

Economics After the Crisis: Models, Markets, and Implications for Policy
February 21, 2014

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Thank you for inviting me to speak to you today. It's been a long time since I was an active participant in the world of economic research. These days, as I play a role in policy deliberations, I am a consumer of research findings, not a producer. In that role I was privileged to witness, and at times take part in, some of the policy discussions that shaped the Fed's management of the financial crisis of 2007–08. Although it has been more than five years since then, the recollections of that unhappy time should still be relatively fresh in our minds. If they are not, the annual release of the transcripts of the meetings of the Federal Open Market Committee, with a five-year lag, can help jog our memories. In fact, the 2008 transcripts were released this morning. Within those 1,500 verbatim pages, you will see me and several other consumers of economic research grappling with some very difficult policy decisions. In my remarks today I would like to share some observations inspired by my experience attempting to use economic models in decision making during the crisis. Before I begin, I must note that my opinions are my own and may not be shared by all my colleagues in the Federal Reserve System.¹

The period from the summer of 2007 through the winter of 2009 was a scary time, marked by significant volatility in financial markets and anxiety about asset values and counterparty risk. Policymakers heard a lot of scary words used to describe market conditions, words such as “disruption,” “distress,” “fragile,” “firesale,” and “stressful.” People talked about markets seizing and investors running; about logjams and credit crunches; about deterioration and dysfunction.² These words have frightening connotations, but, by themselves, they lack specific economic meaning and thus do not provide an obvious guide for policy.

There are, however, economic models based on specific financial frictions, such as adverse selection and limited participation, that appear to generate similarly scary phenomena. Such models were at times invoked as justification for some of the array of programs that expanded Fed lending and allocated credit to specific sectors of the economy. In this respect, economic theory mattered a great deal. But I think it's fair to say there was far less discussion of specific models of banking and financial markets than there could have been. I found it disappointing that there did not appear to be much interest in probing the applicability of different models to the question at hand or in critically examining models' assumptions about frictions to see if they were a good match for what we actually observed. Moreover, in my view, there was not enough discussion about the long-term consequences of our response in a given circumstance and whether it would be consistent with a pattern of response that, if permanently adopted, would be ex-ante efficiency enhancing.

I am going to organize my remarks around selected moments during the financial crisis at which particularly critical decisions were made to intervene in credit markets. I will share some of the rationales used to justify them, as well as some alternative explanations for market conditions at the time. Along the way, I will share some of the reasons for my opposition to the Fed's credit market interventions, and why I remain deeply skeptical about the advisability of those actions. I do so mindful of the possibility that future research could alter our understanding of the events and policy prescriptions of 2007–08. Indeed, it was 30 years after the Great Contraction of 1929–33 that Milton Friedman and Anna Schwartz gave us the first compelling understanding of those events,³ and in the last two decades researchers have significantly improved our understanding of the Great Depression. But even at this early date, the evidence strikes me as fairly persuasive that the Fed missed an opportunity to respond far more constructively than it did. Finally, I'll share some suggestions regarding research directions that would be useful to policymakers in future crises.

Discount Window Lending

Let's start with the summer of 2007. The dramatic events of the fall of 2008 have garnered the lion's share of the attention devoted to the financial crisis, but I would argue that the policy direction was set earlier, which significantly influenced the subsequent evolution of events. On the evening of August 16, 2007, the FOMC held a video conference call. To simplify considerably the conditions we discussed, the financial-market volatility of the previous weeks seemed to be escalating.⁴ Particular attention focused on the market for asset-backed commercial paper — short-term instruments backed by designated pools of other financial assets. As staff explained to the committee, investors were withdrawing from the ABCP market. The spreads on ABCP were rising and the amounts being issued were smaller and of shorter maturity. Some large banks had sponsored ABCP financing vehicles and market conditions were affecting their need for funding. At the conclusion of the call, the Committee decided to lower the interest rate charged on discount window loans to banks. In recent years this rate had been kept at 1 percentage point above the Committee's target for the federal funds rate; the Committee lowered the spread to 50 basis points. This move was intended to improve the cost and availability of credit to banks.⁵

What was the justification for this policy action? For some meeting participants and staff, the aforementioned scary words seemed to suffice. Others viewed the action as directly in line with the central bank's historical role as the “lender of last resort.” As one person noted while explaining the proposed change, “We have given considerable thought here to what we might do with the lender-of-last-resort facility to try to help break up some of the *logjams* in the market, where people simply aren't making markets...We felt that one issue was a funding uncertainty in the banks.”⁶ [Emphasis added.]

The presumption was that the markets were suffering from a problem for which increased Fed credit was the solution. But this presumption was open to question. In the late summer of 2007, we were hearing that there were plenty of funds on the sidelines and plenty of actors who could have purchased asset-backed paper if they thought the price made it a worthwhile opportunity. Moreover, banks also had access to significant funding through the Federal Home Loan Banks, entities that could borrow in capital markets at advantageous rates because they were viewed as

“too big to fail” and pass those rates on to member banks. Indeed, borrowing from the FHLBs expanded by about \$180 billion in the third quarter of 2007. The lack of interest in borrowing from the Federal Reserve Banks probably reflected the fact that we were simply out priced.

More broadly, expanded Federal Reserve lending would not have increased the net supply of liquidity to the banking system. Open market operations by the trading desk at the New York Fed maintained the interbank federal funds rate at the FOMC’s target by adding or draining reserves. Thus, lending to individual banks was automatically offset by a sterilizing drain of reserves through the sale of U.S. government securities. The “logjam” was not an insufficient supply of reserves to the banking system; if anything, the supply of reserves to individual banks was the problem.

This observation points toward an alternative diagnosis of the situation: The deterioration in housing market conditions was inducing fundamental revisions in beliefs about the probability distributions governing the returns on housing-related financial assets. These revisions were sometimes sudden, sometimes not, but they resulted in a cumulative deterioration in the perceived creditworthiness of asset pools exposed to housing-related losses. For various reasons, ABCP issuers were unwilling to sell at prices that buyers wanted to pay, and they were willing to bear the consequences by taking the assets onto their balance sheets for a time or by drawing down lines of credit. In essence, volume fell in the ABCP market because the supply was so elastic. The ABCP market didn’t “seize up” under this interpretation, it simply moved elsewhere.⁷ In short, the so-called logjam in the ABCP market looked like a price-discovery process: Information was emerging and being digested, and market participants were groping toward a new view. That process might take a long time to resolve and require substantial reintermediation, but it does not indicate a market failure that the Fed needs to step in and fix.

Evidence from research conducted since 2007 is consistent with the notion that increases in counterparty credit risk drove the financial market turmoil that summer and fall. A study by Daniel M. Covitz, Nellie Liang and Gustavo A. Suarez shows that the extent to which counterparties pulled away from issuers of ABCP was directly related to the extent of their holdings of risky housing-related assets.⁸ And work by John Taylor and John Williams suggests that the evidence on the behavior of interest rate spreads around that time is consistent with fluctuations in counterparty risk.⁹ While these research results were not available to policymakers in real time, they do support the hypothesis that markets were responding in a plausibly efficient manner to significant revisions in expectations about the underlying economic fundamentals.

Apart from the specifics of what was happening in the ABCP market, I’d also like to comment more generally on the modern interpretation of the phrase “lender of last resort.” During the conference call, it was noted that “The benefit of [lender-of-last-resort activity] is that it’s directly related to the functioning of markets. It’s a traditional central bank approach to dealing with disorderly markets.”¹⁰ The idea of the central bank as the lender of last resort comes from writings of Henry Thornton in the early 1800s and Walter Bagehot in the 1870s regarding the Bank of England.¹¹ Bagehot’s work is generally paraphrased as “Lend freely on good collateral at penalty interest rates,” which would seem to describe the Fed’s actions during the financial crisis.

Our current financial system is quite different from that of 19th century England, however. At that time, a central bank loan to a bank necessarily increased the money supply, and lending was the primary way the central bank managed the stock of coins and paper bank notes in circulation. At times, a large number of bank customers would seek to convert their deposits into notes and coins. When Bagehot advocated central bank lending during a crisis, he was advocating an expansion in the supply of circulating bank notes and coins to meet the increase in demand. Both Thornton's and Bagehot's writings make clear that they were not recommending rescues for insolvent institutions and that their prescriptions were about monetary policy, not credit policy.¹²

In contrast, the Fed's emergency lending programs during the crisis did not increase the net supply of liquid assets to the economy. Under modern interest rate targeting procedures, open market operations take care of expanding the aggregate supply of money to meet demand. Fed lending during the crisis was offset by sales of Treasury securities, so the supply of currency plus reserves did not increase. Instead, the lending programs simply reallocated credit, effectively selling Treasury securities to the public and using the proceeds to provide funds to private entities on terms they would not otherwise have obtained in the marketplace. The Fed's lending thus constituted credit allocation — that is, fiscal policy — and not the monetary policy Thornton and Bagehot had in mind.¹³

The Term Auction Facility

Policymakers' concerns about bank funding did not subside following the August 2007 reduction in the discount rate. In September, the Committee discussed, and in December initiated, the Term Auction Facility (TAF) in order to further improve the terms on which banks could obtain credit from the Fed. Under this program, term discount window loans were auctioned off to eligible banking institutions.¹⁴ The resulting rates tended to be much lower than the prevailing discount rate.

One rationale for the TAF was to overcome the perceived stigma of borrowing from the discount window, which was said to be limiting the response to the lower rates on discount window loans. Even though discount window lending was strictly confidential, market participants were sometimes able to infer that a particular bank had been unable to obtain market funding and as a result probably had turned to the window. I was not aware of any models of stigma in bank lending at that time. Some time later, Huberto Ennis and John Weinberg produced a model of stigma, but they did not analyze policy interventions.¹⁵ In December 2007, I argued in a letter to the FOMC that the notion of stigma in bank lending suggested adverse selection might be interfering with market functioning.¹⁶ I was trying to give the benefit of the doubt to the case for intervention. Stigma suggests a separating equilibrium, however, and the design of the TAF program seemed inconsistent with attaining a better equilibrium. Instead, it seemed designed to subsidize the borrowing costs of riskier banks. The public policy rationale of such cross-subsidies was not obvious.

Another rationale advanced at that time was the notion that some financial asset prices might have been driven inefficiently low as the result of "cash-in-the-market" pricing. In chapter 9 of their book *Understanding Financial Crises*, Franklin Allen and Douglas Gale describe a model

in which the only available buyers have insufficient cash to pay the fundamental value, and so the asset trades at an inefficient discount.¹⁷ The asset price is the ratio of investor cash to the quantity of assets for sale. In this model, central bank lending to banks collateralized by the asset in question alleviates the problem and restores prices to their “fundamental” value. In a similar vein, the broader notion of “firesales” rests on the premise that barriers to market participation result in prices that can, at least for a time, be depressed below their “fundamental” values.

This class of models did not seem persuasive as a relevant representation of market conditions at the time.¹⁸ Banks did not seem to be facing forced asset sales, and there were widespread accounts of money sitting on the sidelines while investors waited for more attractive prices. There were no apparent barriers to the participation of a wide array of investors in markets for various financial instruments, and it wasn’t clear that asset valuations had deviated much from their fundamental values. Exceptionally low payoffs on mortgage-backed securities were not inconceivable and could easily have coincided with rather dire aggregate economic conditions. Thus, relatively high risk premia and relatively low security prices did not strike me as unwarranted.

Inherent Versus Induced Fragility

The next key moment in the crisis was the March 2008 acquisition of Bear Stearns by JPMorgan Chase, with assistance from the Federal Reserve Bank of New York that effectively protected Bear’s creditors from the fallout of an unassisted failure. That moment illustrates a broader theme underlying the events of 2007 and 2008: The extent to which fragility is not inherent in the functioning of financial markets, but rather induced by the government’s provision of the very backstop that is meant to be stability-enhancing.

Deposit insurance is one obvious example,¹⁹ and we saw the moral hazard created by federal deposit insurance reach the boiling point during the savings and loan crisis of the 1980s,²⁰ at a cost to taxpayers of \$124 billion. And beginning in 1970, the Fed and other regulators began to intervene in credit markets in ways that protected *uninsured* creditors of large financial firms. First was the railroad Penn Central Transportation Company, which defaulted on \$82 million in commercial paper obligations. The Fed responded by encouraging banks to borrow from the Fed to purchase commercial paper, thus providing support to securities markets. In 1972, the Federal Deposit Insurance Corporation (FDIC) gave the \$1.2 billion Bank of the Commonwealth a \$60 million line of credit that prevented its failure.²¹ In 1974, the Fed lent \$1.7 billion to Franklin National Bank and assumed \$725 million of its foreign exchange book. In 1984, the failing \$40 billion bank Continental Illinois was able to borrow from the discount window even as it was receiving a capital injection from the FDIC. In 1998, we organized a \$3.6 billion rescue of the hedge fund Long Term Capital Management.²²

The net result of this history has been a large increase in the fraction of our financial system that is covered by explicit and implicit government guarantees. At the end of 1999, the government safety net covered 45 percent of financial sector liabilities, according to Richmond Fed researchers. By the end of 2011, that number had grown to 57 percent, about the same size it was at the end of 2009, despite the many new regulations we have put in place since the crisis.²³

Prior to 2007, but certainly by March 2008, investors arguably viewed the Federal Reserve as quite likely to intervene to prevent creditor losses at large financial institutions. While that expectation was undoubtedly strong for the large bank holding companies, instances of intervention in response to financial distress outside of the banking system are likely to have contributed to the expectation of support for the large investment banks as well, especially after the Gramm-Leach-Bliley legislation in 1999 placed them on more even regulatory footing with the bank holding companies. And the policy actions of late 2007 that I've already discussed plausibly conveyed the message that the Federal Reserve viewed its lending as an appropriate remedy for credit market disruptions. This would have discouraged troubled institutions such as Bear or Lehman Brothers from incurring the costs of raising additional equity or reducing their reliance on short-term funding.

This safety net creates two mutually reinforcing conditions that seriously distort the incentives of financial market participants to monitor and control risk. First, creditors of some financial institutions feel protected by an implicit government commitment of support should the institution become financially troubled. Second, policymakers often feel compelled to provide support to certain financial institutions to insulate creditors from losses. These instances of government intervention over time have reinforced creditors' expectations of support and thereby dampened incentives to contain risk-taking. This has promoted financial firms of greater size, complexity and interconnectedness and encouraged greater leverage and more reliance on highly liquid short-term funding. In this view, the apparent fragility of modern financial market arrangements is not entirely a force of nature. Instead, the narrative I've sketched out here suggests that financial instability is a *consequence* of the moral hazard effect of expected official intervention.

The thesis that financial market instability is inherent, rather than induced by poor policies, must also confront the fact that instances of instability are quite unevenly distributed across different countries and different regulatory regimes, as exemplified by the contrasting experiences of the United States and Canada. Over the past 180 years, the United States has experienced 14 major banking crises, compared with just two mild illiquidity episodes in Canada over the same period.²⁴ If financial fragility were an inherent feature of financial markets, financial panics would be ubiquitous, but that's not what we see.

I do want to emphasize that to my knowledge Fed policymakers during the crisis were genuinely concerned that the problems in financial markets might have costly consequences for the real economy and the American people. With that concern in mind, they acted in what they thought was the best interest of the economy and the public. But I see the dilemma as resulting in part from a dreadful time-consistency problem. Decades of rescues had given rise to expectations of further rescues, which just encouraged high leverage and fragile funding arrangements. Disappointing those expectations would have limited moral hazard but forced investors to revise their expectations about future Fed support and reconfigure and reposition their investments accordingly. This would likely have been a turbulent process.

One more crisis moment deserves comment. Lehman Brothers filed for bankruptcy on September 15, 2008. One day later, the insurance company American International Group (AIG) received a large credit extension from the New York Fed.²⁵ At that point, regulators had resolved

six large failing financial firms in five different ways. Some positions in the capital structure were rescued in one firm's resolution but not rescued in another's. Each had been handled on an ad hoc basis, without comment on how similar cases might be handled in the future. Market conditions following Lehman and AIG cried out for a general policy statement providing guidance on future interventions. But at that point it would have been very hard for policymakers to articulate a credible policy that differentiated between firms or investors. The most expedient path to stability was to throw in the towel and backstop anything in question. To persuade Congress to provide the legislative authority to do so, even scarier words were invoked — “another Great Depression,” for example. I believe the resulting shock to consumers' and businesses' expectations significantly deepened the recession already underway.

Suggestions for Researchers

I promised at the outset that I would share some suggestions for the economic researchers in the room, and I turn to that task now. First, though, commendations are necessary. The progress made on the theory of banking and financial intermediation in the last few decades has been profound, and we owe that progress to many of the people here today.

Second, a characterization is in order: There is a sense in which the models that were cited to justify the interventions that began in 2007 are simply “possibility theorems.” They are stripped-down, bare-bones models demonstrating that under a specific set of assumptions government intervention of the type we saw can be efficiency enhancing. Let me be clear: I am not criticizing stripped-down models, per se; indeed, I doubt we could make much progress in economics without them. In fact, I wrote down a few simple models myself back in the day. In order to isolate a theoretical phenomenon you've identified, you eliminate all the unnecessary details, leaving only the essential features, as in a chess puzzle where every piece on the board plays a role in the solution. This puts the economics of the issue in stark relief so that it can be better understood and subjected to further study by other researchers.

But there is a large gap between such models and the needs of policymakers, because they often provide us with little guidance on how critical assumptions compare to the real world. Often the predictions of models in which policy interventions play a useful role are qualitatively indistinguishable from the predictions of models in which markets are fairly well functioning and intervention does not enhance efficiency. To take a simple but relevant example, “firesales,” in which financial assets are trading below their fundamental value due to limited participation or market segmentation, can be hard to distinguish from downward revisions in expected returns. In both cases, prices and quantities fall.

To choose between the two competing policy recommendations therefore requires some additional information. Some other aspect of the models needs to be compared to observations in order to discriminate between them. One possibility is to bring quantitative information to bear on the problem. For example, one could estimate the fundamental value of the financial assets in question to see if market prices seemed to diverge significantly. During the crisis, however, this tended to lead to an impasse. Estimates of fundamental values based on risk neutrality pointed to large deviations in market prices. But it seemed quite plausible that investors anticipated a high correlation between realized returns and their wealth — that is, if very large losses materialized,

aggregate economic conditions were likely to be very bad. In essence, large risk premia could not be ruled out and very low fundamental values were quite plausible.

That leaves us with comparing the assumptions built into the model environments, which leads naturally to a suggestion for the economic research community. I think it would be very useful to see more effort devoted to comparing specific model features, particularly information and technology assumptions, to actual observations. For example, how do the frictions that generate market segmentation stack up against modern market settings, in which traders are often physically isolated but communications technologies are very inexpensive? And we know that the sequential service constraint — in which depositors seeking withdrawals are isolated from each other and have only one interaction per period with their banker — is essential to the classic Diamond-Dybvig model of bank runs as multiple equilibria. Is the sequential service constraint a good representation of networks of traders linked by modern telecommunications services?

For me personally, and I believe for my fellow policymakers as well, more work focused on validating the technological and informational assumptions underlying models of financial market frictions would greatly help narrow the range of defensible disagreements on the relevance of any given model. In a sense, I am urging more horse races between various models of “possibility theorems” and models in which observed outcomes are reasonably efficient.

I have another suggestion as well. The induced-fragility narrative places expectational considerations center stage. This suggests that for financial stability it’s critical to achieve a commitment to limiting intervention, since constraining risk-taking ex ante through tougher regulation is likely to prove fallible. I’ve spoken on several other occasions on this theme and about the path toward better policy.²⁶ Achieving financial stability also is likely to require overcoming distributional motivations. Training in modern welfare economics conditions one to dissect and debate the efficiency rationales for intervention. As I have reflected over time on policymaking during the crisis, I have come to see the impulse to intervene as driven less by ex-ante or even ex-post efficiency considerations and more by sheer distributional concerns. Externalities, in the strict sense, are hard to identify with rigor in markets in which everyone is connected by chains of voluntary transactions. As the FOMC transcripts will show, scary words and language about protecting financial markets and Main Street were far more prominent than discussions of the efficiency properties of policy proposals. In hindsight, I wish more consideration had been given to the possibility that, as with the fight against inflation, protecting people over the long run can unfortunately require incurring quite substantial short-run costs.

My suggestion here is for more work on the political economy of financial market intervention. Charles Calomiris and Stephen Haber have a provocative new book called *Fragile By Design* in which they explore the connection between the structure of countries’ political institutions and the extent of policy-induced financial fragility.²⁷ This strikes me as an immensely promising research vein and one that is likely to yield substantial insights, because it focuses on the distributional considerations that I think were dominant in the crisis.

Conclusion

I'll conclude simply with a reminder that the stakes are high for making progress. I'll also point out that episodes of macroeconomic and monetary instability in the 1930s and the 1970s generated bursts of research that immensely deepened our understanding and led, arguably, to better policy. I hope that the current crisis-induced burst of interest in financial intermediation will yield similar payoffs in the years ahead, perhaps with your help. I look forward to seeing the benefits of that research.

¹ I am grateful to Jessie Romero, John Weinberg and Kartik Athreya for assistance in preparing these remarks.

² For example, see Federal Open Market Committee, "[Conference Call of the Federal Open Market Committee on August 16, 2007](#)," and "[Meeting of the Federal Open Market Committee on December 11, 2007](#)."

³ Milton Friedman and Anna Schwartz, *A Monetary History of the United States*, Princeton, N.J.: Princeton University Press, 1963.

⁴ FOMC (August 16, 2007)

⁵ FOMC (August 16, 2007), pp. 3-4

⁶ FOMC (August 16, 2007), p. 8. Statement made by then-Vice Chairman of the Board of Governors Donald Kohn.

⁷ See Jeffrey M. Lacker, "[Economics and the Federal Reserve after the Crisis](#)," Speech at Franklin and Marshall College, Lancaster, Pa., February 12, 2013.

⁸ Daniel M. Covitz, Nellie Liang, and Gustavo A. Suarez, "[The Evolution of a Financial Crisis: Panic in the Asset-Backed Commercial Paper Market](#)," Board of Governors of the Federal Reserve System Finance and Economics Discussion Series, no. 2009-36, August 2009.

⁹ John B. Taylor and John C. Williams, "A Black Swan in the Money Market," *American Economic Journal: Macroeconomics*, January 2009, vol. 1, no. 1, pp. 58-83. The authors also discuss other analyses that reach different conclusions from their own. ([Working paper version](#))

¹⁰ FOMC (August 16, 2007), p.7. Statement made by then-Chairman Ben Bernanke.

¹¹ Henry Thornton, "An Enquiry Into the Nature and Effects of the Paper Credit of Great Britain," 1802, Edited and with an Introduction by F.A. Von Hayek, New York: Rinehart and Co., 1939. Walter Bagehot, "Lombard Street," London: Harry S. King and Co., 1873.

¹² For explanation and discussion of Thornton and Bagehot's views on the lender of last resort, see Thomas M. Humphrey, "[Lender of Last Resort: The Concept in History](#)," Federal Reserve Bank of Richmond *Economic Review*, March/April 1989, pp. 8-16; and Michael D. Bordo, "[The Lender of Last Resort: Alternative Views and Historical Experience](#)," Federal Reserve Bank of Richmond *Economic Review*, January/February 1990, pp. 18-29.

¹³ An exception was after October 2008, when the Fed began paying banks interest on excess reserves and stopped offsetting lending-induced increases in the supply of reserves.

¹⁴ More details on TAF are available on the Federal Reserve Board of Governors' [website](#).

¹⁵ Huberto Ennis and John Weinberg, "Over-the-Counter Loans, Adverse Selection, and Stigma in the Interbank Market," *Review of Economic Dynamics*, October 2013, vol. 16, no. 4, pp. 601-16. ([Working paper version](#))

¹⁶ Jeffrey M. Lacker, "[Comments on the Term Auction Facility](#)," Memorandum to the Federal Open Market Committee, December 5, 2007.

¹⁷ Franklin Allen and Douglas Gale, "Understanding Financial Crises," Clarendon Lectures in Finance, New York: Oxford University Press, 2007. Then-Chairman Bernanke cited Chapter 9 of their book during the FOMC meeting on September 18, 2007. See Federal Open Market Committee, "[Meeting of the Federal Open Market Committee on September 18, 2007](#)," p. 147.

¹⁸ Lacker (2007), p. 2.

¹⁹ John H. Kareken and Neil Wallace, "Deposit Insurance and Bank Regulation: A Partial-Equilibrium Exposition," *The Journal of Business*, July 1978, vol. 51, no. 3, pp. 413-38. ([Working paper version](#))

²⁰ Michael Dotsey and Anatoli Kuprianov, "[Reforming Deposit Insurance: Lessons from the Savings and Loan Crisis](#)," Federal Reserve Bank of Richmond *Economic Review*, March/April 1990, pp. 3-28.

²¹ Federal Reserve Chairman Arthur Burns favored a bailout, according to Irving H. Sprague, "Bailout: An Insider's Account of Bank Failures and Rescues," Washington D.C.: Beard Books, 1986.

²² The Fed convened a group of creditors to purchase a 90 percent stake in LTCM but did not put up any of its own funds. To learn more about each of these episodes visit www.federalreservehistory.org.

²³ The Richmond Fed's estimates of the size of the safety net are available [online](#).

²⁴ Charles W. Calomiris and Stephen H. Haber, “Fragile by Design: The Political Origins of Banking Crises and Scarce Credit,” Princeton, N.J.: Princeton University Press, 2014.

²⁵ Learn more about the [support provided to specific institutions](#) at federalreservehistory.org.

²⁶ See Jeffrey M. Lacker, “[The Path Toward Financial Stability](#),” Speech to the Stanford Institute for Economic and Policy Research, Stanford University, Stanford, Calif., February 11, 2014; and “[A Program for Financial Stability](#),” Speech to the Banking Institute, UNC School of Law, Charlotte, N.C., March 29, 2012.

²⁷ Calomiris and Haber (2014)