG did not call for full exchange of variation margin. Rather, they carried a wide range of collateral provisions (details are summarized in AIG 2007c, d, and market standards for collateral are discussed in ISDA 2010). Some contracts made no provision for any exchange of collateral. Most often, AIG would make collateral payments only if the decline in value of the insured assets exceeded some predefined threshold. These thresholds often depended on AIG's credit rating, which meant that a corporate ratings downgrade could lead to a large required collateral payment. Selected examples from December 2007 (AIG 2007d) illustrate agreements ranging from full mark-to-market to an 8 percent threshold with various credit rating triggers for AIG and in some cases for the underlying collateral. Here are three examples. Goldman Sachs had 44 transactions with AIG, with a total notional value of $17.09 billion. The threshold (level of market value change required to trigger a collateral payment) was "4% as long as AIGFP is rated in the AA/Aa category" (AIG 2007d, p. 4). Societe Generale had 38 transactions with AIG, with a total notional value of $18.64 billion. The threshold was "8% as long as AIGFP is rated AA/Aa2 and Reference Obligation is rated at least in the AA/Aa category; the Threshold is reduced based on a matrix that takes into account lower ratings of AIGFP and/or the Reference Obligation" (AIG 2007d, p. 6). Finally, RBS had four transactions with AIG, with a total notional value of $1.35 billion. AIG had to make variation payments for any market value change; the threshold for these was zero (AIG 2007d, p. 6).

The assets underlying the multisector collateralized debt obligations were not easily traded. As a consequence, there were running disagreements between AIG and its counterparties, later documented by the Federal Crisis Inquiry Commission, about their mark-to-market value at any given time and hence the amount of collateral that AIG owed counterparties.

Because many of the AIG credit default swap agreements did not include full payment of mark-to-market variation margin, AIG could and did accumulate unpaid losses. An unpaid variation amount is economically equivalent to a loan from the counterparty to AIG. If AIG has $1 billion in unpaid variation margin, it is as if AIG borrowed $1 billion from the counterparty. In addition, a party accumulating unpaid losses may be unwilling to exit a derivatives contract, because doing so would force it to make full collateral payments. Presumably this is why the credit support annex of swap agreements will often contain provisions that allow the purchaser of a credit default swap to terminate the agreement if the issuer of the swap experiences a credit downgrade.

AIG had first reported a loss on its written credit default swaps in 2007, losing $11.5 billion on all such swaps for the year—$11.1 billion in the fourth quarter

Table 3
Evolution of Collateral Calls and Collateral Posted for AIG's Credit Default Swaps (CDS) on Multisector Collateralized Debt Obligations (CDOs)
(millions of dollars)

	Goldman Sachs		*Societe Generale*		*Total for all counterparties*		
Date	*Call*	*Posted*	*Call*	*Posted*	*Call*	*Posted*	*Total shortfall*
6/30/2008	7,493	5,913	1,937	1,937	15,780	13,241	2,539
9/12/2008	8,979	7,596	4,280	4,008	23,441	18,922	4,519
9/15/2008[a]	10,072	7,596	9,833	4,320	32,013	19,573	12,440
9/16/2008	10,065	7,596	9,818	5,582	33,879	22,445	11,434

Source: "AIG/Goldman Sachs Collateral Call Timeline," Financial Crisis Inquiry Commission (FCIC). http://fcic.law.stanford.edu/documents/view/2172.
[a] AIG was downgraded on September 15, 2008, and this meant that many multisector CDS counterparties were contractually entitled to additional collateral.

alone—with 98 percent of the total coming from credit default swaps on multisector collateralized debt obligations (AIG 2007b, p. 83).[7] Losses continued in 2008. Table 3 depicts the evolution of collateral calls between June and September 2008 for Goldman Sachs and Societe Generale (AIG's two largest credit default swap counterparties), as well as for all counterparties combined. As of June 30, 2008, counterparties had called $15.78 billion and AIG had posted $13.24 billion. The totals climbed gradually until on September 12, 2008, total calls amounted to $23.44 billion, with AIG having posted $18.92 billion. Thus, prior to the rescue, AIG had already provided almost $20 billion to counterparties.

The effect of triggers from changes in credit ratings is evident in a comparison of collateral calls for September 12, 2008, and those for September 15, 2008, the day on which all three credit ratings agencies downgraded AIG below AA−. Total collateral calls increased by $8.6 billion, to $32 billion. AIG's collateral shortfall rose from $4.5 billion to $12.4 billion. Societe Generale's call on that day rose by $5.5 billion.

What Would Have Happened to Credit Default Swap Counterparties If AIG Had Declared Bankruptcy?

If AIG had declared bankruptcy on September 16, 2008, what would have been the direct effect on credit default swap counterparties? It is of course impossible to answer this question definitively, but some straightforward observations are possible.

[7] AIG's credit default swap business was barely disclosed prior to 2007. The phrase "super senior" referring to tranches of collateralized debt obligations appears four times in the 2006 annual report and 114 times in 2007; "multisector" does not appear in 2006, but appears 23 times in 2007; "CDO" (for

Table 4

Multisector Credit Defalt Swap (CDS) Counterparty Collateral Shortfall Relative to Equity and Asset Sales Necessary to Maintain Pre-shortfall Equity-to-Asset Ratio

	Total assets ($ billions) **[1]**	*Total shareholders equity ($ billions)* **[2]**	*AIG shortfall as of 9/16/2008 ($ billions)* **[3]**	*Shortfall/ equity [3]/[2]* **[4]**	*Asset sales to return to pre-AIG-shortfall equity-to-assets ratio ($ billions)* **[5]**
Goldman Sachs	1,081.8	45.6	2.5	5.41%	58.5
Societe Generale	1,694.4	56.0	4.2	7.56%	128.1
Merrill Lynch	875.8	38.4	1.0	2.70%	23.6
UBS	1,784.5	41.5	1.0	2.41%	43.0
DZ Bank	677.0	10.6	0.7	7.00%	47.4
Rabobank	894.0	45.0	0.6	1.31%	11.7
Total					**312.4**

Source: Federal Crisis Inquiry Commission "AIG/Goldman-Sachs Collateral Call Timeline," available at http://fcic.law.stanford.edu/documents/view/2172 and author calculations using 2008 Q2 and Q3 financials. Goldman Sachs, Merrill Lynch, and UBS assets, shareholders equity, and tier 1 capital come from 2008Q3 financial statements. Societe Generale, DZ Bank, and Rabobank values come from 2008Q2 financial statements. For each counterparty, to get the number shown in column 5, multiply total assets shown in column 1 by the percentage shown in column 4. Column 5 represents the assets sales that would be necessary if the AIG collateral shortfall from column 3 was realized and the firm in question chose to preserve its original equity-to-asset ratio.

AIG had 21 counterparties for its multisector credit default swaps. Of those, nine had collateral calls exceeding $500 million, and six of those—Goldman Sachs, Societe Generale, Merrill, UBS, DZ Bank, and Rabobank—had a difference greater than $500 million between the collateral they had requested and the amount AIG had posted. Table 4 shows these collateral shortfalls for the six largest counterparties to AIG's multisector credit default swaps as of September 16, 2008, and also shows the shortfall relative to shareholder equity for each counterparty. Of the $11.4 billion that AIG owed to counterparties on its credit default swaps on September 16, 2008, these six banks accounted for $10 billion.

If AIG had defaulted, the counterparty banks to the credit default swaps on the multisector collateralized debt obligation would have likely faced three direct consequences. First, the banks would have kept the collateral already posted by AIG. This is a result of the rule mentioned earlier that derivatives are exempted from the automatic stay in bankruptcy (for discussion, see Edwards and Morrison 2005;

collateralized debt obligation) appears twice in 2006 and 93 times in 2007. AIG's 2006 annual report discloses that it had written $483.6 billion in credit default swaps, but provides no details, whereas the 2007 report reports notional values of credit default swap by category. AIG's first public disclosure of credit default swaps written on the multisector collateralized debt obligations came on August 9, 2007, during a second-quarter earnings call (Federal Crisis Inquiry Commission 2011, p. 268). The lack of disclosure is surprising given that the credit default transactions increased the size of AIG's balance sheet by 50 percent in economic terms.

Bolton and Oehmke forthcoming). Second, the banks would have been treated as general creditors for any collateral that had been requested but AIG had not yet posted. Third, the banks would have retained the asset or position that had been hedged by the defaulted credit default swap.

Assuming that assets were valued correctly and that the September 15, 2008, downgrade of AIG to an A rating eliminated any remaining thresholds that might have further increased collateral calls, the economic cost of an AIG default for its counterparties would be equal to the collateral shortfall: that is, the difference between called and posted collateral. How significant would this shortfall have been for the counterparty banks? As can be seen in Table 4, even for the six banks that were individually owed more than $500 million, in no case did the shortfall exceed 10 percent of their equity capital.

However, comparing the actual loss with counterparty equity may be too sanguine, because it assumes that counterparties would simply absorb the loss. This assumption faces at least three potential problems. First, Brunnermeier and Pedersen (2009) and Duarte and Eisenbach (2014), among others, emphasize the possibility of fire-sale spillovers. Institutions might respond to the loss in capital by selling assets in order to return to their pre-loss leverage ratios. This could lower asset prices and lead to mark-to-market losses at other firms who might in turn sell assets to get back to target leverage ratios. Our back-of-the-envelope calculations presented in Table 4 suggest that if these six banks had chosen to respond by selling assets to get back to their pre-AIG default debt to equity ratios, they would have needed to sell $312 billion in assets. Second, the cancellation of the credit default swaps would leave many of the counterparties with unhedged exposure to real estate risk. Retaining this risk could reduce the capacity for other risk-taking. Third, even if one concludes that counterparties could have absorbed losses due to an AIG failure, other market participants would not have known at the time who was exposed and in what amount. For this reason, the failure of any large financial firm can be stressful for the financial system—a conclusion that is not particular to credit default swaps or AIG.

Another consequence of AIG's failure would have been cancellation of the $387 billion of other credit default swaps mainly held by European banks. Collateral calls related to these positions totaled just $500 million on September 16, 2008 (Congressional Oversight Panel 2010, p. 42), and as noted above, the institutions were apparently anticipating the swaps to expire when they adopted Basel II capital rules. The cancellation of these swaps would have created a regulatory capital deficiency, but it is not clear that this would have been economically important. In any event, European financial regulators would have had the option to forebear from enforcing the capital rules for a time, thus allowing for a period of adjustment.

Overall, how much did the rescue of AIG benefit its multisector credit default counterparties? Some media reports suggest that $62 billion in taxpayer funds were paid to AIG's multisector credit default swap counterparties (for example, Orol 2010). In fact, the direct counterparty benefit from the rescue is smaller. We can divide the payments to AIG's credit default swap counterparties into three categories.

First, there are collateral payments AIG made prior to the rescue. These payments would have been retained by counterparties in a bankruptcy and therefore cannot be attributed to the rescue. These payments totaled $22.4 billion with $18.5 billion associated with multisector collateralized debt obligations that became part of the Maiden Lane III Fed-created special purpose vehicle (see also Congressional Oversight Panel 2010, p. 93). Second, there are collateral payments made by AIG after the rescue. These payments could only be made because of the rescue and clearly offset losses that counterparties would have sustained in the absence of a rescue. This amount provides a lower bound on the assistance received by counterparties to the credit default swaps due to the rescue. AIG's 2008 10-K reports total collateral payments for credit default swaps of $40.1 billion for 2007 and 2008, suggesting that $17.7 billion was paid after the rescue. (As confirmation of this amount, the Congressional Oversight Panel (2010, p. 93) found that collateral payments of $16.5 billion were made after the rescue for the assets that became part of Maiden Lane III.) Finally, Maiden Lane III made cash payments of $26.8 billion in exchange for the assets that AIG had insured. These payments were equal to the estimated fair market value of the assets at the time (Office of the Special Inspector General 2009). While there may not have been many buyers for these assets, even at 47 percent of face value in the fall of 2008, it is inappropriate to consider the entire amount of the price that Maiden Lane III paid for the credit default swap as a direct benefit to the counterparties. Indeed, as we discuss in the next section, this portfolio of assets appreciated and was later sold for a modest gain.

Performance of Maiden Lane Assets

The Federal Reserve Bank of New York created several special purpose vehicles as part of the rescue of AIG. Among them, Maiden Lane II purchased the remaining securities lending invested collateral from AIG, and Maiden Lane III acquired from AIGFP's counterparties the collateralized debt obligations that AIG had insured. This acquisition terminated the associated credit default swaps. Maiden Lane II was funded by a $19.5 billion loan from the New York Fed and $1 billion from AIG that would absorb the first $1 billion in losses. Maiden Lane III was funded by a loan from the New York Fed of $24.3 billion and $5 billion in equity from AIG (Congressional Oversight Panel 2010, pp. 87, 91). The New York Fed has thoroughly documented the resulting cash flows at http://www.newyorkfed.org/markets/maidenlane.html. These data, in combination with information from various other sources, allow us to examine how the value of these securities evolved both while they were held in the Maiden Lane vehicles and afterward.

Maiden Lane II and III Performance

The New York Fed managed the Maiden Lane vehicles and assets with the goal of selling the assets once markets stabilized. Both Maiden Lane vehicles were ultimately liquidated for a total gain of $9.5 billion. While held in the Maiden Lane vehicles, the underlying securities paid interest and also repaid principal and

Table 5
Summary Statistics for Assets in Maiden Lane II and Maiden Lane III Portfolios

	Maiden Lane II assets			*Maiden Lane III assets*		
	Min.	*Median*	*Max.*	*Min.*	*Median*	*Max.*
Notional (millions $)	0.02	31.00	266.00	0.04	201.00	5,400.00
Purchase percentage	0.01	0.56	0.99	0.10	0.48	0.94
Sale percentage	0.00	0.58	1.02	0.03	0.49	0.96
Gain (millions $)	−70.50	1.53	76.40	−172.00	36.80	779.00
Return (Gain/Purchase Price − 1)	−0.95	0.13	4.06	−0.85	0.35	1.24
Benchmark return	−0.15	0.22	0.23	0.03	0.21	0.23
Return less Benchmark return	−1.18	−0.07	3.84	−0.91	0.14	1.02

Source: Authors' calculations using data from the Federal Reserve Bank of New York and Markit.
Notes: "Purchase percentage" is the ratio of the price paid for each asset to its notional value. "Sale percentage" is the ratio of the price received for each asset to its notional value. The "Benchmark return" for Maiden Lane II is the return on the ABX.HE.AAA.06-1, an index of AAA-securitized subprime mortgage loans originated in the last six months of 2005. For Maiden Lane III the "benchmark return" is 70 percent ABX.HE.AAA.06-1 and 30 percent CMBX.NA.AAA.1-1, an index of commercial mortgage-backed obligations.

experienced write-downs, both of which reduced their face value. They were ultimately sold by auction. The Maiden Lane II assets were bought in December 2008 for $20.5 billion (53 percent of par value), returned $8.9 billion in interest and principal while held, and the residual claims were sold for $15.1 billion (51 percent of par) for a nonannualized return of 16.9 percent. The securities were sold principally in 2011 and 2012. Table 5 summarizes the size, purchase and sale discount, and returns of the individual Maiden Lane II and III securities. There is significant variation in the size and discounts of securities.

It is not obvious whether the overall return of 16.9 percent is "good," given the risk of the assets. We can ask, however, whether the Maiden Lane securities performed especially well or poorly compared to a broader universe of residential real estate. To perform this comparison while controlling for different liquidation dates, we use as a benchmark an index of AAA-securitized subprime mortgage loans originated in the last six months of 2005, the ABX.HE.AAA.06-1 index. The median security in Maiden Lane II had a 13 percent return and underperformed the ABX by 7 percent. It is worth noting that AIG had begun to sell its securities lending collateral prior to the creation of Maiden Lane II, and the securities acquired by the special purpose vehicle were likely the poorest assets.

The securities in Maiden Lane III—primarily the multisector collateralized debt obligations that AIG had insured through its credit default swaps—were bought in November and December 2008 for $29.3 billion (47 percent of par), returned $17.1 billion in interest and principal, and were sold for $22.6 billion (50 percent of par), for a nonannualized return of 35.1 percent. The securities were sold primarily in 2012. The median security in Maiden Lane III returned 35 percent, exceeding the

Table 6

Aggregate Performance of Maiden Lane Asset: Origination through October 31, 2014

	Date			
	At origination	*Beginning of Maiden Lane*	*Maiden Lane sale*	*Most recent*
ML2 notional (billions)	$137.7	$85.9	$62.6	$43.2
ML2 amortization (billions)	$0.00	$51.8	$72.6	$87.4
ML2 write-down (billions)	$0.00	$0.05	$2.5	$7.0
ML2 write-down since start (%)	**0.00%**	**0.04%**	**1.8%**	**5.1%**
ML2 securities with write-downs (%)	**0.00%**	**0.5%**	**17.5%**	**36.0%**
ML3 notional (billions)	$82.5	$68.8	$45.8	$29.5
ML3 amortization (billions)	$0.00	$13.7	$31.0	$43.1
ML3 write-down (billions)	$0.00	$0.00	$5.7	$9.9
ML3 write-down since start (%)	**0.00%**	**0.00%**	**6.9%**	**12.0%**
ML3 securities with write-downs (%)	**0.00%**	**0.00%**	**47.2%**	**59.0%**

Source: Authors' calculations based on data from the Federal Reserve Bank of New York and from summaries derived from Intex data. Analysis using the Intex data was performed by Larry Cordell and Yilin Huang of the Federal Reserve Bank of Philadelphia.

Notes: Data were available for each of the 855 securities in Maiden Lane II and 146 of the 155 securities in Maiden Lane III, accounting for 97 percent of the original Maiden Lane III face amount. Omitted securities were either not present in the Intex data (seven securities) or had partially missing data (two securities). "Origination" is the date the security was created; "Beginning of Maiden Lane" is the approximate time at which the asset was purchased by a Maiden Lane; "Maiden Lane Sale" is the approximate time at which the asset was a sold by a Maiden Lane; and "Most Recent" refers to information as of October 31, 2014 or the most recent prior data available. (Some assets matured or were written down completely prior to October 31, 2014. Once a security has been paid off or written down completely, no additional data are reported for it.) Figures reflect the full outstanding amount for any security that was included in Maiden Lane II or III and not the share of the security purchased by those vehicles. For example, Maiden Lane II might have owned 10 percent of a particular security and 100 percent of the outstanding amount of the security is used to compute the figures in the table.

benchmark return by 14 percent. Returns on the Maiden Lane III securities were greater than those on Maiden Lane II, even after adjusting for the return benchmark. (The benchmark for Maiden Lane III was 70 percent ABX.HE.AAA.06-1 and 30 percent CMBX.NA.AAA.1-1, an index of commercial mortgage backed obligations. We obtained almost identical results using this benchmark and using ABX alone.)

Post–Maiden Lane Performance

Table 6 shows the performance of the securities lending invested collateral portfolio that eventually became part of Maiden Lane II and the super senior tranches of the collateralized debt obligations that were insured by AIGFP and eventually became part of Maiden Lane III.[8] The table provides information at

[8] Figures reported in Table 6 reflect the full outstanding amount for any security that was included in Maiden Lane II or III and not the share of the security purchased by those vehicles. Please see the notes to Table 6 for additional details.

four points: when the securities were originated (various dates); when the Maiden Lane vehicles were created; when the securities were sold from the Maiden Lane vehicles (various dates); and as of October 2014 (or the most recent prior date for which information is available). Thirty-six percent of the Maiden Lane II securities and 59 percent of the Maiden Lane III securities in the table have experienced write-downs. A sizeable share of write-downs have occurred during the post–Maiden Lane period. As explained earlier, senior tranches will be the last to experience actual losses, and for this reason, actual losses in these tranches will appear later and will likely increase over time. With approximately one-third of principal still outstanding, future substantial writedowns for the assets in both Maiden Lanes II and III remain possible.

Reported write-downs to date are 5.1 percent of the original face value of the securities that ended up in Maiden Lane II and 12 percent for Maiden Lane III. These estimates were calculated from information provided by Larry Cordell and Yilin Huang from the Federal Reserve Bank of Philadelphia, following the methodology in Cordell, Huang, and Williams (2011). The Maiden Lane III assets are harder to assess because issuers of collateralized debt obligations do not report writedowns prior to maturity. It is thus necessary to look for writedowns on the individual instruments constituting the collateralized debt obligation. The fact that the Maiden Lane II and III assets have suffered write-downs means that we can reject the stark claim that they were "money good."

Was AIG Special?

Given the drama surrounding AIG, it is natural to ask how AIG compared to other financial firms at the time. Was AIG unusual in its risk-taking or was it just unlucky? It turns out that AIG resembled some large banks in important respects: its real estate holdings were comparable to those of Citigroup and Bank of America, banks which also received considerable official support in 2008 and 2009. In addition, AIG's financing of its real estate positions was fragile and prone to runs in times of financial difficulty. Making a comparison with other firms requires first that we assess AIG's position prior to the rescue, especially its exposure to housing. A notable feature of AIG was its large position in written credit default swaps and we need to take these into account when comparing firms.

Issuing a credit default swap is economically equivalent to borrowing in order to finance the purchase of the same risky bond that the credit default swap would insure. To see this, suppose that you have excellent credit, that you borrow \$50 at a 5 percent rate of interest, and that you use the proceeds to buy \$50 in one-year bonds that might default, and which consequently pay a 15 percent rate of interest. If the bonds pay in full, you have a \$57.50 asset ($50 + .15 \times 50 = 57.50$), offset by a \$52.50 liability ($50 + .05 \times 50 = 52.50$), and you will have earned the 10 percent interest differential (\$5). However, if the bonds lose \$20, for example, you have a \$30 asset and a \$52.50 liability—and you face a loss of \$22.50. This pattern of gains

and losses is precisely that faced by the seller of a credit default swap on the bonds. If the bonds pay in full, the seller earns the credit default swap premium ($5), and if the bonds default, the credit default swap seller bears the loss ($22.50) that is paid to the bondholder.[9]

To relate this insight to AIG, consider the simplified example of a firm with $100 in assets—$90 of debt and therefore $10 of equity. The firm has an asset-to-equity ratio of 10:1 (that is, $100/$10). This firm now sells a credit default swap on $50 of mortgage-backed securities. In the contract, the buyer of the credit default swap agrees to make an annual payment of $5, and the seller bears the loss if the mortgage-backed securities fail. The economic result is the same as if the firm had $150 in assets ($100 plus the $50 in mortgage-backed securities insured by the credit default swap), financed with $140 in debt, $50 of which is implicit in the credit default swap. The issuance of a credit default swap implicitly changes assets and debt, but not equity.

This was approximately AIG's situation: the firm as a whole had $1.06 trillion of assets and about $964 billion in liabilities at the end of 2007, so it had equity of $96 billion. It issued $527 billion in credit default swaps. It was therefore economically equivalent to a firm with $1.59 trillion in assets and $96 billion in equity. Taking into account the credit default swaps, AIG's ratio of assets to equity was 16:1 rather than 11:1.

AIG was not the only financial firm with off-balance sheet real estate holdings. Citigroup, Bank of America, and JPMorgan Chase all had off-balance-sheet asset-backed commercial paper conduits used to fund real estate holdings (Acharya, Schnabl, and Suarez 2013). The effective asset-to-equity ratio for these banks was also higher than reported.

Using these insights, we compared AIG's total real estate exposure with Citigroup, Bank of America, and JPMorgan Chase and with that of another large insurance company, Metlife. Our calculations appear in an online Appendix available with this paper at http://e-jep.org, in Appendix Table X1. After adjusting the balance sheets as discussed above, we find that AIG's real estate exposure was 24 percent of assets, comparable to that of Bank of America (32 percent) and Citigroup (21 percent). AIG's effective real estate holdings were almost four times its book equity.

Was AIG effectively acting like a bank? Banks typically employ short-term financing to fund holdings of long-term illiquid assets. AIG did have some explicit short-term financing, in particular $20 billion of commercial paper. But AIG's illiquid real estate positions were also financed in a way that was not as transparently fragile as demand deposits, but which could create large liquidity needs if AIG suffered losses.

[9] In economic terms, a credit default swap is economically equivalent to a purchase of the insured asset financed by issuing floating rate debt (Duffie 1999). For a general discussion of credit default swaps, see McDonald (2013, chap. 27).

As discussed earlier, AIG's securities lending agreements had a relatively short maturity and could be subject to early termination. As AIG suffered downgrades and as the real estate investments made with securities lending proceeds suffered losses, securities lending counterparties became increasingly likely to terminate these agreements, culminating in a $5.2 billion redemption request on September 15, 2008. This desire by counterparties to unwind their exposure to AIG resembled a bank run, as counterparties sought to unwind the positions rather than be left with collateral and possibly involved in lawsuits. AIG effectively used collateralized short-term financing to buy real estate assets.

Although the mechanism was different, AIG's multisector credit default swap positions also suffered from something akin to a bank run. AIG's credit default swap counterparties could not unilaterally terminate credit default swap agreements, but they were entitled to collect collateral as the values of insured assets declined and these counterparty rights could sometimes be accelerated if AIG's credit rating was lowered. When AIG was downgraded on September 15, 2008, collateral calls on AIG's multisector credit default swaps increased by $8.6 billion as a result. Thus, while AIG was not literally a bank, it undeniably had bank-like characteristics as it employed financing (both explicit and implicit) that was subject to termination and cash demands when asset values fell.

Conclusions

Insurance companies are traditionally less vulnerable to financial crises than banks, in large part because they have relatively low-risk assets and do not rely heavily on short-term funding. However, AIG made itself vulnerable in a number of ways. Notably, AIG's near-failure was a result of two outsized bets on real estate, both of which generated large needs for liquidity. First, AIG used securities lending to transform insurance company assets into residential mortgage-backed securities and collateralized debt obligations, ultimately losing $21 billion and threatening the solvency of its life insurance subsidiaries. On one day in 2008, AIG was required to pay $5.2 billion in cash to satisfy redemption requests. Second, AIG issued credit default swaps on real estate–backed multisector collateralized debt obligations, ultimately losing more than $30 billion and facing a one-day $8.6 billion collateral demand due to a downgrade in its credit rating. Securities lending and writing credit default swaps were both "carry trades:" that is, bets that long-term assets would earn a higher return than the short-term cost of funding. AIG's use of financial markets to transform itself from a traditional insurance company to a bank-like firm ultimately proved disastrous.

The rescue of AIG had many beneficiaries. The broader financial system was spared the unpredictable consequences of a large and complicated firm failing at a time when financial markets were very fragile. Direct beneficiaries of the rescue included the life insurance subsidiaries that received $20 billion in capital infusions, protecting their policyholders. The counterparties to the credit fault swaps

AIG had sold on multisector credit default obligations (CDOs) were also beneficiaries, although their direct benefit was the $17.7 billion in collateral payments made after the rescue rather than much larger figures that sometimes have been emphasized. In addition to addressing problems with securities lending and the multisector credit default swap portfolio, rescue funds provided to AIG directly benefited numerous other counterparties including AIG's employees, holders of AIG's commercial paper and other AIG debt holders and repo counterparties, states and municipalities who had AIG-sponsored Guaranteed Investment Agreements, as well as defined contribution pension plans holding stable "value wraps" (which smooth the volatility of the pension plan) issued by AIG.

AIG's near failure is often described as a liquidity event: that is, it found itself in 2008 holding a number of mortgage-based securities that were impossible to sell—except perhaps at unreasonably low "fire sale" prices. But AIG sustained a loss of $99 billion in 2008, exceeding the firm's end-of-2007 equity of $96 billion (AIG 2008, p. 36), raising the question of whether it experienced a liquidity problem, a solvency problem, or both. Despite its reliance on fragile sources of funding, AIG had no specialized liquidity risk committee until 2007 (AIG 2007b, p. 99). It is tempting to attribute this to the company's insurance origins together with the belief of senior management that the real estate-related investments were "money good." Our examination of the performance of AIG's underlying real estate securities indicates that AIG's problems were not purely about liquidity. While we cannot say whether prices in 2008 were "correct" in any meaningful sense, the assets represented in both Maiden Lane vehicles have experienced substantial write-downs, with the possibility of more in the future. With hindsight, it may seem obvious that AIG's real estate assets were not "money good" and would suffer real losses, but the belief that they would not, and that liquidity would not be a problem, was an important factor in their creation and purchase by AIG and others.

■ *David Autor, Ben Chabot, Larry Cordell, Mark Finn, Scott Frame, Chiang-Tai Hsieh, Yilin Huang, Arvind Krishnamurthy, Anil Kashyap, Andreas Lehnert, Debbie Lucas, David Marshall, Richard Miller, Richard Rosen, David Scharfstein, Robert Steigerwald, and Timothy Taylor provided helpful commentary and feedback, as did seminar participants at Case Western and the Federal Reserve Banks of New York and Chicago. We are grateful to Kyal Berends, Mike Mei, and Thanases Plestis for excellent research assistance. The views presented here are solely our own and do not reflect those of the Federal Reserve Bank of Chicago or the Board of Governors of the Federal Reserve System.*

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Journal of Economic Perspectives—Volume 29, Number 2—Spring 2015—Pages 107–122

Legal, Political, and Institutional Constraints on the Financial Crisis Policy Response[†]

Phillip Swagel

As the financial crisis manifested itself and peaked in 2007 and 2008, the response of US policymakers and regulators was shaped in important ways by legal and political constraints. Policymakers lacked certain legal authorities that would have been useful for addressing the crisis, notably to use public capital to stabilize the banking sector or to deal with the failure of large financial firms such as insurance companies and investment banks that were outside the scope of bank regulators' authority to resolve deposit-taking commercial banks. US policymakers had long been aware that new legal authorities might be useful and even necessary, but political constraints meant that such changes could only be enacted after a financial market crisis actually threatened the economy. Analyzing the response to the crisis and considering improvements to future efforts thus requires understanding the political and legal constraints that narrowed the available options or affected the timing of actions taken.

Legal constraints were keenly felt at the US Department of the Treasury, where I served as a senior official from December 2006 to January 2009. Treasury had virtually no emergency economic authority at the onset of the crisis in 2007, with the exception of the Treasury's Exchange Stabilization Fund, which was intended for use in exchange rate interventions. Even while options such as the capital injections ultimately undertaken through the Troubled Asset Relief Program (the TARP) were being developed at the Treasury in spring 2008, policymakers felt that it was possible

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[†] To access the disclosure statement, visit
http://dx.doi.org/10.1257/jep.29.2.107

doi=10.1257/jep.29.2.107

to propose the necessary changes in the law to authorize the response only when the Secretary of the Treasury and the Chairman of the Federal Reserve could tell Congress that action was necessary to avoid an economic collapse. This constraint explains why, as the systemic risks of the financial crisis became apparent, the initial policy response largely fell to the Federal Reserve, which had the authority to act under emergency circumstances.

The story of the financial crisis response can be told through the lens of evolving legal and political constraints. In late 2007 and early 2008, while policymakers recognized weaknesses in the system, they believed that conventional monetary and fiscal responses such as Fed lending and a modest fiscal stimulus would suffice to buoy the US economy while the imbalances that had built up during the housing bubble were resolved (indeed, Broda and Parker 2014 show that the early 2008 stimulus increased consumption). By the time of the Bear Stearns bailout in March 2008, the usual methods were clearly perceived to be inadequate, and the Fed was making discretionary choices to invoke authority reserved for "unusual and exigent" circumstances to respond to the potential collapse of a nonbank financial firm. In September 2008, the Fed's ability to use this discretionary authority had reached its limits, and the imminent risk of financial crisis led to the Troubled Asset Relief Program, which authorized public money to be used to purchase troubled assets such as subprime mortgage-backed securities from banks or to inject capital into the banking system by purchasing shares of preferred stock in banks. The advent of the TARP capital injections facilitated a program of guarantees by the Federal Deposit Insurance Corporation to support bank funding, undertaken with existing legal authority but in an extraordinary way. Together, these actions reassured market participants that the US financial sector would not collapse and marked the beginning of the stabilization from the crisis.

There will inevitably be another financial crisis, and the response will be shaped by both the lessons learned from recent history and the statutory and political changes in the wake of the crisis. The paper thus concludes by discussing changes in constraints since the crisis, with a focus on two developments: 1) the political reality that there will not in the near future be another wide-ranging grant of fiscal authority as was given with the Troubled Asset Relief Program, and 2) the new legal authorities provided in the Wall Street Reform and Consumer Protection Act of 2010, commonly known as the Dodd–Frank law.

August–September 2007: The Initial Policy Response

By August 2007, policymakers at the Fed and Treasury recognized (belatedly, critics might say) that impending credit losses from poor lending during the run-up to the housing bubble were not just problems for individual firms or investors but posed a broader threat to the financial system and economy.

The initial response to the manifestation of the crisis in August 2007 relied on conventional tools of monetary policy and moderate regulatory discretion. For

example, the Fed made clear in August 2007 that the discount window was available for banks in need, and followed in September with a modest cut in the federal funds interest rate. Treasury officials encouraged efforts by private market participants to avoid fire sales of assets, and shepherded voluntary efforts by mortgage lenders to avoid foreclosures in instances in which the cost of a mortgage modification was less than that of a foreclosure. In Swagel (2009), I discuss these efforts.

With the benefit of hindsight, these policy changes look underwhelming. But at the time, policymakers did not see the need for the extraordinary steps that were eventually taken to respond to the crisis, even setting aside the several legal and political constraints to action that were widely understood to exist. The Treasury could not have gotten the authority to undertake capital injections into private banks in August 2007 even if policymakers had thought this was necessary, and the Fed would have faced a political backlash had it tried under its emergency authority to put into place lending programs for investment banks before Bear Stearns faced failure. Still in late 2007, policymakers did not believe extraordinary action was required, which implies that these legal and political constraints did not bind.

For example, Treasury officials long had been urging financial firms to consider their capital positions, but only the independent bank regulators—notably the Federal Reserve and the Office of the Comptroller of the Currency—had the authority to require banks to fund themselves with more capital rather than by borrowing, or to require that they change their behavior in ways like reducing dividend payments to build capital. Indeed, Timothy Geithner (2014), who as President of the New York Fed was the primary federal regulator for Citigroup, a firm that eventually required extraordinary assistance to survive the crisis, expressed regret in his memoir at not doing more with regard to bank capital. In fairness, given the scope of losses from bad lending and the depth of the subsequent panic, it is not clear that moderate additional amounts of capital would have allowed Citigroup or other firms to avoid the turmoil of 2008. Still, more capital would have helped. Moreover, the Federal Reserve at this time did not regulate the then-investment banks and so could not have required Bear Stearns, Lehman Brothers, Merrill Lynch, Goldman Sachs, or Morgan Stanley to raise more capital—though the US Securities and Exchange Commission could have required this step.

Similarly, the Federal Reserve and the Office of the Comptroller of the Currency (OCC) did not supervise the American International Group (AIG), the insurance company that would require a mammoth bailout. Both regulators did, however, have authority over some of AIG's counterparties in the credit default swaps and securities lending transactions that led to the bailout. With better information and greater foresight, the Fed or OCC might have intervened to limit the accumulation of risk at AIG from the other side (though even here, the Fed and OCC did not supervise investment banks such as Goldman Sachs that were also involved with the AIG transactions).

The failure to respond more strongly to the budding financial crisis in late 2007 reflects many factors, but among them is that policymakers did not fully appreciate the depth of what was to come. Through 2007 and even up to the end of the

summer of 2008, mainstream economic forecasts such as from the Congressional Budget Office were for little or no growth in late 2008 and early 2009, but then for a recovery as difficulties in housing and credit markets subsided. Perhaps contributing to the lack of action by financial regulators during the run-up to the crisis is the political reality that it is difficult to rein in financial activity when markets are in an upswing.

The Collapse of Bear Stearns

The response to the collapse of Bear Stearns in March 2008 constituted the first bailout of the financial crisis. Bear Stearns had come to rely on raising short-term liquidity through mechanisms such as repurchase agreements. According to the Securities and Exchange Commission, the firm was meeting its capital requirements in early 2008 (Cox 2008). However, mounting concerns regarding its exposure to real estate–related losses led many investors to stop renewing short-term funding—the functional equivalent of a bank run, as explained in this journal by Brunnermeier (2009). Thus, regulators thought that Bear was solvent, and yet the firm faced collapse within days.

Bear Stearns was not a commercial bank, and so the usual policy responses for a bank facing either liquidity problems or outright failure were not available. As an investment bank, Bear Stearns had neither stable deposit funding backed by Federal Deposit Insurance Corporation (FDIC) deposit insurance nor access to the Fed's discount window for emergency lending support. In addition, if Bear Stearns went broke it would not be resolved like a bank through the time-tested FDIC process discussed by Bovenzi (2015), but instead would go through a standard commercial bankruptcy. Many government policymakers feared that if such a bankruptcy proceeded, Bear's operations would implode as its short-term funding disappeared or through an exodus of clients while the bankruptcy proceeded. In the eyes of policymakers, Bear Stearns was so interconnected with other institutions that its failure could have had systemic consequences as failures on one end of transactions rippled through the financial system. Whether this fear was correct remains a subject of debate. But this belief and the constraint of inadequate legal authority to deal with a failing nonbank financial firm, combined with the sheer rapidity of Bear's collapse, fostered a blunt Fed intervention to facilitate the acquisition of Bear Stearns by JP Morgan Chase.

The Fed turned to its emergency authority under Section 13(3) of the Federal Reserve Act, which at the time said that in "unusual and exigent circumstances," the Federal Reserve could lend to "any individual, partnership, or corporation" so long as the loan was made against adequate collateral in the judgment of the Fed. Note that the requirement was not that the Fed could not actually take losses, but only that the Fed would not expect to take a loss. (As noted below, use of the Fed's emergency lending would later be constrained by the passage of the 2010 Dodd–Frank law.) JP Morgan was willing to buy Bear Stearns, but did not want the

transaction to include certain illiquid assets with a notional value of $30 billion. The Fed's solution was to provide financing on these illiquid Bear Stearns assets, with JP Morgan exposed to the first $1 billion of losses.[1] Shareholders of Bear Stearns took large losses, but the bailout ensured that holders of Bear Stearns commercial paper and other obligations were made whole.

The Treasury Department did not have the legal authority to commit taxpayer funds to an intervention—this was granted only in October 2008 with the enactment of the Emergency Economic Stabilization Act that created the Troubled Asset Relief Program. Instead, the Treasury could only provide the Fed with a letter from the Secretary of the Treasury to the Chairman of the Federal Reserve noting that any losses suffered by the Fed would eventually mean smaller transfers of profits from the Fed to the Treasury—that is, the letter offered political cover by acknowledging that the Fed and Treasury were both part of the public balance sheet. In the end, the Fed's loan for the Bear Stearns assets was repaid in full with a $765 million gain from interest payments and increases in the value of the underlying assets. The Fed's action did not require Congressional approval, and the firm's rapid collapse and use of nonrecourse lending to a special purpose vehicle meant that, initially, the transaction was poorly understood in Washington. The backlash against bailouts, however, would build.

Following the collapse of Bear Stearns in March 2008, the Fed put in place the Primary Dealer Credit Facility (PDCF), through which the Fed for the first time since the Great Depression stood ready to lend to the broker-dealer units of investment banks. Though other investment banks such as Lehman Brothers and Merrill Lynch were viewed as vulnerable to large mortgage-related losses, the PDCF was widely seen as ensuring that these firms would not face the sort of funding run that doomed Bear Stearns. In spring 2008, policymakers believed that there would be time instead for these firms to raise additional capital or sell themselves off to stronger institutions while a gradual improvement of the economy would help to stabilize the housing market and asset values with it.

Given the need to rely on the Fed's emergency authority for Bear Stearns, a natural question is whether the Bush administration should have approached Congress in spring 2008 to obtain additional legal power. In March and April 2008, policies discussed inside the Treasury included the possibility of large-scale government purchases of illiquid assets or public capital injections into banks in the event of a broader market crisis. But until such a crisis actually arose, the belief was that lawmakers from both parties would be loath to grant discretionary power to executive branch officials to intervene in private firms and put taxpayer money at risk.

[1] The actual transaction involved a $29 billion Fed loan to a limited liability corporation established by the New York Fed that was combined with $1 billion from JP Morgan to purchase the assets. The corporation was named Maiden Lane LLC; it was named after the street behind the New York Fed main building. If the value of the assets turned out to be less than $30 billion, JP Morgan was exposed to the first $1 billion in losses, after which the Fed took any further losses. In making this loan, the Fed thus asserted that the assets would eventually be worth at least $29 billion. This assumption turned out to be correct, though it was a tenuous assumption at the time.

Indeed, many members of Congress would object to proposals that could be seen as encouraging bailouts by making them more possible.

Others proposed that changes to the bankruptcy code could prove useful for dealing with the crisis, like an idea from Zingales (2008) that the power to convert bondholders into equity shareholders could "immediately make banks solid, by providing a large equity buffer." However, changing the legal constraint preventing such an approach ran into the political constraint. Changes to the bankruptcy code had been enacted with considerable controversy in 2005 after at least seven years of Congressional efforts. Further such changes were simply not possible in a timeframe relevant to dealing with the financial crisis.

The Collapse of Lehman Brothers: Constraints on the Fed and Treasury

The bankruptcy of Lehman Brothers in September 2008 marked the onset of a broad financial panic, leading to questions of why the Federal Reserve did not invoke Section 13(3) to save Lehman. After all, the Fed had made loans for Bear Stearns previously and would make another set of loans within two days of Lehman's failure to prevent the collapse of AIG. The difference between the three situations is that the Fed saw Lehman as insolvent, not only that it was holding illiquid assets, and thus the Fed believed it lacked the legal authority to lend to the firm. This argument raises several questions.

Was the Fed correct in its assessment of Lehman's financial situation? Of course, it was difficult for anyone to determine the valuation of Lehman's assets and liabilities in the fall of 2008, at a time of severe credit market strains under which assets comprised of subprime mortgages were characterized by low liquidity and possibly fire-sale prices. Claims that Lehman's assets might have been worth enough to make the firm solvent or nearly so, such as in Stewart and Eavis (2014), are based on six-year-old recollections and do not match documentary evidence and contemporary accounts. At the time, policymakers and market participants widely believed that Lehman was insolvent, and not merely illiquid, with the firm suffering a capital hole of several tens of billions of dollars (for example, according to Paulson 2010; Geithner 2014). The Fed thus hewed to the law.

Should the Fed have loaned to Lehman Brothers even though central bank officials believed that the firm was insolvent? After all, the law left the evaluation of collateral quality up to the Fed itself and did not provide a mechanism for a third party to object. The law did not prohibit the Fed from taking losses but only from making loans on which it expected to make losses—a vital distinction. This question begins with a recognition that the Fed faced legal constraints and asks whether it should in some cases disregard those constraints. This question might be especially relevant if Fed officials suspected that Lehman's failure would spark a panic and play a role in transforming an economic slowdown into the Great Recession. At the time, however, the Fed and the Treasury did not expect this outcome. While

it was widely recognized that Lehman's failure would be challenging for markets because the firm was widely connected to other market participants through derivative contracts and repurchase agreements and because Lehman's failure would call into question the viability of other firms with illiquid assets, the Lehman bankruptcy led to financial panic through two unexpected channels.

First, the Reserve Primary Fund, a large money market fund, had taken a large position in Lehman commercial paper, and the Lehman bankruptcy meant that the fund was forced to "break the buck" by declaring that it could not return investors' money at par. The result was a flight from money market mutual funds as a group. In turn, firms that relied on funding through short-term commercial paper found that it was difficult for them to obtain routine liquidity, because money market mutual funds, which were typically large purchasers of commercial paper, were selling their existing paper to meet redemptions and not buying new issues. The panic in money market funds thus constituted a spillover from the financial sector to the real economy—from Wall Street to Main Street. The Securities and Exchange Commission regulates money market funds, and in principle, could have been aware that the Reserve Fund's exposure to Lehman securities put it at risk, but Lehman paper remained highly rated in the days ahead of the firm's bankruptcy and thus within the scope of allowable assets for money market funds.

Second, the Lehman bankruptcy meant that the assets of many Lehman clients were tied up in London as a result of the UK bankruptcy system, which unlike that in the United States, did not distinguish between the firm's resources and those of its clients for which Lehman was a custodian. This especially affected investment firms such as hedge funds, which in turn sold other assets to generate cash, leading to further downward pressure on asset prices. US policymakers were not prepared for this feature of the British legal system; indeed, the investors whose funds were trapped apparently did not anticipate their dilemma, either.

The panic in money market funds and impact on commercial paper markets was at that time viewed as a grave danger, and Treasury and the Fed both responded by finding ways to use their existing discretionary power. The US Department of the Treasury (2008) used the $50 billion Exchange Stabilization Fund—originally established back in the 1930s to address issues affecting the exchange rate of the US dollar—to set up an insurance program to insure depositors in money market funds. A measure of the panic during that week is that even money market mutual funds that only purchased US government securities bought the Treasury insurance, despite the fact that the federal balance sheet standing behind the insurance was no different than the one standing behind the Treasury securities to be insured. Use of the Exchange Stabilization Fund for this purpose was plausibly legal—after all, a panicked flight from US dollar-denominated securities could be seen as posing a threat to the exchange value of the dollar—but its use in this way was without precedent. Use of the Exchange Stabilization Fund had not been contemplated for dealing with Bear Stearns earlier that year—the rapidity of Bear's collapse and the Fed's response precluded this discussion. In the week following Lehman's collapse when every option was considered, it was clear to

Treasury officials that there would be only one opportunity to use the Exchange Stabilization Fund during the financial crisis because the size of the fund was modest relative to the trillions of dollars that were ultimately guaranteed. This cannon could fire only a single shot. Indeed, Congress was to restrict future use of the Exchange Stabilization Fund as part of the post-crisis reforms, and also limited unexpected uses of government authorities, such as actions by the Federal Deposit Insurance Commission discussed below.

The Fed responded to the related problems in money market funds and commercial paper by developing emergency liquidity programs aimed at these particular markets—steps allowed under the 13(3) emergency authority but extraordinary in that the Fed was offering loans to support an asset class rather than for particular firms. The Money Market Investor Funding Facility provided liquidity to money market mutual funds so that they could avoid fire sales of assets to satisfy the flood of redemptions, and the Commercial Paper Funding Facility effectively served as a buyer of last resort for the new issuance of commercial paper. Together, these programs from the Treasury and Fed were to stanch the redemptions from money market funds. But these programs could only be put in place when the crisis had flared to the point that they were critical—and not beforehand.

While the problems in money markets and commercial paper abated, the panic begun in the week following Lehman's failure continued. Nonetheless, a continuing panic does not suffice to prove that the Fed should have bailed out the firm's funders—this claim requires foresight of the channel through which Lehman's failure affected the economy.

Behind the scenes, top officials from the Treasury and Fed went to extraordinary lengths in seeking to arrange a private solution for Lehman. We will never know for sure because the decision did not have to be taken, but it is possible that the Fed might have been willing to provide some public financing for a transaction if there was a buyer for Lehman that included private capital to absorb potential losses ahead of taxpayers. In the end, and in contrast to the situation with Bear Stearns, no firm was prepared both to absorb at least some of Lehman's losses (perhaps bolstered by Federal Reserve lending) and also actually to continue Lehman's operations. A possible acquisition by the UK firm Barclays would have required a vote by its shareholders at a minimum. It is not clear that British regulators would have allowed the deal in the first place, but they certainly did not allow for the decision to be made rapidly as would be needed for a Fed-assisted transaction.

Having the Fed decide to break its own rules and lend directly to Lehman, despite a lack of sufficient collateral, was not a workable solution. An investment bank dependent on short-term funding implodes rapidly once confidence is lost, and lending by the Fed to Lehman in the absence of a definite plan to sell the firm and have it backed by private capital would probably not have reassured the firm's private sector providers of funding. The end result would have meant that funding from Lehman's private creditors would be replaced by loans from the Fed, leaving American taxpayers exposed to the firm's losses. Moreover, Fed lending to Lehman further would have

made market participants expect similar treatment for other teetering firms such as Merrill Lynch (which instead sold itself to Bank of America).

AIG

The Federal Reserve provided some $85 billion in loans to avert the failure of AIG on September 16, 2008, less than two days after not providing support when Lehman Brothers filed for bankruptcy early in the morning on September 15. AIG faced collateral calls from the counterparties to its credit default swaps and securities lending operations. AIG was already pressed to come up with cash and could not meet the additional collateral obligations that followed a September 15 downgrade in its credit rating by Standard & Poor's.

The decision to rescue AIG was driven by two factors. First, the Fed believed that loans to AIG would be adequately secured by a claim against the firm's well-capitalized and profitable global operating subsidiaries. The Fed's judgment that the loan to AIG was made against adequate collateral seems to have been borne out, with the insurer returning to profitability and paying back the government investment with a taxpayer profit. (Taxpayers became involved when Treasury took on the exposure after using resources from the Troubled Asset Relief Program to replace the Fed's lending.)[2] Second, as the world's largest insurance company, AIG was considerably more interconnected with other firms than Lehman, and had substantial consumer- and business-oriented operations so that its failure would have immediate impacts on the real economy.

Legal constraints shaped the way in which the AIG rescue was carried out. The structure of the deal meant that AIG did not declare bankruptcy but instead received loans from the Federal Reserve under a number of onerous conditions. Specifically, the Fed received a one-time fee of 2 percent on its $85 billion loan commitment, an 8.5 percent interest rate on the $85 billion amount, an additional interest rate at the three-month LIBOR yield for cash actually drawn by the company, and rights to 79.9 percent ownership of AIG common stock. AIG presumably accepted the terms at the time because the outcome was better for shareholders and other firm stakeholders than the alternative of bankruptcy. However, these terms are the subject of ongoing litigation as of early 2015.

This intervention by the Fed meant that AIG counterparties such as banks and other counterparties to AIG credit default swaps did not face losses. Shareholders suffered, as was appropriate, but AIG bondholders and others did not. A number of observers have asserted that the Fed should have done more to ensure that at

[2] In this issue, McDonald and Paulson suggest that AIG was perhaps not in fact solvent, and thus that the Fed's decision to lend was based on a mistake in judgment. Placing an accurate valuation on assets and liabilities in September 2008, and distinguishing insolvency from illiquidity, can often involve controversial decisions. As noted above, the key for the Fed was that it believed at the time that its loans to AIG were secured.

least some of the costs and risks of supporting AIG were borne by private investors. Here, legal constraints bound heavily, because no legal authority existed to impose such losses on the counterparties of AIG as a condition of receiving a loan from the Federal Reserve. Indeed, financial regulators in France had forbidden French banks from agreeing to concessions on their claims against AIG. The liabilities of the AIG financial products division were collateralized by the overall AIG balance sheet, so that a refusal by any counterparty to accept a loss would have meant a collapse of the entire firm. Regulators of AIG insurance units across the United States and around the world would have had a fiduciary obligation to grab assets to satisfy policyholders in their local jurisdictions. Counterparties that had already hedged their exposure might actually have ended up worse off had they agreed to concessions than in the event of an AIG default, which meant that they had no incentive to agree to a voluntary haircut. AIG's rapidly deteriorating cash position meant that there was insufficient time to negotiate with its counterparties en masse.[3] The choice was thus to support the firm as a whole or to let it collapse, with the attendant risk of broad negative implications.

Important elements of the Dodd–Frank financial reform legislation in 2010 (officially, the Wall Street Reform and Consumer Protection Act) were put in place in reaction to the constraints highlighted by the Lehman and AIG situations: notably, government officials now have the ability to commit taxpayer funds to prevent the collapse of a systemically important firm that is not a bank, and not just the ability but the obligation to impose losses on equity owners and other counterparties such as bondholders to ensure that the public resources are paid back in full. In future crises, these changes mean that private investors rather than taxpayers will take on the risk and bear the consequences of firms' failures.

TARP and Constraints on Bank Interventions

The Troubled Asset Relief Program (TARP) was proposed on September 18, 2008—the same week as the Lehman collapse and the AIG bailout—and passed into law as part of the Emergency Economic Stabilization Act on October 3, 2008. The TARP provided authority for the Treasury to purchase or guarantee up to $700 billion of troubled assets; in Swagel (2009), I provide details on the development, proposal, and features of the TARP.

[3] One possibility raised by some commentators to sidestep these constraints was for government officials to pressure particular institutions: for example, the Fed and Treasury could have leaned on, say, Goldman Sachs, Merrill Lynch, Bank of America, Citigroup, and Wachovia to accept less than the full amount they were owed by AIG—with those firms specified because they were American institutions that received billions of dollars of collateral posted by AIG (for discussion, see Walsh 2009). Such an action would have treated singled-out firms unequally with others not singled out—including foreign firms with more at stake than these American ones. Fed and Treasury officials brushed off this possibility, making clear both during and after the bailout that there was no alternative in their view but to support AIG as a whole, even with the frustrating implication that all counterparties would be made whole.

The TARP as originally envisioned by Treasury Secretary Paulson was to purchase illiquid mortgage-backed securities to relieve strains in credit markets and provide clarity regarding firms' balance sheets by restarting a process of price discovery for illiquid securities. Implementing the asset purchases involved technical hurdles, including the need to develop a mechanism by which the government would buy the securities and to ensure that the details of the law were followed regarding who could sell to the government.[4] The plan in late September (with work on reverse auctions to purchase assets having begun even before enactment of the legislation) was that small asset purchases could get under way as a proof of concept at the end of 2008 or early 2009. It would take longer for the approach to buy a sizable amount of assets, but there could still be a positive impact sooner than this if the advent of the TARP helped to boost asset values and coax hesitant investors back into the market. Indeed, the mention of the TARP proposal had precipitated a stock market rally.

While the intent of the TARP when it was proposed was to purchase illiquid assets, its switch in focus to capital injections was driven by events and political realities. By the time the TARP was enacted in early October 2008, two more large banks had failed (WAMU and Wachovia). Confidence in the financial system continued to wane, as indicated by measures such as the spread between the low yields on Treasury securities and elevated interest rates for banks to borrow from one another. It became clear to policymakers that a more rapid approach was needed to shore up confidence in the financial system. The switch from asset purchases to capital injections fit within the TARP's legislative language, because shares of banks that originated loans represented troubled assets related to mortgages. Indeed, some members of Congress had urged the Treasury from the start to carry out capital injections rather than asset purchases.

Capital injections could be put in place faster than asset purchases. In addition, each dollar of TARP capacity used for capital injections provided for a greater increase in the loss-absorbing capacity of US banks than a dollar used for asset purchases or guarantees. This is because under the Emergency Economic Stabilization Act of 2008, the purchase or guarantee of an asset such as a mortgage-backed security counted in the same amount against the $700 billion allocated by Congress as the provision of an equal amount of capital directly to financial institutions through the purchase of equity positions. Asset purchases would help cleanse bank balance sheets of illiquid mortgages and contribute to price discovery but would raise firms' net worth only if Treasury intentionally overpaid for assets (which was not the plan) or if asset prices rose following the TARP purchases (a possibility if the implementation of the reverse auctions lifted confidence and thereby improved asset prices).

The Capital Purchase Program (CPP) was announced in a meeting with the chief executive officers of nine large American banks at the Treasury Department

[4] For example, sellers of assets were required to provide the Treasury with warrants on the firm itself, and obey strictures relating to executive compensation.

on October 13—the Columbus Day holiday. The eight institutions ultimately receiving capital injections (after Bank of America's acquisition of Merrill Lynch) together accounted for more than half of both the assets and deposits of the US banking system. The existence of these mega-firms, while giving rise to concerns over institutions that were too big to fail, also made it possible to strengthen a broad swathe of the banking system rapidly. Each firm received public capital equal to 3 percent of its risk-weighted assets, for a total of about $125 billion. The remaining thousands of US banks together would be eligible for another $125 billion in capital.

The use of a broad capital injection, rather than capital provided only to the institutions that needed it most, was driven by policymakers' desire to signal their confidence in the banking system as a whole while providing the resources necessary to reinforce this confidence with loss-bearing capacity. The terms of the capital injections were thus made relatively attractive to ensure broad participation, with banks paying only a 5 percent yield on preferred shares for five years, after which the yield would increase to 9 percent for banks that had not by that time repaid the Treasury. These terms reflected both a legal constraint and a policy purpose: the constraint that it was not possible to require a healthy financial institution to accept a TARP investment, and the policy purpose of encouraging broad participation that would reassure market participants about the overall health of the US financial system. The US approach was in contrast with capital injections in the United Kingdom, which were made on more onerous financial terms, such that relatively strong banks declined to participate.

In 2009, TARP funds were again set to be used to shore up the financial system, serving as the source of public capital backstopping the so-called "stress tests," in which bank balance sheets were evaluated to see whether they could withstand an additional period of financial stress. Banks that lacked the appropriate capital as determined by the stress test would be given a chance to raise additional capital from the private sector after which they would be required by their regulator to accept it from the TARP (on onerous terms meant to induce private capital-raising). Such a mandate was possible for regulators because banks failing the stress tests could be deemed as operating in an unsafe condition. The availability of TARP capital was essential to making the stress tests credible in that public capital was available to be forced on firms that could not (or would not) raise their own in response to the results of the stress test.

Institutional and legal constraints further affected Treasury decisions to provide additional assistance to Citigroup and Bank of America in 2008 and 2009 beyond the initial capital investment of $25 billion for each institution. These two banks (and perhaps others) appeared to be insolvent at points during the crisis, and were to require extraordinary assistance from the TARP, and yet the government propped them up rather than invoking the usual bank resolution authority of the Federal Deposit Insurance Commission. These decisions reflected several factors. First, there was the concern that a government takeover of Citigroup would lead to a renewed flight from other still-fragile banks. Second, while the Federal Deposit Insurance

Corporation had the legal authority to take over each firm's commercial bank, there was little confidence across the government in the agency's ability to run a mega-bank. Taking over a large bank was easier said than actually done—at least before the new powers granted in the Dodd–Frank law. In the end, the shareholders of Citigroup had their ownership stakes substantially diluted by the government investment (including through the conversion of the Treasury preferred stock holdings into common stock), but the firm did not fail. Meanwhile, bondholders and other counterparties avoided losses entirely, which was in some ways less than fully desirable, but did have the positive effect of limiting further financial contagion.

At the same Columbus Day meeting at which the capital injections were announced, the Federal Deposit Insurance Commission introduced the Temporary Liquidity Guarantee Program (TLGP), under which it would insure senior debt issued by banks. The FDIC further extended its deposit insurance to provide an unlimited backstop on business transactional checking accounts that were previously uninsured. The TLGP program was undertaken using the FDIC's emergency authority, which allowed the FDIC to put taxpayer money behind a bank to avoid serious adverse systemic economic or financial effects without the usual requirement to act in a manner that ensured the least cost for taxpayers. Use of this authority required approval by the boards of the FDIC and the Federal Reserve, and the Treasury Secretary was required to consult with the President—all as part of an effort to ensure that the authority was not used lightly. Introduced in the Federal Deposit Insurance Corporation Improvement Act of 1991, the systemic risk exception had not been used until earlier in September 2008, when the FDIC sought to use it as part of the transaction by which Citigroup was to buy the failing Wachovia bank (in the end, Wells Fargo instead purchased Wachovia without government assistance). The Dodd–Frank legislation was later to prohibit a repeat of the TLGP without explicit Congressional approval.

Veronesi and Zingales (2010) calculate that the guarantees from the Federal Deposit Insurance Corporation account for most of the benefits in terms of stabilization of the financial system. This raises the question of whether the TARP capital injections could have been avoided in favor of just the FDIC guarantees along with the expansions of Fed liquidity, such as for commercial paper and eventually securitized assets under the Term Asset-Backed Securities Loan Facility (TALF), and the Fed purchases of Treasury and mortgage-backed securities under its quantitative easing policies. After all, the FDIC and Fed actions were undertaken with existing emergency powers and did not require Congressional action. Indeed, one can argue that the TARP legislative process itself may have contributed to increased uncertainty in late September 2008 that could have been avoided by limiting action to the Fed and FDIC.

However, this scenario of proceeding without something like the TARP program was infeasible. The guarantees from the Temporary Liquidity Guarantee Program of the Federal Deposit Insurance Corporation would never have been put in place without the existence of the TARP program. While all sources of taxpayer funds are on the same balance sheet, the FDIC in practice acts as if this is not the

case, seeking to protect its deposit insurance fund to avoid having to utilize the statutory authority to borrow from the Treasury.[5] Without the advent of the TARP and its use for capital injections, the FDIC would have feared that its expanded bank guarantees would create too high a risk of needing to borrow from the Treasury, and thus the FDIC have not agreed to put in place the TLGP.

Another suggestion is that the capital injections should have been put into place sooner—that such action had been part of other financial rescues and the Treasury should have learned this lesson from other nations such as Sweden. The difficulty is that the Emergency Economic Stabilization Act legislation that allowed the eventual capital injections would not have been enacted if the proposal presented to Congress were for the US government to purchase $700 billion stakes in private banks. This was a hard political constraint. The legal constraints preventing the TARP capital injections—the response that was ultimately essential to resolving the crisis—could only be addressed when the crisis had become serious enough that political constraints dropped aside. And this was the case only when the use of pre-existing emergency authority by the Fed and FDIC was not enough to arrest the mounting financial sector panic.

Conclusion: Implications for the Next Crisis

What constraints will policymakers and regulators face when the next financial crisis arrives? It seems safe to conclude, based on political considerations, that there will not soon be another Troubled Asset Relief Program, with its broad grant of authority for the government to put taxpayer money into the financial system. Attacks on the bank bailouts in particular have become a staple of political campaigns. Moreover, some emergency actions taken during the crisis are no longer available to policymakers as a result of provisions in the 2010 Dodd–Frank financial reform bill. The Treasury is no longer permitted to use the Exchange Stabilization Fund to guarantee money markets. The Federal Deposit Insurance Corporation must now obtain Congressional approval to provide broad debt guarantees. The Federal Reserve can no longer make emergency loans to individual nonbank institutions but must instead devise broad-based programs.

At the same time, the Dodd–Frank law provided important new powers for government regulators to respond to a future financial crisis. Title II of the Dodd–Frank law creates a nonbank resolution authority under which the government can put taxpayer funds into a failing institution to prevent a collapse. Government officials are required to recoup taxpayer funds by imposing losses on shareholders, bondholders, or other counterparties of the failing firm, and

[5] The desire of the FDIC to avoid borrowing from the Treasury could be seen in the September 2009 action to have banks pre-pay for future deposit insurance premiums as a way of adding resources to the insurance fund (Labaton 2009), even though this imposed a drag on bank resources at the same time as banks were being urged to expand their lending to support the recovery.

ultimately through assessments on other financial sector participants if needed. The Federal Deposit Insurance Corporation is still developing the tools for such an intervention. However, the broad approach is similar to that taken with AIG, in which taxpayer funds go to the parent company and stabilize the firm as a whole. Bovenzi, Guynn, and Jackson (2013) discuss this Title II authority, including the relationship with the bankruptcy code.

Other legal and institutional changes also address weaknesses highlighted by the financial crisis. The Financial Stability Oversight Council (FSOC) was put in place by the Dodd–Frank legislation to avoid the situation with AIG, in which risks developed in a lightly regulated part of the financial system. The FSOC is meant to give all regulators, but especially the Fed, the affirmative duty to pay attention to risks anywhere in the financial system, while the Office of Financial Research established under Dodd–Frank is meant to contribute to this effort as well. These institutional innovations so far do not appear to have had much effect, though it is too soon to know the eventual outcome.

Banks in the wake of the financial crisis are funded with considerably more capital than previously, and are required to ensure that they have stable access to increased sources of liquidity. Many derivative transactions are required to take place on exchanges and through clearinghouses, providing financial regulators with greater ability to assess risks that were previously opaque. A Consumer Financial Protection Bureau was created to address problems highlighted by the crisis, including a lack of clarity or disclosure in financial products.

Given these new legal authorities, it seems clear that the policy response to a future crisis would face different constraints and thus would unfold in a different way. It could be that the increased and altered ability of government officials to intervene during a time of crisis leads to unexpected negative consequences. Bondholders in the last crisis assumed that some banks were too big to fail—and they were right—and thus counted on an intervention that made them whole. With the Title II resolution authority, however, the government can seize a large troubled firm and impose losses on bondholders while maintaining the firm's operations to avoid a broader financial market fallout. In the future then, it could be that systemically important firms subject to the Title II resolution authority will find that their funding dries up rapidly in the face of difficulties, as bondholders and sources of liquidity pull away to avoid the losses. In other words, the ability of policymakers to seize a large financial firm could cause such firms to lose their funding more quickly, thereby making this kind of intervention more likely. It will be hard to know until the next crisis.

In the meantime, I prefer to think of the glass as half full. Political constraints meant that the essential step of the TARP was proposed only when the financial crisis was severe enough to make possible Congressional action to avoid economic meltdown. While there will not be another TARP, the post-crisis reforms have given policymakers certain essential authorities that did not exist in 2007 to 2009—the ability to stabilize a troubled but systemically important firm while imposing losses on private market participants. Indeed, the understanding that such losses are

required in the future should affect markets today; potential lenders to large banks will likely reassess the returns they require knowing that by law they must take losses in a future crisis rather than receiving a bailout. In sum, an understanding of the political and legal constraints that affected the policy response in 2007 to 2009 has the potential to make the future response yet more effective and the next crisis less damaging.

■ *I thank David Autor, Chang-Tai Hsieh, Randy Kroszner, Ann Norman, Hank Paulson, and Timothy Taylor for comments that improved the paper.*

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