8-2-2019

How to Make Banks Too Safe to Fail

Natasha Sarin
University of Pennsylvania Law School

Follow this and additional works at: https://scholarship.law.upenn.edu/faculty_scholarship

Part of the Banking and Finance Law Commons, Economic Policy Commons, Finance Commons, Finance and Financial Management Commons, Law and Economics Commons, and the Policy Design, Analysis, and Evaluation Commons

Repository Citation
Sarin, Natasha, "How to Make Banks Too Safe to Fail" (2019). Faculty Scholarship at Penn Law. 2091.
https://scholarship.law.upenn.edu/faculty_scholarship/2091

This Article is brought to you for free and open access by Penn Law: Legal Scholarship Repository. It has been accepted for inclusion in Faculty Scholarship at Penn Law by an authorized administrator of Penn Law: Legal Scholarship Repository. For more information, please contact PennlawIR@law.upenn.edu.
How to Make Banks Too Safe to Fail

Natasha Sarin*
July 2019

Abstract

There is widespread consensus that the Great Recession did not have to be as Great: Had regulators acted earlier and more aggressively to stem the financial panic, its consequences would have been less severe. Instead, the average American household lost nearly a third of its net worth; two-and-a-half million businesses closed their doors; and nine million families lost their homes. Why was more not done? And are we better prepared to weather the next storm?

Two explanations are typically offered for the lack of aggressive response at the onset of the Great Recession. The first is that financial crises occur unexpectedly, offering little time for intervention by even nimble and alert regulators. The second is that even those who realized that a downturn was on the horizon were constrained by their lack of legal authority to fortify large financial institutions.

This Article disputes both these myths. First, there was significant time between the onset of the crisis and its peak: Between the summer of 2007 and the collapse of Lehman Brothers in September 2008, warning signs appeared in financial markets and many commentators sounded the alarms. Second, regulators had at their disposal significant legal authority to bolster banks and prevent failures. In fact, they used this authority with respect to small banks, but not large systemically important firms.

There is an alternative explanation for the tepid early response to the crisis. Regulators’ default is inaction until regulatory measures of bank health signal distress. These measures are slow to update—in many cases, the day before banks failed, their regulatory capital measures suggested no cause for concern. In the absence of significant change, regulators will inevitably be fire-fighting future financial crises ex-post; rather than successfully policing financial markets ex-ante.

This Article recommends a way forward. It advocates for automatic recapitalization of financial firms when markets indicate that distress is likely. Such an approach would have forced large banks to stop paying dividends and to raise new capital between the summer of 2007 and the fall of 2008, helping to forestall the worst of the Recession. The stress-testing regime, with minor modifications, is a potential tool to dynamically monitor the financial sector and respond to crises at their onset.

Unfortunately, those who lead the Federal Reserve today are not learning from the mistakes of the Great Recession; they are forgetting them. Recent dilution of the stress tests and moves toward more static capital requirements go in the exact opposite direction of this Article’s recommendations. These changes are catastrophic. Unless policymakers are quick to course correct, the next financial crisis is becoming increasingly inevitable. Successful firefighting and good fortune prevented the Great Recession from being a Great Depression. It is unclear whether we will be so lucky next time.

* Assistant Professor of Law, the University of Pennsylvania Law School, and Assistant Professor of Finance, the Wharton School of the University of Pennsylvania, nsarin@law.upenn.edu. I am indebted to Howell Jackson, for first recommending that I write this Article and for providing feedback on various drafts. For helpful conversations, I thank Timothy Geithner, Andrei Shleifer, Jeremy Stein, Lawrence Summers, Daniel Tarullo, and Mark Van Der Weide.
# Table of Contents

**Introduction** ................................................................................................................................... 1

1 **Background on Bank Capital** ........................................................................................................ 7  
   1.A Understanding Capital Structure ................................................................................................. 8  
   1.B Leverage and Financial Crises ........................................................................................................ 9  
   1.C Avoiding Financial Crises ............................................................................................................ 10

2 **The Great Recession** .................................................................................................................... 13  
   2.A Failure of Dynamic Recapitalization Exacerbated Crisis .......................................................... 13  
      2.A.i Failure of Dynamic Recapitalization Not a Consequence of Insufficient Time to Respond ........................................................................ 16  
      2.A.ii Failure of Dynamic Recapitalization Not Caused by Lack of Legal Authority .................................................................................. 19  
      2.A.iii Failure of Imagination and Inaction Default Explains Lack of Aggressive Early Crisis Response .................................................................. 27

3 **Stress Tests as a Tool for Dynamic Recapitalization** ................................................................ 33  
   3.A History of Stress Tests .................................................................................................................... 33  
   3.B Limitations of the Current Stress Test Regime ............................................................................ 36  
      3.B.i Stress Test Failure is not Automatic Trigger ........................................................................... 36  
      3.B.ii Stress Tests are Over-Reliant on Regulatory Capital Measures ........................................... 38  
      3.B.iii Stress Tests are Insufficiently Transparent ............................................................................ 41  
   3.C A Market-Based Stress Test to Automate Recapitalization ....................................................... 43  
      3.C.i Stress Test Failure Should Automatically Force Recapitalization ................................ ........ 43  
      3.C.ii Current Stress Tests are Ill-Suited to Trigger Recapitalization ............................................. 45  
      3.C.iii A Market-Based Stress Test Could Help ............................................................................... 46  
      3.C.iv Bank Complaints with This Approach .................................................................................. 47  
      3.C.v Alternatives That Further Increase Automation .................................................................... 48

4 **Conclusion** ..................................................................................................................................... 50

*Figure 1(a):* Price and Volatility of Large Financial Institutions .......................................................... 53  
*Figure 1(b):* Price and Volatility of Large Financial Institutions .......................................................... 54  
*Figure 2:* Price and Volatility of Large Financial Institutions, Average ............................................. 55  
*Figure 3(a):* CDS Spreads of Large Financial Institutions ..................................................................... 56  
*Figure 3(b):* CDS Spreads of Large Financial Institutions ................................................................. 57  
*Figure 4:* CDS Spreads of Large Financial Institutions, Average ....................................................... 58  
*Figure 5:* S&P Bank Index Performance Over Time ........................................................................... 59  
*Table 1:* Annual Growth Rates, S&P Bank Index .................................................................................. 60
Introduction

The Great Recession was the worst downturn since the Depression. Americans lost nearly $10 trillion in wealth, nine million people lost their homes, and one-in-ten were unemployed. The consequences reverberate today, reflected in the frustration of working-class Americans who feel left behind by an economy that does not work for them; the angst of a new generation who for the first time will have a lower standard of living than their parents; and the long-term psychological consequences of economic insecurity.

While there is not consensus on the cause of the crisis, there is general agreement that the catastrophe could have been mitigated by quicker and more aggressive action by policymakers. So why was more not done to forestall the Great Recession? And are we better prepared to weather the next shock?

Typically, two explanations are offered for why regulators did not act more aggressively early on to mitigate the Recession. The first is that this crisis (and downturns generally) was unpredictable, offering little time for even nimble regulators to respond to limit its scope. The second is that prescient regulators were constrained by limited legal authority to address known problems in financial markets as they emerged. This is the prevailing narrative of the financial crisis, offered repeatedly by the architects of the crisis response, former Federal Reserve Chairman Ben Bernanke, and former Treasury Secretaries Timothy Geithner and Hank Paulson.

This narrative of the crisis is inaccurate. There was significant time—over a year—between the first tremors in the financial sector and its eventual collapse. Additionally, regulators had at their disposal legal authority to shore up financial institutions, and even exercised this authority with respect to smaller banks, but not the systemically important too-big-to-fail firms.

This Article offers an alternative explanation for early crisis missteps. Large financial institutions could have been strengthened between 2007 and 2008 if regulators had exerted pressure on them to hoard and raise capital. Although there was time and authority to limit the severity of the Recession, many policymakers missed warning signals and were overly optimistic. It seemed unnecessary and unfair to force banks to not pay out to their shareholders—and even to dilute them—in response to what seemed to be minor blips in financial markets. Even those who were appropriately concerned were constrained by the regulatory default, which is to avoid aggressive intervention until regulatory measures of bank health suggest cause for concern. The lesson of the Recession is that a financial regulatory regime that relies on affirmative action by imperfectly prescient policymakers will fail to intervene aggressively at the onset of a crisis, mobilizing only later on, when mild fires have escalated to four-alarm blazes.

This Article proposes overhauling financial regulation to make the default rule action, rather than inaction, at the onset of a crisis. I advocate for a regulatory regime that will successfully police financial markets ex-ante, making banks too safe to fail; rather than primarily firefight financial flames ex-post, once devastating bank failures are imminent.

The key to preventing crises is to intervene early and aggressively with capital. Pumping capital into the financial system forestalls panic, because short-term borrowers no longer fear bank failure and run to redeem. Thus, this Article proposes dynamic recapitalization of financial institutions, which will occur immediately and automatically based on market signals of distress. Automation will eliminate the need for regulators to affirmatively act in ways that seem unfair to large financial firms, removing a hurdle that impeded such early response to the Recession. And basing recapitalization on market signals is imperative, because these are the best predictors of
future crises. In contrast, book capital measures—which are regulators’ standard focus—are slow to update and tend to paint incomplete pictures of bank health.

Unfortunately, reliance on regulatory indicia of financial stability has led policymakers today to believe that the financial sector is strong enough to withstand the next downturn. This mistaken complacency prompted a recent dilution of post-crisis reforms—rather than the strengthening of financial regulation that this Article recommends. Unless regulators are quick to course correct, the next financial crisis is inevitable. And this time will be the same: a slow-moving regulatory regime will fail to attack the next downturn at its onset, and the result will be cataclysmic losses for the financial sector, but much more importantly, for average Americans.

This Article’s first contribution is to wholly dispute a false narrative that has emerged with respect to financial crises, and the Great Recession in particular. The first prevailing myth is that downturns cannot be foreseen. Many regulators have a “strong belief…that crises are unpredictable in terms of cause or timing or the severity of when they hit.” Some academics also hold this view, equating the surprise of the Recession to the shock of a terror attack like September 11th. This is also the view of the popular press, who recall withholding information about the Recession from the public for fear of fanning the flames of financial fires, and the public, who envision George Bailey’s plight in *It’s a Wonderful Life*, when a vicious rumor leads Bailey Building and Loan’s depositors to run to withdraw their funds.

This view is incorrect. Certainly, crises cannot be perfectly predicted. The timing and scope of a financial crisis is not pre-ordained, and in fact the likelihood of a catastrophic downturn can be mitigated substantially by the early and aggressive regulatory response this Article advocates.

However, the empirical evidence offered in this Article demonstrates that the market provides clues that distress is likely, and these clues are leading indicators relative to regulatory measures of banks’ health. This is disconcerting, because the default for regulators is to refrain from aggressive action until regulatory measures of banks’ capital positions indicate distress. So, even though the market and its observers are aware that a crisis is likely, regulators will fail to act aggressively. This is the simplified story of the Great Recession, where market-based indicators signaled cause for concern for more than a year before Lehman Brothers (“Lehman”) collapsed and sent the financial system into free-fall. This Article’s push to consider market-based indicia of bank health relates closely to recent work by economists Matthew Baron, Emil Verner, and Wei Xiong. These authors point out that large declines in bank stock prices portend...
financial crises and conclude that “simple bank equity measures…provide a useful barometer of the health of the banking sector.”

The second myth this Article disputes is that regulators who were prescient about the risks building up in the financial sector could not have acted in the year leading up to Lehman’s bankruptcy because they were wanting for legal authority. Those with this view concede that the first tremors appeared in financial markets in 2007. And yet, banks were not forced to build up their defenses by hoarding and raising capital—because regulators had no authority to force them to do so.

Lack of authority is the explanation often offered for why, in the year leading up to the Lehman collapse, more than $100 billion of bank capital was allowed to leave the financial system in the form of dividend payouts to bank shareholders. Lehman itself increased its dividend by 13% in January 2008—six months before it declared bankruptcy and months after it became clear to many in the regulatory community that the firm was on the brink of collapse. Investment banks like Goldman Sachs (“Goldman”) and Morgan Stanley even continued to pay dividends after taxpayer-funded capital infusions. The legal authority view is that regulators had no basis for intervention because these banks were above their requisite regulatory capital ratios. And, investment banks (including Bear Stearns (“Bear”) and Lehman, which both failed during the Recession) were not even under the Federal Reserve’s purview. Oversight authority was in the hands of the SEC, a notoriously lax regulator.

Legal authority is a red herring with respect to the response to the Great Recession, and financial crises more broadly. First, as illustrated infra, at least with respect to commercial banks, substantial legal authority existed to quickly recapitalize the financial system. In fact, financial regulators relied on this authority to force struggling small financial institutions, even those well above requisite regulatory capital ratios, to raise additional capital and restrict dividend payouts in the year leading up to Lehman’s collapse. Even without addressing the capital deficiencies of the less-regulated investment banks, limiting disbursements and forcing capital-raising by large commercial banks would have made them less vulnerable to the aftershocks of Lehman.

Second, even with respect to investment banks, regulators had substantial moral authority and were able to exercise their existing legal authority creatively as the crisis intensified. More pressure, and at the very least, aggressive public shaming, could have been exerted on investment banks to raise and hoard capital, and specifically on Lehman to accept the terms of lifelines offered by investors like Warren Buffet and Korea Development Bank. Steps regulators took as the crisis became more dire—like forcing Goldman and Morgan Stanley to become bank

---


5 See, e.g., Timothy Geithner. Stress Test: Reflections on Financial Crisis (2014), Broadway Books, New York, NY, at 96: “I wasn’t confident that our rules would ensure that Fed-supervised banks had enough capital to survive a serious crisis…The question was what to do about it…We couldn’t even generate stress scenarios bleak enough to force the banks we regulated to raise more capital.”

6 Although not the focus of this Article, the substantial debate about legal authority with respect to bailing out Lehman also appears largely overstated. See, e.g., David Zaring, “Did the Fed Fail To Save Lehman Brothers Because It Legally Couldn’t?” The Conglomerate (Jun. 3, 2015), recounting comments by Peter Conti-Brown, who argued that the idea that 13(3) presented any kind of statutory barrier is “pure spin. There is no obvious hook for judicial review and no independent mechanism for enforcement, and the authority given is completely broad. https://www.theconglomerate.org/2015/06/did-the-fed-fail-to-save-lehman-brothers-because-it-legally-couldnt.html#disqus_thread.

7 See infra Section 2.A.ii, “Legal Authority Existed to Force Banks to Quickly Recapitalize.”
holding companies and fall under the Federal Reserve’s authority—could have been contemplated sooner.

Many have argued that claims of insufficient legal authority are a cop-out with respect to crisis response. But too often these critics contend that there was some deeply political motivation to regulators’ inaction. This Article has a different view. Well-intentioned regulators failed to act more aggressively at the onset of the crisis for myriad reasons. Some failed to appreciate its scope and magnitude. Others misdiagnosed banks’ problems and believed that providing access to liquidity and facilitating acquisitions of troubled institutions would be enough to forestall panic.

Without a consensus on the scope and severity of the crisis, aggressive early response was untenable. Regulators’ default is to react to changes in regulatory capital positions, but not to market-based indicators of financial distress. As the downturn began, it seemed unfair and an overreaction to force dilutive equity issuance and require banks to forestall planned capital disbursements. There is no process that requires regulators to incorporate market information into their assessment of banks’ stability. So, they did not. As a result, regulators did not require recapitalization between the summer of 2007 and the fall of 2008, despite their clear legal authority to do so.

As such, more than a year after the first signals of distress emerged, months after commentators stressed the importance of recapitalization, and nearly six months after the collapse of Bear, a harbinger of what was to come—on September 18, 2008, Lehman declared bankruptcy, and the economy went into freefall. Only after the Recession was in full swing, and to avert a downturn worse than the Depression, did policymakers find creative authority to force rapid recapitalization of the financial industry and bring under the Federal Reserve’s regulatory umbrella the nonbanks at the forefront of the crisis. The fact that no new legal authority emerged between the summer of 2007 and the capital-raising following the inaugural stress tests in the spring of 2009 proves that lack of authority could not have been the binding constraint.

This Article’s next contribution is to draw lessons for the future of financial regulation based on the experience of the Great Recession.

On the one hand, this is an optimistic story. Contrary to popular perception, crises do not occur entirely without warning. The financial crisis did not begin when Lehman declared bankruptcy—instead, alarm bells sounded as early as the summer of 2007. If the Recession is our guide, in the next crisis, there will be time to force the financial sector to recapitalize quickly. And the authority to force recapitalization exists. Thus, financial regulation can usefully invest in fire prevention, because there will be time—and authority—to fight the next blaze before it threatens the whole forest.

But, if the Recession is our guide, regulators may not, despite their best intentions, act affirmatively to force painful, seemingly unfair, and potentially stigmatizing capital-hoarding and dilution until crises are raging. Early and aggressive intervention with capital at the onset of a crisis is difficult because, in the current framework, the default is inaction until regulatory measures of bank health signal distress. As the Great Recession illustrates, these signals tend to

---


be lagging indicators of bank health relative to market information. This means that, absent an overhaul of the regulatory regime, the story of the Recession will repeat itself.

This Article proposes a way forward, making the case for a system of dynamic recapitalization. It proposes automating suspension of dividend payouts and new capital-raising when the market indicates that distress is likely. By automating this process, it removes from the regulators the need to act affirmatively—and seemingly unfairly—in the early stages of a crisis, when a minor disruption appears more likely than the next Recession. This is a superior approach to calls for higher capital requirements or, in the extreme, 100% equity-financed banks, because it forces additional capital into the financial sector at exactly the moment it is needed, allowing for lower baseline levels of capital and minimizing the distortive effects of high capital requirements on financial intermediation.

Specifically, I advocate incorporating a market component into the Federal Reserve’s stress-testing regime. Rather than stressing financial institutions only once annually, the stress tests can be dynamically responsive to risks as they appear in the industry. If, for example, CDS spreads spike—as they did in late 2007 following BNP Paribas’ suspension of its subprime mortgage funds, and in early 2008 following Bear’s collapse—large financial institutions will be subject to a secondary round of stress tests based on their current balance sheets. Dividend payouts and share buybacks will be automatically suspended. Regulators will tailor these crisis stress tests, as in the inaugural stress tests (Supervisory Capital Adequacy Program, or “SCAP”), to focus on asset classes that appear riskiest. Like SCAP, banks that are found to have capital holes will be forced to raise new dollars of equity capital to fill them.

Numerous approaches to dynamic recapitalization that merit attention exist, of which a market-based stress-testing is but one. These range from relatively minor interventions that would require financial institutions to explain substantial divergence between their market-based and regulatory capital ratios\(^\text{10}\) to completely automating recapitalization by wiping out financial institutions’ debtholders in moments of distress.\(^\text{11}\)

Regardless of the approach pursued, the main objective of this Article is to push regulators to abandon narratives of financial crises that are implausible, despite their popular acceptance. Financial crises do occur unexpectedly and without warning. Nor do regulators lack the authority to address them at their onset. Instead, our regulatory system relies too heavily on affirmative action by individual policymakers who cannot be expected to have perfect foresight and who are governed by a system that does not react to valuable market information about financial sector health.\(^\text{12}\) It is imperative to overhaul the regulatory default to force action, rather than foster complacency, in response to indicia that the banking sector is insufficiently capitalized.

Moving to more aggressive early intervention is not a panacea. The result will be fewer Great Recessions, but also more false positives—instances of unnecessary pain for the financial


sector, such that banks will be disallowed from planned dividend payouts or forced into dilutive equity issuance in periods when distress is not imminent, despite market signals to the contrary.

This is a tradeoff that requires thoughtful deliberation. But the status quo of a regulatory regime that completely ignores market signals that are known to predict future distress is problematic.\(^\text{13}\) And, it is causing the same complacency by the financial regulatory community that exacerbated the Great Recession. In a speech at the Boston Federal Reserve in July 2019, Federal Reserve Vice Chairman for Supervision Randal Quarles advocated for bank-friendly changes to the annual stress tests, arguing that a laxer regulatory regime was now justified, because “Our stress tests demonstrate that banks have now built enough capital to withstand a severe recession. The capital-building phase of the post-crisis era is now complete.”\(^\text{14}\)

There is substantial danger in regulators’ assertions that the financial system is so well-capitalized that we will never see another crisis in our lifetimes.\(^\text{15}\) If this were indeed the case, there would be no reason to develop on a framework for dynamic recapitalization—because it will never be utilized. There would be no reason to devote energy to monitoring risks in the financial sector—because no matter their magnitude, capital buffers are so large that they will overwhelm them.

This view is inaccurate. Market evidence suggests it is implausible that large financial institutions today have nearly enough capital to continue to intermediate as normal in the event of a severe downturn.\(^\text{16}\) And this inaccuracy is dangerous: it has precipitated a “kind of low-intensity deregulation, consisting of an accumulation of non-headline grabbing changes and an opaque relaxation of supervisory rigor.”\(^\text{17}\) These regulatory changes move us precisely in the wrong direction. Unlike this Article’s proposal, which will reduce the likelihood of financial crises, recent actions by the Federal Reserve makes them more inevitable.

Under the guise of transparency, regulators are conceding to banks at every turn—for example, stressing fewer financial institutions and providing banks with more information about the models the Federal Reserve uses to project bank losses. This serves to make the results of the regulatory stress tests far less informative than they could be.\(^\text{18}\) But the most consequential

---

\(^\text{13}\) See Baron, supra note 4, who finds that a 30% decline in bank equity prices in a year predicts credit contraction. Also see Andrew Haldane. “Dog and the Frisbee” (pub. Aug. 31, 2012), given at the Federal Reserve Bank of Kansas City’s 36th economic policy symposium, “The Changing Policy Landscape,” Jackson Hole, WY. Haldane shows that the simple market-based capital ratio had ten times the predictive power of the Tier-1 capital ratio in predicting which banks would fail during crisis. https://www.bankofengland.co.uk/paper/2012/the-dog-and-the-frisbee.


\(^\text{18}\) Id. Former Vice Chairman for Supervision Daniel Tarullo made exactly this point, noting that the eventual damage from the laxer stress-testing regime “may well come after those who loosened up the regulation have moved
change is the Federal Reserve’s insistence that stress-testing not impose volatile capital requirements on financial institutions.

This is a disturbing proposition, and one with catastrophic consequences. Stress-testing is the only regulatory tool in place that is (imperfectly) responsive to risks as they emerge in the financial sector. They create volatile capital requirements by design: Their premise is that as banks’ risks change, so should the capital they hold to safeguard against failure. As former Vice Chairman for Supervision Daniel Tarullo points out, volatility is a “necessary feature of a stress test regime, not a bug to be corrected.” That is why this Article advocates for greater volatility in stress-testing, by incorporating market-based information into the regime.

Recent regulatory complacency threatens the edifice of financial stability, making it increasingly likely that the next global financial crisis is on the horizon. And unless the course correction this Article recommends is embraced, when we are inevitably given a replay of the Great Recession, the outcome will be the same. At the onset, capital will flee from, rather than be hoarded to bolster, large financial firms. The best-case scenario will be a severely undercapitalized financial system, costly taxpayer bailouts, and a Recession with significant real consequences.

This Article proceeds as follows. Part I explains banks’ capital structure and presents a conceptual framework that illustrates how insufficient capital leads to bank runs and costly financial crises. Part II tells the story of the Great Recession, arguing that the severity of the crisis could have been mitigated by forcing large banks to recapitalize in 2007 and 2008. Although authority for intervention existed, inaction was the consequence of a regulatory regime that mandates that regulators act affirmatively to stem crises at moments when intervention appears an overreaction. Part III calls for overhauling the regulatory default to make action, rather than complacency, the automatic response to the early stages of a downturn. It advocates stress-testing as a potential tool to quickly recapitalize financial institutions when the market signals distress. This approach would have forced banks to stop paying dividends and required raising new capital at the beginning of the financial crisis, limiting its severity. The reforms proposed will prevent the next downturn from being “Great.” Part IV concludes.

1 Background on Bank Capital

This section provides a simple framework to help understand why capital structure matters for financial institutions. The business of banking entails reliance on short-term debt financing to make longer-term investments. In good economic times, banks are useful intermediaries. In downturns, excessive reliance on short-term runnable debt can lead to systemic panic. We examine the role that lack of capital has historically played in precipitating crises and how the government has repeatedly intervened to quell panic as a backstop to insure that banks’ creditors will be repaid. This cycle leads to concerns about moral hazard, as financial institutions are incentivized to take on excessive leverage if they will be bailed out by the government in downturns. Academics have long proposed alternatives such as extraordinary capital requirements (of 100%, in the extreme) to address concerns. This is unnecessarily distortionary because it requires higher capital requirements always, rather than our preferred approach of forcing banks to hold more capital exactly when downturns appear likely.

on. But somewhere down the line, someone else will suffer that damage. In all likelihood, it will once again be the most vulnerable of households and businesses.”

19 Tarullo, supra note 17.
1.A Understanding Capital Structure

Firms often need external funds to finance their operations and future investments. They can finance either using debt (borrowing funds they are required to repay with interest) or by issuing equity (selling off the rights to a portion of the firm’s future cash flows). If a firm knows it will generate significant profits, it will prefer debt financing so it can pay off its loans and keep all of the surplus. If a firm anticipates that times will be tough, it may prefer to raise capital to fund itself, because the obligation to repay debtholders could lead to costly bankruptcy if cash flows are not sufficient to cover required repayment.

Under a set of (unrealistic) assumptions, firms should be indifferent between debt and equity financing. But asymmetries that distort this foundational notion of capital structure irrelevance abound: For example, the fact that debt is tax-advantaged—because deductions are allowed when firms repay debt obligations but not when they pay dividends to equity holders—may lead firms to favor debt funding. Conversely, debt is undesirable, as these obligations can also discourage profitable investment because they create “overhang” problems. Imagine a project that would generate $100 in cash flows and require a $90 investment. The firm should easily be able to raise $90 to fund this project. But if the firm is required to pay back $15 in unpaid debt, no one will provide equity funding, because they will receive no portion of the positive profits their investment generates.

Firms weigh the benefits of debt and equity investment and come to myriad decisions about desirable capital structure. There is significant heterogeneity across industries. Banks tend to be highly levered relative to non-financial firms. Given our basic conception of how banks operate, this fact is not surprising. Debt financing is core to the business of banking—taking money from customers that banks are required to pay back and using this money to fund its investments. However, bank funds do not just come from customers’ deposits, and additional funds that banks secure are also more likely to be short-term liabilities than they are to be new equity issuances. This has led many academics to speculate both theoretically and empirically on why banks may prefer debt. Some argue that it is because bank managers are especially prone to agency problems and may take risks that are not in the interests of investors, so debt obligations provide needed discipline. Others point out that transacting with U.S. government treasuries comes with a “money premium” because of the safety and surety of this investment. To the extent bank liabilities are perceived as money-like safe claims, debt funding is preferable.

---

20 This point comes from Modigliani and Miller’s analysis of the irrelevance of capital structure, known as the Modigliani-Miller theorem. Both Modigliani and Miller were awarded Nobel prizes for this insight. F. Modigliani & M. Miller, “The Cost of Capital, Corporation Finance and the Theory of Investment.” *American Economic Review* (1958).

21 Stewart C. Myers, Determinants of Corporate Borrowing, Sloan School, Massachusetts Institute of Technology, Cambridge, Massachusetts (1977). This is known as the “debt overhang” problem. https://www2.bc.edu/thomas-chemmanur/phdfincorp/MF891%20papers/Myers%201977.pdf.

22 See, e.g., Anat Admati and Martin Hellwig. *The Bankers’ New Clothes: What’s Wrong with Banking and What to Do About It* (Feb. 24, 2013), Princeton University Press, Princeton, NJ, at 111: “Some of the main functions of banks are tied to their borrowing...However, banks typically have a lot of debt other than deposits.”


Despite the debate on the cause of debt reliance for financial institutions, the consequences of this reliance are well understood. During a downturn—when bank assets start to lose value—leverage magnifies crises.

1.B Leverage and Financial Crises

Imagine you deposit your life savings at Savings Bank, and the bank uses your funds—and other funds—to make loans to farmers. There is a bad fire that wipes out this year’s crop. The farmers have no money to pay back the bank. They will probably be able to pay back next year, and since you don’t need your deposits immediately, there is no reason to panic. But then your neighbors tell you they aren’t sure the farmers will ever pay the Savings Bank back, and they have heard rumors that the bank will be forced out of business. You rush to Savings Bank to withdraw your deposits, and all the banks’ other customers run as well. The bank liquidates its assets but doesn’t have enough money to pay everyone back. It closes its doors. You’ve lost your life savings. You tell your friends, who bank with Different Bank. Their bank doesn’t even make loans to farmers, but fear spreads and depositors panic anyway. Different Bank can’t meet its obligations either, and shuts as well.

In essence, this is the story of the Great Depression. Although the market crashed in 1929, the real trouble began with a series of four banking panics that began in October 1930 and did not end until President Roosevelt declared a Bank Holiday and the Emergency Banking Act (passed during the holiday) created de facto 100% deposit insurance once banks reopened. The extension of deposit insurance ended conventional bank runs because customers’ deposits were insured (up to a cap), so there is no reason for panicked individuals to run, no matter how precarious their banks’ financial conditions.

https://pdfs.semanticscholar.org/d90e/058acba3c030ed349303724c0a0291caab73.pdf. The authors note that “Our starting point is the liability-centric view of banks, which holds that an important point of banks’ value comes from their ability to manufacture safe money-like liabilities. This view helps make sense of the fact that, in contrast to nonfinancial firms, banks have capital structures that are highly homogenous in both the cross-section and the time series; they are almost always heavily deposit financed.” See also J.C. Stein, “Monetary policy as financial-stability regulation,” Quarterly Journal of Economics, 127 (1), 57–95 (2011).


26 Ben S. Bernanke, “Non-Monetary Effects of the Financial Crisis in the Propagation of the Great Depression,” Working Paper No. 1054, National Bureau of Economic Research, Cambridge MA (Jan. 1983). Friedman & Schwartz (1963) make the now conventionally accepted point that the banking panics of the 1930s were a “contagion of fear” leading to a liquidity shock for fundamentally solvent institutions. Although once asset prices started falling, bank assets couldn’t cover their liabilities during the panic, these institutions were solvent—meaning in normal times, there would be no cause for concern. The liquidity crunch had real consequences, explained Bernanke: “The basic premise is that, because markets for financial claims are incomplete, intermediation between some classes of borrowers and lenders requires nontrivial market-making and information gathering services. The disruption of 1930-33...reduced the effectiveness of the financial sector as a whole in performing these services. As the real costs of intermediation increased, some borrowers (especially households, farmers, and small firms) found credit to be expensive and difficult to obtain. The effects of this credit squeeze on aggregate demand helped convert the severe but not unprecedented downturn of 1929-1930 into a protracted depression.” https://www.nber.org/papers/w1054.pdf.

Financial crises did not end, but runs shifted from individual depositors (now insured) to other kinds of bank liabilities. Panic-type phenomena occurred in the Great Recession. For example, on the day Lehman Brothers collapsed, one money market fund “broke the buck,” reporting to customers that it would only be able to provide a 97-cent return on every $1 of customers’ investments. Reserve’s losses were tied to its holdings of (now worthless) Lehman bonds. But because money market fund investors had previously thought of the entire industry as riskless, this triggered fears by customers of other funds that their investments may not be safe. Explained then-Fed Chairman Ben Bernanke (“Bernanke”): “What we didn’t recognize immediately was the vulnerability of the system to a run of short-term funding…This crisis involved a 21st century electronic panic by institutions, rather than depositors running up at bank doors. It was an old-fashioned run in new clothes.”

There is a conceptual difference between an irrational bank run (see Savings Bank example above, where depositors run from institutions that are not exposed to the farmers’ plight) and a rational bank run (investors run to limit losses from insolvent institutions that will never be able to repay their debts). While irrational runs are hard to anticipate, rational runs are preceded by asset losses that are known to the market and observers in advance of the panic. The latter seems a better description of the Recession: The financial system began to show signs of weakness well before the fall of 2008, and Lehman’s exposure to the housing bubble was well known by its collapse. As we argue infra, we view the probability of a Lehman-like event as high in the year prior to its collapse—and very high in the months preceding Bear’s near-failure. This is perhaps unsettling in evaluating the early crisis response, but does provide some comfort as we think through to future crises. Predictable panics can be avoided by timely intervention.

1.C Avoiding Financial Crises

Given the consequences of over-reliance on leverage, policymakers have proposed alternatives aimed at restricting the capital structure of financial firms. These include ideas like 100% equity-financed banks and higher capital requirements. This section details the advantages and disadvantages of these alternatives. One solution to the problem of overly leveraged financial institutions is to restrict debt financing altogether. To go back to the Savings Bank:

Dybvig provide a famous model of how deposit insurance forecloses costly bank runs. Bernanke (2009) explains that “The historically most familiar type of panic, which involves runs on banks by retail depositors, has been made largely obsolete by deposit insurance or guarantees and the associated government supervision of banks.”


See, e.g., Gennaioli & Shleifer, supra note 12, noting that the asset-backed commercial paper market came to a halt in the summer of 2007, and yet “the financial system did not collapse; it continued to limp along for over a year.”

imagine this bank was not funded by consumer deposits but was instead funded by the Bank issuing shares to the public. It made the same investments—in the farming industry, and one year the crops were all wiped out by a fire. What now?

Nothing. The shareholders will certainly be upset that Savings made a bad investment (at least in the short-term), but there is no panic, because Savings isn’t obligated to pay shareholders anything. Professor John Cochrane discusses this difference between equity and debt financing: “The 2000 stock market bust was not a crisis, because it was not a run. Yes, there were huge losses. But when stocks plunge, all you can do is go home, pour a drink, yell at the dog, and bemoan your dumb decisions. You can’t demand your money bank from the issuing company, and you can’t drive the company to bankruptcy if it does not pay. Panic selling, even if ‘irrational,’ even if it causes ‘herding’ by others, even if it drives prices down, is not a crisis, and it’s not a run, because the issuing company doesn’t have to do anything about it.”

So one solution to avoid financial crises is to transition to 100% equity-financed banks, as Professor Cochrane suggests. He is not alone: Professor Adam Levitin has made a similar proposal for “safe banking” that decouples deposit-taking from lending and creates banks with 100% reserves. These are not new ideas: Irving Fisher was the leading voice behind a movement in the aftermath of the Great Depression to transition to full-reserve banking, arguing that “Our government has, in a significant sense, allowed the commercial banks to usurp its primary function of controlling the currency,” and that to solve this problem, it would not be sufficient to “specify the kind of lending or collateral banks needed to hold, but instead we need “the outright abolition of deposit banking on the fractional reserve principle.” Merton Miller revived this proposal in the early 1990s: “Why not just scrap the whole costly system of deposit insurance, capital requirements plus risk surveillance in favor of a variant on Irving Fisher’s 100 percent money proposal, under which insured deposits—and no limitations need to be placed on the size of the accounts—must be invested only in short-term Treasury bills on their close equivalents. That will surely guarantee the safety of the payment system and head off any future taxpayer bailouts.”

If it were true that capital structure was irrelevant from the bank’s perspective, then a 100% equity-financed bank seems an easy way to stave off financial crises. Professors Anat Admati and Martin Hellwig propose a less radical alternative: 25% capital requirements. They argue this would capitalize banks at historical levels that existed before the too-big-too-fail subsidy, when banks still worried that high leverage could bankrupt their firms. Although less extreme than 100% equity financing, raising capital requirements to these levels would still represent a sea change from the perspective of the banking industry.

---

37 “Quarterly Trends for Consolidated U.S. Banking Organizations, First Quarter 2018,” Federal Reserve Bank of New York. Today, average tier 1 capital levels for U.S. banks are around 1%. The Admati and Hellwig proposal thus represents a significant increase for financial institutions that are already much less leveraged (on a book equity basis) than they were prior to the crisis. https://www.newyorkfed.org/medialibrary/media/research/banking_research/quarterlytrends2018q1.pdf?la=en
While maintaining higher capital levels would decrease the risk of costly bank failures, it would also create inefficiencies. Having to raise capital is perceived as a negative signal of a firm’s health. This means that in the face of higher capital requirements banks may simply decide to lend less—even when lending is a good investment—because of the stigma associated with financing investments through equity-raising. Many studies show that equity is expensive from the perspective of regulated banks, and that higher capital requirements have real effects like decreasing consumers’ access to credit.\(^{38}\)

100% reserve banking is even less appealing: Fractional-reserve banking allows banks to use resources that are otherwise idle (e.g., consumer deposits) to fund profitable behavior (e.g., starting a business or opening a new factory). In a world with 100% reserve banking, who will play this intermediation role? Either there will be less investment, or risky unregulated entities (e.g., “shadow banks”) will gain prominence, and we will push risk out of one sector of the economy that we somewhat understand—the traditional financial sector—into the shadows that are both understudied and under-regulated.\(^{39}\) If the latter, in the next crisis the government will face a run in the shadow banking sector and, as in all crises, be forced to dedicate resources to stemming it.

Full-reserve banking and higher capital requirements are also undesirable conceptually, because these approaches are the financial regulatory equivalent of using a boulder to plug a dike: too blunt and unwieldy a tool to address a specific problem. The issue confronting financial regulators is that when bank assets begin to lose value, bank creditors (depositors, or more recently, institutional investors) worry that they won’t be repaid, and so run to collect what they are owed and fan the flames of the crisis fire. The solution in the minds of the critics above is to make banks hold more capital always. The solution this Article advocates is to make banks hold more capital at exactly the moment when creditors are concerned. Just like 100% reserve banking, such dynamic recapitalization means the end of costly panics and financial crises. But this approach is minimally distortive, because it doesn’t restrict banks’ intermediation generally—only in the precise moments when distress appears likely. Dynamic recapitalization must be automatic, because, as the experience of the Great Recession demonstrates, reliance on regulators to affirmatively act is problematic. Even those charged with policing the financial

---


\(^{39}\) See Admati, id., which explains exactly this phenomenon in detailing opposition to such narrow banking proposals—“Narrow banks would likely constitute a very small part of the financial system, as seen by the migration of deposits to money market funds that pay higher interest. Unless they are regulated effectively, non-deposit-taking institutions can become subject to runs and be systemically harmful failures. The aftermath of the Lehman Brothers’ bankruptcy, which was an investment bank, are clear examples.” https://www.gsb.stanford.edu/sites/gsb/files/compelling_case_september_30.pdf
sector underestimate risks of systemic collapse as cautions emerge. Thus, an approach to automatic and timely recapitalization is developed infra.

2 The Great Recession

In this Part, we dive deeply into a case study that is both recent and relevant to our understanding of capital and crises—the Great Recession. This Article’s thesis is that a system of dynamic recapitalization would have limited the severity of the Recession. Those who dispute this claim may argue that (1) there was not sufficient time for banks to recapitalize, or (2) regulators lacked the legal authority to force recapitalization, e.g., by restricting dividend payouts or forcing capital raising. Here we consider the early stages of the financial crisis to illustrate that neither claim appears true: There was time to act and regulators had the authority to do so. It suggests that the reasons for regulatory inaction are varied. Some in positions of power appeared fundamentally unaware of the risks of crisis; others appear aware but lacked imagination of how bad the Recession could be.

2.A Failure of Dynamic Recapitalization Exacerbated Crisis

The subprime mortgage crisis became the Great Recession because of a failure to quickly recapitalize financial institutions when the market was signaling distress. One might think that the crisis came about quickly and so there was no time to recapitalize. In the aftermath of the Recession, some policymakers made exactly this argument. This section makes clear the errors of this view of the Recession. Regulators missed opportunities to act to shore up the financial system and even let capital leave the system—for example, in the form of dividends paid to shareholders—at the same time that government funds were being used to push capital into these same banks. The crisis would have been much less severe if some of the missteps detailed in this section had been avoided.

In order for dynamic recapitalization to have any bite as a policy tool, it is imperative that there be a period of time between the onset of a potential crisis and the inevitability of a downturn like the Recession for such recapitalization to occur. The prevailing view of the Great Recession is that it was an unpredictable panic. Regulators tend to describe it as such. The popular press also tends to refer to the downturn as triggered by Lehman’s September 2008 bankruptcy filing: As John Cassidy wrote in a September 2018 retrospective titled The Real Cost of the 2008 Financial Crisis “September 15th marks the tenth anniversary of the demise of the

---

40 See, e.g., Gennaioli and Shleifer, supra note 12, noting that “Our best judgment is that for a year after the summer of 2007, neither investors nor policymakers fully appreciated the tail risks that had built up in the financial system.”
41 See infra Section 2.C, “A Market-Based Stress Test to Automate Recapitalization.”
42 See Ben S. Bernanke, Timothy F. Geithner, & Henry M. Paulson Jr., Firefighting: The Financial Crisis and Its Lessons, Penguin Random House (2019) at 29. This is consistent with how regulators describe the crisis: “We were worried something terrible could happen, but even in the months leading up to it, we didn’t foresee how the scenario would unfold… These failures of anticipation were in part a failure of imagination and in part a failure of institutional organization within the government.”
43 Id. at 30 (“One lesson for crisis detection is that it’s incredibly hard to predict a financial meltdown. Some people might be prescient about some things, but you can’t count on prescience as a realistic crisis avoidance strategy.”)
44 See also Bernanke, supra note 28: “Although the panic was certainly not an exogenous event, its timing and magnitude were largely unpredictable, the result of diverse structural and psychological factors.”
investment bank Lehman Brothers, which presaged the biggest financial crisis and deepest economic recession since the nineteen thirties.”

Many academics subscribe to the view that Lehman’s failure was the proximate cause of the crisis—explains Professor John Cochrane: “The signature event of this financial crisis was the run that started in late September of 2008 and receded over the winter….If that panic had not occurred, it is likely that any economic contraction following the housing bubble would have been no worse than the mild 2001 recession that followed the dot-com bust…Why was there a financial panic? There were two obvious precipitating events: the failure of Lehman Brothers investment bank in the context of the Bear, Fannie Mae, Freddie Mac and AIG bailouts; and the chaotic days in Washington surrounding the passage of legislation establishing the Troubled Asset Relief Program (TARP).

Professors Adrian Vermuele and Eric Posner compare the onslaught of the Recession (which they date to September 18, 2008—immediately following Lehman’s failure) to September 11th, 2001. While they acknowledge the differences between the worst terror attack and the worst financial crisis in our lifetime, the authors seem to suggest that the unpredictability of both events reflects the same pattern of what they call “crisis governance”—where “[p]olitical conditions and constraints, including demands for swift action by an aroused public, massive uncertainty, and awareness of their own ignorance leave rational legislators and judges no real choice but to hand the reins to the executive and hope for the best.”

The idea that the crisis was (1) precipitated by Lehman and (2) largely unpredictable fits with how policymakers conceive of the Recession and pushes against the notion of an optimal moment when the dynamic recapitalization can occur. Former Treasury Secretary Henry Paulson (“Paulson”) recently argued that “crises are unpredictable in terms of cause or timing or severity when they hit.” Former Treasury Secretary Tim Geithner (“Geithner”) similarly notes that “financial crises can’t be reliably anticipated or preempted, because human interactions are inherently unpredictable.”

The view of crises as fundamentally unpredictable is reinforced by reading assessments by many of the policymakers in charge of monitoring financial markets in the months leading up to Lehman’s bankruptcy. They are, for the most part, unaware of the scope of the catastrophe that was to come. It’s not that the regulators were oblivious to the change in market conditions: They understood well that the housing market was declining (home prices peaked in 2006 before trending downward), which caused runs to begin as early as in the summer of 2007 in the asset-backed commercial-paper market.

Still, many seemed confident in the months leading up to Lehman’s bankruptcy that the worst of the crisis had passed. In the fall of 2007, Bill Dudley, then at the Federal Reserve Bank of New York, noted that “the general sense is that US banks are very healthy and well-capitalized.” In that same meeting, the Chicago Federal Reserve Bank President argued that the Fed should be wary of letting concerns about tail risk (low probability, very bad outcomes, like

---

45 John Cassidy, “The Real Cost of the 2008 Financial Crisis,” The New Yorker (Sept. 10, 2018) https://www.newyorker.com/magazine/2018/09/17/the-real-cost-of-the-2008-financial-crisis. See also Authors, supra note 3, describing how Lehman caused a (conventional) bank run and brought the financial system to the brink. He recalls not publishing reports of the queues of customers who lined up to withdraw funds that were above the FDIC’s deposit insurance limit: “Such a story on the FT’s front page might have been enough to push the system over the edge. Our readers went unwarned, and the system went without that final prod into panic…Was this the right call? I think so. All our competitors also shunned any photos of Manhattan bank branches.”

46 See Posner & Vermeule, supra note 2.

47 See Cohen, supra note 1.
the crisis ended up being) too significantly shape policy: “We have to continue to ask, what happens in the more likely event that things turn out better than these tail events. That’s why they’re called tail events...If we respond aggressively to address financial conditions beyond our dual mandate goals, we should be prepared to retrace that pattern...”

March 2008 was another watershed moment in the crisis that in retrospect was a harbinger of the calamity to come: Bear, a large investment bank with significant exposure to subprime mortgages, failed and was subsequently merged with JP Morgan. And yet, FOMC transcripts in the immediate aftermath of Bear reveal relatively little concern. Rather ironically in light of what was to come, Bill Dudley pointed out that investment banks looked better post-Bear than they had prior, and specifically that although “Lehman’s stock price fell to 19 percent, its CDS narrowed by 20 basis points, to 450 basis points, yesterday.” His view was that Bear’s resolution as well as a ratcheting up of Federal Reserve liquidity decreased the risk of future insolvencies. Geithner argued that “it is very hard to make the judgement now that the financial system as a whole or the banking system as a whole is undercapitalized.”

And in August 2008, in the last FOMC meeting before Lehman collapsed, many appeared unaware that a global financial meltdown could be on the immediate horizon (Lehman eventually declared bankruptcy a mere six weeks later). St. Louis Federal Reserve Bank President James Bullard called for the FOMC to “begin to de-emphasize systemic risk worries” because since the crisis had been ongoing for some time, “all of the major players have made adjustments as best they can to contain the fallout from the failure of another firm in the industry...I say that the level of systemic risk has dropped dramatically and possibly to zero.” Richmond Federal Reserve Bank President Jeffrey Lacker agreed with Bullard’s assessment and argued that concerns about systemic risk were not a useful guide for policy and tended to be overblown.

This conventional view of the Great Recession—as triggered by Lehman’s bankruptcy and unexpected until the fall of 2008—is dismal. It means there is no moment for dynamic recapitalization—no time between warning signs of market distress and whole-scale panic. Thus, the only option to prevent the possibility of costly bank runs is distortionary capital requirements (in the extreme, 100% reserve banking).

This dismal view is bolstered by the fact that not only did many fail to appreciate that the financial system, broadly, was undercapitalized prior to fall 2008, but regulators and industry participants that were in the best position to judge these institutions often proclaimed that the firms that failed (or almost failed before costly government-assisted mergers) were well capitalized even at the moment that their failure was imminent. Chris Cox, then-Commissioner of the Securities and Exchange Commission, testified before the Senate Committee on Banking, Housing and Urban Affairs in the weeks after Bear’s collapse that what happened to the firm was unprecedented because “For the first time, a major investment bank that was well-capitalized and apparently fully liquid experienced a crisis of confidence that denied it not only unsecured financing, but short-term secured financing, even when the collateral consisted of agency securities with a market value in excess of the funds to be borrowed.” Erin Callan, then-CEO of

---


Lehman, announced in June 2008 that the firm was “extremely well capitalized to take advantage of...new opportunities.” In July, before a September bailout, James Lockhart, the director and regulator of the government-sponsored enterprises (GSEs) proclaimed them “adequately capitalized, which is our highest criteria.” And when the Federal Reserve rescued AIG immediately after Lehman’s failure, the insurer noted that “AIG is a solid company with over $1 trillion in assets and substantial equity” and that the loan was “backed by profitable, well-capitalized operating subsidiaries with substantial value.”

This is a conundrum for dynamic recapitalization. If financial crises are unpredictable and the crisis was the byproduct of irrational panicked runs on institutions with sufficient capital, there was no opportune moment for measured crisis response. And more importantly, going forward, there will be no such moment in the next downturn. Financial markets function well until they do not, and just as there is no way to stop an avalanche as it races down a hill, that a tail-risk event is realized is a function of luck, not policy.

2.A.i Failure of Dynamic Recapitalization Not a Consequence of Insufficient Time to Respond

Fortunately, this view of the Recession—and crises in general—is inaccurate. As Professor Kate Judge points out in an important essay on the year leading up to Lehman, the crisis was not an unexpected shock like September 11th. Instead, tremors in financial markets began over a year prior.

During this period, market indicators of bank health revealed sufficient stress. Figures 1(a) and 1(b) show the market capitalization of the largest financial firms (Bank of America, Citigroup, Goldman, Morgan Stanley, JP Morgan, Wells Fargo, Bear, and Lehman Brothers) between January 2007 and December 2008. Figure 2 shows price movements on aggregate for a $100 portfolio equally invested across these firms in January 2007. Important inflection points of the crisis: The suspension of three of BNP Paribas’ subprime mortgage funds in August 2007, the collapse of Bear in March 2008, and the bankruptcy of Lehman in September 2008, are highlighted.

During the period between the early ABCP runs and Lehman’s collapse, the market capitalizations of large financial institutions fell by an average of 64%. Figures 3(a), 3(b), and 4

---

51 Id.  
54 David Skeel, “History credits Lehman Brothers’ collapse for the 2008 financial crisis. Here’s why that narrative is wrong,” Brookings (Sept. 20, 2018). Skeel makes a similar point in a recent Brookings piece where he calls this the “Lehman myth.”—“In the 10 years since Lehman Brothers filed for bankruptcy...a standard narrative about the implications of not bailing Lehman out took hold. According to this narrative, the failure to rescue Lehman was the defining event of the 2008 crisis, the match that started the conflagration...In my view, this settled wisdom...is largely mistaken.” https://www.brookings.edu/research/history-credits-lehman-brothers-collapse-for-the-2008-financial-crisis-heres-why-that-narrative-is-wrong/. For an earlier discussion of the “Lehman myth” see also David C. John, William G. Gale, J. Mark Iwry, & Aaron Krupkin, “From saving to spending: A proposal to convert retirement account balances into automatic and flexible income, Brookings (July 31, 2019). https://dealbook.nytimes.com/2009/10/06/dealbook-dialogue-david-skeel-the-lehman-myth/.
show how CDS spreads, which measure the cost of insurance against default, changed during this period. The cost of insuring against Goldman’s default, for example, more than doubled between the summer of 2007 and the spring of 2008. Other financial institutions followed this same trend. While Lehman’s trajectory is certainly the worst of this lot, it’s a mistake to say that it is a massive outlier. The problems in financial markets were not problems of one rogue firm but rather skepticism about the viability of the entire industry.

In November 2007, Tom Russo, then-General Counsel and Chief Financial Officer of Lehman, presented to the G-30 about the problems plaguing the financial sector. He estimated that the next two years would result in the foreclosure of two million homes, highlighted that bank capital ratios were significantly reduced relative to June 2007, and suggested that “capital needs to be raised, but the market is concerned about the underlying assets…Consequently, the cost to raise capital becomes high and for some prohibitive.”

So, both market indicators and industry participants signaled that distress was likely. These signals led to many to call for more action to shore up banks: Former Treasury Secretary Lawrence Summers wrote in March 2008, in the aftermath of Bear’s collapse, that “a priority for financial policy has to be increases in the level of capital held by financial institutions.” Economists Anil Kashyap and Hyun Song Shin, writing with industry experts, predicted that losses to institutions with exposure to subprime mortgages would total almost $400 billion and result in a substantial contraction in credit for American consumers and businesses. They too advocated for shoring up the capital positions of large banks: An “effective means to attack directly the financial turmoil would be to facilitate the raising of new equity capital by the banks, and to encourage them to retain cash flow by cutting dividends if necessary.” Said in the parlance of economics, Lehman’s bankruptcy was far from an exogenous shock. The market’s view of these financial institutions’ stability had been trending downwards for months prior.

This is a simultaneously comforting and distressing fact. Comforting, because it suggests there is a period between when cracks in financial markets begin to show and the market collapses. In the case of the Great Recession, there was over a year between tremors in the ABCP market—and nearly six months between the failure of Bear—and the collapse of Lehman. But this fact, while hopeful for the potential of dynamic recapitalization approaches, is also concerning with respect to the Recession, because it suggests more could have been done in the months before Lehman.

---

56 See Summers, supra note 9. Summers furthered that “Capital infusions to date fall far short of prospective losses. Without new capital, the financial sector will operate with too much risk and leverage or will put the economy at risk by restricting the flow of credit…As part of its dialogue with financial institutions, the Fed should push for further efforts to raise capital.”
57 David Greenlaw, Jan Hatzius, Anil K. Kashyap, & Hyun Song Shin, “Leveraged Losses: Lessons from the Mortgage Market Meltdown,” U.S. Monetary Policy Forum Report No. 2, Rosenberg Institute, Brandeis International Business School and Initiative on Global Markets, University of Chicago Graduate School of Business (2008) https://faculty.chicagobooth.edu/anil.kashyap/research/papers/MPFReport-final.pdf (furthering that “Of course, the cutting of dividends will need to overcome the considerable stigma attached to doing so. On this score, ministers of finance and central bankers may have a role to play in facilitating coordinated action so as to overcome the stigma across regions.”)
58 There are raging debates about whether even immediately prior to Lehman’s failure, regulators should not have bailed out Lehman as it did AIG a mere two years later. This Article does not delve into this debate, but rather suggests that early and targeted capital interventions could have forestalled an event like Lehman from even being
This Article argues exactly this: Time existed to limit the severity of the crisis, and policymakers did not respond rapidly enough. Specifically, at a time when the market’s assessment of banks’ capital positions was falling precipitously (see Figure 5), banks were not forced to recapitalize. And rather than hoard the relatively little capital they did have, during this period, large banks paid out dividends and repurchased shares. This is an astounding fact. In 2008, 61 components of the S&P 500’s stock index cut their dividends. However, banks—where markets were concerned about capital deficiencies—continued to disburse capital rather than shore up their institutions. Between January 2007 and August 2008, the crisis knocked out more than half of the market value of banks’ equity. The cumulative dividends these firms paid out during this same period were as large as their losses.

The anecdotal evidence is striking. Lehman announced a 13% increase in its dividend at a $100 million share repurchase in January of 2008, nine months before filing for bankruptcy and after its market cap dropped by 30% in the prior year. All large financial institutions continued to pay out dividends even after receiving capital infusions by the government. Banks argued that any decision to cut dividends for their particular institution would signal weakness to the market and hasten their downfalls. While there is theoretical and empirical support for this signaling proposition for individual institutions, the failure of coordination by regulators to stop costly capital disbursements for the sector as a whole is harder to understand. Because most large banks received equity infusions from TARP, continued dividend payouts amounted to preferencing wealthy bank shareholders at the expense of ordinary taxpayers.

Perhaps unsurprising since banks did not even hoard the capital they did have, when banks were encouraged to raise new capital, they resisted. In early FOMC meetings, regulators noted that despite pressure on banks and GSEs to raise capital from the outset of the crisis, they had repeatedly been told that “now is not a good time to raise capital…This desire to postpone capital raising stems in part to the fact that bank executives do not want to dilute existing shareholders, which of course include themselves…The self-interested thing to do is to avoid dilution and hope for a good state of the world.” In these cases, what was bad from the perspective of current shareholders (new common equity issuance) was good from the perspective of society (capitalizes the financial sector) and even from the perspective of new on the horizon. Contra Larry Ball, see also “Panic, Fear, and Regret,” an interview with Timothy Geithner, Ben Bernanke, and Henry Paulson, Marketplace. https://features.marketplace.org/bernanke-paulson-geithner/  

60 Id. This was likely mechanical, because most corporate debt has covenants which prevent banks from paying out dividends in quarters with negative earnings.
63 Id.
64 David S. Scharfstein & Jeremy C. Stein, “This Bailout Doesn’t Pay Dividends,” The New York Times (Oct. 20, 2008). The authors make this point quite clearly: “Although dividends should be a matter of near indifference to shareholders of healthy companies, when companies are financially distressed there is a conflict of interest between shareholders and bondholders that leads shareholders to prefer immediate payouts. Here’s why: Each dollar paid out as a dividend today is a dollar that cannot be seized by creditors in the event of bankruptcy. For a distressed company, dividends are not in the interest of the enterprise as a whole (shareholders and lenders taken together), but only in the interest of shareholders. They are an attempt by shareholders to beat creditors out the door.” https://www.nytimes.com/2008/10/21/opinion/21stein.html.
shareholders (who benefit from buying a share of the firm at a relatively low value). Decisions about capital were being made by firms maximizing with respect to their existing shareholders, rather than governments maximizing with respect to overall social welfare. The result was too little capital raised despite substantial cause for concern and a long windup to the crisis’ climax.

The important question for this Article—and financial regulation more broadly—is why, despite warning signs to the contrary, regulators did not force recapitalization of financial institutions sooner and instead allowed capital to leave vulnerable institutions, as outlined supra. Much of the severity of the crisis could have been avoided if banks had been forced to recapitalize sooner—or at the very least, if we had forced banks to retain capital rather than pay it out in the form of dividends.

We consider two possible explanations for failure for more aggressive action in the early crisis period: (1) Regulators lacked the legal authority to force recapitalization, and (2) regulators did not fully appreciate the risks in the financial sector that were related to undercapitalization.

2.A.ii Failure of Dynamic Recapitalization Not Caused by Lack of Legal Authority

Geithner muses about issues of legal authority in his book Stress Test: “I wasn’t confident that our rules would ensure that Fed-supervised banks had enough capital to survive a severe crisis. But I knew many nonbanks had even less capital, even though they didn’t have the safeguard of insured deposits and wouldn’t have access to Fed loans in an emergency…The question was what to do about it. The Fed didn’t have the legal authority to force Bear Stearns, Lehman Brothers, or other investment banks to raise more capital. We couldn’t even generate stress scenarios bleak enough to force the banks we regulated to raise more capital.” To the Financial Inquiry Crisis Commission, Geithner reported that he was “consumed” in the months leading up to Lehman to find a way that the firm might “get more conservatively funded,” but lacked the legal tools to force action.

This view has become mainstream with respect to bank capital in the financial crisis. Even in taking issue with the lack of aggressive policy action in the early stages of the financial crisis, economists Nicola Gennaioli and Andrei Shleifer suggest that the defense of “lack of legal authority” for inaction “has many merits, after all, banks until the summer were in compliance with formal regulatory requirements and bank regulators had no legal power to force them to stop dividends or raise equity.”

It is worth considering these claims about the importance of legal authority with respect to banks and nonbanks separately.

2.A.ii.a Legal Authority Existed to Force Banks to Quickly Recapitalize

First, with respect to banks, the legal authority argument suggests that the Fed lacked the ability to force the commercial banks under its purview to raise capital because these institutions were above requisite capital ratios. It is certainly true that one constraint on banks’ leverage is that they must stay above regulatory mandated thresholds. If this were the only way to constrain

---

66 Id.
67 See Geithner, supra note 5 at 95-96.
69 Gennaioli & Shleifer, supra note 12 at 63.
banks’ leverage, then the issue of legal authority is clear. Banks can be either above or below mandatory capital ratios. If above, this requirement is met. There is then not a lot of room for adjustment of the required capital level based on risks that emerge differently across the financial industry.

But setting and enforcing a singular capital ratio is not the only authority bank regulators had at their disposal, and in the months leading up to the crisis, they could have demanded recapitalization of banks and restricted dividends and share repurchases even when banks were above regulatory capital thresholds.

The clearest such authority comes from the International Lending and Supervision Act (“ILSA”). ILSA was passed in the aftermath of the LDS (less-developed-country) debt crisis in the early 1990s, which was triggered by Mexico’s inability to service an $80 billion debt obligation, primarily due to U.S. commercial banks.70 This crisis prompted banking regulators to review and enhance their existing supervision of banks’ international lending. One result of ILSA and the rules thereunder was the imposition of minimum capital adequacy ratios on commercial banks. Another—even more relevant in the context of Geithner’s remarks—was the decision to allow banks to set capital requirements that vary by institution depending on what regulators “[deem] to be necessary or appropriate in light of the particular circumstances of the banking institution.”71

To be precise, contrary to popular (mis)conception, regulators do (and did during the crisis) have the authority to force banks to raise bank capital levels above regulatory minimum thresholds. Additionally, they have (and had during the crisis) the discretion to set different capital requirements for different institutions depending on their perception of a particular firm’s risks. While there are procedures in place that allow banks to contest such requirements,72 in practice, few banks ever challenge capital directives.73

It is worth noting that ILSA, though the clearest authority for bank-specific capital requirements, is not the only authority regulators had at their disposal to force at least commercial banks to recapitalize during the crisis.74 The Bank Holding Company Act explicitly provides the Federal Reserve Board with broad supervisory authority to “issue regulations and orders, including regulations and orders relating to the capital requirements for bank holding companies, as may be necessary.”75 Similarly, the National Bank Act provides the Office of the Comptroller of the Currency (“OCC”) this same authority over the banks it regulates. In fact, even as it sets minimum capital thresholds, the OCC is explicit that setting these ratios for the industry as a whole should not be construed as limiting the “authority of the OCC to take action under other provisions of law, including action to address unsafe or unsound practices or

---

71 12 U.S. Code § 3907.
72 For example, regulators must provide the opportunity for notice and comment on proposed capital directives. In exigent circumstances, this period of review can be shortened. Specifically, “The bank or bank holding company shall be allowed at least 14 days to respond, unless the Board determines that a shorter period is necessary because of the financial condition of the bank or bank holding company.” 12 CFR § 263.85.
74 The issue of investment banks is a little more complicated, as discussed below.
conditions, deficient capital levels, or violations of law or regulation.” Also, the Federal Deposit Insurance Act gives banking agencies the authority to take “prompt corrective action” to determine which depositories are troubled and resolve them appropriately.

As Professor Julie Hill notes, regulators historically have asserted this discretionary authority to set bank-specific capital requirements. The FDIC points out that it “is not precluded from requiring an institution to maintain a higher capital level based on the institution’s particular risk profile” and that such levels are justified when “the future earnings prospects of a bank are not adequate, or where a bank has sizeable off-balance sheet or funding risks, significant risks from concentrations of credit or nontraditional activities…or a significant volume of assets classified substandard, doubtful, or loss otherwise criticized.” The Fed asserts that heightened capital levels are justified when banks have “inordinate levels of risk.” The OCC suggests that it may be appropriate to consider the “overall condition, management strength, and future prospects of the bank” when determining bank-specific capital levels. The Office of Thrift Supervision recommends consideration of the “overall condition, management strength, and future prospects” of banks as well as liquidity levels and overall financial stability.

After determining that banks require additional capital, regulators have a variety of formal and informal tools at their disposal. Formal actions include prompt corrective action directives that force banks to take any action that regulators deem necessary to capitalize struggling financial institutions, capital directives to any bank that “fails to meet capital at or above” the level determined by a regulator; cease-and-desist orders directing banks to refrain from “unsafe or unsound” banking practices (like operating with capital ratios below the bank-specific minimum levels that regulators mandate); and formal supervisory agreements requiring banks to increase capital levels. Less formal, softer approaches are also possible—for example telling banks that failure to raise capital levels will result in the issuance of a capital directive or a cease-and-desist order.

So why then were these enforcement actions not used to encourage banks to hoard and raise capital, rather than pay excessive dividends at the outset of the crisis? One concern perhaps was that higher capital requirements for the riskiest banks would lead to asset firesales and thus push more banks to the brink. Imagine that regulators directed Wachovia to increase its capital

76 Electronic Code of Federal Regulations (as of July 29, 2019), e-CFR. https://www.ecfr.gov/cgi-bin/text-idx?SID=d7af58fdd86758900925a47f146f4935&node=12:1.0.1.1.3&rgn=div5#sp12.1.3.a
77 Since Dodd-Frank, regulators have even more tools at their disposal to force capital raising and restrict disbursements. As I discuss infra, Section 3.C.i, “Stress Test Failure Should Automatically Force Recapitalization,” stress test failure (at least in principle) mandates that banks abandon planned capital disbursements. Furthermore, Section 165 of the Dodd-Frank Act permits the Federal Reserve to mitigate risks to financial stability that could arise from the failure of large, interconnected banks by “prescribing more stringent prudential standards.”
78 Hill, supra note 73, at 656.
79 12 C.F.R. pt. 208, app. A. Higher capital requirements might also be appropriate when the bank has significant interest rate risk, liquidity issues, poor earnings, portfolio risk, or risk from nontraditional activities. See id.
80 12 C.F.R. § 3.11.
81 12 C.F.R. § 567.3(c).
82 The difference is that while violations of formal actions can result in fines, removal of bank management, or, in extreme cases, regulators directly taking over banks, violating an informal action does not provoke as severe a punishment. In most cases, failing to comply with informal actions prompts more formal requirements like forced capital raising. See Hill, supra note 73 at 661.
83 Id. PCA directives result when banks become “undercapitalized, significantly undercapitalized, or critically undercapitalized” (explicit regulatory thresholds), but can also be triggered by banks’ failure to meet bank-specific capital requirements.
ratio to 12% in 2007.\textsuperscript{84} Capital ratios are (simplistically) the ratio of a bank’s equity levels to its total assets. Wachovia would have had two options to meet this 12% requirement: raise new equity or sell off assets. Perhaps regulators did not subject large banks to heightened capital requirements because they were worried that to meet these requirements, banks would sell off assets. These firesales would lower the value of the assets being sold not just for Wachovia but for all banks, and this spillover effect would have debilitated an already-weakened financial sector. This is the worry Professors Robin Greenwood, Sam Hanson, and Adi Sunderam voice about heightened capital requirements during downturns: “If in the midst of a crisis, banks are given the option of improving their capital ratios by shrinking assets rather than by raising new dollars of equity capital, they will likely do a good deal of adjustment on the former margin, thereby exacerbating the economy-wide problems associated with firesales and credit crunches.”\textsuperscript{85}

A related concern is that the ability to set bank-specific capital ratios may not mean that regulators could have shut down dividend payments by troubled institutions. Higher capital requirements for Bank of America, Citigroup, JP Morgan, and Wells Fargo could have encouraged these firms to firesale assets to meet higher capital ratios while still sustaining their planned capital disbursements.

Such firesale concerns are not valid because regulators explicitly have the authority to require banks to meet heightened capital requirements by raising new dollars of equity capital and not making planned capital disbursements. Specifically, ILSA gives banking regulators the authority to cause banks to achieve and maintain adequate capital by establishing minimum levels of capital, not minimum capital ratios. Prompt corrective action authority similarly allows regulators to direct banks to raise new dollars of equity capital and restrict capital distribution until troubled banks submit satisfactory capital restoration plans.\textsuperscript{86} This means regulators could have been explicit that to meet heightened capital requirements, banks could not disburse capital and/or had to raise new dollars of equity capital, not simply sell off assets to reduce capital ratios to the requisite levels and fan the flames of the crisis along the way.

The reason we know that regulators have the authority to (1) set bank-specific capital requirements and (2) force banks to meet these capital requirements by restricting planned disbursements and requiring new capital be raised (rather than meeting capital ratios by selling existing assets) is that they did exactly this for small banks during the financial crisis. The number of formal capital enforcement actions tripled as the crisis began, from 2007 to 2008, and tripled again from 2008 to 2009.\textsuperscript{87} The vast majority of these crisis enforcement actions (nearly 75%) contained individual bank minimum capital requirements, the mean of which (9.2% Tier-1 capital ratio) was more than double the 4% required at the time to be considered adequately capitalized.\textsuperscript{88} In addition to imposing bank-specific capital requirements, crisis enforcement actions regularly mandated that banks agree to suspension of planned dividends. For example, an

\textsuperscript{84} In reality, there were no formal enforcement actions for Wachovia or Washington Mutual despite their collapses in the early stages of the crisis. Hill, supra note 73 at 691.


\textsuperscript{87} Hill, supra note 73 at 672.

\textsuperscript{88} Id. at 679-680. One bank was even required to meet a 28% leverage ratio, seven times the standard regulatory requirement.
April 2008 cease-and-desist order agreed to by Greater Atlantic Bank required the Savings Association to reach a risk-based capital ratio of 12% before July 2008 and mandated that the firm “shall pay no dividends or make other capital distributions…without receiving the prior written approval of the Office of Thrift Supervision Regional Director.” Similarly, the OCC required in June 2009 that Amcore Bank in Illinois increase its risk-based capital ratio to 12% in the following months and forbade the bank from paying out any dividends “without the prior written determination of no supervisory objection from the Assistant Deputy Comptroller.”

Interestingly, regulators shied away from exercising this authority with respect to large banks. During the crisis, such a directive was leveled only once against one of the fifty largest financial institutions in the United States: In June 2009, the Federal Reserve Board announced a cease-and-desist order to maintain the financial soundness of The Colonial BancGroup. It required that Colonial raise its risk-based capital ratio to 12% (higher than the 10% required to be well capitalized at the time) and forbade the bank from declaring or paying dividends without prior written approval of the Reserve Bank, the Director of the Division of Banking Supervision of the Board of Governors, and the Superintendent. It also forbade BancGroup from purchasing or redeeming shares of its stock without the prior written approval of the Reserve Bank and the Superintendent. At the time it consented to this cease-and-desist order, BancGroup was the 47th largest bank holding company in the U.S. The Federal Reserve issued no such decree to Washington Mutual, the sixth-largest bank holding company, before its failure in the fall of 2008; or Wachovia, the third-largest bank holding company, which nearly failed before its distressed purchase by Wells Fargo; or Citigroup, whose stock price dropped by 80% in 2008 before the firm finally decided to slash its dividends; or JP Morgan and Wells Fargo, which continued to pay out capital to shareholders even after they received emergency capital infusions from the federal government in the fall of 2008.

This big/small bank heterogeneity in regulators’ capital approach is confusing. It is not only an artifact of the crisis, however. Philip Wellons studied prompt corrective actions issued between 1993 and 2001 and found that no large bank—not a single “major” financial institution—received a Prompt Corrective Action (“PCA”) directive. One plausible explanation is that regulators find larger banks to be less risky than their smaller counterparts. However, that seems implausible given that only failure of the “too-big-to-fail” financial institutions could have ripple effects throughout the financial sector; the failure of the $203 million Greater Atlantic Bank could never have destabilized the entire financial system. In fact, in recognition of large banks’ contribution to the crisis, in May 2009 the FDIC chose to collect an outsized share of the FDIC...
insurance levy from the largest institutions because “as a group, [they] have posed much greater risks to the banking system than small banks have.”

Capital directives to the largest financial institutions would have prevented billions of dollars in capital from leaving the financial system at a time when regulators understood that the industry was starving for capital. The legal authorities were in place to allow for that requirement—and even used with respect to less systemically important financial institutions. Why the reluctance to use these tools where they could have been most helpful?

Another possibility is that regulators were reluctant to stigmatize large financial institutions by public enforcement actions. Declaring in 2008 that Citigroup’s risk profile demanded that it raise more capital to weather the financial crisis would have triggered depositors above the FDIC’s insurance limit to run to withdraw their cash. This, the argument goes, would have speeded Citigroup’s demise rather than slowed it. A version of this argument was presented by bank supervisors to the Financial Crisis Inquiry Commission. They noted that they avoided the issuance of formal, public supervisory action taken under the federal banking statutes in part out of fear that “financial markets would overreact to public actions, possibly causing a run.”

That is certainly plausible, but on examination a rather perverse result—regulators did not use the tools they had to quickly recapitalize the largest banks because of a concern that using those tools—meant to make the banking sector safer—would actually make it less able to withstand the downturn. Such perversity could have been avoided if regulators acted quickly with respect to these large financial institutions. Pushes to raise capital in 2007 could have helped large financial institutions build up a capital buffer that better prepared them for the downturn and ultimately would have lessened the severity of the crisis. Also, concerns about stigma could have been avoided by exerting of private pressure on institutions to recapitalize under the threat of enforcement action.

Regulators’ reluctance to force banks to raise capital was likely related to the complaints they were hearing from the financial institutions under their purview: In the year leading up to Lehman’s failure, banks repeatedly told the Fed that it was not the right time for banks to raise capital and that scaling back on planned disbursements would stigmatize vulnerable financial firms.

---

96 Binyamin Appelbaum, “Big Banks to Pay Larger Share of FDIC Levy,” washgintonpost.com (May 23, 2009). http://www.washingtonpost.com/wp-dyn/content/article/2009/05/22/AR2009052203442.html. Contra John Dugan, who noted that this was a “frankly perverse” move given that the insurance fund was primarily being drained by the failures of small banks.


98 Financial Crisis Inquiry Commission Report, supra 68.

99 A more cynical view is that regulators were captured and beholden to banks. This view is consistent with George Stigler’s Nobel Prize winning work, offering a theoretical framework and early empirical analysis of the incidence of regulatory capture. In his view, regulation is undesirable because it is inevitably a byproduct of industry and interests with the means to shape it to achieve their ends: “As a rule, regulation is acquired by the industry and designed and operated primarily for its benefit.” Stigler, The Theory of Economic Regulation. We do not have this view of regulators and view crisis policymakers as well-intentioned.
FOMC transcripts show that many regulators understood that recapitalization would be beneficial but seemed sympathetic to dilution and stigma concerns. The transcripts also show regulators growing increasingly concerned and trying to persuade banks to raise capital, rather than contemplating the use of their authority to force recapitalization. For example, in March 2008, Kevin Warsh speculated that the banking sector was “systematically undercapitalized, and we need to use all our tools to persuade them that it is in their interest and the interest of the broad economy for them to raise capital. But finding capital, certainly over the next six months, will be a very real challenge. The capital markets are not in a very strong position to satisfy issuer needs at present.” 100 Bill Dudley highlighted that because of the “sharp decline in the equity prices” banks were “reluctant to raise new capital, despite the prospects of higher-margin new businesses, because additional share issuance at the current share prices would lead to massive dilution for existing shareholders.” 101

The dilution concerns were significant: In April 2008, Kevin Warsh pointed out that “The Fed and the Treasury have been calling for some months for capital-raising across all types of financial institutions. The questions then were whether the financial institutions were willing to take the dilution and go raise capital. At least equally important was whether there would be sufficient demand.” Governor Mishkin also points out that the system would be better if more capitalized but cautioned that banks would be reluctant to act: “When we think about the long-term solution to the problems in the financial markets, cleaning up the mess and raising capital is going to be absolutely critical…But it is going to very much involve the large financial institutions, which will have to solve the agency problems.” 102 In August 2008, Elizabeth Duke, member of the Federal Reserve Board of Governors, reiterated the concerns of the banks that regulators were subtly encouraging to recapitalize: “No matter why they are trying to raise capital, capital issuance is viewed as a sign of weakness. It is scarce. It is expensive. The short selling has just been amazing. It has really driven down the prices. For some of the larger banks, it is running anywhere from 10 to 15 percent of total float.” 103 While concerns about bank capital levels are made at various points between the summer of 2007 and the summer of 2008, so too are discussions of the pain of dilution for shareholders and stigma from raising new equity. The Fed transcripts reveal no contemplation of the possibility of forcing dilution or demanding banks limit disbursements.

Perhaps stigma concerns with respect to large financial institutions were more pronounced than with smaller counterparts. Additionally, forcing large banks to raise capital in this environment felt weighty because it would have diluted thousands of shareholders. This seemed unfair to those in the regulatory community who agreed with banks that the market was overreacting and undervaluing their firms. Shoring up small banks and hurting their owners was presumably an easier choice precisely because it impacted a much smaller swath of the financial sector.

100 “Meeting of the Federal Open Marketing Committee on March 18, 2008.” https://www.federalreserve.gov/monetarypolicy/files/FOMC20080318meeting.pdf
101 Id.
2.A.ii.b Soft Power Existed to Intervene in Nonbanks

The critique that regulators failed to exercise existing authority to force recapitalization is not fully fair because the legal authority described existed only with regard to commercial banks and bank holding companies, and not with respect to the investment banks that were at the forefront of the financial crisis. This conundrum is detailed explicitly in Firefighting: The Financial Crisis and Its Lessons: “Outside the commercial banks, oversight was even less stringent...No one had the authority to step in to avoid a chaotic bankruptcy of a major nonbank during a crisis.”104

It is true that the crisis started on the periphery of the financial sector where regulatory authority was much less developed. Although the proximate cause of the September 2008 tailspin was Lehman’s collapse, had the traditional commercial banks been forced to hoard and raise new capital in the preceding year, it is unlikely that Lehman’s collapse would have been as significant. So, although the Federal Reserve may have struggled to directly force the nonbanks to increase their capital buffers, their collapse would not have ricocheted through the financial sector had the commercial banks that very clearly were under the Federal Reserve’s oversight been bolstered between the summers of 2007 and 2008.

And even with respect to the nonbanks, regulators could have threatened to restrict nonbanks’ access to liquidity or used “softer” power to more forcefully encourage investment banks to recapitalize at the onset of the crisis.

As Professors Andrei Shleifer and Nicola Gennaoli point out, the Fed did, even for investment banks, control access to liquidity through the Term Auction Facility and the Primary Dealer Credit Facility, which gave it significant influence over investment banks—which would not have survived until the fall of 2008 without these interventions. After Bear’s collapse, the Fed could have threatened to signal to the market that the remaining investment banks were dangerously undercapitalized unless they agreed to restrict dividends and raise new equity.

And while Lehman and Bear were not under the Fed’s purview, investment banks were not unregulated. The SEC should have done more to exercise its own supervisory authority over undercapitalized investment banks to set higher capital requirements ex-ante and encourage recapitalization ex-post, especially in light of Bear’s March 2008 collapse. And all regulators could and should have pressured Lehman CEO Dick Fuld more aggressively to a merger or a dilutive equity issuance. One moment when the crisis could have gone differently: In August 2008, Lehman was in talks with Korea Development Bank for purchase of 50% of the firm. Lehman set a price higher than the only interested private party was willing to pay—a week before Lehman’s failure, when straits were even more dire, the Korean bank came with another offer, only to be rebuffed yet again.105 The threat of public shaming could have encouraged the firm to accept capital investment on the terms being offered.

104 Bernanke, Geithner, & Paulson, supra 42 at 24.
105 Madelyn Antoncic, “Lehman Failed for Good Reasons,” The New York Times (Sept. 17, 2018). https://www.nytimes.com/2018/09/17/opinion/lehman-brothers-financial-crisis.html (arguing that Lehman should have saved itself by accepting the Korean Bank’s overtures. This piece is written by the former Chief Risk Officer of Lehman who makes a point relevant to this Article: “To me, the biggest risk of all has not been adequately addressed. What I learned from the Lehman experience is the importance of governance. Leadership is about doing the right thing, and no one should go unchallenged when they are about to make a questionable decision. This culture of checks and balances is still lacking in many institutions.”)
Beyond “softer” interventions, the Fed did get the remaining investment banks under its regulatory umbrella as Goldman and Morgan Stanley became bank holding companies in September 2008. This could have been done earlier.

The objective of this Article is not to suggest that the Fed failed on the job or even to argue that the SEC should have set much higher capital requirements—the latter appearing in retrospect to be broadly indisputable. Instead, the relatively limited pressure exerted on investment banks—despite their being the proximate cause of the Recession—provides two important warnings for the next crisis. First, it is not surprising that the least-regulated aspects of the financial sector are where the crisis began to percolate. The same will certainly be true in the next crisis—not for investment banks, which have now been brought under the Federal Reserve’s umbrella, but for the hitherto unregulated shadow banking sector. Regulatory balkanization, though not the subject of this Article, remains a concern.

Second, the lack of energy around recapitalization generally, and the lack of creativity with respect to the recapitalization of investment banks particularly, in the year leading up to Lehman is quite distinct from the period following—where regulators managed to demand both banks and investment banks raise new capital, no matter how little authority they had and how painfully dilutive these measures were. The result was quick action that forestalled the Great Depression. But it suggests that while regulators will be nimble in preventing a Recession from becoming a Depression, they will not be sufficiently motivated to prevent a downturn from becoming a Recession. They will act with force, but only when crises are sufficiently severe. The decision to recapitalize earlier then is best left not to discretion but instead should be automated by thoughtful financial regulatory design.

2.A.iii Failure of Imagination and Inaction Default Explains Lack of Aggressive Early Crisis Response

Thus far, this Article contests certain points of conventional wisdom. The first point is that the Recession was fundamentally unpredictable, leaving little room for well-designed regulation to curb its severity. This is untrue. The period between the first signs of distress in the financial sector and the collapse of the economy lasted more than a year. Understanding what we now do about the severity of the Recession, it is indisputable that the regime could and should have demanded much more drastic recapitalization, and more capital could have prevented the worst of the crisis. The second point is that regulators could not have done more because they were constrained by legal authority. Legal authority to force bank recapitalization and restrict capital disbursements exists and in fact was used by regulators with respect to small financial institutions, but not with respect to their larger and more systemically important counterparts. This is puzzling but can be rationalized by the lack of desire on the part of regulators to force large, consequential, and painful dilutions in response to a crisis that many viewed as substantially addressed by creative liquidity infusions.

So, while it is possible that regulators did not appreciate their sizeable legal authority, it is also likely that they simply misunderstood the magnitude of the crisis and were not as alarmed as they should have been in the months leading up to Lehman’s failure. Regulators themselves acknowledge this, noting that the “failures of anticipation were in part a failure of imagination.”

106 See Judge, supra note 32. This is why, following the crisis, Geithner’s mantra is “capital, capital, capital.”
107 Bernanke, Geithner, & Paulson, supra note 42 at 29.
There is significant heterogeneity in these failures of imagination that predated Lehman’s bankruptcy, which are discussed infra. Some policymakers were simply ignorant of the risks in the system, despite mounting evidence that a major disruption was on the horizon. But those at the forefront of the crisis were not so naïve. Some believed that the crisis was an “old-fashioned run in new clothes,” and so liquidity, not recapitalization, was the appropriate response. Some over-extrapolated from the success in unwinding Bear and believed that the same playbook would work again if necessary, without being fully cognizant of the deterioration in financial markets that occurred in the next six months.

Detailing the reasons regulators underestimated the severity of the crisis is not meant as an indictment of the policymakers whose creativity and aggressive crisis response averted a Great Depression. Instead, the hope is to illustrate the many ways in which human judgment can err in the early stages of a downturn. Bernanke, Geithner, and Paulson make exactly this point recently in their joint memoir *Firefighting: The Financial Crisis and Its Lessons*, “it is…important to have humility about the ability of human beings to anticipate panics, because doing so requires them to anticipate the behavior of other human beings interacting in complex systems.” Because well-intentioned regulators will inevitably err, in myriad ways, at the outset of a crisis, the only hope for early action is having a regulatory infrastructure in place that requires it.

2.A.iii.a  Some Policymakers Were Ignorant of Risks

Careful examination of the available evidence suggests that some regulators, even in the days leading up to Lehman’s collapse, lacked any cognizance that the worst financial disruption since the Depression was on the horizon. The FOMC transcripts between the summer of 2007 and the fall of 2008 are littered with statements about how healthy and well-capitalized the banking sector was. For example, in September 2007, after the first tremors in the asset-backed commercial paper market, Federal Reserve Board Governor Randall Krozner declared that “the banking system…is in a good state. As was mentioned, a lot of capital is above the regulatory minimums….” In that same meeting, Bill Dudley, who went on to become the Governor of the Federal Reserve Bank of New York, noted that “the general sense is that US banks are very healthy and well-capitalized.” Months later, after the collapse of Bear, Geithner said “it is very hard to make the judgment now that the financial system as a whole or the banking system as a whole is undercapitalized…based on everything we know today, if you look at very pessimistic estimates of the scale of losses across the financial system, on average relative to capital, they do not justify that concern.” Days before Lehman collapsed, St. Louis Fed President James Bullard estimated that “the level of systemic risk has dropped dramatically and possibly to zero.”

This extreme confidence in the face of significant market evidence that the system was on the brink is also reflected in regulators’ forecasts of the likely trajectory of the economy. As economists Nicola Gennaioli and Andrei Shleifer point out, forecasts of economic growth as late as the summer of 2008, and even immediately after Lehman’s bankruptcy, reveal little cognizance of the scale of the meltdown to come. As late as the third quarter of 2008, the Survey of Professional Forecasters’ prediction for the subsequent year’s real GDP growth averaged

---

108 See infra Sections 2.A.iii.a and 2.A.iii.b, “Some Policymakers Were Ignorant of Risks” and “Even the Policymakers Who Understood Risks May Have Misdiagnosed the Problem,” respectively.
1.36%. In reality, that “growth” was negative 3.90%. And in July 2008, in preparation for the August FOMC meeting, forecasters were asked to estimate credit losses that would accrue as a result of “severe financial stress.” They anticipated that unemployment in this worst-case outcome would peak at 6.7% in 2009. It actually peaked at 10%.  

Bernanke attributes this under-prediction as reflecting “excessive optimism about the evolution of financial conditions” and suggests that the forecast evidence is reflective of an “important blind spot” of regulators.

It is important to acknowledge that many at the forefront of the crisis were much less optimistic about the health of the financial sector, and Lehman specifically, in the months leading up to its collapse. Although when testifying about the collapse of the subprime mortgage bubble in 2007, Bernanke and Paulson were both sanguine (Bernanke said that “the impact on the broader economy and financial markets of the problems in the subprime market seems likely to be contained.” Paulson agreed, noting that Treasury was monitoring the situation but “it appears to be contained.”), by the spring of 2008, worldviews had shifted. For example, Geithner reported to the Financial Crisis Inquiry Commission that he spent the months leading up to Lehman’s collapse “consumed” with trying to force the bank to become more conservatively funded. Fed Vice Chairman Donald Kohn told Bernanke that in the wake of Bear’s collapse, institutional investors believed Lehman’s failure was imminent. Erik Rosengren, the President of the Boston Federal Reserve, used the spring and summer FOMC meetings as an opportunity to try and caution his colleagues that the worst was yet to come: In the March meetings he warned that “The rise in credit default swaps for companies like Washington Mutual and Lehman Brothers indicates increased concerns for the solvency of other large financial institutions with large exposures to mortgages. The potential for a further episode of financial market dysfunction and for runs on additional financial firms is significant.” In June, he voiced skepticism about the reliability of Lehman’s capitalization despite its 12.5% regulatory capital ratio and noted that he “continued to be concerned that we have more, significant difficulties ahead for many financial institutions.”

And by August 2008, while some were naively celebrating “zero systemic risk” in the financial sector, Federal Reserve officials decided that Lehman’s collapse was so likely that they needed a “game plan” that would identify activities of Lehman that “could significantly harm financial markets and the economy if it filed for bankruptcy.” Perhaps with this in mind, Bernanke refutes those who appear unconcerned with systemic risks at the August FOMC meeting, warning that a year into the crisis “we are facing a situation of greater fragility, of much lower capital, and fewer shock absorbers” and cautioning presciently that the largest banks were about to take very significant hits that would restrict credit access for households and small businesses, further exacerbating the crisis.

---

111 Gennaioli & Shleifer, supra note 12.
112 Bernanke, supra note 28 at 14.
115 Id.
116 Financial Crisis Inquiry Commission Report, supra note 68.
It is true that in the pre-Lehman months, some had mislearned the lesson of the Bear collapse and believed the tools the Federal Reserve had successfully deployed to avert panic in March would be viable six months later. This view was bolstered by the fact that the market stabilized after JP Morgan’s federally assisted acquisition of Bear, as seen in Figures 1 through 4. However, as Bernanke, Geithner, and Paulson reflected on in Stress Test: Reflections on Financial Crises, this turned out to be untrue for several reasons: Lehman was larger, and “the system was much more fragile, so the universe of plausible buyers was much more limited. And there was nobody really strong enough to be willing to step in, even with the prospect of some assistance.”

Although a decade of retrospection has led to this conclusion, ex-ante, it was much less obvious that increased systemic fragility would thwart the Lehman rescue efforts. By all accounts, as Lehman was entering its final days, most anticipated that the firm would inevitably be acquired by a private buyer propped up by government funds.

Some were even overly optimistic about the state of the financial sector after Lehman’s collapse. The New York Times editorial page celebrated the desire of the government not to intervene to bolster Lehman: “Government intervention would have been seen either as a sign of extreme peril in the global financial system or of extreme weakness on the part of federal regulators.” Further, Bernanke testified that the Federal Reserve and Treasury decided against intervening in Lehman because of the view that fallout would be limited because the market had significant time to prepare for Lehman’s collapse.

The divergence of regulatory views between the summer of 2007 and the fall of 2008 discussed above is pivotal to understanding the lack of aggressive regulatory response to the first year of the crisis. The Federal Reserve and regulators more broadly are bureaucratic, slow-moving, consensus-driven groups. It is important to note that the crisis response this Article critiques as lackluster was, at the time, attacked by many as too aggressive, unorthodox and rash. Specifically, the liquidity interventions that had been piloted by regulators with some understanding of financial sector risks were resisted by some who thought them unnecessary and considered it inappropriate for the Federal Reserve to extend liquidity to nonbanks outside its direct regulatory purview.

118 See also, Financial Crisis Inquiry Commission Report, supra note 68 at 292 (quoting David Wong, Morgan Stanley’s Treasurer, making the point that “in hindsight, the markets were surprisingly stable and almost seemed to be neutral a month after Bear Stearns”).
119 Bernanke, Geithner, & Paulson, supra note 42.
120 “Chronology of Selected Events Related to Lehman Brothers and the Possibility of Government Assistance.” The Financial Crisis Inquiry Commission Report contains a thorough timeline of the days leading up to Lehman, which contain information on how regulators evaluated the crisis in real-time. For example, a September 10, 2008, email from Federal Reserve Assistant General Counsel Mark Van Der Weide to Federal Reserve Bank of New York General Counsel Scott Alvarez notes that “Geithner seemed to think Lehman would survive into the weekend, but may need some...help.” (p. 7).
121 “Prepared Text of Bernanke’s Statement,” The New York Times (Sept. 23, 2008). “In the case of Lehman Brothers, a major investment bank, the Federal Reserve and the Treasury declined to commit public funds to support the institution. The failure of Lehman posed risks. But the troubles at Lehman had been well known for some time, and investors clearly recognized — as evidenced, for example, by the high cost of insuring Lehman’s debt in the market for credit default swaps — that the failure of the firm was a significant possibility. Thus, we judged that investors and counterparties had had time to take precautionary measures.” https://www.nytimes.com/2008/09/24/business/24txtbernanke.html.
122 Id.
123 “Conference Call of the Federal Open Market Committee on March 10, 2008,” at 16. See, e.g., Fisher in response to the proposed Term Securities Lending Facility in March 2008: “I guess the real question is that we can fly blind
It is thus an oversimplification to say that the errors at the early stage of the crisis arose from regulators under-appreciating financial market risks; it is true in some cases. However, a broader problem—and one this Article seeks to address—is that very little regulatory will existed for earlier and even more aggressive crisis response, because there was no broad agreement about the magnitude of these risks and the likelihood of a Recession. It is implausible to expect such consensus at the onset of a crisis. This means that without a change to the regulatory default that precipitates action in the face of skepticism of its necessity, the next crisis will follow the same pattern.

2.A.iii.b  Even Policymakers Who Understood Risks May Have Misdiagnosed the Problems

The 1983 article, “Bank Runs, Deposit Insurance, and Liquidity,” by Douglas Diamond and Philip Dybvig asserts that “Bank runs are a common feature of the extreme crises that have played a prominent role in monetary history. During a bank run, depositors rush to withdraw their deposits because they expect the bank to fail. In fact, the sudden withdrawals can force the bank to liquidate many of its assets at a loss and to fail.”124

In the authors’ canonical model, a bank that is forced by the panic of its depositors to liquidate assets early is subsequently forced into failure—but before depositors panicked, no problems existed for this institution. Panic can be forestalled by the extension of deposit insurance (i.e., if depositors have no fear of losses, there is no reason to run) or liquidity (if the bank has cash on hand to repay depositors, it does not have to liquidate its assets at a loss).

The early crisis response was shaped by a belief that liquidity infusions would be sufficient to forestall panic. This is unsurprising since Bernanke believes that “the Diamond-Dybvig model describes the crisis extremely well”125—“like the classical financial panics of the nineteenth and earlier twentieth centuries, the recent panic—in wholesale funding markets, rather than in retail bank deposits—resulted in a scramble for liquidity and a devastating credit crunch.”126

The alternative view of the crisis is that it was not an “indiscriminate panic” as Bernanke describes, but instead a rational response: Bank creditors were concerned because asset losses attributable to the subprime mortgage collapse were so significant that large financial institutions faced solvency problems that made their liabilities outweigh the value of their assets. Liquidity facilities like the Federal Reserve’s Term Auction Facility do not address deeper solvency problems. Although they provided access to short-term funding, they did nothing to recapitalize banks that ran a significant risk of defaulting. For insolvent financial institutions to be viable, recapitalization was necessary.

The market signaled exactly this in the year leading up to Lehman. Large financial institutions’ market-based capital ratios (their market value of equity/assets) plummeted in the

126 Bernanke, supra note 28.
fall of 2007 and declined more precipitously following the collapse of Bear. And yet evidence suggests that regulators did not seriously contemplate recapitalization through restriction of dividends, forcing new equity issuance, or, at the extreme, direct capital provision, because they viewed it as unnecessary. In the three FOMC meetings leading up to Lehman, the word “solvency” appears only once each time in the transcript; and “liquidity” 26 times in September, 29 times in August, and 59 times in June.127 While a host of new liquidity facilities emerged in the immediate aftermath of the Bear collapse, regulators warned not to raise solvency concerns, let alone try to address them: Geithner cautioned against “casting broad aspersions about solvency…May we get to that point where those concerns are justified? Of course we may get to that point. If we systemically mismanage policy, we may get to that point. But please be careful in that context.”128

It seems that even policymakers who were attuned to vulnerabilities in the financial sector did not grapple much with the possibility that recapitalization was necessary. This foreclosed discussion of policies that could have mitigated the severity of the crisis. As the Financial Crisis Inquiry Commission concluded: “Regulators either failed or were late to identify the mistakes and problems of commercial banks and thrifts or did not react strongly enough when they were identified.”129

This discussion illustrate the difficulty of even identifying the possibility of catastrophic downturns as they emerge in the financial sector, let alone responding to them forcefully and appropriately. A 2013 speech by economist and then-Federal Reserve Board Governor Jeremy Stein makes exactly the same point:

It seems indisputable that the severity of the crisis would have been mitigated if policymakers had clamped down on dividend payouts earlier, and had compelled substantial new equity raises… the conflict between the interests of the firms, acting on behalf of their shareholders, and those of the broader public became particularly acute once the crisis got underway, because of the debt overhang problem. Cutting back on dividends and issuing new shares might have been strong positives for the banks’ overall set of stakeholders, as well as for society more broadly, but were clearly negatives for shareholders, given that such actions would have entailed large transfers to underwater creditors. This conflict of interest can make it hard for even the best-intentioned regulators to muster the conviction to take full advantage of either the appropriate legal tools or the resources available under the existing institutional framework. Under what circumstances does one tell a firm that is still well above its regulatory capital requirement that it must do a share issue that will be helpful for the economy as a whole, but highly dilutive to its existing equity holders?130

128 “Meeting of the Federal Open Mark Committee Meeting on March 18, 2008.” This is unfair to Geithner, who was likely making a point about stigmatizing large financial institutions that was rightfully at the forefront of regulators’ minds as they contemplated the appropriate response to the crisis. Policymakers’ publicly raising solvency concerns was likely to trigger widespread panic. https://www.federalreserve.gov/monetarypolicy/files/FOMC20080318meeting.pdf.
The answer to former Governor Stein is that a regulator cannot reasonably be expected to force painful recapitalization, no matter what legal authority she has, until downturns are Great. As Citigroup’s stock price fell by 80% in 10 months in 2008, the regulatory default should have been forced recapitalization. Legal authority is not sufficient because it relies on regulators choosing to act to force painful dilution that, if successful, will appear ex-post unnecessary, because a crisis will be averted. This is why automating recapitalization would have been the only way to shore up banks quickly between the summers of 2007 and 2008, and why, going forward, our regulatory regime would be enhanced if it did not require the affirmative action by well-intentioned regulators. Designing such a system of dynamic recapitalization is complicated, and the focus of the remainder of this Article.

3 Stress Tests as a Tool for Dynamic Recapitalization

The lack of a speedy regulatory response to the early stages of the Recession was not due to a lack of time to address an unpredictable panic, nor to a lack of authority to financial institutions to hoard capital. Instead, regulators—and many in the financial industry—suffered from a “crisis of beliefs” and underestimated the likelihood of a systemic collapse. This Article pushes for creation of a regulatory regime that automates recapitalization of the financial sector when market indicia of distress appear, as they did in 2007 and early 2008. Stress tests are the appropriate tool to facilitate dynamic recapitalization.

This Part begins with a history of stress tests and their implementation during the Recession. It then follows with an analysis of the limitations of the current stress test regime, which is insufficiently transparent and dynamic. The innovation of this Article is to suggest the creation of a more dynamic, market-based stress test, and force banks that fail to recapitalize immediately. This regime would go beyond forcing banks that fail the stress tests to not pay out dividends (as the stress test rules currently require), but also to force new equity raises.

3.A History of Stress Tests

By the time President Obama took office in January 2009, the economy was in free fall. Many industry commentators and academics believed the only way forward was nationalization of the largest banks. The approach eventually adopted by the Administration was a series of “stress tests” that aimed to restore confidence (and consequently capital) to the industry.

The basic idea behind the tests was that Federal Reserve examiners would investigate the books of the largest financial firms—those with more than $100 billion in total assets—representing roughly two-thirds of the U.S. banking system. The examiners would determine how much extra capital banks would need to weather a downturn if it continued at current levels and also how much excess capital would be needed to weather a catastrophic downturn. The plan was complicated: It rested on examiners being able to reliably measure (1) how much banks had already lost in the crisis and (2) how much they would lose going forward if the crisis accelerated. Projected capital ratios would be compared to minimum targets, and banks with post-stress capital ratios that fell below the targets would be given the opportunity to raise this

131 Gennaioli & Shleifer, supra note 12.
132 Bernanke, Geithner, & Paulson, supra note 42 at 107 (noting that many in the Obama Administration believed that nationalization was inevitable).
capital; if they could not attract sufficient new equity, the government would invest in these firms directly to avert system-wide failures.

Such a deep dive into banks’ financials was unheard of, and the market was skeptical of the efficacy of this approach. The stock market plummeted by 5% when Geithner announced the plan, which was panned by industry experts as “convoluted, obfuscating, and clouded.” Executives argued that the tests were pointless because they would “not produce information that is very different from what regulators already knew about the banks:” What’s striking is that these are not new issues that they are facing. These are the same issues that the Treasury faced last fall—how do we price the assets? The fact that it’s been so difficult to figure out the answer may tell you something about whether it’s worth doing or not” suggested Ethan Harris, head of economic research at Barclays Capital.

The stress test results, when announced in May 2009, revealed a capital shortfall of $75 billion in the largest financial institutions. Within a month, they raised $66 billion of that shortfall without additional taxpayer dollars. While, at the time, regulators were criticized for being too easy on banks and underestimating their woes, in retrospect, the crisis stress tests are regarded as “one of the critical turning points in the financial crisis. [They] 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 banking system and enabled its successful recapitalization.”

The success of the crisis stress tests (Supervisory Capital Adequacy Program, or “SCAP”) is still a bit of a mystery, and certainly the stress tests were not responsible for stemming a Depression in isolation. The months leading up to the May 2009 announcement were combined with policy approaches like an aggressive fiscal stimulus package and programs to kickstart consumer lending. The relative success of the U.S. stress tests when compared to, for example, the European exercise, makes clear that stress testing is not a capital panacea: The announcement of capital shortfalls in European banks in 2009 did little to stem runs on these institutions. The difference was that in the U.S., the stress tests were perceived as accurate and

---

133 Geithner, supra note 5 at 12.
136 Geithner, supra note 5 at 351: “Most Americans never heard about the stress test, and for many of those who did, it sounded like another Washington joke. Saturday Night Live had a field day with it, having an actor playing me open the show by earnestly announcing that we had given every bank a passing grade, since we didn’t want to ‘unfairly stigmatize banks who scored low on the test because they followed reckless lending practices or were otherwise good at banking.”
As a result, the market believed it credible that, with relatively minor capital-raising, banks would be able to build up a buffer that would enable them to successfully withstand the crisis. Shedding light on the fact that banks could make it through the crisis with small capital infusions then helped these banks raise equity from the market. The value of the exercise was to provide certainty at a time when investors were wary about the health of banks. Without certainty, the market was nervous about plugging a potentially unfillable hole. This is perhaps why the U.S. stress tests were more effective than their European counterparts: The Committee of European Banking Supervisors, which conducted a crisis stress tests of the region’s 91 largest banks, at first kept the results confidential.

Stress tests assess the health of banks’ balance sheets regularly and require that they adjust capital levels as new risks emerge. Given their success at recapitalizing struggling institutions during the crisis, the stress tests became a tool relied on by regulators after the crisis to help prevent the next downturn. The idea behind the post-crisis annual stress tests was that rather than wait for an actual crisis incident to stress the largest financial institutions and determine their capital shortfalls, we would now subject them to annual fire drills. With the infrastructure in place to determine banks’ projected losses during a crisis, we could extend this same infrastructure to project losses during hypothetical crises, in hopes of averting such downturns.

Annual stress tests are viewed by many policymakers as the most important post-crisis financial reform. Federal Reserve Chairman Jerome Powell called stress-testing the most significant advancement of Dodd-Frank. Former Vice Chair Dan Tarullo referred to supervisory stress testing as “a cornerstone of a new approach to regulation and supervision of the nation’s largest financial institutions” creating a regulatory framework that is “more dynamic, more macroprudential, and more data-driven than pre-crisis practice.”

---

141 Id. The EU did not publish bank-specific stress test results; further, its stress tests were perceived by the market to be overly optimistic given their divergence from external reviews of banks’ capital shortfalls. In contrast, in the United States, industry largely agreed with the stress projected losses: in May 2009, Bridgewater, a global investment firm, released a memo explaining that “It agrees!” with the regulators’ assessments.

142 “Stress Tests and Capital Planning,” Board of Governors of the Federal Reserve System. Today, annual stress tests have two distinct components. First, section 165 of the Dodd-Frank Act requires all financial institutions with assets of more than $10 billion (around 100 banks) to conduct annual company-run stress tests (this threshold has since been raised to $50 billion). The Dodd-Frank Act stress tests (DFAST) are forward-looking exercises that assess whether an institution has sufficient capital to weather a projected downturn of varying magnitudes. The Federal Reserve projects losses under three distinct scenarios: baseline, adverse, and severely adverse for all banks of at least $50 billion in total assets (now, $250 billion in total assets) The second dimension of stress-testing is the Comprehensive Capital Analysis and Review (“CCAR”), which applies to large bank holding companies (the initial threshold was $50 billion in total assets, which has since been raised to $250 billion). Large banks are required to submit detailed capital plans—e.g. planned dividend payouts and share buybacks. The Federal Reserve incorporates these plans into its assessment of their ability to withstand a Recession. To “pass” CCAR, regulated banks must have sufficient capital to cover projected losses while continuing disbursements at planned levels. Assessment of capital plans is both quantitative—measuring what happens to capital levels in the different stress scenarios—and qualitative, depending on the Federal Reserve’s assessment of banks’ internal risk management and capital provisioning. The difference between DFAST and CCAR stress-testing is that the CCAR exercise stresses banks based on their actual proposed capital disbursements, whereas the DFAST exercise stresses banks based on generalized capital plans that are based on historical disbursements rather than future plans for banks. If a bank plans to increase dividends in the coming year, it will be harder for them to pass the CCAR stress test than DFAST. https://www.federalreserve.gov/supervisionreg/stress-tests-capital-planning.htm.

hailed regular stress testing as a “new supervisory tool…more rigorous than pre-crisis bank examinations.”\textsuperscript{144}

Stress tests are a substantial innovation because they provide a forward-looking indicium of a bank’s health. Unlike regulatory capital thresholds, which are computed quarterly based on changes in capital and asset levels over the prior three months, the stress tests set capital requirements based on the expectation of what will happen to banks over nine quarters of stress. They are also largely viewed as a credible exercise that proves difficult for firms to game ex-ante, because the models the Federal Reserve uses to project crisis losses are not divulged to stressed firms.\textsuperscript{145}

The most significant contribution of stress-testing is that it, at least in principle, forces some of the dynamic capitalization that this Article argues is critical to financial stability. Had stress testing existed during the financial crisis, regulators could have relied on its results to immediately force banks to forestall dividend payouts and share buybacks (though, as discussed \textit{infra}, stress test failure does not currently trigger raising new capital). The consequence of stress test failure is the Federal Reserve’s objection to a bank’s planned capital distributions. When the Board objects to a capital plan, the firm is disallowed from making a planned capital distribution unless expressly permitted by the Board.\textsuperscript{147} If a capital plan is objected to, it may be resubmitted and reconsidered in advance of the next round of stress tests.

3.B Limitations of the Current Stress Test Regime

3.B.i Stress Test Failure is not Automatic Trigger

Stress testing is designed to automate capital hoarding by struggling financial institutions, because banks that fail the stress test are prohibited from planned capital disbursements until submission of a capital plan that keeps capital ratios above requisite minimums for the entire stress period.

However, even in this most ideal form, stress testing falls short of its promise because it does not automate capital-raising, but only prevents planned capital disbursements. To be clear, this is a significant improvement. In the summer of 2007, a well-performed stress test would have revealed significant capital shortages at many large financial institutions. These firms went on to pay out over $150 billion in capital over the next two years, at a time when the federal government poured capital into these very same institutions in efforts to stave off systemic collapse. It is undeniable that preventing dividend payouts at the outset of the crisis would have


\textsuperscript{145} Although the Federal Reserve is contemplating providing much more information about its models to stressed institutions, see, e.g., “Enhanced Disclosure of the Models Used in the Federal Reserve’s Supervisory Stress Test,” a notice by the Federal Reserve System (Feb. 28, 2019). https://www.federalregister.gov/documents/2019/02/28/2019-03505/enhanced-disclosure-of-the-models-used-in-the-federal-reserves-supervisory-stress-test. This move will dilute the value of stress-testing to regulators, as firms will have every incentive to game the stress-tests and adopt the same models as the Federal Reserve, creating widespread concerns of model monoculture.

\textsuperscript{146} See \textit{infra} Section 3.B.i, “Stress Test Failure is not Automatic Trigger.”

contributed to financial stability. The stress tests do, however, in theory provide a structure to encourage capital hoarding during times of distress.

However, there are reasons to be skeptical that this structure will operate to prohibit capital disbursements in moments of distress.

Stress test passage or failure is not an automatic byproduct of banks failing to maintain a significantly high capital threshold during hypothetical distress. Instead, the Federal Reserve decides whether to object to a firm’s capital plan. And it may choose to not object to capital plans even when firms’ capital ratios during stress fall below the requisite minimum thresholds. That was the experience of the 2018 stress tests. Morgan Stanley and Goldman submitted capital plans that led their capital levels to fall below mandated minimums in distress—meaning they failed the quantitative portion of the bank stress tests.148

The failure to maintain minimum capital justified issuing an objection to Goldman and Morgan Stanley’s capital plans. An objection would have forbidden the firms from making their planned capital disbursements until the re-submission and approval of a plan that would keep the firms at levels above the requisite 2.7%. Instead, the Federal Reserve Board chose to “conditionally non-object” to Goldman and Morgan Stanley, despite their capital levels falling below requisite levels. The conditional non-objection allowed these firms to continue to pay out dividends as long as those dividends remained at the level of the past year. This unprecedented “non-objection” allowed these banks to pay out a combined $13 billion, or about $5 billion more than they would have been able to pay if they had to re-submit capital plans to keep them above the 3% leverage ratio throughout the nine quarters of hypothetical stress.149 The Fed attributed its decision to the impact of the 2017 tax reform on firms’ capital positions, and even cheered the tests as demonstrating that “even with one-time challenges posed by changes to the tax law, the [stress test] results demonstrated that the largest banks have strong capital levels, and after making their approved capital distributions, would retain their ability to lend even in a severe recession.”150

The conditional non-objections to Goldman and Morgan Stanley are dangerous territory for the stress-testing regime and push against its usefulness in future crises. Recent proposed changes to the stress tests also make it less likely that they will operate to forestall capital disbursements during a downturn. Regulators propose that poor performance on one year’s test

---


will not change capital requirements and are eliminating the possibility of failure for “qualitative objections” based on concerns with institutions’ risk management.

Stress tests (in their current, undiluted state) would have shown weaknesses in bank capital positions and prohibited disbursements as signs of distress emerge in the financial sector. Section 2 demonstrates that regulators already had the authority to shut down dividend payments but failed to exercise it broadly until well after the collapse of Lehman Brothers, because they misperceived the severity of the crisis and worried about stigmatizing already-vulnerable institutions.

The idea behind the stress tests is thus not that they provide previously unavailable legal authority. Instead, automation is meant to remove the difficult choice of doing what seems unfair (saying banks couldn’t pay dividends) and an overreaction from regulators and instead make this an automatic consequence of the determination that banks do not have sufficient capital buffers to withstand distress. What recent “conditional non-objections” suggest is that stress tests fail to do much meaningful automation, because precluding disbursements still requires affirmative action by the Federal Reserve to object. There is no reason to believe that the onset of the next crisis will produce active objection and the automatic restriction of dividends, as should have been done in 2007.

The stress tests thus appear to provide the Federal Reserve the legal authority it already had to limit dividends if it affirmatively chooses to do so. To be fair, the stress-test regime also gives regulators a process to determine if banks have capital shortfalls that will be problematic in moments of distress. But the FOMC transcripts from the summer of 2007 reveal that, even without stress tests, many regulators were nervous that banks were not sufficiently well capitalized to withstand the crisis. Analysis that leads to the conclusion that a capital problem exists is not sufficient. A structure must be in place to dynamically and automatically address capital weaknesses.

The lack of any automation to force capital-raising is not the only criticism to levy against the current stress-testing regime—there are at least two other significant issues.

3.B.ii Stress Tests are Over-Reliant on Regulatory Capital Measures

In 2009, the SCAP was a success because the market viewed its determination as a credible estimate of the amount of capital banks would need to withstand the crisis. As Fed Governor Dan Tarullo explained: “The results were deemed credible by most market participants, owing in part to the release of details about our assumptions and methods, as well as the variation in our assessment of banks.” This credibility importantly distinguished stress-testing in the U.S. from European stress tests, where market participants believed the shortfall estimates were overly optimistic and, as such, failed to move market priors about the weakness

153 Practically, these risks began to emerge in summer 2007, and so the earliest they would have shown up in annual stress tests is the summer of 2008.
of European financial institutions.\textsuperscript{155} Credible estimates of capital shortfalls are clearly a necessary ingredient for stress testing’s success. Without reliable measures of the extent to which bank capital will be impaired during hypothetical distress, there is no way to be confident that banks will raise enough capital ex-ante to withstand a crisis. If the stress tests are overly optimistic today, the capital buffer that is required for tomorrow will not be sufficient to stave off panic. Although the earliest SCAP was credible, there is reason for concern about the excessive optimism of the annual stress tests, especially for the most recent exercises as we move farther away from the pain of the Recession.

In 2017, all banks passed the Federal Reserve’s annual supervisory stress tests for the first time since the crisis.\textsuperscript{156} Again in 2018, the stress test results report that all stressed banks would remain well capitalized in the event of a severely adverse shock resulting from a doubling of the unemployment rate, a contraction of GDP more severe than the Recession, and a 65% decline in the stock market. To be precise: If believed, the stress-test results reveal that in the event of a downturn more severe than the Recession, not a single bank would need significant government intervention and the financial sector would continue to intermediate as normal. The combined losses of the largest commercial banks through a Recession-like shock are expected to be a maximum of 1.1% of total assets. Wells Fargo is even predicted to make money during the next financial crisis; its pre-tax net income is expected to increase by 1.6% during a period when the overall stock market will fall by 65%.

This is quite a rosy picture; thus, recent stress-test success leads to significant optimism on behalf of regulators that future downturns are unlikely to become global crises. Janet Yellen, former Chairwoman of the Federal Reserve, believes it unlikely that we will see another financial crisis in our lifetimes.\textsuperscript{157} Jerome Powell celebrated the 2017 stress-test results as “show[ing] that even during a severe recession, our large banks would remain well capitalized. This would allow them to lend throughout the economic cycle, and support households and businesses when times are tough.” The success of banks on recent stress tests has led the Fed to embrace calls for deregulation and dilution of the stress-testing exercise, based on the belief that the financial system now has enough capital to withstand a severely adverse shock.\textsuperscript{158}

There are reasons to be dubious of these claims. For one thing, stressed capital ratios rely on regulatory measures of capital and risk-weighted assets. Because regulatory measures can be gamed, for example, by selectively choosing asset classes with high risk but low risk-weights, there is considerable reason for skepticism. This is why Andrew Haldane finds that a bank’s market-based capital ratio (the market value of equity/total assets) is ten times better at predicting the likelihood of bank failure than regulatory capital ratios (regulatory capital/risk-weighted assets). The fact that the more mark-to-market investment banks, which are forced to mark down the value of their assets as they trade among themselves,\textsuperscript{159} perform worse on stress tests than their less mark-to-market counterparts hints that the ability of commercial banks to avoid marking-to-market may result in overly optimistic estimates of likely losses during


\textsuperscript{158} Kapinos et al., \textit{supra} note 155.

distress. In fact, economists at the Federal Reserve emphasize that banks actively manage their balance sheets to avoid even minimal mark-to-market requirements. Economist Jeremy Bulow states the problem succinctly: “It is hard to think of what would be more important for bank safety than to make sure the bank assets are worth what they claimed…the system failed and continues to fail on this front.”

Another data point that leads us to question the credibility of stress-test estimates is a comparison to losses in earlier iterations of the test. The first annual stress tests projected that banks would lose an average of 1.7% of assets during the stress period; this was down to 0.8% in 2018. One interpretation of this result is that banks have accumulated much more capital and are safer today than they were before the crisis. But Kevin Dowd points out that the Fed’s loss projections are far too low: The 2017 projected loss from a scenario that, in GDP growth or unemployment terms, is even worse than the Recession is estimated to produce losses that are barely half of those experienced during the crisis.

Another issue for the stress tests is that they fail to even try to grapple with what Vice Chairman Dan Tarullo calls the “second-order effects” of banking crises—that is, the contagion that can accrue in a crisis. For example, when one institution fails, or is deemed to have insufficient capital, this mechanically increases the probability of default of counterparties that contract with the distressed firm and can trigger system-wide panic and runs even from well-capitalized institutions, which inevitably draw down capital buffers in times of stress.

To understand how credible the Fed’s stress test estimates are, economists Natasha Sarin and Lawrence H. Summers perform a naïve market-based stress test. Taking the beta of the largest banks—a measure of their co-movement with the market—they determine what will happen to capital levels in the event of a 65% decline in the overall stock market, as called for by the 2018 severely adverse stress scenario. Unlike the regulatory stress test results, which find that all banks remain well-capitalized in the event of such a downturn—they find that every large financial institution falls below the requisite 4.5% tangible common equity ratio. In fact, their estimates predict that the capital buffers of Bank of America, Citigroup, and Morgan Stanley would be depleted entirely by a downturn of this severity.

While an admittedly naïve exercise, the point is to illustrate how a more market-based exercise leads to a significantly more pessimistic assessment of banks’ ability to withstand a crisis than the regulatory stress test. If stress test results are not credible, there is reason to be skeptical that the largest financial institutions will continue to intermediate in the event of a downturn. Additionally, if banks still do not have sufficient capital to weather a storm, rather than celebrate the capitalization of the financial sector—e.g., Mark Carney’s statement that banks are 10x more capitalized today than before the financial crisis—instead, greater attention should be paid to proposals like this Article’s call for dynamic recapitalization, or alternatively Anat Admati and Martin Hellwig’s suggestion to increase capital held by financial institutions. Also, greater skepticism should be leveled against recent changes that significantly watered down the stress tests and are supported by regulators who, based on stress-test performance, argue that “as firms become resilient they may no longer need to build capital to support their

---


161 Bulow, supra note 159.


163 Sarin & Summers, supra note 16.
current level of risk taking, but rather move into the mode of retaining the capital they’ve already built.\textsuperscript{164}

3.B.iii  Stress Tests are Insufficiently Transparent

The 2009 SCAP was successful because its estimates of capital shortfalls were credible. But it was also successful because its estimates were transparent. Another distinguishing factor of the U.S. stress test was that the SCAP revealed firm-specific results, which had historically been treated confidentially. The push by Obama Administration officials to publicize bank-specific results was met with resistance from the regulatory community, which was concerned that publishing “guesses about future losses and capital positions” would undermine confidence, and the release of results based on proprietary bank data would “violate [the] confidentiality of supervisory information and...irreparably damage the credibility of the supervisory process.”\textsuperscript{165}

Still, Administration officials believed that only the “fullest possible disclosure” had a chance of being well received by the market and “overruled the traditional conservatism of the Fed staff.” This was not the path adopted by European regulators, where lack of transparency is often cited as a reason that firms’ strong crisis stress test performance was viewed as a non-event by markets, whereas large abnormal positive returns followed the Fed’s May 2009 SCAP announcement.

Transparency of results, then, has long been a hallmark of successful stress testing. But concerns about the lack of transparency of the process of stress testing leads many to be concerned. Industry groups and some academics argue that the Federal Reserve must make its scenarios and method for modeling likely losses during a hypothetical Recession known to the banks ex-ante. They argue it is unfair that banks are subjected to capital requirements based on stress-test performance that are unpredictable ex-ante because of insufficient regulatory transparency.\textsuperscript{166}

Historically, regulators have argued against such disclosure due to concerns that

\begin{itemize}
  \item \textsuperscript{165} Geithner, supra note 5.
  \item \textsuperscript{166} A high-profile critique by Professor Hal Scott suggests that the black-box nature of stress testing—and particularly the lack of room for public notice-and-comment on elements of the tests—leaves the Fed vulnerable to legal challenges. Such challenges were reportedly being weighed by industry groups that represent the interests of the largest banks. Note that it is unlikely that an APA challenge in this context will be sustained. For one, it is hard to see how stress testing is a rule in the context of the APA. Further, even if the stress-test process (particularly, the stress scenarios and the Board’s models) are determined to be rules, exemptions to notice-and-comment rulemaking requirements apply. Courts exempt rules from the APA’s requirements when “ordinary procedures—generally presumed to serve the public interest—would in fact harm that interest.” With respect to the stress tests, revealing internal models would be against the public interest because it would allow banks to game their investments strategically to take maximal risk (thus generating yield) with minimal capital protection in place. Additionally, revealing stress-test models would create model monoculture. Today, the Federal Reserve monitors banks’ risks with its own internal models, and banks monitor their own risks with their internal models. The differences mean that one set of monitoring may capture risks that the other ignores. Making public the regulators’ models would mean that all banks would converge to this same structure for monitoring risk—there would be no reason to continue to invest in internal risk modeling. The consequence would be a less-safe financial system. In fact, Andrew Haldane, Chief Economist of the Bank of England, attributes the crisis in large part to the failures of model monoculture and over-reliance on banks’ internal estimates as the foundation for firms’ risk management. See Andrew G. Haldane, “Rethinking the financial network.” presented at the Financial Student Association, Amsterdam (Apr. 28, 2009); and Hal Scott, “Stress Tests: Restore Compliance with the APA,” The Clearing House.
\end{itemize}
banks may game the stress tests and that the result would be model monoculture. Today, banks and regulators each run their own tests, and these differences mean that one set of monitoring may capture risks the other ignores. Making public the regulators’ models would mean all banks would converge to this same structure for monitoring risk. The consequence would be a less-safe financial system. In fact, Andrew Haldane, the Chief Economist of the Bank of England, attributes the crisis in large part to the failures of model monoculture and over-reliance on banks’ internal estimates as the foundation for firms’ risk management.  

That said, the general desire for transparency is one that has been reiterated by industry and begun to penetrate. In parting remarks, former Governor Dan Tarullo noted the need to promote transparency in stress testing: “Transparency of the scenarios and results gives investors and analysts valuable information about the condition of the tested banks, thereby contributing to market discipline. It also allows the public to evaluate the job the Federal Reserve is doing. For example, analysts can compare our loss estimates for specified portfolios under specified stress conditions with their own evaluations—an exercise that can inform both the analysts and us.”

In recent remarks, Randy Quarles argued the need for even greater transparency in stress testing: “Enhanced transparency goes to the very core of democratic accountability and to the rights of all US citizens, including the management and shareholders of institutions that are subject to the stress tests.”

The Board has, in fact, moved in this direction, providing for the first time detailed information about its modeling process and how hypothetical loan portfolios perform under the tests. It argues that greater transparency is in keeping with the “fundamental principle of the first stress test and every one that has followed.” This logic is confused. Although the initial


167 Andrew G. Haldane, “Why Banks Failed the Stress Test,” presented at the Marcus-Evans Conference on Stress-Testing (Feb 9-10, 2009). http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.360.5247&rep=rep1&type=pdf. In this 2009 speech, Haldane rehashed comments by Goldman executives who remarked that in August 2007 the firm experienced “things that were 25-standard deviation moves, several days in a row.” “To provide some context, assuming a normal distribution, a 7.26 sigma daily loss would be expected to occur once every 13.7 billion or so years. That is roughly the estimated age of the universe….Fortunately, there is a simpler explanation—the model was wrong….risk management models have during this crisis proved themselves wrong in a more fundamental sense. They failed Keynes’ test—that it is better to be roughly right than precisely wrong. With hindsight, these models were both very precise and very wrong.”

168 Id. These arguments have been made by members of the regulatory community. In parting remarks upon his departure from the Federal Reserve Board, Vice Chair for Supervision Daniel Tarullo distinguished the stress tests from typical agency rule makings: “In short, this is not like using a model to develop a regulation that, for example, limits emissions of polluting substances. In such a case, adherence to the precise model output would itself achieve the regulatory purpose. Here, by contrast, the very purpose of the regulatory regime would be undermined. Remember, this is a stress test. The shifts in activities of banks and in the economy create a dynamic set of risks. Effective prudential regulation must be equally dynamic and should try to avoid pushing major financial firms toward measuring all of their risk positions in exactly the same way.”


170 Id.

171 “U.S. Federal reserve provides more information on bank stress tests,” Reuters (Mar. 28, 2019). https://www.reuters.com/article/us-usa-fed-banks/u-s-federal-reserve-provides-more-information-on-bank-stress-tests-idUSKCN1R92N7 (many critique this disclosure as compromising the integrity of stress-testing and increasing the likelihood of model monoculture in the regulatory regime going forward).

172 Quarles, supra note 14
SCAP’s success had to do with transparency, this was about transparency of individual bank results, which the market deemed as credible assessments of individual banks’ capital holes. Transparency around scenario design, and especially Federal Reserve models, undermines the usefulness of the stress-testing exercise because it means large financial institutions will be able to game the tests. These changes also magnify model monoculture concerns, as, if banks are able to back out of the Federal Reserve’s models, they have no incentive to maintain their own projections of likely crisis losses, and the risk management benefits are thus diluted.

More transparency in the stress-testing regime is likely to be welcomed by both the current regulatory community and the financial industry. A market-based component to the stress-test, discussed infra,\(^{173}\) is fully transparent. It also will push back against many of the detrimental recent changes to stress testing that have decreased the informational content of the annual exercise. Instead of relying purely on regulatory capital measures, which have been made easier to game by the Federal Reserve’s transparency-oriented reforms, adding a market-based component to stress testing will paint a more accurate and dynamic picture of financial sector stability.

### 3.C  A Market-Based Stress Test to Automate Recapitalization

Stress tests are the most significant post-crisis financial regulatory innovation. And yet, the current stress-testing regime does not achieve its full potential, because stress tests do not rapidly recapitalize financial institutions as warning signals appear. Additionally, reliance on regulatory capital measures raises questions about the credibility of stress test estimates. There are also concerns about the transparency of the stress-testing process. These concerns have led to reforms that substantially dilute the stress tests’ usefulness, as regulators now provide significant detail about stress-test models and estimates to stressed institutions, increasing the likelihood of model monoculture and gaming to reduce requisite capital levels.

A series of relatively straightforward reforms can make stress tests the tool to dynamically recapitalize financial institutions. Simultaneously, we can make stress testing more transparent and credible. The solution is a market-based stress test whereby failure automatically (1) forces banks to stop making capital disbursements and, if not sufficient (2) requires them to raise new equity capital to fill the market-determined capital hole. How would this operate in practice?

### 3.C.i  Stress Test Failure Should Automatically Force Recapitalization

The first innovation is that the stress-test rules should be amended to automate capital hoarding and new capital raising. The Board adopted the current capital plan rule in 2011, which required each bank holding company with more than $50 billion in total assets to submit an annual capital plan.\(^{174}\) Comprehensive Capital Analysis and Review (“CCAR”) uses these capital plans to determine whether large financial institutions will be able to weather a crisis shock even while making planned disbursements. The rules allow but do not require the Board to object to capital plans if banks have not demonstrated “an ability to maintain capital above each minimum regulatory capital ratio...under expected and stressful conditions throughout the planning

---

173 See infra Section 3.C.i, “A Market-Based Stress Test to Automate Recapitalization.”
174 12 CFR 225.8
Amending these rules to say that the Board will object to capital plans when banks fail the quantitative aspect of the stress test will automate halting capital disbursements when an institution shows signs of being ill-equipped to withstand a crisis.

Automating objection means that when a bank fails the stress test, it will no longer be able to make planned dividend payouts or share repurchases without the express approval of the Board. Our stress-testing regime should be amended to mandate that, if a bank is not able to meet minimum stress capital ratios through changes to its distribution policy alone, its revised capital plan must include a plan to raise new dollars of equity capital within some pre-specified period (e.g., three months). Following the capital-directive language, the failure to propose and implement an adequate capital plan can trigger judicial remedies (“the Board may seek enforcement of the directive, including the capital adequacy plan, in the proper [court]”) as well as administrative remedies (“the Board…may also assess civil money penalties for violation of the directive”). For maximum severity, the rules requiring recapitalization for stress-test failure can be analogized to those of prompt corrective action directives for severely undercapitalized banking institutions, which mandate the appointment of a receiver if other action fails to restore capital and an institution remains undercapitalized for 270 days.

An alternative to amending the stress-test rules to require recapitalization is to amend the existing rules for recapitalization of banks to include stress-test failure as a trigger for action. For example, ILSA stipulates that banks that fail to meet minimum regulatory capital ratios may be “issue[d] a directive…to submit and adhere to a plan acceptable to the appropriate Federal banking agency describing the means and timing by which the banking institution shall achieve its required capital level.” As discussed, ILSA directives can also be issued at the discretion of banking agencies to particular institutions that fail to meet capital levels that the agency deems “necessary or appropriate in light of the particular circumstances of the banking institution.” This ability to set bank-specific capital requirements that are responsive to the particular circumstances of banking institutions already provides the Federal Reserve the authority to issue capital directives as a result of stress-test failure.

That said, amending ILSA to include stress-test failure as an explicit justification for a capital directive may increase the likelihood that regulators will use this authority in response to stress-test failure. However, ILSA still requires regulators to affirmatively act to force recapitalization. An automatic system is preferable because it will change the default to recapitalization unless regulators intervene, instead of vice versa. This pushes in favor of automation of capital hoarding and even the raising of new capital through the stress-testing regime. An alternative is to automate ILSA capital directives, which would require new legislative action.

https://www.federalreserve.gov/newsevents/pressreleases/bcreg20111122a.htm
177 § 263.84 Enforcement of directive, Cornell Law School Legal Information Institute.
https://www.law.cornell.edu/cfr/text/12/263.84.
179 8000 - Miscellaneous Statutes and Regulations, Capital Adequacy section (B)(i).
180 Id.
3.C.ii  Current Stress Tests are Ill-Suited to Trigger Recapitalization

Several caveats to these approaches are worth noting. The first is that the policy prescriptions for automating recapitalization through the stress tests necessarily will work only for banks that are subject to regular stress testing. Although the Dodd-Frank Act mandated that the Board create a stress-testing regime for banks with more than $50 billion in consolidated assets, in 2018 this threshold was raised to $250 billion.\(^1\) This leaves only 13 banks subject to requisite annual stress-testing.\(^2\) If stress-tests are the mechanism by which to enforce dynamic recapitalization, we will be able to recapitalize only the largest banks in the financial sector. This is less worrisome than it appears, as these banks cover more than 70% of total domestic banking assets. The goal of dynamic recapitalization is to insure that financial institutions have sufficient capital to withstand an adverse shock so their potential failure does not trigger a debilitating run on the industry. The adverse systemic consequences of a large firm’s failure are much more severe than that of a small firm, so it seems reasonable to focus dynamic recapitalization on the largest financial firms.\(^3\)

Even if a combination of regulatory and legislative changes increased the likelihood that financial institutions would automatically recapitalize after failing stress tests, the success of this approach requires that the stress-testing regime paint an accurate picture of banks’ capital deficiency. As discussed above, there is reason to believe that the stress tests paint an overly optimistic picture of bank health: A simple “market-based” stress test suggests that three of the six largest financial institutions will find their capital buffer totally depleted in the event of the stress tests’ 2018 severely adverse scenario and that the rest will all be far under the requisite minimum threshold. The regulatory stress-test results suggest the opposite—that banks will continue to intermediate as normal, and not a single large institution will require government support.

The problems with regulatory capital ratios are three-fold. First, they are a backward-looking measure of banks’ health—that is, they measure the leverage of financial intuitions as of the beginning of the prior quarter. Second, they are static—they do not adjust throughout the quarter despite the fact that banks’ balance sheets change continuously. Third, they are not reliable measures of bank health—as Andy Haldane reported, there is no difference in regulatory capital ratios for banks that failed versus those that did not fail, although there is substantial variation in their capital ratios measured based on market values (market value of equity/total assets).

The current stress-testing regime addresses only one of these problems—the tests are a forward-looking indication of bank health based on projections of what could happen to financial institutions during a crisis. However, they are not dynamic, and they rely on the same regulatory capital ratios that we know paint a less-than-accurate picture of banks’ stability.

\(^1\) The stress-testing requirement was removed for banks with $50 billion to $100 billion in total assets, and the Fed has discretion to determine whether a financial institution with assets equal or greater than $100 billion must be subject to such standards.
\(^3\) This makes the story of the financial crisis even more puzzling. We did avail of existing legal authorities to encourage capital-hoarding (e.g., dividend bans) and capital-raising (e.g., bank-specific heightened capital requirements)—but only for small firms, those whose failures would be least risky from a financial stability perspective.
Having a component of stress testing that is market-based would create a dynamic regulatory regime. Combined with changes that automate recapitalization post stress-test failure, the result could be a financial system that forces banks to hoard and increase capital levels automatically the moment signs of distress begin to emerge.

3.C.iii A Market-Based Stress Test Could Help

As Professors Matthew Baron, Emil Verner, and Wei Xiong illustrate using data from historical banking crises in nearly 50 countries, bank equity returns predict financial crises. Specifically, the authors find that a 30% decline in bank equities in a year is a signal that the financial sector is undercapitalized and predicts a severe credit crunch is on the horizon.

It is imperative to design a regulatory regime that triggers recapitalization in response to market-based information about financial sector health. The empirical evidence is overwhelming that the market indicia are leading indicators relative to their regulatory counterparts.

Imagine that the stress-testing regime required the Federal Reserve to re-stress banks whose stock returns had fallen by more than 30%, or whose CDS spreads had doubled in the last year. They would conduct these supplemental stress tests based on balance sheet data about the firm at the moment in time when their CDS spread spiked and prevent any capital from leaving the firm (e.g., immediate suspension of dividends/share buybacks) until the Board determined that it was sufficiently well capitalized to successfully navigate severely adverse stress. The secondary stress test could be tailored to stress asset classes in which the struggling firm is highly invested and determine whether the bank is well equipped to handle a sudden shock in these markets.

Such a policy would have caused regulators to stress every large financial institution in the year leading up to the collapse of Lehman, many (Bear, Citigroup, Goldman, JP Morgan, Morgan Stanley, and Wells Fargo, and of course Lehman itself, by the fall of 2007). Of course, stress-testing did not exist then, but when such patterns emerge going forward, the result of this market-based component to stress testing is that banks will be forced to stop paying out dividends and perhaps raise new capital immediately as the next crisis begins.

What we propose is, in essence, forcing banks into the SCAP exercise earlier. SCAP was a success because it forced regulators to estimate the size of the capital hole in the midst of the actual crisis. By forcing banks to measure this capital hole earlier, we could have filled it earlier.

Of course, this is not a panacea, because this approach assumes that a 2007 SCAP would have been as successful as a 2009 SCAP in predicting how much extra capital was needed to

---

184 This is the trigger that Baron et al. focus on in their paper. See supra note 4.
185 More recently, this policy would have forced regulators to re-stress Deutsche Bank when its CDS spread spiked in February 2016, after its stock price dropped by nearly 10% in a single day. As an illustration of the issues with regulatory capital ratios, at this moment, former CEO John Cryan pointed to the firm’s Tier-1 capital ratio (over 11%) as proof it is “absolutely rock solid.” See “+++ V.I. (SA) Deutsche Bank Brutalized By European Economic And Political Malaise,” Searchbonus (Aug. 18, 2016). https://searchbonus.eu/category/deutsche-bank/page/17/
186 This stress test reform is but one way to force capital into the financial system in response to market signals of distress. Other possibilities exist and merit consideration. For example, Jeremy Bulow and Paul Klemperer propose “equity recourse notes,” or convertible bonds that will convert from debt to ordinary stock in response to market indicia of banks’ health. This is a market-based version of the “contingent convertible bond” approach that has been encouraged by Basel III. See Edmund Andrews, “Jeremy Bulow: A Better Approach to Bank “Bail-Ins”,” Stanford School of Graduate Business (May 22, 2014). https://www.gsb.stanford.edu/insights/jeremy-bulow-better-approach-bank-bail-ins.
stabilize the financial system. In 2009, the crisis stress tests were benchmarking against a crisis that was actually happening—the predictions they were stressing large financial institutions against (e.g., a 10% unemployment rate) were only a few weeks away from being realized. The reason the current stress-testing exercise paints a much less realistic picture of bank health is that the “normal times” stress test does not come to realistic predictions of the accumulation of bank losses during crisis. This is a complex exercise at any point in the business cycle, but it is simplified when regulators are able to see the trajectory of bank losses in an actual crisis. It is much more difficult to do ex-ante, as the over-jubilance of the regulatory stress-testing exercise indicates.

One approach would be to force large financial institutions subject to a secondary stress test to reconcile the differences between the regulatory and market capital levels. If in the fall of 2007 the Big 6 banks were subject to a second stress test, regulators may well have concluded (as they have done in the last three rounds of annual stress testing), that the banks had sufficient capital to intermediate as normal even if a severe downturn (e.g., 10% unemployment, 50% decline in the stock market) was on the horizon.

However, we know that market-based measures of bank capital levels paint a less-serene picture in normal times: In 2018, every large bank passed the regulatory stress tests, but a market-based approach showed that all would be severely undercapitalized if a crisis hit. Reconciling this discrepancy becomes very important at the outset of a crisis. If, in the fall of 2007, we forced large banks to explain the differences between what regulatory capital ratios and market-based capital ratios predicted about their capacity to withstand a crisis, this would have focused bank executives and regulators on an indicator of bank health that was less sanguine. If secondary stress tests automatically foreclose disbursements, we would have stopped large banks from making planned dividend payments until they satisfactorily explained to policymakers why the market deemed them unlikely to withstand a crisis without significant government intervention.

3.C.iv Bank Complaints with This Approach

Institutions that are forced into a secondary stress test may complain of the stigma associated with being labeled by the Board as a struggling bank. They may also argue (as banks did during the financial crisis)\(^{187}\) that short sellers are aggressively targeting firms to push them into a secondary test, and that this speculative behavior—rather than a fundamental problem with their investment strategy—has panicked the market. In this case, however, firms should welcome a secondary stress test. Rather than slug along for a year and continuously justify to shareholders that, despite what the market believes, your bank’s capital position is rock solid (as Deutsche Bank proclaimed in February 2016, after its stock price fell by 10% in single day), examiners from the Board would make that determination on the bank’s behalf, making clear to the market that there was no reason for concern. Resolution of uncertainty is desirable for healthy financial institutions, and that is why, in response to the initial SCAP results, banks experienced positive abnormal returns.

Beyond complaints about stigma, a natural argument by banks will be that the market is noisy. This can be used to object both to being forced into a secondary stress test based on equity valuations, as well as be how large banks seek to explain the discrepancies between regulatory and market capital levels. As economist Eugene Fama famously noted, “The only certainty is that the market is wrong.”

This line of criticism is unpersuasive. First, as overwhelming empirical evidence illustrates, periods of low bank equity performance precede financial crises. While on occasion, these declines “might be driven by equity market noise,” a 30% decline in bank equities in a year—the trigger we advocate using—is associated with a 6% credit contraction in the following three years.

To get a sense for how many “false positives” our trigger will precipitate, Table 1 and Figure 5 examine the performance of the S&P Bank Financials Index since 1990. In the last three decades, there were only two instances of bank equity declines greater than 30% in magnitude in a year. One was the Great Recession (2007), the other the aftermath of the Savings and Loan Crisis (1990). Although it is true that banks will complain that they are being forced into dilution on the basis of noisy market information, the data suggest we should be skeptical of such complaints.

Even assuming that, on occasion, banks will be forced into dilutive recapitalization on the basis of noisy market information (an assumption the data decidedly does not corroborate). As a result, banks will in some instances be forced into dilutive equity issuance. This will be painful for their shareholders (in the short-term, although they can and will buy back shares in the future). The alternative is a regime that results in costly taxpayer bailouts. From a policy perspective, it is hard to argue that short-term inequity to financial firms’ shareholders should outweigh the costs of taxpayer-funded bailouts and the long-term consequences of Recession.

Further, even from the banks’ perspective, flexible dynamic recapitalization is preferable to constantly higher capital requirements—like the safe banking proposal (100% capital ratios) or even more moderate approaches like Admati and Hellwig’s (25% capital ratios) would require. The system could sustain lower baseline capital ratios (lower cost of capital for banks) in normal times, and only in downturns, to avoid panics, would more equity need to be raised.

3.C.v Alternatives That Further Increase Automation

The proposal of a secondary stress test is a fairly mild policy approach. Banks will be subject to another round of stress testing if their equity returns (or CDS spreads) fall significantly. As part of this exercise, they will be required to explain discrepancies that exist between their regulatory and market capital levels, and secondary stress-test failure or failure to convincingly reconcile these differences will trigger automatic recapitalization.

---

On its face, this is a reasonable critique. The market can over- and under-react to information and be a noisy signal of financial health. This is one reason a purely market-based regulatory regime is undesirable (another reason: such a regime would inevitably be counter-cyclical—banks would always appear to be safe when the market was doing well, even if risks were building up on their balance sheets that regulatory measures of capital are well-equipped to identify). So, it is possible that this dynamic recapitalization regime would cause painful dilution at low price for many firms.

See Baron, supra note 4

For comparison, relying on slightly different data (but the same trigger, which we adopt from their work), these are the same instances of crisis that Baron et al. identify in their work in the US in this same period. See Baron et al., supra note 4.
Note that this approach still affords regulators flexibility in deciding when recapitalization is necessary. Even if bank capital levels—as gleaned from market valuations—indicate cause for concern, if policymakers find banks’ explanations for the discrepancies between regulatory and market-based indicators of health persuasive, banks will be free to disburse capital at planned levels and will not be required to raise new equity.

This regime is intended to be an improvement over the status quo, because it will at least force thoughtful reconciliation of regulatory and market information instead of simply ignoring warning signs from the latter. It will change the regulatory default from inaction and ignorance of market information to at least some action (e.g., foreclosing dividends while secondary stress tests are underway) and careful attention to what we can learn from bank stock performance. It is possible to imagine a regime in which bank executives testify before Congress about the discrepancy between regulatory and market-based capital levels. This could help alleviate concerns that financial regulation is insufficiently democratic and decision-making rests too heavily with unelected power.

This proposal is intentionally a middle way—between waiting for regulators to find the “courage to act” to tackle capitalization problems in the financial sector and true automation that would require recapitalization immediately when the market indicates distress may be likely. The issue with a fully automatized response is that it exacerbates concerns about death spirals being triggered by investors who stand to profit from banks being forced into dilutive equity issuance. It also makes it difficult for regulators to intervene when it is known that the market is providing volatile signals of financial sector stability that there are good reasons to believe are noise rather than information. But by not going to the extreme of automation, we still allow room for regulatory judgment to under-respond to a crisis at its offset: to grapple with but ultimately dismiss the informational content of poor market performance.

This is not the only approach. Others have made the case for financial sector recapitalization to be programmed as indicia of bank health. The basic premise is that financial crises can only occur when banks’ debts exceed their underlying assets. If debt is extinguished or converts to equity, during moments of distress, from the creditor’s perspective, this debt is risky; but, from the taxpayer’s perspective, the system is completely safe. No bank could ever fail and no bailout ever ensue, because its debtholders’ claims would be extinguished in moments of distress.  

A more drastic regulatory response would be to prewire recapitalization, either with a contingent instrument that automatically increases a bank’s equity position, or by requiring banks to purchase an insurance policy (“capital insurance”) that provides capital in a bad state of the world. Like a stress-test-based approach to recapitalization, these approaches recognize

---

191 It is actually not obvious from a financial stability perspective whether the write design for convertible instruments is for them to be written-off or converted to equity in moments of distress. Outside of the US, both models exist: principal write-down bonds represent 55% of issuances; with the remainder consisting of CoCos (Avdjiev et al. 2017). Some argue that debt instruments that are written off entirely are preferable because ex-ante shareholders are more likely to issue convertible claims that will not dilute them; they do not create the risk of a “death spiral”; and “they are more suited to fixed-income investor mandates and limit the risk of fire sales following a trigger.” See Baron, supra note 4 and Boris Vallee, “Contingent Capital Trigger Effects: Evidence from Liability Management Exercises,” HEC Paris Research Paper No. FIN-2013-1014 (June 4, 2019). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2346376.

that a less-distortionary alternative to making banks be more equity-financed always, is requiring
greater capital at precisely the moment when it appears likely the financial sector needs it most.

For these alternatives to precipitate successful recapitalization, they should be triggered
by market measures of bank health. Many contingent capital plans in practice have been based
on regulatory capital levels, but these approaches are inefficient given the empirical evidence
that market measures contain information about distress that leads regulatory indicators. Some
contend that contingent capital instruments with conversion tied to market triggers may lead to
self-fulfilling death spirals. Imagine shareholders who observe their firm is close to the 30% threshold for conversion. Dilution may well be on the horizon, and to hedge this risk, shareholders could go short themselves, which puts further downward pressure on the share price. This could well trigger conversion, which becomes self-fulfilling as equity prices begin to fall. These concerns are not the death knell for contingent capital instruments, however, and are addressed by designing write-off debt instruments rather than those that convert to equity in moments of distress.

Thus, from a regulatory perspective, should full automation be the objective, a write-off contingent-capital instrument, for which debtholders’ claims are written off based on the realization of a market trigger, seems the most sensible design. However, it is not obvious that such an extreme approach is desirable or politically feasible. As a starting point, this Article advocates more of a middle ground that defaults regulators into action—by automating foreclosure of dividends and forcing reconciliation of market and regulatory capital levels—in response to market signals of financial sector distress.

4 Conclusion

There is universal agreement that the financial sector—and global economy—would have been better off if more had been done earlier to mitigate the Recession. The reasons offered for lack of early response to the crisis are generally two-fold. On one hand, many argue that crises are inherently unpredictable, and there was not sufficient time before the escalation of the crisis for well-designed policy to limit its effects. On the other hand, some suggest that even those regulators who were prescient about the possibility of a calamity could not have done more, because they lacked the authority to intervene aggressively.

This Article disputes these myths. First, significant time existed between the onset of the crisis in the summer of 2007 and the collapse of the global financial system in the fall of 2008.

---


194 See, e.g. Hanson, supra note 11, pointing out, for example, that “in November 2009, Lloyds Bank issued £7.5 billion in contingent convertible debt, with conversion to equity to be issued £7.5 billion in contingent convertible debt, with conversion to equity to be triggered if Lloyds’ Tier 1 capital ratio falls below 5 percent.”

195 The academics who have written about CoCos do not agree on the optimal design, and have debated on whether the trigger should be market equity or regulatory capital levels. Flannery (2005, 2016), Raviv (2004), Duffie (2009), McDonald (2013), Coffee (2011), Pennacchi et al. (2014), and the Squam Lake Working Group (2010).

196 For more on death spirals, see also https://ftalphaville.ft.com/2011/03/08/507336/an-explanatory-coco-death-spiral/ (noting that for an equity holder who sees a bank where debt conversion to equity is likely; the investor may go short the bank, and this can drive the bank’s share price down significantly, making a significant decline in bank equity self-fulfilling when risks of conversion are significant enough).
Second, regulators did have significant authority to force financial institutions to hoard and even raise capital to stave off collapse. In fact, they exercised this authority with respect to small banks, but not to their large, systemically more important counterparts.

This Article offers a third rationale for insufficient early action. Our regulatory framework relies on policymakers making the affirmative choice to force banks to raise capital in moments of distress. Regulators are human: They are imperfectly prescient and can underestimate the probability of a severe downturn and underreact.

Thus, a system of dynamic recapitalization that automatically forces banks to hoard and raise new capital as signs of distress emerge in financial markets is desirable. Such a system does not rely on regulators choosing to act, but instead, is directly responsive to signals of distress as they emerge. This approach would have forced banks to stop paying dividends and even raise new capital in the fall of 2007, when instead more than $100 billion left the financial sector despite many indicators that all was not well.

By investing in crisis prevention, we can end the need for, rather than inevitably force, value-destroying firefighting once downturns pick up steam. It is true that the result may be occasional false positives: big banks will be forced to not pay dividends or to issue new equity because of market noise, rather than imminent distress. But the costs of these false positives will be borne by financial firms and their shareholders. That is preferable to the costs of bailouts being borne by taxpayers.

It is important to point out that regulators are moving in the wrong direction. In recent months, in the name of transparency, the Federal Reserve has chipped away at the usefulness of the stress-testing exercise by ending regular stress-testing for many large banks. It has also begun providing financial firms with more information about the models it relies on to project bank losses and it is contemplating changes to stress-testing that will reduce the volatility of bank capital ratios.

The Federal Reserve is basing these changes on a belief that the financial sector is sufficiently capitalized to survive the next downturn.\footnote{Federal Reserve Board. “Federal Reserve Board Releases Results of Supervisory Bank Stress Tests.” (Jun. 2017) (“This year’s results show that, even during a severe recession, our large banks would remain well capitalized,” Governor Jerome H. Powell said. “This would allow them to lend throughout the economic cycle and support households and businesses when times are tough.”)} Regulators point to performance on recent stress tests as dispositive on this point. However, as economists Natasha Sarin and Lawrence Summers have made clear, there is no reason to be this sanguine about the health of the financial sector.\footnote{See Sarin and Summers, supra note 16 (finding that based on a market-based stress test, each of the six largest banks in the United States will be under-capitalized if the Federal Reserve’s “severely adverse” scenario comes to pass).} Market-based stress tests suggest that, come the next crisis, financial firms will have large capital holes that regulators will need to find a way to fill.

There is no problem with this as the status quo. We need not force large banks ex-ante to have so much capital that, without any changes to their disbursements or baseline capital levels, they will be able to withstand a Recession-like shock. These shocks are rare, and it is inefficient to require such high equity levels that undercapitalization will never be a concern, as some scholars, like Anat Admati and Martin Hellwig, have advocated.\footnote{See Admati and Hellwig, supra note 22.} But in the absence of 100-percent equity-financed banks, the only way to safeguard the financial system is to overhaul regulation to create a regime that will quickly bolster banks when distress appears likely. There is significant danger in assuming, incorrectly, that the system has
reached “reasonably full capitalization” because this breeds complacency: Regulators today are failing to invest sufficiently in policing financial markets because of an errant belief that the system is already safe enough to weather the next storm.200

Unless we are quick to course correct, when the next crisis is inevitably on the horizon, we will again fail to act early to forestall systemic panic. The results will be costly bank failures and devastating losses to average Americans. We can do better, but only by creating a more dynamic, faster-moving regulatory regime. Recent deregulatory headwinds appear to have forgotten the lessons of the financial crisis. This Article hopes to revive them.

---

200 See Quarles, supra note 164 (arguing that “having a highly variable capital requirement presents a significant management challenge” that is unnecessary, since financial institutions have built up sufficient capital buffers).
Figure 1(a): Price and Volatility of Large Financial Institutions
Figure 1(b): Price and Volatility of Large Financial Institutions
Figure 2: Price and Volatility of Large Financial Institutions, Average

Volatility is average (equal-weighted). Price is price movement for a portfolio of $100, equally invested across these firms.
Figure 3(a): CDS Spreads of Large Financial Institutions

Bank of America

Citibank

JP Morgan

Morgan Stanley
Figure 3(b): CDS Spreads of Large Financial Institutions
Figure 4: CDS Spreads of Large Financial Institutions, Average

CDS spreads are average across all firms (equal-weighted) for 5-year tenor.
Figure 5: S&P Bank Index Performance Over Time
### Table 1: Annual Growth Rates, S&P Bank Index

*Red indicates years where decrease would meet 30% threshold for secondary stress tests*

<table>
<thead>
<tr>
<th>Year</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>-34%</td>
</tr>
<tr>
<td>1992</td>
<td>58%</td>
</tr>
<tr>
<td>1993</td>
<td>25%</td>
</tr>
<tr>
<td>1994</td>
<td>7%</td>
</tr>
<tr>
<td>1995</td>
<td>-7%</td>
</tr>
<tr>
<td>1996</td>
<td>53%</td>
</tr>
<tr>
<td>1997</td>
<td>35%</td>
</tr>
<tr>
<td>1998</td>
<td>44%</td>
</tr>
<tr>
<td>1999</td>
<td>4%</td>
</tr>
<tr>
<td>2000</td>
<td>-20%</td>
</tr>
<tr>
<td>2001</td>
<td>19%</td>
</tr>
<tr>
<td>2002</td>
<td>-2%</td>
</tr>
<tr>
<td>2003</td>
<td>0%</td>
</tr>
<tr>
<td>2004</td>
<td>18%</td>
</tr>
<tr>
<td>2005</td>
<td>11%</td>
</tr>
<tr>
<td>2006</td>
<td>-3%</td>
</tr>
<tr>
<td>2007</td>
<td>11%</td>
</tr>
<tr>
<td>2008</td>
<td>-35%</td>
</tr>
<tr>
<td>2009</td>
<td>-48%</td>
</tr>
<tr>
<td>2010</td>
<td>-9%</td>
</tr>
<tr>
<td>2011</td>
<td>19%</td>
</tr>
<tr>
<td>2012</td>
<td>-11%</td>
</tr>
<tr>
<td>2013</td>
<td>21%</td>
</tr>
<tr>
<td>2014</td>
<td>27%</td>
</tr>
<tr>
<td>2015</td>
<td>14%</td>
</tr>
<tr>
<td>2016</td>
<td>-4%</td>
</tr>
<tr>
<td>2017</td>
<td>26%</td>
</tr>
<tr>
<td>2018</td>
<td>19%</td>
</tr>
<tr>
<td>2019</td>
<td>-17%</td>
</tr>
</tbody>
</table>