

Stress for Success: A Review of Timothy Geithner's Financial Crisis Memoir[†]

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Timothy Geithner's memoir of the financial crisis of 2007–08—Stress Test: Reflections on Financial Crises—is an important historical document offering details of how policies were formed and implemented during the crisis, showing the political constraints, and offering lessons for future crises. Walter Bagehot's classic rule for fighting crises—that the central bank should lend against good collateral at a high rate—is passive and incomplete. Geithner argues for the use of overwhelming force to reestablish confidence. Also, although the Federal Reserve's new crisis lending programs needed to be anonymous so as not to reveal weak banks' identities—"stigma"—the stress tests during the crisis did reveal information that may have been useful in reestablishing confidence. (JEL B31, E44, E63, G01, G21, G28)

1. Introduction

Timothy Geithner's memoir of the Financial Crisis of 2007–08, *Stress Test: Reflections on Financial Crises*, is a valuable historical record of the formation and implementation of the policy responses during the crisis. Lessons for future crises can be distilled from his recollections. Geithner's crisis response was informed by his direct experiences of the Mexican and Asian crises. In the book, he discusses conducting triage during the crisis, the importance of avoiding stigma

(i.e., the costs to banks from having their identity revealed at emergency lending programs), navigating through the politics, the failure of Lehman Brothers, dealing with the policy naysayers, and timing the use of overwhelming force. During the crisis, a new tool was introduced to reestablish confidence, the stress tests of large banks.

Events during the crisis were chaotic and fast moving. Fundamentally, policymakers did not know initially what was actually happening, but had to respond, at first in reaction to events as they unfolded and then, with the Troubled Asset Relief Program and the stress tests, proactively. Timothy Geithner, like Ben Bernanke, was there during the entire crisis period, first as president of the Federal Reserve Bank of New York (and coincidentally, vice chairman of the FOMC) and then as US treasury secretary. "Our response to the global financial crisis is still wrapped in

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[†]Go to <http://dx.doi.org/10.1257/jel.53.4.975> to visit the article page and view author disclosure statement(s).

myth and haze and misperception. And I was in the middle of it from start to finish . . .” (p. 12).¹ “We lived through months of terror” (p. 19). His book is a record of this.

Pretty much from the beginning, Bernanke and Geithner spoke of the crisis as a bank run. Then FOMC Governor Kevin Warsh (2009) noted the chaos in April 2009: “Characterizing the current period as a ‘recession’ is still wanting, insufficient in some important respects. In my view, this period should equally be considered a panic . . .,” likening it to the Panics of 1837, 1857, 1873, 1893, and 1907. But, a public narrative of the underlying causes of the crisis was not articulated until Bernanke (2009a, August), who explained the events as “. . . a generalized run by providers of short-term funding to a set of financial institutions, possibly resulting in the failure of one or more of those institutions.”

Geithner emphasizes, and it is one of the main points of the book, that what is needed to combat a financial crisis is the “. . . use of overwhelming force to quell panics . . .” (p. 397). “Overwhelming force” refers to having a credibly large amount of committed resources available to use with discretion during a financial crisis. Geithner learned this in the previous crises he experienced as a policymaker; the Mexican crisis and the Asian crisis. However, obtaining and using overwhelming force is complicated by politics. “It turned out that things had to get a lot worse before Congress would even consider expanding our authority to make things better, a common problem in crisis response” (p. 164). “It took the fall of Lehman and the impending collapse of AIG to persuade President Bush and [Treasury Secretary] Hank [Paulson] to seek legislative authority to try to repair the entire system” (p. 208). The timing of overwhelming force

is important; it cannot come too early, as that may signal that the situation is worse than the market thinks. And it cannot come so late as to be ineffective. It was largely Geithner who had to get the timing right.

Economics enters the memoir only with reference to “moral hazard,” Bagehot’s rule, and Kindleberger’s 1996 book *Manias, Panics and Crashes*, which is mentioned in passing. And that is a telling point for economists. Economists had little to offer in the way of policy advice during the crisis. Kindleberger’s vague description of a cycle of manias, followed by panics, and ending in crashes seems to be a kind of reference point since macroeconomic models cannot display crises. But Kindleberger does not explain financial crises and his description does not lead to any policy advice. Economics (actually insurance) contributed the concept of “moral hazard.” Geithner’s point about moral hazard is that during a crisis, any policy to ameliorate the situation is open to the charge of “moral hazard,” but a crisis is not the time to address that issue. Moral hazard is perhaps controversial, but the first point—that we need models of crises—should not be.

During the crisis, there seems to have been a steady stream of criticism from “moral hazard fundamentalists.” “. . . I found the more hawkish obsessions with moral hazard and inflation during a credit crunch bizarre and frustrating” (p. 131). And after Lehman: “I had heard enough moral hazard fundamentalism” (p. 217). Geithner becomes quite irritated at constantly being told that crisis response policies would cause “moral hazard.” In fact, the term “moral hazard fundamentalists” appears to have become part of the policymakers’ lexicon during the crisis. Before he joined the Obama administration Larry Summers wrote an op ed in the *Financial Times*, September 23, 2007, entitled “Beware Moral Hazard Fundamentalists,” arguing that in a financial crisis “avoiding moral hazard” cannot be the

¹All unattributed quotations and pages numbers refer to Geithner’s book.

basis for crisis response policies.² Geithner also has this view.

Lehman Brothers filed for bankruptcy on September 15, 2008, and within a month Congress passed the Troubled Asset Relief Program (TARP). TARP was \$700 billion allocated by Congress to address the crisis; it passed on October 3, 2008. Bernanke and Geithner argue that they could not legally have saved Lehman Brothers. Clearly, the results of the Lehman bankruptcy were devastating. Lingered still is the question of whether large banks should be allowed to fail during a crisis. Was Lehman's bankruptcy a mistake? A large part of the book is devoted to the events surrounding Lehman Brothers.

Bagehot's (1873) rule that in a crisis the central bank should lend freely, at a high rate, and on good collateral is frustratingly vague.³ In a crisis, events are not clear. In particular, it is not even clear if there is a crisis. During a crisis it is not exactly clear what constitutes "good collateral."⁴ Bagehot's advice is a passive and incomplete response to a crisis. Most likely because it does not have the all the right tools, the central bank is, in a way, passive because it relies on banks coming forward to borrow. Use of the discount window faces the problem of "stigma," which refers to a bank's reluctance to go to the discount window because of fears that depositors, creditors, and investors will view this as a sign of weakness, causing its borrowing

costs to rise or maybe generating a bank run.⁵ Stigma issues arise throughout the book. And although never mentioned by Bagehot, maintaining the secrecy of borrower identities seems paramount during crises.

During the crisis of 2007–08, the new Federal Reserve lending programs that were introduced were carefully designed to avoid stigma.⁶ The identities of borrowers were kept secret. But, the stress tests introduced during the crisis had exactly the opposite goal: find and publicly reveal the weak banks! The stress tests of the largest banks are widely viewed as a great success. The banks calculated losses that they would incur during a forward-looking stress scenario proposed by the government. The banks' results (in terms of bank capital) were then compared to the regulators' calculations and then the results were announced in terms of how much capital each bank would have to raise. Yet, there were no runs on the banks identified publicly as weak. The stress tests came late in the crisis and the results may have eliminated any residual uncertainty. The information environment during a crisis deserves careful study.

Broadly, policy responses in a crisis are fundamentally about managing expectations. The lenders, who ran on the banks demanding cash, need to be convinced that it is safe to lend again. That is, at one point in time, there is a panic, and later, beliefs are revised and the runs dissipate. Why do beliefs change?⁷ Geithner proposes that overwhelming force is the key to regaining confidence. Overwhelming force requires backing policies with a sufficiently large amount of money. This war chest must be perceived as sufficient. It is hard to know how much

² See <http://www.ft.com/intl/cms/s/0/5fffd2606-69e8-11dc-a571-0000779fd2ac.html#axzz37dlPrATn>.

³ Ben Bernanke reported that the Federal Reserve followed Bagehot's rule (see Bernanke 2014a and 2014b). Also, see King (2010) with regard to the Bank of England and Draghi (2013) with regard to the European Central Bank.

⁴ Bagehot famously quotes one of the Bank of England's more senior directors, Mr. Harman, that, during the Panic of 1825, the Bank of England "lent by every possible means and modes we have never adopted before . . ." (*Lombard Street*, p. 51–2). Also see Flandreau and Ugolini (2011) on the collateral the Bank of England took during the Panic of 1866.

⁵ Stigma was not a problem in England in the nineteenth century because of the industrial organization of banking. This is discussed further below.

⁶ In particular, they were auctions in which many banks bid at the same time.

will be sufficient. “Larry [Summers] and I told the President we might have to ask for another TARP, at a time when Congress had zero interest in more bailouts” (p. 5). In a crisis it not clear, almost by definition, how to determine the size of the war chest. Another example is the head of the European Central Bank (ECB), Mario Draghi’s statement that the ECB was “. . . ready to do whatever it takes to preserve the Euro.”⁷ Although the formation of expectations is at the center of macroeconomics, in the context of financial crises, it has not been studied.

In what follows, I discuss the above issues in terms of Geithner’s experiences, and sometimes in a broader context. In section 2, I look at the unfolding of the crisis and discuss the meaning of “financial crisis.” In section 3, I look at the policy responses. Managing expectations and overwhelming force are the subjects of section 4. Lehman is discussed in section 5. Section 6 concerns moral hazard. And the stress tests are examined in section 7. Section 8 offers some tentative conclusions and outlines open questions for economics.

2. *The Crisis*

What is a “crisis”? When are events a “crisis”? “At the start of any crisis, there’s an inevitable fog of diagnosis” (p. 119). Is it the start of a recession or something more extreme?⁸ When should the central bank act? On August 10, 2007, the Federal Reserve issued a press release saying it would provide reserves as necessary due to the “unusual funding needs because of dislocations in money and credit markets.”⁹

⁷<http://www.ecb.europa.eu/press/key/date/2012/html/sp120726.en.html>.

⁸The determination of whether an event is a crisis and when it starts and ends is a problem for researchers more generally. See Boyd, De Nicolò and Loukoianova (2011).

⁹<http://www.federalreserve.gov/newsevents/press/monetary/20070810a.htm>.

In my personal experience, I would date the start as August 9, 2007, when repo haircuts started to increase. Formal dating of the events in the crisis, based on Bai (2010), is provided by Gorton, Metrick, and Xie (2014).

What was going on? By October 2007, events were described as a bank run. Bernanke (FOMC Minutes, October 28–29, 2008): “I think there was a panic brought about by the underlying concerns about the solvency of our financial institutions. That panic essentially turned into a run. Companies like Wachovia that had adequate Basel capital faced a run on their deposits, which was self-fulfilling. The investment banks essentially faced runs.” (p. 149). The Fed announced the introduction of a new lending facility, the Term Auction Facility (TAF), on December 12, 2007. Unlike the discount window, where borrowers’ identities leaked and they were then identified as weak, TAF was designed to avoid this by using auctions. So, Douglas Diamond’s (2008) point that: “Financial crises are everywhere and always due to problems of short-term debt” was again confirmed. Only the form of the debt and the form of the banks had changed. Instead of demand deposits, the debt was both sale and repurchase agreements (repo) and asset-backed commercial paper (ABCP), and the “banks” were dealer banks.

But, it seems that the Federal Reserve (and most everyone) did not grasp the significance of what was going on until Lehman failed a little less than a year later. For example:

Economic growth in late 2007 and during 2008 was likely to be somewhat more sluggish than participants had indicated in their October projections. Still, looking further ahead, participants continued to expect that, aided by an easing in the stance of monetary policy, economic growth would gradually recover as weakness in the housing sector abated and financial conditions improved, allowing the economy to expand at about its trend rate

in 2009. Federal Open Market Committee Minutes, December 11, 2007.¹⁰

This was a widely-held view and it is worth pondering why this was the case. The paper I delivered at the August 2008 Federal Reserve Bank of Kansas City's annual Jackson Hole Conference was entitled "The Panic of 2007." To me, it was clear by then that events were systemic. Gorton, Metrick, and Xie (2014) show empirically that systemic fragility was building up in the period *prior* to Lehman. Why did it take the Fed and the Treasury so long to see this? One possibility is that they do not trade in the relevant financial markets, where trading would allow them to see what was happening. That was probably part of it. But "seeing" is a function of your paradigm. Using textual analysis of the FOMC minutes of 2007, Fligstein, Brundage, and Schultz (2014) argue that the inability to see the unfolding financial crisis as a systemic event prior to Lehman was due to their common macroeconomic paradigm. Perhaps so.

A crisis is a *systemic* event. "Of the twenty-five largest financial institutions at the start of 2008, thirteen failed (Lehman, WaMu), received government help to avoid failure (Fannie, Freddie, AIG, Citi, BofA), merged to avoid failure (Countryside, Bear, Merrill, Wachovia), or transformed their business structure to avoid failure (Morgan Stanley, Goldman)" (p. 255–6). Bernanke made the same point. The *FCIC Report* (2011) quotes Ben Bernanke's testimony that during September and October 2008 ". . . out of 13 of the most important financial institutions in the United States, 12 were at risk of failure within a period of a week or two" (p. 354). Recent research showing that crises are very different from recessions is due to Atkeson, Eisfeldt, and Olivier-Weill (2014). They

show that the Great Depression, the recession of 1937, and the recent financial crisis stand out in the data as very distinct.

Bank runs are about cash; banks must pay out cash to lenders who do not want to roll their debt. But then the banks have to sell assets to raise cash, pushing asset prices down. Indeed, the prices of *all* assets go down, in particular the best assets, since they are sold under the view that they can raise the most cash. So, the crisis spreads to these other assets, e.g., AAA/Aaa credit card, auto loan, and student loan asset-backed securities. Geithner (2008a):

What we were observing in the U.S. and global financial markets was similar to the classic pattern in financial crises. Asset price declines—triggered by concern about the outlook for economic performance—led to a reduction in the willingness to bear risk and to margin calls. Borrowers needed to sell assets to meet the calls; some highly leveraged firms were unable to meet their obligations and their counterparties responded by liquidating the collateral they held. This put downward pressure on asset prices and increased price volatility. Dealers raised margins further to compensate for heightened volatility and reduced liquidity. This, in turn, put more pressure on other leveraged investors. A self-reinforcing downward spiral of higher haircuts forced sales, lower prices, higher volatility and still lower prices.

What do "market prices" mean in this context? "If a security sold at its \$100 'par' value a month ago, and you couldn't sell it for \$30 today, but it might be worth \$89 in five years, what was its true value? And what kind of write-down should you take?" (p. 140). Consequently: "In a financial crisis, insolvency can be in the eye of the beholder. If AIG had been forced to mark all its assets to their depressed market prices during a selling frenzy, then sure, it would have been insolvent. Just about every financial firm would've been insolvent" (p. 206). Markets effectively shut down for a range of asset-backed securities, and interbank markets shut down, where

¹⁰ <http://www.federalreserve.gov/monetarypolicy/fomcminutes20071211.htm>.

“shut down” means that trading was so thin that the prices were basically meaningless. It must also be kept in mind that the markets being discussed are over-the-counter markets, so prices are not readily observable in any case.¹¹

The issue Geithner raises is an important one. The predominant view is that securities markets are always the best guide to fair value, no matter what. This is the view based on the price efficiency of stock markets. And, this is the view that informs the Financial Accounting Standards Board (FASB), although the FASB agreed to let banks use more discretionary judgment and the accountants towards the end of the crisis.¹² The argument that assets should be marked-to-market even during a crisis is that otherwise banks would be able to hide losses. This view does not admit the possibility of a crisis. The markets in question are not stock markets, but over-the-counter debt markets. These are not price discovery markets. Rather, the whole point of these markets is that there is no price to discover in noncrisis times (see Holmström 2014).

In a crisis, there is a fear of adverse selection, a fear that counterparties are engaging in private price discovery. Fearing this, there is a run on the banks, which in turn sell assets to raise cash. Since all the banks sell assets, the prices of their assets plummet. But, in a bank run, no one wants the banks' assets for fear of adverse selection. That is, in a systemic financial crisis there are no private agents capable of buying the assets of the banking system, except

the government. In the period prior to the Federal Reserve's existence, during a crisis, banks would suspend convertibility, simply refusing to give cash to depositors, and in the Great Depression, President Franklin Delano Roosevelt declared the banking holiday. There simply were no markets to sell bank loans. That was the point of suspension. Without suspension or government intervention, asset prices will plummet because even as prices become lower and lower, there are not enough willing private buyers. Only the Fed and the Treasury can buy trillions of dollars of assets in a short period of time. That is one way to think of a financial crisis. In the crisis of 2007–08, there was no mechanism to avoid selling assets. Assets had to be sold, depressing prices. Then, mark-to-market accounting can spread the crisis.¹³

But, calling the events a “bank run” does not really explain what happened. What exactly is a “banking panic”? This is a very important question for thinking about policies to prevent bank runs. A related question is: Why are banks regulated? Dang et al. (2014) argue that banks are optimally opaque, so that their short-term debt can be used in transactions where the debt is accepted at par. Dang, Gorton, and Holmström (DGH) (2013) argue that the optimal contract for transactions is debt backed by debt. Indeed, banks select their assets so that it is very expensive to produce information about the payoffs of these assets, e.g., loans to small businesses and consumer loans. Opacity is optimal and that is why banks are regulated. Before the financial crisis, both sale and repurchase agreements (repo) and asset-backed commercial paper were often backed by asset-backed securities

¹¹There usually is no reason to observe the prices of money market instruments. Holmström (2014) distinguishes between price discovery markets—equities—and money markets, where the point is to avoid the need for any price discovery.

¹²E.g., PriceWaterhouseCoopers (2008): “Although it has generated controversy, fair value continues to represent the best available methodology for determining and reporting the value of financial instruments” (p. 2).

¹³Laux and Leuz (2010) find no evidence that mark-to-market accounting exacerbated the crisis, but they studied US commercial banks, not the investment banks that were at the core of the crisis.

(ABS) (including residential and commercial mortgage-backed securities).

Short-term debt is an optimal security for trading and storing value because debt is information insensitive, that is, it is common knowledge that no agent has an incentive to privately produce information about the payoffs of the debt. The debt is free from adverse selection. Information insensitivity equals liquidity. A bank run or panic is an information event.¹⁴ Gorton (1988) showed empirically that during the National Banking Era, 1863–1914, when unexpected news of a future recession arrived (in the form of an innovation in a leading indicator of recessions), depositors at banks ran to withdraw their money. A crisis is a situation where conditional on a public shock—e.g., house prices are declining—the debt becomes information sensitive, so adverse selection or the fear of adverse selection. The debt is then illiquid. Market “prices” are meaningless.

Short-term debt backed by asset-backed securities (ABS) works until lenders doubt the value of the ABS.¹⁵ Kevin Warsh (2008), at the time an FOMC governor, diagnosed the underlying problem in the crisis as being related to “the explosive growth in securitization markets in recent years. The loss in confidence in structured products was first evidenced last year in securities backed by subprime mortgages. . . . Participants also lost confidence in the value provided through the securitization process itself.” Geithner also describes the events as a panic. Recognition of the crisis as a panic, a distinct event from a recession, is one important lesson to take from the book.

But, how exactly does the panic start? Morris and Shin (2012) argue that even small amounts of adverse selection can result in a loss of confidence. Also, see Goldstein and

Pauzner (2005). Still, many, many, questions remain about how panics work.

3. *The Policy Responses to the Crisis: Dealing with Stigma*

There is not much guidance for policy responses during a financial crisis. Bagehot (1873) distilled his rule for fighting crises from observing events in England in the mid-nineteenth century (see Bordo 1990 and Bignon, Flandreau, and Ugolini 2012).¹⁶ In fact, things are more complicated. Bagehot’s (1873) rule does not correspond to what we observe in crises. He omits an essential element: secrecy (see Gorton and Ordoñez 2014b). The organization of the English banking system essentially ensured the anonymity of emergency borrowers.¹⁷ And Flandreau and Ugolini (2011) argue that Bank of England did not even want to know the identities of borrowers: “An important feature of the picture that emerges from this literature is the notion that, paramount in the transformation of the Bank of England into a modern central bank, was the development of ‘anonymous’ dealing with the market.” So, for Bagehot the issue never came up.

While in noncrisis times central banks have trended towards increasing transparency, during crises information is suppressed. Even in the period prior to the Federal Reserve’s existence in the United States, information was suppressed by private bank clearinghouses during periods of suspension of convertibility (see Gorton and Tallman 2014). The suppression of information refers to the identities of banks making use of the central bank’s (or clearinghouses’) discount

¹⁶There is a very large literature on Bagehot and the lender-of last-resort. See, e.g., Goodhart (1988, 1995), Freixas et al. (1999, 2000).

¹⁷Capie (2007) explains that in England, geographically between the country banks and the Bank of England, was a ring of discount houses. This kept the identity of distressed country bank borrowers secret. Also, see Capie (2002).

¹⁴Also, see Gorton and Ordoñez (2014a).

¹⁵On asset-backed securities, see Gorton and Metrick (2013).

window or other special lending facilities. Similarly, in the pre-Fed period, information about bank balance sheets that was required to be published in normal times was suppressed during suspension periods, as were the identities of banks borrowing from the clearinghouse's internal discount window.

Throughout Geithner's book, this issue of stigma arises (although, curiously, it is not in the index). Use of the central bank's discount window faces the problem of "stigma," which refers to a bank's reluctance to go to the discount window because of fears that depositors, creditors, and investors will view this as a sign of weakness, causing its borrowing costs to rise or maybe generating a bank run. "Stigma was a real danger . . ." (p. 235). In response to stigma, the central bank created new anonymous lending programs during the financial crisis, the Term Securities Lending Facility, the Primary Dealers Credit Facility, and others, in addition to TAF.¹⁸ All these programs were designed to use auctions to make loans in secret, not publicly revealing borrowers' identities. Bernanke (2010b): ". . . [because of] the competitive format of the auctions, the TAF [Term Auction Facility] has not suffered the stigma of the conventional discount window" (p. 2).¹⁹ Armantier et al. (forthcoming) found that: ". . . banks were willing to pay a premium in excess of 44 basis points on average (143 basis points after the bankruptcy of Lehman Brothers) to avoid borrowing from the discount window. Discount window stigma is economically relevant as it increased banks' borrowing costs by up to 32.5 percent of their net income during the crisis."²⁰

¹⁸Lending programs were also created by the European Central Bank. See Stolz and Wedow (2010).

¹⁹It is not obvious how an auction avoids stigma. Perhaps it is a coordination device. This is an area for future research. Also see Stolz and Wedow (2010) on programs in the European Union.

²⁰Also, see Ennis and Weinberg (2010) and Furfine (2003) on stigma costs.

Bloomberg L.P., the news organization, submitted requests under the Freedom of Information Act to the Board of Governors of the Federal Reserve System in April and May, 2009, requesting information about loans made under the special lending programs, including specifically the identities of borrowers. The Board of Governors of the Federal Reserve refused the requests and Bloomberg sued (*Bloomberg L.P. v. Board of Governors of the Federal Reserve System*, 601 F.3d 143 2d Cir. 2010). See Biscontini (2011) and Berry (2012). The defense against this suit was the argument that stigma would create problems if the borrowers' identities were revealed. Brian Madigan (2009), at the time Director of the Board's Division of Monetary Affairs: "This stigma . . . can quickly place an institution in a weakened condition vis-à-vis its competitors by causing a loss of public confidence in the institution, a sudden outflow of deposits (a 'run'), a loss of confidence by market analysts, a drop in the institution's stock price, and a withdrawal of market sources of liquidity. In extreme cases, such developments can lead to closure of the institution" (p. 10). If information leaks out, there will be runs. The UK parliament attributed the run on Northern Rock to a leak by BBC that the bank had asked for and received emergency loans from the Bank of England.²¹

For these reasons, the response of central banks and private bank clearinghouses, historically, to financial crises has been to try to *prevent* information from being revealed. If bank-specific information leaks out, then the financial system might unravel sequentially as the weakest bank is run on, and then the next weakest, and so on. In the United States, as events unfolded, this was the fear: "Merrill's stock had lost more than a third of its value in a week. If Lehman went the

²¹See <http://www.publications.parliament.uk/pa/cm200708/cmselect/cmtreasy/56/5602.htm>.

way of Bear, Merrill was widely understood to be the next-weakest investment bank, the next obvious target for a run” (p. 181); “. . . everyone on Wall Street knew that if Morgan [Stanley] went the way of Lehman, Goldman would be next” (p. 204).

What is the point of designing anonymous lending programs if bank-specific information is revealed via the banks’ stock prices? The Securities and Exchange Commission (SEC) also acted to suppress bank-specific information, revealing the weak financial institutions, by instituting short-sale bans on almost 800 financial firms starting on September 18, 2008.²² Geithner: “. . . the SEC temporarily banned the short selling of 799 financial stocks, a heavy-handed effort to stop the stampede of speculation and rumor mongering. . . . The ban’s most immediate beneficiary appeared to be Morgan Stanley; CEO John Mack was publicly accusing the shorts of sabotaging his firm” (p. 203). If the short sale bans prevented adverse selection, uninformed buyers would be more willing to trade. Appel and Fohlin (2010) argue that the bans on covered short sales improved market liquidity. Beber and Pagano (2013) find the opposite.²³ Flannery, Kwan, and

Nimalendran (2013) find some evidence that spreads on bank stocks rose during the financial crisis.²⁴ This question remains open.

Why, during a crisis, is it important to suppress bank-specific information? To keep information from being revealed in markets, opacity must be recreated by essentially backing the financial system with the government, either implicitly or explicitly. Then the issue becomes whether the government is solvent. “To resolve a crisis, a government has to show the capacity and the will to end it; it has to demonstrate through its deeds that its words can be trusted. *Credit* and *credibility* share the same Latin root. It was bad enough when Russian and Indonesian politicians broke promises. We were the United States” (p. 223; emphasis in original). This becomes the basis for the use of overwhelming force.

4. *Overwhelming Force and Managing Expectations*

How can the government respond in a crisis (aside from introducing special lending programs)? Based on his previous experiences with crises, Geithner thinks that panics need to be fought with “overwhelming force,” not piecemeal—the “Vietnam approach.”²⁵ In discussing the Korean experience during the Asian Crisis, he noted that “. . . what we thought was overwhelming force didn’t stop the run. The markets weren’t sure the commitment was credible. . . .” (p. 61). And about Thailand: “We hoped to put a lot of ‘money in the window,’ enough to look big compared

²²See SEC Release 34-58592 (<http://www.sec.gov/rules/other/2008/34-58592.pdf>). Similar bans were put in place in England and in many European and other developed market regulators temporarily banned the short selling of the stock of financial firms after September 2008. Also, on May 19, 2010, the German Federal Financial Supervisory Authority (BaFin) prohibited naked short sales of euro-denominated government bonds, naked credit default swaps (CDSs) based on those bonds, and also naked short sales of the stock of Germany’s ten largest financial institutions. “Naked” short selling means selling a security when the seller has not borrowed the security. See Gruenewald, Wagner, and Weber (2010) for a list of worldwide short-selling bans that were instituted during the financial crisis. In Europe, naked CDS on sovereign debt was also banned (EU Short Selling Regulation (236/2012).

²³What about CDSs? Did they reveal information during the crisis? Here the evidence is not clear-cut. Mitchell and Pulvino (2012) show evidence that during the financial crisis the “arbitrage” relationship between bond yield spreads and credit default swap broke down.

²⁴There are quite a few other papers on this topic, e.g., Boehmer, Jones, and Zhang (2013) and Autore, Billingsley, and Kovacs (2011).

²⁵“Overwhelming force” is the essence of the Powell Doctrine. Following Vietnam, Colin Powell developed the “Powell Doctrine,” part of which was that if a military force is to be used, it should be done so with “overwhelming force.”

to the liabilities that could run” (p. 55).²⁶ Treasury Secretary William McAdoo also used overwhelming force in managing the crisis of 1914, the last successful example of crisis management in the United States. Silber (2007): “McAdoo succeeded in August 1914 because he did not hesitate to bludgeon the crisis with a sledgehammer” (p. 6).²⁷ So, this message is not new, but Geithner rediscovered it.

Overwhelming force was not possible initially during the 2007–08 crisis because there were many problems. “We only had limited tools to defend against a run on firms outside the commercial banking system, at a time when running seemed increasingly rational” (p. 173). “Our inconsistency had multiple causes; the limits of our authority, which made us look like we were flailing; the balkanization of our authority, which put different tools in the hands of different officials with different strategies and different perceived responsibilities; and the inevitable messiness of fighting a crisis with limited time and incomplete information to make decisions. But whatever the cause, our unpredictability undermined the effectiveness of our response” (p. 224). However, once Lehman failed the situation was different.

The source of overwhelming force was to be the Troubled Asset Relief Program (TARP), part of the Emergency Economic Stabilization Act of 2008, authorizing \$700 billion of expenditures. The hope was that TARP would be the overwhelming force. The first step under TARP was to inject \$125 billion into the nine largest financial institutions that held roughly two-thirds of the assets in banking system. In order to avoid revealing the relative strengths and

weaknesses of the nine, all were told that they had to take TARP money. “I warned the bankers that if they all didn’t accept the capital, TARP would become stigmatized . . .” (p. 238).

“Overwhelming force” is about expectations in the context of an information environment that has focused attention on the *financial system* because bank-specific information is not present, as a matter of policy. Geithner’s view is that in order to create positive expectations that the banking system will survive, it must be demonstrated that the war chest available to lend to banks is large enough. But how big does the war chest need to be? This is not clear. And there is no way to know in advance.

There are different types of “overwhelming force,” but the crisis response must be credible, and ultimately that means a large war chest—“money in the window.” Laevan and Valencia (2008, 2010, 2012) study systemic crises around the world since 1970 and show the instances where various overwhelming force-type policies were used, including deposit freezes, bank holidays, asset purchases, blanket guarantees of bank debt, or bank nationalizations. These policies are essentially forms of liquidity support. And, their success or failure is related to the credibility of the resources backing the policy.

Another important example of managing expectations occurred during the Great Depression when Roosevelt took office in March, 1933. When Roosevelt took office, the country was in the midst of nationwide bank runs. The President declared a national banking holiday on March 5, 1933. Then, on March 12, 1933, Roosevelt gave the first radio address to the nation by a US President. It was about fifteen minutes long.²⁸ The next day,

²⁶A recent example, of what “in the window” means: <http://www.forbes.com/sites/gordonchang/2014/03/30/china-officials-fibbed-to-depositors-to-stop-bank-runs/>.

²⁷McAdoo also undertook extraordinary measures, like closing the New York Stock Exchange for four and half months.

²⁸The speech can be heard on YouTube: <http://www.youtube.com/watch?v=z9CBpbuV3ok> and the text is here: <http://millercenter.org/president/fdroosevelt/speeches/speech-3298>.

when the banks reopened, depositors lined up to redeposit their money (see Smith 2007 and Silber 2009). The speech was remarkable, in particular, for explaining the crisis as a bank run. What changed depositors' beliefs? Silber (2009) argues that the Emergency Banking Act of 1933, passed by Congress on March 9—combined with the Federal Reserve's commitment to supply unlimited amounts of currency to reopened banks—created de facto 100 percent deposit insurance. The overwhelming force was the commitment that the supply of currency would be unlimited.

5. *Lehman*

“... the fall of Lehman was a serious blow, shattering confidence around the world” (p. 212). Should Lehman have been allowed to fail? Geithner is clear on this. “Nothing is more dangerous during a panic than the sudden liquidation of a major institution” (p. 149). “[I]n a colossal crisis, you never want to allow a messy liquidation of a major institution [Lehman] unless you can draw a circle of protection around the rest of the system's core, a firebreak to contain the flames. If Lehman failed, and the US government publicly proclaimed that we are done with bailouts, rational investors would simply run from other financial institutions” (p. 179).

Geithner's view is based on his prior crisis experiences. For example, “Indonesian execution [of crisis policies] was a problem, but the IMF made mistakes too. The most damaging may have been forcing Suharto to shut down troubled banks. . . . That triggered a run on deposits in the rest of the banking system. . . .” (p. 58). Djwandono (2005), the head of the Indonesian central bank at the time, also argues that the IMF-led closure of sixteen banks in November 1997 led to a run on other banks.

So, why was Lehman not bailed out? Bernanke, at his Financial Crisis Inquiry

Commission (FCIC) (2009) interview: “. . . I will maintain to my deathbed, that we made every effort to save Lehman, but we were just unable to do so because of a lack of legal authority. . . . In the case of Lehman Brothers, there was just a huge hole. I mean, they were insolvent and they had a thirty- to forty-billion-dollar hole in their capital structure” (p. 29, FCIC Interview). Geithner also argued that “. . . without a willing buyer, we didn't think we could legally do the rescue ourselves” (p. 187). Under Section 13(3) of the Federal Reserve Act, the Fed is allowed to act under “unusual and exigent circumstances.” So, it seems that the Fed could have acted. But there was another argument, namely that Lehman did not have sufficient “good” collateral. (See FCIC Report 2011, p. 341.)²⁹ Lehman CEO, Dick Fuld, however, in his written statement to the FCIC (September 1, 2010): “First, there was no capital hole at Lehman Brothers. . . even the Lehman bankruptcy examiner found immaterial differences in the firm's asset valuations. . . . Second, Lehman had adequate collateral” (p. 6).³⁰ This is the issue of valuation during a financial crisis, discussed above. Solvency is in the eye of the beholder. In the end, the Fed and Treasury made a decision and it is hard to second-guess them.

Bailing out banks is not popular when the government does it. But it happens even without a central bank. Prior to the Federal Reserve, during the National Banking Era, private bank clearinghouses bailed out large member banks when they teetered on the brink. See Gorton (2012) and Gorton and Tallman (2014). Geithner, I think, is right to see the question of bailouts as central to policy responses, and his view is consistent with

²⁹See <http://www.federalreserve.gov/aboutthefed/section13.htm> and Fetting (2008).

³⁰Also see Report of Anton R. Valukas, Examiner, *In re Lehman Bros. Holdings Inc.*, No. 08-13555 (JMP) (Bankr. S.D.N.Y. Mar. 11, 2010), <http://jenner.com/lehman>.

the historical record. “This is a classic problem in crisis response. The overwhelming temptation is to let the most egregious firms fail, to put them through a bankruptcy-type process like the FDIC had for community banks and then haircut bondholders. But unless you have the ability to backstop every other systemic firm that’s in a similar position, you’ll just intensify fears of additional failures and haircuts” (p. 306). Without a bailout, the war chest may have to be enlarged, which may not be politically feasible. And there is uncertainty about whether the size of the war chest is large enough.

The perceived heart of the problem is the trade-off between moral hazard creation and saving the economy from the destructive effects of a large bank failure, a trade-off Geithner was very aware of. During the crisis, decisions must be made. But, this dichotomy of bailing out banks or not is a false one in general because the best policies would be ones that *prevent* financial crises, at least for significant periods of time, as the United States did from 1934 to 2007.

As a practical matter, if I had been Ben Bernanke or Tim Geithner, I would have allowed Lehman to fail, but only because saving Lehman would have resulted in such a populist backlash that the Fed’s independence would have been compromised for a long time. Politics is inevitably involved in such decisions, and Congress would likely not have passed TARP had it not been for Lehman. But, looking forward to the next crisis, when the question will no doubt arise again, it is worth asking whether Lehman should have been allowed to fail (without regard to politics).

6. *Moral Hazard*

Geithner did think that “moral hazard” was a genuine issue: “The moral hazard risk [with bailing out Bear] was real. . .” (p. 151).

And he knew that because of his policies he “. . . would later be criticized as a walking source of moral hazard. . .” (p. 145). In a crisis, “moral hazard” basically is a policy of implicitly (or maybe explicitly) allowing banks to fail, and that seems to have been the source of the frustration. “. . . [O]ur critics didn’t have feasible plans of their own” (p. 325). His frustration with the “moral hazard fundamentalists” was that *any* policy proposed to ameliorate a crisis would be open to the charge of “moral hazard.” Repeatedly, he says things like: “I got irritated when the critics offered anxieties without alternatives” (p. 342). I mention this because it seems that, to the extent that economics had any influence on the crisis response, moral hazard concerns was it.

Geithner’s concern seems very legitimate to me. The most relevant issue here is whether a financial crisis is the time to deal with moral hazard, by teaching banks lessons by letting them fail or firing their managements. It is more important to prevent twelve of the thirteen largest U.S. financial institutions from failing. The historical record seems clear: do not let big banks fail in crises. And the counterfactual of Lehman seems consistent with this. The new resolution procedures of Dodd–Frank seek to make such bank failures less disorderly. We will see in the next crisis.

Moral hazard is not the cause of financial crises. With respect to banks and crises, the concept is a tricky one. Did banks engage in “moral hazard” prior to the Fed? Are those pre-Fed crises different? Why was there no “moral hazard” after deposit insurance was adopted in the United States in 1934? Is “moral hazard” a theory of crises under central banks? Bank runs have occurred throughout the history of market economies, and often when there was no central bank, no deposit insurance, and no government bailouts. These crises were also about short-term debt, Diamond’s point. Also, there

have been long periods without crises even though there was deposit insurance or there were only a few large banks. The root problem is short-term debt, not moral hazard.

Government policies adopted to address the vulnerability of short-term debt may engender a problem of moral hazard. And, in a sense, the government has caused the problem. But actually, the problem is that the solution to the vulnerability of short-term debt is imperfect. It need not be imperfect. The United States did not experience a financial crisis between 1934 and 2007. Yet, there was deposit insurance and there were large banks. How did that happen? To say that the empirical evidence on the existence of moral hazard is mixed is an understatement. Results seem to depend on the time period, country, the existence of credible bank examinations, and on the type of financial intermediary. Are bank failures and losses due to moral hazard, managerial entrenchment, forbearance, or looting?³ Some examples of the empirical work on this include: Keeley (1990), Akerlof and Romer (1993), Gorton and Rosen (1995), Gan (2004), Gropp and Vesala (2004), and Dam and Koetter (2012).

There are probably many reasons why banks would not engage in moral hazard. One reason is that a bank's charter value, an intangible asset that is lost if the bank becomes insolvent, provides an incentive not to engage in moral hazard. Charter value is the present value of rents the bank may get from limited entry. See Marcus (1984) and Furlong and Kwan (2006). Or, another reason may be that the bank's reputation would be lost if it were to become insolvent. Finally, the information the bank has on borrowers is lost if it fails. See Slovin, Sushka, and Polonchek (1993).

Banks and firms are large, complex, organizations—too complex, it seems to me, to be adequately captured by a principal–agent model. But, even in the principal–agent framework, what looks like “moral hazard”

may just be behavior that is consistent with the desires of the principals, riskier firms pay more in compensation—bonuses. Some firms, i.e., boards of directors and top managements, may prefer more or less risk-taking, and investors may sort on this basis. In such a world, compensation schemes would look different across different banks. We simply don't know much about any of these issues. However, Cheng, Hong, and Scheinkman (forthcoming) is an example of recent work on some of these issues.

Rather than describe firms in terms of principals and agents, we should investigate corporate culture.³¹ Geithner hints at this, saying: “Throughout my time at the [New York] Fed, we found that the firms with cultures that valued risk management and risk managers tended to be stronger and more conservatively financed” (p. 165). Risk management and risk-taking propensities seem (to me) to be intimately related to corporate culture. Following the crisis, in the United Kingdom both houses of Parliament appointed a Parliamentary Commission on Banking Standards “to consider and report on professional standards and culture of the UK banking sector. . .”³² The report is far reaching, but has large sections essentially on bank culture. Even prior to the crisis, the Basel Committee noted the importance of culture and the intertwining with governance (BIS 2006). It seems difficult to change a firm's internal culture and even harder for regulators to do this.

Compensation is no doubt related to corporate culture, and in banking this does seem important; see Philippon and Reshef (2012). But, in economics there is little work on corporate culture. One interesting empirical

³¹ Schein (1985) defines corporate culture as a set of shared norms and values expressed in terms of common language.

³² See <http://www.parliament.uk/business/committees/committees-a-z/joint-select/professional-standards-in-the-banking-industry/news/changing-banking-for-good-report/>.

example is Carretta et al. (2006).³³ Also, see Guiso, Sapienza, and Zingales (forthcoming). This is an area for future research.

7. *Stress Tests of Banks*

The crisis dragged on. Geithner became US Treasury Secretary in 2009. Shortly after taking office, he announced a new initiative to inspire confidence: stress tests for large banks. “The stress test would provide a form of triage, separating the fundamentally healthy [banks] from the terminally ill” (p. 12). “. . . [I]f an unhealthy firm couldn’t raise enough [capital] from private investors, government would forcibly inject the missing capital” (p. 11). The basic idea was to reduce uncertainty about remaining losses on bank assets (see Bernanke 2009c). The goal now was to produce and reveal information publicly. “The plan aimed to impose transparency on opaque financial institutions and their opaque assets in order to reduce the uncertainty that was driving the panic” (p. 286). The stress tests are widely viewed as a success.

The plan for the stress tests of the nineteen largest bank holding companies (about two-thirds of the total US bank assets) was announced by the US Treasury Department, Federal Deposit Insurance Corporation, Office of the Comptroller of the Currency, Office of Thrift Supervision, and the Federal Reserve Board in a joint statement on February 10, 2009.³⁴ On April 24, 2009, the Federal Reserve Board released a twenty-page white paper describing the procedures employed in the stress test.³⁵ And on May 7, 2009, the results of the Supervisory Capital Assessment Program (SCAP) were released.

The banks were instructed to calculate losses, profits, and loan loss reserves over the next nine quarters under a baseline scenario and under a more adverse (i.e., stress) scenario (see Hirtle, Schuerman, and Stiroh 2009). The regulators independently made their own such projections under each scenario. Comparing a bank’s capital projection to that of the regulators produced the “capital gap.” If there was a significant gap, compared to required capital, then the gaps were required to be filled with capital plans filed by the banks, privately produced capital, and if that could not be done, then through the Capital Assistance Program (CAP). The backstop for the capital gaps, announced in conjunction with the stress tests was the Treasury’s Capital Assistance Program (CAP), “which makes capital available as a bridge to private capital” (Geithner et al. 2009).³⁶

The stress tests did produce new information, based on abnormal stock returns. Overall, the banks displayed positive abnormal returns, though there are some nuances (see Peristiani, Morgan, and Savino 2010 and Bayazitova and Shivdasani 2012). Of the nineteen banks stress tested, ten had capital gaps. By November 2009, nine of the ten gap banks had raised sufficient capital privately to close their gaps. GMAC was the one exception; it met its remaining gap via TARP (Fed Press Release November 9, 2009). The widespread reaction to the stress tests was to hail them as having been important in ending the crisis. Bernanke (2013, p. 2): “In retrospect, the SCAP stands out for me as one of the critical turning points in the financial crisis. It provided anxious investors with something they craved: credible information about prospective losses at banks. Supervisors’ public disclosure of the stress test results helped restore confidence in the

³³With respect to theory, see Camerer and Vepsäläinen (1988) and Kreps (1990).

³⁴See <http://www.federalreserve.gov/newsevents/press/bcreg/20090223a.htm>.

³⁵See <http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20090424a1.pdf>.

³⁶See <http://www.federalreserve.gov/bankinforeg/stress-tests-capital-planning.htm>.

banking system and enabled its successful recapitalization.”³⁷

FOMC Governor Daniel Tarullo (2010) points to three reasons for the success of the stress tests. The test results were viewed as credible, which he attributes to their transparency in releasing details about test assumptions and methods. Second, he argues that “the results were released at a time when uncertainty about bank conditions was very high, and some market participants feared the worst.” Finally and perhaps most importantly, part of the announcement and program for the tests was that “the Treasury stood ready to make capital available to any SCAP bank with capital needs through the CAPP [the Capital Asset Purchase Program] if they were unable to raise private capital.” In other words, the war chest was available. And, it turned out that none of the banks received CAPP funds.

The stress tests seem paradoxical. All the Fed’s special lending programs protected the identities of the borrowers to avoid stigma. The Fed defended itself against the Bloomberg suit by describing the devastating effects of stigma. And, steps to prevent bank identities from being revealed upon borrowing at central bank or private clearinghouse crisis lending programs has been a feature of crisis policy responses for over a century. The contrast with the stress tests is dramatic. The stress test results were made public. See Board of Governors of the Federal Reserve System (2009b). But, the model of the regulators was *not* made public. So, interestingly, while results are made public, the process of achieving the results is not made public.³⁸ In the nineteenth century,

private bank clearinghouses sometimes sent teams to examine some individual member banks during suspension periods. Usually, the banks were declared solvent, but no details were ever released. (See Gorton and Tallman 2014.)

There are many unanswered questions about the stress tests. Were the stress tests a success? How do we measure success? If they were a success, why were they a success? If hiding information reduces stigma, why does releasing information create positive results? Goldstein and Leitner (2013) is an example of some research on these questions, but they remain an important mystery.

There may be some tentative clues. Perhaps credibility is the key. Although the model was never revealed, it seems that the results were believed and, like Roosevelt’s fireside chat, seem to have resulted in increased positive expectations. But would the stress tests have worked just after the Lehman bankruptcy or, say, the month before Lehman? Clearly, we do not know. Roosevelt’s fireside chat came in the midst of the nationwide panic. However, no weak banks were identified. The stress tests came very late in the crisis; results were announced on May 7, 2009, but the date of the last crisis event on the timeline of the financial crisis produced by the Federal Reserve Bank of St. Louis is March 19, 2009.³⁹ Gorton, Metrick, and Xie (2014) also finish their crisis dating prior to the stress tests. The NBER dated the trough of the recession at June 2009. It may be that *at that point* in the crisis, the tests served to eliminate any remaining uncertainty providing an ending point for the crisis. Maybe a lot of uncertainty about whether the government could backstop the entire financial system had already been attenuated. This is clear with respect to the

³⁷In contrast, the stress tests in Europe are widely viewed as having been a failure because the tests did not include sovereign debt. See, e.g., Blundell-Wignall and Slovik (2010) and Ahmed et al. (2011).

³⁸The banks report their calculations in Federal Reserve Form Y-14A, which is not made public. See <http://www.federalreserve.gov/bankinforeg/stress-tests/>

<http://www.federalreserve.gov/bankinforeg/stress-tests/>ccar/November-1-2013-Instructions-for-Submission-of-Capital-Plans.htm.

³⁹See: <http://timeline.stlouisfed.org/index.cfm?p=timeline>.

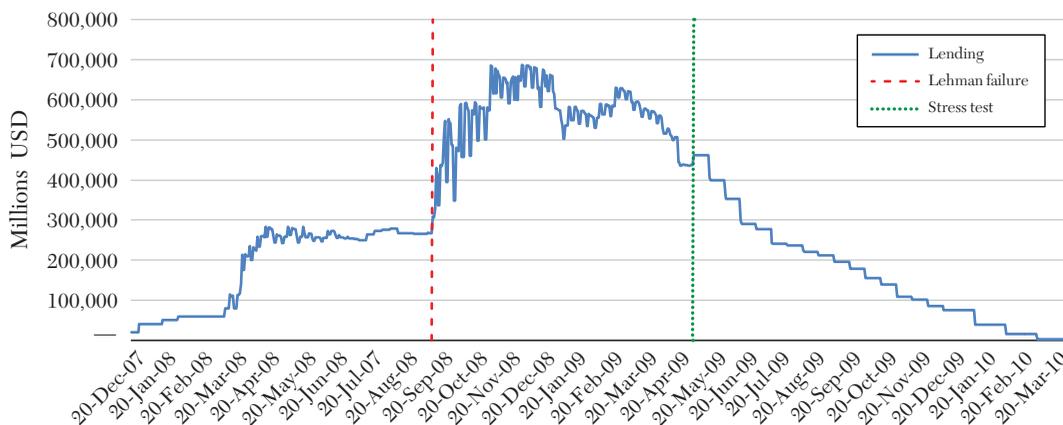


Figure 1. Total TAF, TSLF, PDCF Lending Outstanding

Source: Federal Reserve System.

Federal Reserve's special lending programs. Figure 1 shows the total lending outstanding for the sum of the Term Auction Facility (TAF), the Term Securities Lending Facility (TSLF), and the Primary Dealer Credit Facility (PDCF). The first vertical line is the date of the Lehman bankruptcy and the second vertical line is the date that the stress test results were announced. It seems that the lending was winding down. While many countries also introduced stress tests, it is not clear that the panel of countries will help us solve this puzzle. We have no stress tests earlier in the crisis.

Another major reason that the stress tests were hailed, I think, has to do with the new methodology for examining banks, a new supervisory tool.⁴⁰ Here I see little debate. In a way, the tests are more rigorous than precrisis bank examinations, although on-site examinations have no substitute. The tests are forward-looking and compute results for stress scenarios, as well as a baseline scenario. It is a major step forward to impose

the discipline on banks to be able to actually implement the stress tests. It requires, for example, that IT systems communicate, a major problem for some banks. Further, it offers a template for how the tests can become broader, for example incorporating derivative positions. The stress tests will become more complex and comprehensive over time. And the precrisis-type bank examinations will continue.

For use in noncrisis times, perhaps most importantly, stress tests are not rules based; the banks do not know exactly how the regulator's results are computed, so it is hard to game the tests. Oversight of banks is now largely rules based. Notably, capital requirements depend on rules, in particular with the Basel III risk weights for assets and bank internal models which can be used to determine risk weights. Rules invite gaming by banks. The gaming may have started already. The Bank for International Settlements (2013) noted that there was considerable variation across banks in average risk-weighted assets for credit risk. With respect to internal bank models, which can be used to assess the risk weights for some

⁴⁰See Board of Governors of the Federal Reserve (2014) for the current state of the stress tests.

asset classes, Behn, Haselmann, and Vig (2014), studying Germany, found that internal risk estimates used for regulatory purposes “systematically under-predict actual default rates” (abstract).⁴¹ Recent research on risk weights includes Acharya, Engle, and Pierret (2014) and Glasserman and Kang (2014).

Under a rules-based system, the banks have discretion to try to evade rules, to find gray areas, and the regulators are in the business of trying to catch them (Haldane 2013). But, the banks do not know the models that the bank supervisors use in stress tests. With stress tests, only the regulators know the models and so the discretion has been shifted in their direction. Banks cannot game a model they do not know. This is very important.

Still, there are many issues with the stress tests. How do we validate stress tests, for example? And, what exactly is the role of the stress tests? Are they microprudential or macroprudential? In other words, should the tests mostly be used to find weak banks, or should the tests focus on finding macroeconomic fragilities? Whether the stress tests can predict future vulnerabilities is not clear. In one study, it turned out that the majority of such tests conducted around the world prior to crises concluded that the banking system was robust. See Alfaro and Drehmann (2009).⁴² Also, see Ong and Pazarbasioglu (2014).

The tests will get better over time, but in any case, the regulators must choose the right models and the right scenarios. This seems quite difficult. See, however, Glasserman, Kang, and Kang (2015). Prior to the financial crisis, the set of institutions at the core of the crisis were not regulated banks and would

not have been involved in the stress tests had they been in existence then. Stress tests are only one tool. While the data are limited, economists should pay careful attention to these stress-tests-related issues.

8. Conclusion

Timothy Geithner’s book raises many important points for future research and economists have a lot of work to do to prepare for the next crisis. Most importantly, in a financial crisis, Geithner’s overwhelming force argument for restoring confidence seems to me to be correct. If confidence is the information insensitivity of short-term debt, then it seems that re-creating confidence amounts to using overwhelming force to convince people that the backing of the government is unquestionably sufficient to buy the banking system. The government itself is information insensitive in that people unquestionably believe that the government can tax enough in the future.⁴³ Whether the war chest is explicit (e.g., TARP) or implicit (e.g., Draghi’s statement), it must be perceived as large enough to be credible. Managing expectations, in the first instance, is about the size of the war chest backing the financial system. Roosevelt’s fireside chat may be an example of this. But, how do we know how large the war chest should be and what form should it take?

Political constraints are naturally an issue, especially when policymakers ask for hundreds of billions of dollars to finance crisis responses. It is unfortunate that the crisis had to become so bad for a consensus to form and then to allocate sufficient resources. But neither the Fed nor the Treasury seems to have wanted TARP prior to Lehman. That was a failure to understand the unfolding events. Although described as a bank run early on,

⁴¹ Also, see Le Leslé and Avramova (2012).

⁴² The study is based on results from countries involved in the IMF Financial Sector Assessment Program in 2005, 2006, and the first half of 2007.

⁴³ Obviously, this is not true for all governments at all times.

the full ramifications only became clear to the Fed and the Treasury with Lehman. This raises the issue of what a “crisis” is and how it unfolds through time. This is a fundamental starting point. Economists seem confused about this. Government efforts to address the vulnerability of short-term debt do not *cause* crises. Short-term debt is vulnerable to runs. That is the problem.

The stress tests were a major innovation during the crisis and will be important in the future in some form, in noncrisis times if not during crises. It is not clear how and why they were effective during the crisis—or were they? How do they work when every other policy response program maintains the identities of banks secret? As a tool for oversight of banks and the banking system, they may well evolve into a fundamental tool.

Geithner had a wealth of practical crisis experience when the Panic of 2007 started. He could make decisions based on those experiences. Next time, hopefully, economists can give meaningful advice.

REFERENCES

- Acharya, Viral, Robert Engle, and Diane Pierret. 2014. “Testing Macroprudential Stress Tests: The Risk of Regulatory Risk Weights.” *Journal of Monetary Economics* 65: 36–53.
- Ahmed, Enam, et al. 2011. “Europe Misses Again on Bank Stress Test.” *Moody’s Analytics Regional Financial Review*, July.
- Akerlof, George A., and Paul M. Romer. 1993. “Looting: The Economic Underworld of Bankruptcy for Profit.” *Brookings Papers on Economic Activity* 2: 1–73.
- Alfaro, Rodrigo, and Mathias Drehmann. 2009. “Macro Stress Tests and Crises: What Can We Learn?” *BIS Quarterly Review* December: 29–41.
- Appel, Ian, and Caroline Fohlin. 2010. “Shooting the Messenger? The Impact of Short Sale Bans in Times of Crisis.” Unpublished.
- Armantier, Olivier, Eric Ghysels, Asani Sarkar, and Jeffrey Shrader. Forthcoming. “Discount Window Stigma during the 2007–08 Financial Crisis.” *Journal of Financial Economics*.
- Atkeson, Andrew G., Andrea L. Eisfeldt, and Pierre-Olivier Weill. 2014. “Measuring the Financial Soundness of U.S. Firms, 1926–2012.” Unpublished.
- Autore, Don M., Randall S. Billingsley, and Tunde Kovacs. 2011. “The 2008 Short Sale Ban: Liquidity, Dispersion of Opinion, and the Cross-Section of Returns of US Financial Stocks.” *Journal of Banking and Finance* 35 (9): 2252–66.
- Bagehot, Walter. 1873. *Lombard Street: A Description of the Money Market*. London: Henry S. King.
- Bai, Jushan. 2010. “Common Breaks in Means and Variances for Panel Data.” *Journal of Econometrics* 157 (1): 78–92.
- Bank for International Settlements. 2013. “Analysis of Risk-Weighted Assets for Credit Risk in the Banking Book.” Basel: Bank for International Settlements.
- Basel Committee on Banking Supervision, Bank for International Settlements. 2006. “Enhancing Corporate Governance for Banking Organisations.” Basel: Bank for International Settlements.
- Bayazitova, Dinara, and Anil Shivdasani. 2012. “Assessing TARP.” *Review of Financial Studies* 25 (2): 377–407.
- Beber, Alessandro, and Marco Pagano. 2013. “Short-Selling Bans around the World: Evidence from the 2007–09 Crisis.” *Journal of Finance* 68 (1): 343–81.
- Behn, Markus, Rainer Haselmann, and Vikrant Vig. 2014. “The Limits of Model-Based Regulation.” Institute for Monetary and Financial Stability Working Paper Series 82.
- Bernanke, Ben et al. 2008. “Minutes of the Federal Open Market Committee: October 28–29.” <http://www.federalreserve.gov/monetarypolicy/fomcminutes20081029.htm>.
- Bernanke, Ben S. 2009a. “Reflections on a Year of Crisis.” Speech at the Federal Reserve Bank of Kansas City’s Annual Economic Symposium, Jackson Hole, WY, August 21. <http://www.federalreserve.gov/newsevents/speech/bernanke20090821a.htm>.
- Bernanke, Ben S. 2009b. “The Federal Reserve’s Balance Sheet: An Update.” Speech at the Federal Reserve Board Conference on Key Developments in Monetary Policy, Washington, D.C., October 8. <http://www.federalreserve.gov/newsevents/speech/bernanke20091008a.htm>.
- Bernanke, Ben S. 2009c. “The Supervisory Capital Assessment Program.” Speech at the Federal Reserve Bank of Atlanta 2009 Financial Markets Conference, Jekyll Island, GA, May 11. <http://www.federalreserve.gov/newsevents/speech/bernanke20090511a.htm>.
- Bernanke, Ben S. 2010a. “Lessons from the Failure of Lehman Brothers.” Testimony by Ben S. Bernanke, Chairman of the Board of Governors of the Federal Reserve System Before the Committee on Financial Services, U.S. House of Representatives, Washington, D.C., April 20. <http://www.federalreserve.gov/newsevents/testimony/bernanke20100420a.pdf>.
- Bernanke, Ben S. 2010b. “Statement By Ben S. Bernanke, Chairman of the Board of Governors of the Federal Reserve System, Prepared for the Committee on Financial Services, U.S. House of Representatives.” <http://www.federalreserve.gov/newsevents/testimony/bernanke20100210a.pdf>.

- Bernanke, Ben S. 2013. "Stress Testing Banks: What Have We Learned?" Speech at the 'Maintaining Financial Stability: Holding a Tiger By the Tail' Financial Markets Conference Sponsored By the Federal Reserve Bank of Atlanta, Stone Mountain, GA, April 8. <http://www.federalreserve.gov/newsevents/speech/bernanke20130408a.htm>.
- Bernanke, Ben S. 2014a. "Central Banking after the Great Recession: Lessons Learned and Challenges Ahead: A Discussion with Federal Reserve Chairman Ben Bernanke on the Fed's 100th Anniversary." Brookings Institution, January 16.
- Bernanke, Ben S. 2014b. "The Federal Reserve: Looking Back, Looking Forward." Speech at the Annual Meeting of the American Economic Association, Philadelphia, PA, January 3. <http://www.federalreserve.gov/newsevents/speech/bernanke20140103a.htm>.
- Berry, John. 2012. "Bloomberg vs. the Fed." *International Economy* Winter: 65–68.
- Bignon, Vincent, Marc Flandreau, and Stefano Ugolini. 2012. "Bagehot for Beginners: The Making of Lender-of-Last-Resort Operations in the Mid-Nineteenth Century." *Economic History Review* 65 (2): 580–608.
- Biscontini, Peter J. 2011. "Private Loan Documents under Federal Reserve Emergency Lending Programs Are Subject to Full Public Disclosure Because They Are Not 'Privileged or Confidential' under the Freedom of Information Act's Exemption for Trade Secrets and Commercial or Financial Information: *Bloomberg L. P. v. Board of Governors of the Federal Reserve System*." *Duquesne University Business Law Journal* 13 (1): 137–49.
- Blundell-Wignall, Adrian, and Patrick Slovik. 2010. "The EU Stress Test and Sovereign Debt Exposures." OECD Working Papers on Finance, Insurance and Private Pensions 4.
- Board of Governors of the Federal Reserve System. 2009a. "The Supervisory Capital Assessment Program: Design and Implementation." <http://www.federalreserve.gov/bankinfo/gbcbreg20090424a1.pdf>.
- Board of Governors of the Federal Reserve System. 2009b. "The Supervisory Capital Assessment Program: Overview of Results." <http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20090507a1.pdf>.
- Board of Governors of the Federal Reserve System. 2014. "Dodd-Frank Act Stress Test 2014: Supervisory Stress Test Methodology and Results." <http://www.federalreserve.gov/newsevents/press/bcreg/bcreg20140320a1.pdf>.
- Boehmer, Ekkehart, Charles M. Jones, and Xiaoyan Zhang. 2013. "Shackling Short Sellers: The 2008 Shorting Ban." *Review of Financial Studies* 26 (6): 1363–1400.
- Bordo, Michael D. 1990. "The Lender of Last Resort: Alternative Views and Historical Experience." *Federal Reserve Bank of Richmond Economic Review*. https://www.richmondfed.org/publications/research/economic_review/1990/pdf/er760103.pdf.
- Boyd, John, Gianni De Nicolò, and Elena Loukoianova. 2011. "Banking Crises and Crisis Dating: Theory and Evidence." International Monetary Fund Working Paper WP/09/141.
- Camerer, Colin, and Ari Vepsäläinen. 1988. "The Economic Efficiency of Corporate Culture." *Strategic Management Journal* 9 (Special Issue 1): 115–26.
- Capie, Forrest. 2002. "The Emergence of the Bank of England as a Mature Central Bank." In *The Political Economy of British Historical Experience, 1688–1914*, edited by Donald Winch and Patrick O'Brien, 295–315. Oxford and New York: Oxford University Press.
- Capie, Forrest. 2007. "The Emergence of the Bank of England as a Mature Central Bank." In *The Lender of Last Resort*, edited by Forrest Capie and Geoffrey Wood, 297–316. London and New York: Routledge.
- Carretta, Alessandro, Vincenzo Farina, Franco Fiordelisi, and Paola Schwizer. 2006. "Corporate Culture and Shareholder Value in Banking Industry." Munich Personal RePEc Archive Paper 8304.
- Cheng, Ing-haw, Harrison Hong, and José A. Scheinkman. Forthcoming. "Yesterday's Heroes: Compensation and Risk at Financial Firms." *Journal of Finance*.
- Committee of European Banking Supervisors. 2009. "CEBS Press Release on the Results of the EU-Wide Stress Testing Exercise." <https://www.eba.europa.eu/-/cebs-press-release-on-the-results-of-the-eu-wide-stress-testing-exercise>.
- Dam, Lammertjan, and Michael Koetter. 2012. "Bank Bailouts and Moral Hazard: Evidence from Germany." *Review of Financial Studies* 25 (8): 2343–80.
- Dang, Tri Vi, Gary Gorton, and Bengt Holmström. 2013. "Ignorance, Debt and Financial Crises." Unpublished.
- Dang, Tri Vi, Gary Gorton, Bengt Holmström, and Guillermo Ordoñez. 2014. "Banks as Secret Keepers." Unpublished.
- Diamond, Douglas W. 2008. "The Current Financial Crisis, Other Recent Crises, and the Role of Short-Term Debt." <http://research.chicagobooth.edu/igm/docs/ChicagoCrisistalk.pdf>.
- Djiwandono, J. Soedradjad. 2005. *Bank Indonesia and the Crisis: An Insider's View*. Singapore: Institute of Southeast Asian Studies.
- Draghi, Mario. 2013. "Building Stability and Sustained Prosperity in Europe." Speech at "The Future of Europe in the Global Economy," London, May 23. <http://www.bis.org/review/r130524a.pdf?frames=0>.
- Ennis, Huberto, and John Weinberg. 2009. "A Model of Stigma in the Fed Funds Market." *Review of Economic Dynamics* 16(4): 601–616.
- Federal Open Market Committee. 2001. "Meeting of the Federal Open Market Committee on December 11, 2001." Washington, D.C.
- Fettig, David. 2008. "The History of a Powerful Paragraph." *The Region* June: 33–34.
- Financial Crisis Inquiry Commission. 2009. "Interview with Ben S. Bernanke." <http://fcic.law.stanford.edu/resource/interviews>.
- Financial Crisis Inquiry Commission. 2011. *The Financial Crisis Inquiry Report: Final Report of the*

- National Commission on the Causes of the Financial and Economic Crisis in the United States*. Washington, D.C.: U.S. Government Printing Office.
- Flandreau, Marc, and Stefano Ugolini. 2011. "Where It All Began: Lending of Last Resort and the Bank of England during the Overend–Gurney Panic of 1866." Norges Bank Working Paper 2011-03.
- Flannery, Mark J., Simon H. Kwan, and Mahendrarajah Nimalendran. 2013. "The 2007–2009 Financial Crisis and Bank Opacity." *Journal of Financial Intermediation* 22 (1): 55–84.
- Fligstein, Neil, Jonah Stuart Brundage, and Michael Schultz. 2014. "Why the Federal Reserve Failed to See the Financial Crisis of 2008: The Role of 'Macroeconomics' as a Sense Making and Cultural Frame." University of California Berkeley Institute for Research on Labor and Employment Working Paper 111-14.
- Freixas, Xavier, Curzio Giannini, Glenn Hoggarth, and Farouk Soussa. 1999. "Lender of Last Resort: A Review of the Literature." *Financial Stability Review* November: 151–67.
- Freixas, Xavier, Curzio Giannini, Glenn Hoggarth, and Farouk Soussa. 2000. "Lender of Last Resort: What Have We Learned since Bagehot?" *Journal of Financial Services Research* 18 (1): 63–84.
- Fuld, Richard S., Jr. 2010. "Written Statement of Richard S. Fuld, Jr. before the Financial Crisis Inquiry Commission." September 1.
- Furfine, Craig. 2003. "Standing Facilities and Interbank Borrowing: Evidence from the Federal Reserve's New Discount Window." *International Finance* 6 (3): 329–47.
- Furlong, Frederick T., and Simon H. Kwan. 2006. "Sources of Bank Charter Value." Unpublished.
- Gan, Jie. 2004. "Banking Market Structure and Financial Stability: Evidence from the Texas Real Estate Crisis in the 1980s." *Journal of Financial Economics* 73 (3): 567–601.
- Geithner, Timothy F. 2008a. "Actions By the New York Fed in Response to Liquidity Pressures in Financial Markets." Testimony before the U.S. Senate Committee on Banking, Housing and Urban Affairs, Washington, D.C., April 3. <http://www.newyorkfed.org/newsevents/speeches/2008/gei080403.html>.
- Geithner, Timothy F. 2008b. "Reducing Systemic Risk in a Dynamic Financial System." Remarks at the Economics Club of New York, June 9. <http://www.newyorkfed.org/newsevents/speeches/2008/tfg080609.html>.
- Geithner, Timothy F., Ben S. Bernanke, Sheila Bair, and John C. Dugan. 2009. "The Treasury Capital Assistance Program and the Supervisory Capital Assessment Program." <http://www.federalreserve.gov/newsevents/press/bcreg/20090506a.htm>.
- Glasserman, Paul, Chulmin Kang, and Wanmo Kang. 2015. "Stress Scenario Selection By Empirical Likelihood." *Quantitative Finance* 15 (1): 25–41.
- Glasserman, Paul, and Wanmo Kang. 2014. "Design of Risk Weights." Columbia Business School Research Paper 13-39.
- Goldstein, Itay, and Yaron Leitner. 2013. "Stress Tests and Information Disclosure." Federal Reserve Bank of Philadelphia Research Department Working Paper 13-26.
- Goldstein, Itay, and Ady Pauzner. 2005. "Demand-Deposit Contracts and the Probability of Bank Runs." *Journal of Finance* 60 (3): 1293–1327.
- Goodhart, Charles A. E. 1988. *The Evolution of Central Banks*. Cambridge, Mass. and London: MIT Press.
- Goodhart, Charles A. E. 1995. *The Central Bank and the Financial System*. Cambridge, Mass. and London: MIT Press.
- Gorton, Gary B. 1988. "Banking Panics and the Business Cycles." *Oxford Economic Papers* 40 (4): 751–81.
- Gorton, Gary B. 2010. *Slapped by the Invisible Hand: The Panic of 2007*. Oxford and New York: Oxford University Press.
- Gorton, Gary B. 2012. *Misunderstanding Financial Crises: Why We Don't See Them Coming*. Oxford and New York: Oxford University Press.
- Gorton, Gary B., and Andrew Metrick. 2013. "Securitization." In *Handbook of the Economics of Finance, Volume 2A*, edited by George M. Constantinides, Milton Harris, and René M. Stulz, 1–70. Amsterdam and Boston: Elsevier, North-Holland.
- Gorton, Gary B., Andrew Metrick, and Lei Xie. 2014. "The Flight from Maturity." Unpublished.
- Gorton, Gary B., and Guillermo Ordoñez. 2014a. "Collateral Crises." *American Economic Review* 104 (2): 343–78.
- Gorton, Gary B., and Guillermo Ordoñez. 2014b. "How Central Banks End Crises." Unpublished.
- Gorton, Gary B., and Richard Rosen. 1995. "Corporate Control, Portfolio Choice, and the Decline of Banking." *Journal of Finance* 50 (5): 1377–1420.
- Gorton, Gary B., and Ellis Tallman. 2014. "How Do Banking Panics End?" Unpublished.
- Gropp, Reint, and Jukka Vesala. 2004. "Deposit Insurance, Moral Hazard and Market Monitoring." *Review of Finance* 8 (4): 571–602.
- Gruenewald, Seraina N., Alexander F. Wagner, and Rolf H. Weber. 2010. "Emergency Short Selling Restrictions in the Course of the Financial Crisis." National Centre of Competence in Research, Financial Valuation and Risk Management Working Paper No. 569.
- Guiso, Luigi, Paola Sapienza, and Luigi Zingales. Forthcoming. "The Value of Corporate Culture." *Journal of Financial Economics*.
- Haldane, Andrew G. 2013. "Constraining Discretion in Bank Regulation." Speech given at the Federal Reserve Bank of Atlanta Conference on 'Maintaining Financial Stability: Holding a Tiger By the Tail(s)'. <http://www.bankofengland.co.uk/publications/Documents/speeches/2013/speech657.pdf>.
- Hirtle, Beverly, Til Schuermann, and Kevin Stiroh. 2009. "Macroprudential Supervision of Financial Institutions: Lessons from the SCAP." Federal Reserve Bank of New York Staff Report 409.
- Holmström, Bengt. 2009. "Commentary: The Panic of

- 2007." In *Maintaining Stability in a Changing Financial System*. Proceedings of the Federal Reserve Bank of Kansas City Economic Policy Symposium, Jackson Hole, WY, August 21–23.
- Holmström, Bengt. 2012. "The Nature of Liquidity Provision: When Ignorance Is Bliss." Presidential Address of the Econometric Society, ASSA Meetings, Chicago, January 5.
- Holmström, Bengt. 2014. "Understanding the Role of Debt in the Financial System." Paper delivered at the 13th BIS Annual Conference, Lucerne, Switzerland, June 27.
- Keeley, Michael C. 1990. "Deposit Insurance, Risk, and Market Power in Banking." *American Economic Review* 80 (5): 1183–1200.
- Kindleberger, Charles P. 1996. *Manias, Panics, and Crashes: A History of Financial Crises*, Third edition. Cambridge and New York: Cambridge University Press.
- King, Mervyn. 2010. "Banking—From Bagehot to Basel, and Back Again." Speech at the Second Bagehot Lecture, Buttonwood Gathering, New York, October 25. <http://www.bis.org/review/r101028a.pdf?frames=0>.
- Kreps, David M. 1990. "Corporate Culture and Economic Theory." In *Perspectives on Positive Political Economy*, edited by James E. Alt and Kenneth A. Shepsle, 90–143. Cambridge and New York: Cambridge University Press.
- Le Leslé, Vanessa, and Sofiya Avramova. 2012. "Revisiting Risk-Weighted Assets: Why Do RWAs Differ across Countries and What Can Be Done About It?" IMF Working Paper WP/12/90.
- Laeven, Luc, and Fabian Valencia. 2008. "Systemic Banking Crises: A New Database." International Monetary Fund Working Paper 08/224.
- Laeven, Luc, and Fabian Valencia. 2010. "Resolution of Banking Crises: The Good, the Bad, and the Ugly." International Monetary Fund Working Paper 10/146.
- Laeven, Luc, and Fabian Valencia. 2012. "Systemic Banking Crises Database: An Update." International Monetary Fund Working Paper 12/163.
- Laux, Christian, and Christian Leuz. 2010. "Did Fair-Value Accounting Contribute to the Financial Crisis?" *Journal of Economic Perspectives* 24 (1): 93–118.
- Madigan, Brian F. 2009. "Declaration of Brian F. Madigan." *Bloomberg L.P. v. Board of Governors of the Federal Reserve System*, United States District Court for the Southern District of New York.
- Marcus, Alan J. 1984. "Deregulation and Bank Financial Policy." *Journal of Banking and Finance* 8 (4): 557–65.
- Mitchell, Mark, and Todd Pulvino. 2012. "Arbitrage Crashes and the Speed of Capital." *Journal of Financial Economics* 104 (3): 469–90.
- Morris, Stephen, and Hyun Song Shin. 2012. "Contagious Adverse Selection." *American Economic Journal: Macroeconomics* 4 (1): 1–21.
- Ong, Li Lian, and Ceyla Pazarbasioglu. 2014. "Credibility and Crisis Stress Testing." *International Journal of Financial Studies* 2 (1): 15–81.
- Peristiani, Stavros, Donald P. Morgan, and Vanessa Savino. 2010. "The Information Value of the Stress Test and Bank Opacity." Federal Reserve Bank of New York Staff Report 460.
- Philippon, Thomas, and Ariell Reshef. 2012. "Wages and Human Capital in the U.S. Finance Industry: 1909–2006." *Quarterly Journal of Economics* 127 (4): 1551–1609.
- PricewaterhouseCoopers. 2008. "Fair Value Accounting: Is it an Appropriate Measure of Value for Today's Financial Instruments?" *Point of View* April.
- Schein, Edgar H. 1985. *Organizational Culture and Leadership*. San Francisco: John Wiley & Sons, Jossey-Bass.
- Silber, William L. 2007. *When Washington Shut Down Wall Street: The Great Financial Crisis of 1914 and the Origins of America's Monetary Supremacy*. Princeton and Oxford: Princeton University Press.
- Silber, William L. 2009. "Why Did FDR's Bank Holiday Succeed?" *Economic Policy Review* 15 (1): 19–30.
- Slovin, Myron B., Marie E. Sushka, and John A. Polonchek. 1993. "The Value of Bank Durability: Borrowers as Bank Stakeholders." *Journal of Finance* 48 (1): 247–66.
- Smith, Jean Edward. 2007. *FDR*. New York: Random House.
- Stolz, Stephanie Marie, and Michael Wedow. 2010. "Extraordinary Measures in Extraordinary Times: Public Measures in Support of the Financial Sector in the EU and the United States." European Central Bank Occasional Paper 117.
- Summers, Lawrence. 2007. "Beware Moral Hazard Fundamentalists." *Financial Times*, September 23.
- Tarullo, Daniel K. 2010. "Lessons from the Crisis Stress Test." Speech at the Federal Reserve Board International Research Forum on Monetary Policy, Washington, D.C., March 26. <http://www.federalreserve.gov/newsevents/speech/tarullo20100326a.htm>.
- Warsh, Kevin. 2008. "Financial Market Turmoil and the Federal Reserve: The Plot Thickens." Speech at the New York University School of Law Global Economic Policy Forum, New York, April 14. <http://federalreserve.gov/newsevents/speech/warsh20080414a.htm>.
- Warsh, Kevin. 2009. "The Panic of 2008." Speech at the Council of Institutional Investors 2009 Spring Meeting, Washington, D.C.: April 6. <http://federalreserve.gov/newsevents/speech/warsh20090406a.htm>.