Journal of Economic Perspectives—Volume 33, Number 1—Winter 2019—Pages 61–80

Financial Regulation: Still Unsettled a Decade After the Crisis

Daniel K. Tarullo

A decade after the darkest moments of the financial crisis, both the US financial system and the legal framework for its regulation are still in flux. The post-crisis regulatory framework has made systemically important banks much more resilient. They are substantially better capitalized and less dependent on runnable short-term funding. But the current regulatory framework does not deal effectively with threats to financial stability outside the perimeter of regulated banking organizations, notably from forms of shadow banking. Moreover, with the political tide having for the moment turned decisively toward deregulation, there is some question whether the resiliency improvements of the largest banks will be preserved.

This article assesses the accomplishments, unfinished business, and outstanding issues in the post-crisis approach to prudential regulation. After briefly reviewing how the ongoing integration of capital markets and traditional lending channels undermined the New Deal regulatory framework, I explain how the post-crisis regulatory approach of instigating changes across a range of bank activities and practices brought about a steady improvement in the resiliency of the financial system, especially in the largest financial institutions. Next, I turn to an evaluation of how

■ *Daniel K. Tarullo is Professor of Law, Georgetown University, Washington, DC, and Visiting Professor of Law, Harvard Law School, Cambridge, Massachusetts. From 2009 to 2017, he was a member of the Board of Governors of the Federal Reserve, Washington, DC, where he served as oversight Governor for Supervision and Regulation. His email address is dtarullo@law.harvard.edu.*

† For supplementary materials such as appendices, datasets, and author disclosure statements, see the article page at
https://doi.org/10.1257/jep.33.1.61

doi=10.1257/jep.33.1.61

durable this regulatory approach will prove over time. The answer will depend on how financial regulators can and will respond to what will surely be the highly adaptive behavior of financial market participants to changes in regulation, technology, and the overall market environment. The hurdles to doing so, both political and institutional, are substantial. While regulators have ample legal authority to contain risks at prudentially regulated banking organizations, over time they may lack the will or organizational capacity to exercise those authorities effectively. It is doubtful whether they have adequate authority to address threats to financial stability that may arise *outside* the perimeter of prudentially regulated firms. In particular, there is reason for concern about appropriate regulation of liquidity and short-term finance, which would likely be at the center of a future crisis. Thus, while the resiliency of the financial system is likely to remain fairly high in the near term, the medium- and longer-term prospects are hazier than one might hope.[1]

A Brief Overview of Financial Regulation Since the New Deal

The Banking Act of 1933, more commonly known as the Glass–Steagall Act, which passed against the backdrop of a different kind of financial crisis, adopted a structural approach by separating and then, in various ways, protecting commercial banking from investment banking and trading. The ensuing stability in the banking system occasioned only modest changes in financial regulation for the better part of 40 years. However, from the late 1960s into the early 1970s, the demise of the Bretton Woods system, adverse macroeconomic conditions, and increasing international competition posed big challenges for what had been the relatively safe and profitable—but not particularly innovative—business of commercial banking. In addition, capital markets activities made incursions into areas previously dominated by commercial banks. As inflation ballooned in the 1970s, banks faced regulatory limits on the interest rate they could pay on bank deposits ("Regulation Q"), and funds flowed into money markets funds instead. On the asset side of the balance sheet, public corporations increasingly turned to commercial paper and public debt markets, thus reducing their demand for bank loans.

As bankers faced the erosion of barriers to competition from nonbank financial institutions, they sought regulatory relief on everything from limits on interstate branching to restrictions on their affiliating with securities underwriters. Bank regulators and legislators, fearing a continued decline of the franchise value of traditional depository institutions, provided a good bit of that relief over a quarter century: for example, the Riegle–Neal Interstate Banking and Branching Efficiency Act of 1994 allowed banks to branch across state lines, and the Financial Services Modernization Act of 1999 (the Gramm–Leach–Bliley Act) allowed commercial

[1] This essay will not discuss a number of important nonprudential regulatory topics covering the financial system, including cybersecurity, consumer protection, and investor protection.

banks, investment banks, securities firms, and insurance companies to combine under the umbrella of a bank holding company.

Given that market pressures had undermined the rationale for, and effectiveness of, the New Deal regulatory framework, many of these steps were reasonable. However, the old regulatory framework was not replaced with a new one, other than the formalization of relatively modest capital requirements following the troubles of Latin American debt and the savings and loan industry in the 1980s. The removal of many activity and affiliation restrictions freed banks to grow and to acquire or develop trading and investment banking units. Meanwhile, "shadow banking" grew rapidly: the term refers to nonbank financial institutions, including investment banks and money market funds, that receive short-term funding and then make loans or invest in debt-related assets.

This progressive integration of capital markets and traditional lending played a major role in the unsustainable explosion of subprime lending and mortgage-backed securities in the 2000–2006 period. A sharp reduction in the ability of shadow banks to raise capital in short-run markets has an effect similar to the bank runs in the early 1930s, before federal deposit insurance was established. In the 2007–2009 crisis, these new vulnerabilities manifested themselves with a vengeance when short-term wholesale funding (such as repurchase agreements, or "repos") dried up, as investors reacted to the decline in housing prices and questions about the underwriting of mortgage-backed securities.

While the Dodd–Frank Wall Street Reform and Consumer Protection Act that passed in July 2010 emphasized financial stability and systemic risk, it largely eschewed the structural regulatory solutions of the 1930s. It did not seek to reinstate the Glass–Steagall separation of commercial and investment banking, nor to break larger banks into smaller sizes. Instead, the law enacted a broad range of measures, each addressed to a bank practice or shortcoming that was believed to have contributed to the financial crisis. These measures were mostly directed at regulated banking organizations—particularly the largest banks, which were perceived as being treated by government as if they were too-big-to-fail. This focus was understandable given the extraordinary steps taken by the government in response to the actual or potential failure of numerous large financial firms in 2008–2009, including brokered mergers and injections of public capital. Dodd–Frank also includes provisions aimed at the derivatives markets. But otherwise, relatively little attention was paid to potential risks generated outside the perimeter of conventional bank holding companies. This emphasis on regulated banking organizations was again understandable, because much of the pre-crisis shadow banking at least indirectly involved institutions that were regulated banks or, in the case of the surviving large investment banks, had turned themselves into regulated banks.

The Dodd–Frank legislation left to regulatory agencies the task of elaborating its often generally stated standards into detailed regulations. Indeed, by the time Dodd–Frank was passed, the US banking regulatory agencies were well along in a self-imposed task of raising capital requirements and imposing liquidity requirements

under existing authority to ensure safety and soundness of banking activities—an enterprise of which Congress was fully aware and appeared to approve.

Accomplishments of Post-Crisis Regulation

While it is obviously too soon to render a complete verdict on the post-crisis regulatory response, three significant accomplishments seem reasonably apparent: tiering of bank regulations by size of institution, greater financial resiliency for bank-related financial institutions, and movement toward an orderly resolution mechanism for failing banks.

Tiering

The 2010 Dodd–Frank legislation established a principle that prudential regulation should vary with the size and systemic importance of banking organizations, based on the magnitude of the negative externalities that would be associated with the stress or failure of various groups of banks. This "tiering" principle was most clearly stated in the Dodd–Frank provision that requires "more stringent" capital, liquidity, risk management, and other standards for banking organizations with more than $50 billion in assets, explicitly "to prevent or mitigate risks to the financial stability of the United States" (Section 165(a) of the Dodd-Frank Act, 12 US Code §5365). Numerous other requirements apply only to banks above a certain size, such as a requirement that a bank's financial resilience be evaluated by calculating how it would perform under a variety of "stress testing" scenarios, and the so-called "Volcker Rule" prohibition against a bank engaging in proprietary trading.

Where the thresholds for application or increased stringency of various regulations should be set has been a continuing source of debate since then. The Financial Regulatory Reform Act in May 2018 that raised the threshold for introducing additional prudential measures from $50 billion in assets all the way to $250 billion probably went too far, but it also implicitly affirmed that the risks faced and created by banks differ substantially, and that effective and efficient regulation should accordingly vary among groups of banks as well. Going forward, this tiering concept should contribute to a better allocation of both the risk management resources of banks and the supervisory resources of financial regulators.

Greater Financial Resiliency for Bank-Related Financial Institutions

The post-crisis regulatory regime has led to a dramatic increase in the resiliency of the prudentially regulated part of the financial system, as measured by 1) the quality and quantity of capital both required and actually maintained by banks; 2) the greater stability of funding sources for banks; and 3) the risk management capacities and practices of banks. This increase in resiliency extends to the surviving large, formerly "free-standing" investment banks, which are now parts of banking holding companies. Because, *at present*, there is only a moderate amount of runnable short-term funding outside very large banking organizations, the

enhanced resiliency of this group of large banking organizations goes a good way toward containing the risk of a major financial crisis.

Capital requirements were traditionally conceived as helping to combat the moral hazard associated with deposit insurance and lender-of-last-resort assistance. (That is, capital requirements were seen as offsetting the unintended consequences of government programs to staunch bank runs.) Today, they are also recognized as an especially supple prudential tool, insofar as they are available to absorb losses from sources both anticipated and unanticipated by bankers and regulators. Although high capital levels may not in themselves prevent unsustainable increases of credit and associated asset price shocks, they mitigate the severity of the negative externalities associated with those shocks. A bank with high capital will be better positioned to continue providing credit in a crisis. It is also less likely to face a need to sell assets at depressed fire sale prices, which can spread distress to other firms.

Capital requirements may be either a simple ratio of capital to assets or "risk-weighted." The simple measure, referred to as a "leverage ratio," has a numerator consisting of a bank's common equity and some other forms of loss-absorbing capital such as certain preferred stock, and a denominator consisting of all assets.[2] As the term suggests, a "risk-weighted" capital ratio is calculated by dividing bank capital by a dollar value of assets, other exposures, and off-balance-sheet items that has been adjusted for the perceived riskiness of each asset, determined on the basis of past experience. For the last 30 years, US bank regulations have included both kinds of requirements, on the premise that each compensates in part for the shortcomings of the other. Most regulators here and abroad believe that the risk-weighted requirement should usually be the binding one, while the leverage ratio should help protect against big increases in the riskiness of asset classes above historic norms.

Several important changes have been made to regulatory capital requirements in the post-crisis period. Prior to the crisis, there was only an indirect requirement that banks have minimum amounts of common equity, which can most dependably absorb unexpected losses; some hybrid instruments and even certain forms of subordinated debt qualified as "capital." During the crisis, though, bank equity was the capital metric of most, and often sole, interest to investors, counterparties, and analysts. A minimum risk-weighted capital requirement of 4½ percent of common equity has accordingly been added, along with a 2½ percent buffer above the minimum. A firm falling into the buffer range of capital requirements must limit its capital distributions, even if it remains above the minimum levels. Leverage ratio requirements have been increased in the United States (and adopted for the first time in many other countries). For the eight US banks designated as being of global systemic importance (Global Systemically Important Banks, or G-SIBs), surcharges for both risk-weighted and leverage requirements have been added.

[2]As one of the post-crisis reform measures, the Basel Committee on Banking Supervision established a leverage ratio requirement that includes an asset equivalent approximation of derivative and securities exposures, as well as off-balance-sheet items. The US banking agencies have added this requirement for large banks as a "supplemental leverage ratio."

The so-called "Collins amendment" in Dodd–Frank requires that even the largest banks meet minimum capital ratios based on standardized risk weights that apply to all banks, rather than rely on an internal ratings-based approach to setting capital levels that uses banks' own models to determine regulatory capital, with its potential for abuse and mistake.

The Federal Reserve has developed a more risk-sensitive capital measure using the annual stress tests required by the Dodd–Frank legislation (Hirtle and Lehnert 2014). Stress tests involve creating unlikely but plausible severe economic scenarios and then using a supervisory model (maintained by the Fed) to estimate the impact of those scenarios on bank assets and earnings. The large banks subject to the stress are required to limit capital distributions so that even under the scenario conditions they would remain above minimum capital requirements. Thus, even if they were to suffer the projected losses, they could remain viable financial intermediaries. The stress test thus substitutes a more forward-looking projection of capital for the fixed 2½ percent buffer in the point-in-time capital requirements. (For other banks not subject to the stress test, the 2½ percent buffer remains.) The simultaneous and comparable testing of all large banking organizations also gives a more complete picture of potential vulnerabilities across the financial system.[3]

With the caveat that changes in accounting rules and regulatory definitions make comparisons somewhat imprecise, the Federal Reserve Bank of New York (2018) calculates that the aggregate risk-weighted common equity ratio of the largest US banks increased from about 7 percent in the years preceding the financial crisis to about 13 percent as of the end of 2017. At its nadir during the crisis, the risk-weighted capital ratio of this group of banks was barely above 4 percent. The leverage ratio for this same group of banks stood at just under 9 percent at the end of 2017, reversing a downward trend in the decade preceding the onset of the crisis to about 6 percent. Individual ratios for the eight US institutions that have been designated as of global systemic importance are reported in Table 1.

Substantial as this improvement has been, has it has been enough? Cline (2017) concludes from both a careful review of the literature and his own cost–benefit analysis that capital levels should be even higher. A study by Federal Reserve Board researchers reaches a similar conclusion (Firestone, Lorenc, and Ranish 2017). The robust stress-testing program in the United States has effectively raised requirements above the nominal, point-in-time minimum ratios and buffers described above, though not as high as the approximately 14 percent recommended by Cline and the Federal Reserve researchers. Indeed, the efficacy of the stress test program itself is still limited by the fact that second-order losses, such as would occur from funding disruptions or a need for forced sales of assets at low fire sale prices, have not yet been incorporated into the supervisory model.

[3]Among other things, tying capital requirements to stress testing helps counteract, but does not eliminate, the traditional problem of capital ratios as a lagging indicator of bank difficulties. Banks, and sometimes their supervisors, have often postponed the recognition of losses and, thereby, maintained that capital levels were higher than turned out to be the case.

Table 1
Capital Ratios of the Eight US Firms of Global Systemic Importance (as of December 31, 2017)

Firm	*Common equity ratio*	*Leverage ratio*
Bank of America	11.9	8.6
Bank of New York Mellon	11.9	6.6
Citigroup	10.3	8.8
Goldman Sachs	12.1	8.4
JPMorgan	12.2	8.9
Morgan Stanley	16.5	8.3
State Street	11.9	7.3
Wells Fargo	12.3	9.4

Source: Board of Governors of the Federal Reserve, Dodd–Frank Act Stress Test 2018: Supervisory Stress Test Methodology and Results (June 2018).
Notes: The eight banks included in this table are the US firms designated by the Financial Stability Board as of global systemic importance. US banking regulations apply certain requirements only to these eight firms. Under US banking regulations, the Common Equity Ratio is referred to as the "Common Equity Tier 1 Capital Ratio." Also, under US banking regulations, the Leverage Ratio is referred to as the "Tier 1 Leverage Ratio."

With respect to the stability of funding sources, a "liquidity-coverage ratio" regulation requires that the largest banking organizations be able to self-fund for 30 days in a period of stress. This is important because it should provide government authorities with a little time in which to consider how to respond to a possibly crippled large bank. This breathing space stands in contrast to the need to devise a plan over a weekend after Bear Stearns and Lehman experienced runs in the spring and fall of 2008, respectively. However, this liquidity-coverage ratio does not address issues of funding sustainability more generally. Through its supervisory oversight, the Federal Reserve supplements this regulatory requirement with annual quantitative liquidity assessments that are customized to the activities and funding needs of individual large banks.

The Federal Reserve estimates that large banks have reduced their reliance on short-term wholesale funding from an amount equivalent to about 50 percent of total assets in the pre-crisis period to about 30 percent today (Quarles 2018a). These banks have roughly tripled their holdings of "high-quality liquid assets," defined to include reserves at the Fed, Treasuries, and agency securities (Ihrig, Kim, Kumbhat, Vojtech, and Weinbach 2017). As with increased levels of capital, their reduced vulnerability to runs by short-term debtholders has made the financial system more stable. As I will discuss later in this article, however, requirements on funding and liquidity need more work, perhaps considerably more.

The final ingredient for greater resilience of bank financial sheets is that banks have been required to develop and maintain rigorous risk management systems that aggregate information and monitor risk across all business lines. During the first stress test, conducted in early 2009, bank supervisors noted with dismay the serious shortcomings of many banks in quite basic risk management essentials—such as

being able to identify readily the exposures of all a bank's business lines to a specific counterparty. Many banks were especially deficient in projecting and planning for tail risks. As part of the stress-testing process, supervisors required much more attention to these matters and have subsequently observed considerable improvement in these and other risk management capabilities.

An Orderly Resolution Mechanism

In many respects, creating at least the credible possibility of an orderly resolution of a large failing financial institution is the holy grail of efforts to contain the too-big-to-fail problem. If investors and counterparties believe the government would allow even the largest financial firm to fail and the government could in fact do so without endangering the financial system, three beneficial consequences would follow: the moral hazard issue of financial firms taking on excessive risk in the expectation of a government bailout would be substantially contained; crisis amplification effects arising from the prospect of serial failures would be limited; and taxpayer bailouts would be averted.

The 2010 Dodd–Frank legislation created a special insolvency mechanism under which the Federal Deposit Insurance Corporation could manage a large financial firm's resolution in a manner roughly akin to its authority to resolve insured depository institutions, including access to a funding line from the Treasury to inject any needed liquidity into the failed firm. The law also required a planning process for addressing the many practical impediments to resolution, such as organizational complexity, funding shortfalls, cumbersome shared services arrangements, and the prospect that foreign authorities would not permit capital and liquidity to be moved from an American bank's foreign subsidiaries to other subsidiaries in need of resources (so-called "ring-fencing").[4] Finally, and in further pursuit of this goal, the Federal Reserve has required the eight systemically important banking organizations to hold significant amounts of longer-term debt that is designated as available for conversion to equity in the event of a bank's failure.

The joint efforts of the Federal Reserve and the Federal Deposit Insurance Corporation (FDIC) in implementing these provisions have yielded some progress in making the "rapid and orderly resolution" of a very large financial firm a credible prospect, though Goldberg and Meehl (2018) observe that the biggest US banks remain quite complex. A natural research approach in looking for evidence on this subject is to examine how cheaply large financial firms are able to raise funds. Were large firms able to raise funds more cheaply than smaller banks before the crisis, based on the expectation that a government bailout would be forthcoming if necessary? Has any such funding advantage diminished in recent years?

[4] Technically, the resolution planning requirement is that systemically important firms demonstrate that they could be resolved in an orderly fashion *in bankruptcy*—that is, not under the special orderly liquidation authority created by Dodd–Frank. Under existing bankruptcy law, which does not take account of the unusual features of financial firms relative to nonfinancial firms, this aim is an ambitious one. Jackson (2015) and others have proposed amending the US Bankruptcy Code to make it a more viable option for large failing financial firm.

It is notoriously difficult to fix on a point estimate of a pre-crisis funding advantage for very large firms based on market expectations of a government bailout. However, studies of pre-crisis funding conditions such as Ueda and Weder di Mauro (2013) and Brewer and Jagtiani (2013) were consistent in finding a nontrivial positive number. More straightforward in documenting at least the perception of too-big-to-fail was the considerable "uplift" in the pre-crisis debt ratings by major ratings agencies, indicating an expectation of government support. Indeed, the dogged efforts by government authorities during the crisis to avoid outright failure of large financial firms—including government assistance—and the impact on the financial system when Lehman was allowed to fail vindicated the expectations of the market and ratings agencies that bailouts would be forthcoming.

Since the financial crisis, the ratings uplift provided by the credit agencies has dropped significantly. Cetorelli and Traina (2018) find the effective subsidy of the cost of capital of large banks, while still notable, has been reduced (mostly because of an increase in the cost of equity). On the other hand, Afonso, Blank, and Santos (2018) find that while the gap between the credit ratings of bank holding companies and operating subsidiaries has widened, as one would expect if subsidiaries are to be recapitalized using debt at the holding company level, a comparison of bond spreads between parent and subsidiaries does not show a similar narrowing. It appears, then, that the most one can say is that market indicators show a measure of progress, with some indications that investors are pricing in the possibility of failure to a greater extent.

Is an orderly resolution of a huge failed financial institution actually a practical option? My own judgment is that we are probably within shouting distance of the goal of a credible orderly resolution in the case of an idiosyncratic failure of a very large banking organization. In a situation of systemic stress, it is *perhaps* realistic to think we can reach a point at which the first large firm to falter in a period would be placed in resolution, followed by broad measures to inject liquidity into the whole financial system. But the risks of an untested resolution regime are real, and officials may not be willing to take even a modest chance that a systemically important firm placed into resolution would implode. Also, they may be reluctant to use the cache of convertible long-term debt to recapitalize the firm if doing so would impose losses on politically sensitive entities such as pension funds.

Officials might instead look for alternatives, such as an arranged purchase of the failing firm by a stronger bank, quite possibly with government assistance. In 2008, for example, Washington Mutual and Wachovia were both essentially depository institutions for which the Federal Deposit Insurance Corporation already had statutory resolution authority, and neither had significant capital market activities carrying the potential for quick contagion. But instead of placing them into receivership under the FDIC's authority to resolve depository institutions, the government facilitated their purchase by other, healthier firms (JP Morgan and Wells Fargo, respectively). Finally, it seems very unlikely that multiple large firms would be placed into resolution during a period of high stress. The risks to the financial system would almost surely motivate top government officials to

seek ways to stabilize the system instead. In this sense, too-big-to-fail may remain with us.

Consolidating and Extending the Post-Crisis Framework

The accomplishments of post-crisis financial regulation are substantial, but they have focused mainly on addressing the vulnerabilities and risky practices of banking organizations, and mainly through the exercise of discretion by the banking agencies under quite generally stated statutory requirements or grants of authority. This raises two concerns. First, the increased resiliency of large banking organizations may become degraded over time. Second, less attention has been paid to the risks to financial stability that may arise in the "shadow banking" area—that is, nonbank financial firms that borrow and lend, but do so outside the perimeter of prudentially regulated firms—especially if their borrowing is heavily short-term.

A First Risk: Degradation of the Resiliency of Large Banking Organizations

The future degradation of the resiliency of large banking organizations is by no means foreordained, but it could arise through some combination of the sheer mass of the post-crisis regulatory structure and more-or-less intentional efforts by regulators, in whom so much discretion has been lodged. The 2010 Dodd–Frank legislation called for literally hundreds of new regulations, an approach that entailed protracted and often complicated rulemakings. Many were slowed by the novelty of the new measures, the enormous complexity of measures like the resolution planning process, and the unusual requirement that three, five, or sometimes as many as seven agencies all agree on the regulatory text. While the jury is out on whether this broader participation resulted in better rules, there is no question it stretched out the post-crisis reform efforts considerably. Indeed, eight years after the passage of Dodd–Frank, and nearly a decade after the banking agencies began to work on stronger capital and liquidity regulation, the new regulatory framework in place is still not completed, with numerous proposed regulations not having been finalized.[5]

Dodd–Frank affords substantial discretion to the regulatory agencies. The merit of this approach is that it allows for a more finely tuned and informed regulatory implementation. But it also poses real challenges for the financial regulators, faced with crafting, monitoring, and presumably modifying these regulations as conditions change. For example, core capital and liquidity regulations need continual refinement, both to combat arbitrage efforts by the banks and to adapt to new financial products and conditions. Effective stress tests require constant and timely work

[5]For example, despite the requirement of section 956 of the Dodd–Frank Act that the banking and market regulators adopt regulations to prohibit incentive compensation practices by financial firms that could lead to risky practices, the proposed regulation issued in 2014 has yet to be finalized, and at least four of the relevant agencies removed the proposal from their regulatory agenda in 2017.

to refine loss functions, to guard against incentives for cross-firm asset correlation, and to incorporate scenario elements based on changing economic conditions and financial vulnerabilities.

Moreover, this agency discretion need not always result in more stringent financial rules. Discretion works in both directions, and could allow the rigor of the regulatory system to be substantially reduced without legislation. Rationalization of excessively complicated or unnecessarily burdensome regulation, which nearly everyone agrees is needed to a greater or lesser degree,[6] could morph into a troublesome deregulation. While Congress legislated some changes to Dodd–Frank in early 2018 that eliminated regulatory requirements for small and mid-sized banks, the banking agencies have moved toward relaxing regulation for the largest banks as well. They have proposed reductions in the leverage ratio surcharge for the eight banks designated as being of global systemic importance (Department of the Treasury, Office of the Comptroller of the Currency, Federal Reserve Board 2018a) and effective reduction in capital requirements for the three "super-regional" banks (Department of the Treasury, Office of the Comptroller of the Currency, Federal Reserve Board 2018b).

The Federal Reserve has also recently proposed integrating point-in-time and stress test capital requirements, along with some changes in stress test assumptions (Board of Governors of the Federal Reserve 2018). As proposed, this step would likely increase modestly the risk-weighted requirements of the largest banks, but it would also effectively reduce leverage ratio requirements. Because the Federal Reserve provided an estimate of the impact of the change only for risk-weighted requirements and did not publicly provide an estimate of the effective decrease in leverage requirements, it is difficult to determine just how much these changes would net out in terms of total capital required for a firm. It remains to be seen whether the Federal Reserve will also respond favorably to the banks' request for reduction in the amount of the risk-weighted capital surcharges, in which case the amount of capital effectively required by the stress tests would likely decrease.

Even without changes in regulations, stress testing could be made less taxing and less useful. The Federal Reserve's Vice Chair for Supervision has indicated receptivity to various requests of banks to provide more information to the banks about the supervisory model used to calculate losses and revenues and to find a way to smooth out the impact of the stress tests on banks' required capital from year to year, because of the variation in the shocks included in the scenario (Quarles

[6]In this context, "rationalization" need not refer only to simplifying certain regulations. It might also be more far-reaching, such as determining whether multiple constraints can achieve similar degrees of protection from financial instability at lower levels (and thus cost to the economy in normal times) than would be needed if reliance was placed on a single metric. For an example of rationalizing through simplification, see the proposal by Greenwood, Hanson, Stein, and Sunderam (2017) to eliminate the leverage ratio while adjusting the stress test approach to risk-weighted assets. For an example of rationalizing through using multiple complementary regulations, based on a retrospective look at how differing capital and liquidity ratios would have performed individually and together pre-crisis, see Aikman, Haldane, Hinterschweiger, and Kapadia (2018).

2018b). Both changes would make capital planning easier for banks, but would also undermine the information and regulatory value of supervisory stress tests. Depending on how these ideas are implemented, considerable reduction in the effective capital requirements of the largest banking organizations could follow. This outcome is made more likely by the vice chair's proposal to eliminate the requirement that large banks' leverage ratio be projected to remain above minimum levels post-stress, since this has been the binding constraint on several of the largest banks in each recent stress test.[7]

Risks of Shadow Banking

"Shadow banking" includes a broad range of nonbank intermediation activity, many forms of which pose little or no threat to financial stability. However, to the extent that post-crisis regulation makes riskier activities more costly for banks, the incentive for these activities to migrate to shadow banking grows. The resulting financial stability concerns will be most tangible where funding is potentially unstable. Of course, a run on nondeposit, "shadow" funding was a central feature of the financial crisis itself, most notably in the repo markets (Gorton and Metrick 2012). Investment banks and others had continually rolled over short-term borrowings to fund longer-term assets. When that funding abruptly dried up as the value of the collateral for that borrowing (such as mortgage-backed securities) was called into question, the effect was similar to a run on bank deposits in a prudential institution.

While this "rollover risk" associated with short-run sources of finance has been only modest in the immediate post-crisis years, there is no guarantee this will remain the case. Yet the post-crisis regulatory approach has created neither a structural solution to shadow banking—for instance, by subjecting all forms of bank-like financial intermediation to a specified regulatory framework—nor the discretionary authority that would enable at least ad hoc responses. There is no generalized authority lodged in the Fed or any other agency to regulate forms of shadow banking that might pose threats to financial stability. It is not clear that there is authority *anywhere* within the US government to regulate the involvement in shadow banking of certain kinds of financial institutions—including hedge funds, private equity funds, and some finance companies.

The Dodd–Frank Act did create a Financial Stability Oversight Council (FSOC), charged with identifying and responding to risks to financial stability. Despite this broad remit, the FSOC's authority is quite limited. Its only direct regulatory powers are the designation of nonbank systemically important financial firms for supervision by the Federal Reserve and the identification of systemically important financial market utilities and payments activities. In its early years, the FSOC designated four

[7] There is continuing debate over whether it is optimal for a capital regulation framework to be designed in such a way that the leverage ratio is the binding constraint under most circumstances. But many who take the position that it generally should not be (myself included) argue that the remedy is to raise risk-weighted requirements, not to lower overall capital in a bank by reducing or eliminating the leverage ratio.

nonbank financial firms as systemically important, and accordingly subject to supervision by the Federal Reserve Board. Subsequently, all have had the designation removed. With political opposition and one federal court's ill-conceived imposition of high barriers to designation, this authority may well be a dead letter for the foreseeable future (Kress 2018).

All other statutory duties of the Financial Stability Oversight Council (FSOC) involve analysis, discussion, reporting, or making recommendations for action to its constituent regulatory agencies.[8] Because most voting members of an agency that *do* have authority to act on a specific financial stability risk are not represented on the FSOC, a conclusion by the FSOC that a regulatory measure is warranted is only the starting point for what is in effect a negotiation with that agency.

The agency with the existing authority likely to be most salient in addressing shadow banking is the Securities and Exchange Commission. But at least to date, most SEC staff and Commissioners have maintained that the focus of the agency should be its explicit mandates for investor protection and market operations, and that the financial stability mandate for the SEC is quite limited. For example, money market mutual funds are widely considered to be among the ongoing forms of shadow banking that have the potential to produce runs. However, only after prolonged and contentious debate did the SEC agree that institutional funds are prohibited from maintaining a stable net asset value unless they invest only in short-duration government securities.[9] And there is some skepticism that this measure truly addresses the risk of runs from money market mutual funds. Moreover, many money market funds have apparently met these new requirements by shifting their investments from bank commercial paper to securities issued by the Federal Home Loan Bank System, which in turn lend to banks (Gordon and Gandia 2014; Anadu and Baklanova 2017). Thus, ironically, the "solution" to concerns about runs from money market funds may end up including de facto taxpayer support.[10]

Macroprudential Policy and Liquidity Regulation

"Macroprudential" policy refers to financial regulation formulated with a view to the health of the financial system as a whole, rather than to the health of individual firms, no matter how large. By definition, macroprudential policy measures should

[8] Because the law made the Secretary of the Treasury the chair of the Council, it was perhaps inevitable that the agenda of the Financial Stability Oversight Council has been significantly weighted toward the sometimes near-term priorities of the presidential administration rather than longer-term financial stability concerns.

[9] The buffer within which the fund may maintain the stable net asset value before it must "break the buck" and reflect a loss creates an incentive for investors to run so as to be insulated from the initial losses to securities held by the fund.

[10] The SEC subsequently also adopted a rule requiring certain liquidity risk management practices by asset managers other than money market funds, though the effective date for that rule has now been delayed to late 2018.

cover both bank and nonbank actors; thus, the limits of shadow banking regulation handicap development of macroprudential policies. The case for a macroprudential emphasis had been advanced prior to the financial crisis (Crockett 2000), but was little heeded. As the crisis revealed the consequences of highly correlated asset holdings, shared risks, dependence on runnable short-term funding, and contagion across the financial system, regulators around the world began to invoke macroprudential aims in almost talismanic fashion.

For a number of reasons, macroprudential measures are relatively underdeveloped. While the broad conceptual case for macroprudential measures is strong, substantial analytic work is needed to translate intuitions on system-wide feedback and second-order effects into well-considered and manageable regulatory practice. For example, no real consensus has emerged on the comparative merits of macroprudential policies to increase resiliency of individual institutions versus lean-against-the-wind efforts to prevent unsustainable increases in the price of leveraged assets. Time-varying measures, while conceptually appealing for their countercyclical potential, are especially challenging to specify.

The history of policies that were macroprudential in all but name has not been a particularly happy one in the United States. There is often political opposition to macroprudential policy from legislators and the public, who have regularly pushed back on measures to dampen economic growth in an effort to prevent or avoid relatively rare events (Elliott, Feldberg, and Lehnert 2013). It is perhaps for this reason that, for example, no US government agency has authority to impose a maximum loan-to-value ratio on all mortgages—one of the macroprudential tools most often used in other countries (though its efficacy has been subject to debate, Claessens 2014).[11] Institutional concerns are an additional obstacle. As noted earlier, the Financial Stability Oversight Council has no real macroprudential powers, unlike some of its foreign counterparts. As a matter of expertise, the Federal Reserve is probably best equipped to implement macroprudential policies, but there are practical and political reasons not to give it yet more power over the US economy.

Unsurprisingly, then, post-crisis measures with a macroprudential dimension have been directed principally at large regulated banks. The capital surcharges applicable to the eight US banking organizations of global systemic importance are calibrated to take into account the disproportionate impact the failure of one of these firms would have on the financial system as a whole. Along with the other banking agencies, the Fed has put in place a process for imposing additional countercyclical capital requirements in a time-varying fashion, though it has not to date applied such a buffer.

There are also significant macroprudential measures in the annual stress tests. The stress scenarios incorporate a few countercyclical features, such as increasing projected unemployment to a high level even when strong economic growth has

[11] Although the banking agencies could apply a rule that limited loan-to-value ratios for regulated banks, the inability to bind nonbank mortgage companies would likely render that action less-than-effective and would surely drive more business to those unregulated firms.

brought actual unemployment to historically low ranges. The supervisory model used in the test measures the effects of stress on the balance sheets of all the larger banks at the same point in time, an approach that comes reasonably close to treating the collective assets of the banking system as a single "portfolio." Because the Fed requires banks in the stress test to have enough capital to continue lending to creditworthy borrowers even were the severe scenario to materialize, these features help ensure that recessions would not be intensified as capital-constrained banks stopped lending.[12]

The Financial Regulatory Reform Act of 2018, amending the 2010 Dodd–Frank legislation, may end up reducing the efficacy of this last macroprudential element. While increasing to $250 billion the dollar asset threshold at which banks would be subject to more stringent prudential requirements, the law kept banks with between $100 and $250 billion in assets subject to stress testing. However, it did so through a vaguely stated provision that seems to require less frequent, and perhaps less binding, stress testing. Depending on how the Federal Reserve implements this provision, the roughly $1.5 trillion in assets held by banks of this size may be removed from the "portfolio" of financial system assets examined annually.

While continued discussion of some form of authority over nonbank lending is worthwhile, the more pressing macroprudential issue is that of liquidity and funding regulation. It is through fragile funding structures that runs begin, and with them the makings of financial crises. A decade after the crisis, the funding profile of large banking organizations looks much healthier. There have been some modest reductions in the vulnerability of the market for repurchase agreements and some changes in the money market fund industry. But the regulatory system has not produced a cohesive set of measures to forestall some future variation on the "run on repo" that was a defining feature of 2008. Problems lie both in the shortcomings of existing liquidity regulation of banks and in the role that nonbank funding needs and practices may play under stressed conditions.

The main existing liquidity regulation, mentioned earlier, is the liquidity-coverage ratio requirement that systemically important banks maintain 30 days of self-funding. This is an important element of an effective crisis management program and, as such, it fulfills a limited macroprudential purpose. But from the very origin of the liquidity-coverage ratio a decade ago, there has been concern that the regulation could cause banks to horde their liquidity during stress periods. A bank's sensitivity to market or regulatory agency reactions to its liquidity-coverage ratio declining below minimum levels (or even declining from higher levels) may lead even the soundest banks to sit on their liquidity, rather than use it to reduce liquidity shortages of its customers and markets more generally. Thus, at least in its

[12]The Federal Reserve had other rules in development prior to the 2016 election, including the modeling of some second-order effects for inclusion in the annual stress tests and a proposal to require minimum margins for securities financing transactions not involving Treasuries, regardless of whether the counterparties were regulated banking organizations. The extent to which the Fed will pursue these initiatives during the Trump administration is unclear.

current configuration, the liquidity-coverage ratio may be contributing to a paradoxical situation in which better preparations for orderly resolution could amplify liquidity squeezes at the onset of a period of stress.[13]

The liquidity-coverage ratio is intended only to provide some breathing space for officials confronted with a potential bank failure. Liquidity strains can (and, in the 2007–2008 period, did) extend well beyond 30 days. To address longer-term funding issues, in 2016 the US banking agencies proposed a version of the "net stable funding ratio" (NSFR) developed in the Basel Committee on Banking Supervision. The Basel Committee had already diluted an earlier version of the NSFR because of concerns that its calibration would prevent banks from providing needed liquidity to customers and markets even in fairly normal times. The banking agencies may well dilute it further if they proceed with its eventual adoption. In itself, rendering the NSFR essentially superfluous may not be a bad thing, since it is not especially useful in promoting sustainable funding patterns over the longer term. It creates liquidity requirements based on a comparison of total funding expected to be available over a twelve-month period with expected total funding needs over that same period. Since funding mismatches and consequent shortages arise within much smaller time increments, the NSFR could be unnecessarily restrictive in some respects while still not preventing funding disruptions under stressed conditions.

What is needed, then, is not simply to weaken the net stable funding ratio into insignificance, but to substitute a framework that builds on the actual funding patterns of large banks and that would be an appropriate complement to capital requirements and lender-of-last resort policies by preventing too much reliance on short-term debt. To achieve this goal in an economically sensible fashion, it will be necessary to take the rest of the financial system into account. The demands on a bank's liquidity, and the availability of funding to it, are substantially dependent on the reactions of central clearing parties, hedge funds, pension funds, insurance firms, money market funds, and other asset managers. To take one example, preliminary work by researchers at both the Federal Reserve Bank of New York (Cetorelli, Duarte, and Eisenbach 2016) and the Bank of England (Baranova, Liu, and Shakir 2017) suggests that corporate bond funds of asset managers may be vulnerable to liquidity squeezes during periods of falling prices. To the extent that these and other forms of nonbank financial intermediaries create funding risks with potentially systemic consequences, it may be more efficient to require them to internalize at least some of the negative externalities they would create for the financial system under stress. Otherwise, liquidity regulation would need to make the prudentially regulated banks de facto insurers of liquidity for the nonbank actors.

[13] The resolution plans of the largest banks mandated by the Dodd–Frank Act contain what is in effect a second form of quantitative liquidity requirement. To facilitate resolution in the face of possible restrictions by foreign (or even domestic) regulators on intracorporate liquidity transfers during a crisis, the Fed and the FDIC have obliged the banks to maintain minimum levels of liquidity within certain subsidiaries.

As the preceding discussion suggests, liquidity regulation is still quite under-theorized on a variety of dimensions: its relationship to capital regulation; its interaction with the expected role of the central bank as lender-of-last-resort; and its impact on financial intermediation, including the availability of safe assets. The subject is almost assuredly the major unfinished business of post-crisis reform. It should be a priority for both academic research and policy development.

The Challenge of Crisis Management

In the aftermath of the financial crisis, extraordinary measures taken by the Fed, the Federal Deposit Insurance Commission, and eventually Congress itself helped keep the financial system from freezing up and stabilized financial institutions whether prudentially regulated or not. Meanwhile, very little was done to provide direct assistance to homeowners who found themselves underwater following the precipitous decline in real estate prices. Part of the impetus—both policy and political—behind the 2010 Dodd–Frank legislation was to reduce the chance of any future "bailouts" of financial firms. One approach to this goal was to increase resilience and thus reduce the possibility that systemically important financial firms would fail at all. As noted earlier, another was to create an orderly resolution authority and a requirement for resolution planning so that large distressed financial firms could be wound up, rather than rescued.

But Congress was concerned that the government would still be tempted to offer emergency loans or other assistance to large financial firms, the prospect of which might create unacceptably high moral hazard. Thus, Dodd–Frank took additional steps to rule out such policies. It pared back some longstanding Fed authority to engage in secured lending to nonbanks during "unusual and exigent circumstances." Similarly, the discretionary authority of the Federal Deposit Insurance to guarantee the liabilities of banks other than insured deposits was made subject to Congressional ratification, which as a practical matter may mean it is not available during a crisis.

Some have drawn the opposite conclusion from the 2008–2009 experience—namely, that the kit of crisis-fighting tools needs to be augmented rather than diminished. Former Treasury Secretary Geithner (2016) has argued that the crisis powers of the Federal Reserve and the Federal Deposit Insurance Corporation should be restored to their pre-Dodd-Frank state. Moreover, he argues that new powers should be created for the Fed to *buy* assets in a crisis (rather than just lend against them), and for the government to inject capital into failing firms.

The unpredictability of future episodes of financial stress, along with the earlier mentioned imprudence of counting too much on a resolution process to deal with problems at systemically important banks, make the current situation worrisome. Still, at present it is hard to see any agreement to add additional crisis-fighting tools. Views are strong. While the vote on the Dodd–Frank legislation as a whole was entirely partisan, a considerable number of Republicans agree that in order to assure an expectation that market discipline will be imposed on failing firms, any

authority to provide extraordinary liquidity and capital during a crisis should be very limited. Thus, in the absence of a credible commitment mechanism to ensure that an enhancement of crisis-fighting tools would not be followed by relaxation of prudential requirements, there does not seem much prospect of support for new tools—even from legislators who might see their merit were the continued robustness of prudential regulation ensured. Here, then, is another example of how the extensive discretion placed in the agencies by the post-crisis regulatory approach can both advance and undercut financial stability aims. In a future crisis, government officials may face the unappealing choice of using only an inadequate set of tools or of taking action that arguably goes beyond the limits set by Congress.

Conclusion

Within the perimeter of prudentially regulated banking organizations, post-crisis financial regulation has made considerable strides, though liquidity regulation needs more work and capital requirements for the biggest banks should probably be somewhat higher. If, during the next few years, the Federal Reserve, Office of the Comptroller of the Currency, and Federal Deposit Insurance Corporation could successfully rationalize the current regulatory framework without weakening the resiliency measures applicable to the most systemically important firms, the broad post-crisis approach to those firms might be relatively durable, albeit with adjustments reflecting industry changes and electoral shifts.

Unfortunately, this outcome is far from assured, and may not even be the most likely. Regulatory agencies over the next few years may undermine the core regulation of the largest banks to the point that proponents of strong regulation will renew their search for more structural measures, or simply blunter measures, in pursuit of financial stability. When control of the Congress and Presidency shifts, as will happen at some point, such ideas will become live policy options. If the largest banks were to be the biggest beneficiaries of developments in financial and payments technology, as seems plausible, the resulting increased concentration in the banking industry could also motivate a more basic change in the post-crisis regulatory regime.

While there is at least a chance for maintaining the progress toward more resiliency for the largest banks, it is considerably harder to conjure up a benign outcome with respect to financial activity that occurs outside the perimeter of banking organizations. Recycled or new forms of shadow banking will almost surely increase over time, whether from existing nonbank financial firms or from new fintech (financial technology) entrants. Some of these will present risks to financial stability. It would be a cruel irony if the mistake of the 1980s and 1990s were repeated, and banking organizations were relieved of core regulations relating to financial stability so as to preserve their franchise value in the face of new competition. It would be crueler still if Congress and federal financial agencies were to wait for another serious financial dislocation before they turned their attention to new risks from new sources.

The argument offered by nonbank financial services firms that they should not be subject to "banking" regulation is often reasonable, but this fair point is not the same as a conclusion that *no* regulation is warranted. Especially with respect to short-term funding or other business models that can produce liquidity squeezes, some system-wide regulation is needed. But with limited legal authority and the apparently exclusive focus of current regulators on deregulatory measures, the business left unfinished by post-crisis reform is likely to remain so for the foreseeable future.

References

Afonso, Gara Michael Blank, and João Santos. 2018. "Did the Dodd-Frank Act End 'Too Big to Fail'?" *Liberty Street Economics*, Federal Reserve Bank of New York, March 5.

Aikman, David, Andrew G. Haldane, Marc Hinterschweiger, and Sujit Kapadia. 2018. "Rethinking Financial Stability." Bank of England Staff Working Paper 712. February 2018. https://www.bankofengland.co.uk/-/media/boe/files/working-paper/2018/rethinking-financial-stability.pdf.

Anadu, Kenechukwu, and Viktoria Baklanova. 2017. "The Intersection of U.S. Money Market Mutual Fund Reforms, Bank Liquidity Requirements, and the Federal Home Loan Bank System." Office of Financial Research Working Paper 17-05.

Baranova, Yuliya, Zijun Liu, and Tamarah Shakir. 2017. "Dealer Intermediation, Market Liquidity and the Impact of Regulatory Reform." Bank of England Staff Working Paper 665, July 14, 2017. https://www.bankofengland.co.uk/working-paper/2017/dealer-intermediation-market-liquidity-and-the-impact-of-regulatory-reform.

Board of Governors of the Federal Reserve. 2018. Notice of Proposed Rulemaking, April 25, 2018, *Federal Register*, Wednesday April 25, 83(80), pp. 18160–88. https://www.gpo.gov/fdsys/pkg/FR-2018-04-25/pdf/2018-08006.pdf.

Brewer, Elijah III, and Julapa Jagtiani. 2013. "How Much Did Banks Pay to Become Too-Big-To-Fail and to Become Systemically Important?" *Journal of Financial Services Research* 43(1): 1–35.

Cetorelli, Nicola, Fernando Duarte, and Thomas Eisenbach. 2016. "Are Asset Managers Vulnerable to Fire Sales?" *Liberty Street Economics* blog, Federal Reserve Bank of New York, February 18.

Cetorelli, Nicola and James Traina. 2018. "Resolving 'Too Big to Fail.'" Federal Reserve Bank of New York Staff Report 859, June 2018. https://www.newyorkfed.org/medialibrary/media/research/staff_reports/sr859.pdf.

Claessens, Stijn. 2014. "An Overview of Macroprudential Policy Tools." IMF Working Paper WP/14/214.

Cline, William R. 2017. *The Right Balance for Banks: Theory and Evidence on Optimal Capital Requirements*. Washington, DC: Peterson Institute of International Economics.

Crockett, Andrew. 2000. "Marrying the Micro- and Macro-Prudential Dimensions of Financial Stability." Remarks before the Eleventh International Conference of Banking Supervisors, Basel, Switzerland, September 20–21, 2000. https://www.bis.org/review/r000922b.pdf.

Department of the Treasury, Office of the Comptroller of the Currency; and Board of Governors of the Federal Reserve. 2018a. Joint Notice of Proposed Rulemaking, April 18, 2018, *Federal Register* 83(76): 17317–27. https://www.gpo.gov/fdsys/pkg/FR-2018-04-19/pdf/2018-08066.pdf.

Department of the Treasury, Office of the Comptroller of the Currency; Board of Governors of the Federal Reserve; and Federal Deposit Insurance Corporation. 2018b. Joint Notice of Proposed Rulemaking, October 21, 2018. https://www.federalreserve.gov/newsevents/pressreleases/files/bcreg20181031a1.pdf.

Elliott, Douglas J., Greg Feldberg, and Andreas Lehnert. 2013. "The History of Cyclical Macroprudential Policy in the United States." Finance and Economics Discussion Paper 2013-29, Federal Reserve Board, Washington, D.C. https://www.federalreserve.gov/pubs/feds/2013/201329/201329pap.pdf.

Federal Reserve Bank of New York. 2018. "Quarterly Trends for Consolidated U.S. Banking Organizations." https://www.newyorkfed.org/research/banking_trends.html.

Firestone, Simon, Amy Lorenc, and Ben Ranish. 2017. "An Empirical Economic Assessment of the Costs and Benefits of Bank Capital in the US." Finance and Economics Discussion Paper 2017-034, Board of Governors of the Federal Reserve, Washington DC. https://doi.org/10.17016/FEDS.2017.034.

Geithner, Timothy F. 2016. "Are We Safer? The Case for Strengthening the Bagehot Arsenal." Per Jacobsson Foundation Lecture. http://www.perjacobsson.org/lectures/100816.pdf.

Goldberg, Linda S., and April Meehl. 2018. "Have the Biggest U.S. Banks Become Less Complex?" *Liberty Street Economics* blog, Federal Reserve Bank of New York, May 7.

Gordon, Jeffrey N., and Christopher M. Gandia. 2014. "Money Market Funds Run Risk: Will Floating Net Asset Value Fix the Problem?" *Columbia Business Law Review* 2014(2): 314–370.

Gorton, Gary, and Andrew Metrick. 2012. "Securitized Banking and the Run on Repo." *Journal of Financial Economics* 104(3): 425–51.

Greenwood, Robin, Samuel G. Hanson, Jeremy C. Stein, and Adi Sunderam. 2017. "Strengthening and Streamlining Bank Capital Regulation." *Brookings Papers on Economic Activity,* Fall, pp. 479–544.

Hirtle, Beverley, and Andreas Lehnert. 2014. "Supervisory Stress Tests." Federal Reserve Bank of New York Staff Report 696. November.

Ihrig, Jane, Edward Kim, Ashish Kumbhat, Cindy Vojtech, and Gretchen C. Weinbach. 2017. "How Have Banks Been Managing the Composition of High-Quality Liquid Assets?" Finance and Economics Discussion Paper 2017-092, Board of Governors of the Federal Reserve, Washington, DC. https://www.federalreserve.gov/econres/feds/files/2017092pap.pdf.

Jackson, Thomas H. 2015. "Building on Bankruptcy: A Revised Chapter 14 Proposal for the Recapitalization, Reorganization, or Liquidation of Large Financial Institutions." Chap. 2 in *Making Failure Feasible,* edited by Kenneth E. Scott, Thomas H. Jackson, and John B. Taylor. Hoover Institution Press.

Kress, Jeremy C. 2018. "The Last SIFI: The Unwise and Illegal Deregulation of Prudential Financial, Inc." November 5. Available at SSRN: https://ssrn.com/abstract=3278730.

Quarles, Randall K. 2018a. "Liquidity Regulation and the Size of the Fed's Balance Sheet." Remarks at "Currencies, Capital, and Central Bank Balances: A Policy Conference." Hoover Institution Monetary Policy Conference, Stanford University Stanford, California, May 4, 2018. https://www.federalreserve.gov/newsevents/speech/quarles20180504a.htm.

Quarles, Randal K. 2018b. "A New Chapter in Stress Testing." Remarks at the Brookings Institution, Washington, DC, November 9, 2018. https://www.federalreserve.gov/newsevents/speech/quarles20181109a.htm.

Ueda, Kenichi, and Beatrice Weder di Mauro. 2013. "Quantifying Structural Subsidy Values for Systemically Important Financial Institutions." *Journal of Banking & Finance* 37(10): 3830–42.