

Regulatory Reform

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Abstract

In the wake of the global financial crisis (GFC), many nations embarked on reform to the financial regulatory system. This reform, unprecedented in its scope, touched virtually every part of the financial system in the United States and Western Europe. This article summarizes the key reforms, explains how these reforms fit together, assesses the relevant scholarly literature, and suggests six significant areas of open questions for researchers. These six areas are (a) liquidity rules, (b) central clearing of swaps, (c) shadow banking, (d) lenders of last resort, (e) extended guarantees, and (f) resolution and restructuring.

Global financial crisis (GFC): the financial crisis of 2007–2008 triggered by the crash of the subprime mortgage market in the United States

Lender of last resort (LOLR): lender willing to provide liquidity to financial institutions when it is unavailable elsewhere

1. INTRODUCTION

In the wake of the global financial crisis (GFC), many nations embarked on reform to the financial regulatory system. This reform, unprecedented in its scope, touched virtually every part of the financial system in the United States and Western Europe. This article summarizes the key reforms, explains how these reforms fit together, assesses the relevant scholarly literature, and suggests six significant areas of open questions for researchers.

Throughout this article, we restrict our scope to the regulation of systemic risk, which we define as anything directly related to the prevention and management of financial crises. While our focus on systemic risk includes the bulk of post-GFC reform, it excludes a significant component of the pre-GFC literature on financial regulation. Prior to the GFC, academic study of financial regulation existed mostly in a few silos. A large literature on financial institutions, considering most aspects of commercial and investment banking, existed in economics, finance, and law. Within finance, this literature was at the boundary of financial intermediation and corporate finance. A separate literature on financial markets, including the relatively young field of market microstructure, sat at the border of financial intermediation and asset pricing. These somewhat separate but active fields touched on regulatory issues, but not much on systemic risk or financial crises.

At the same time, the study of financial crises and systemic risk had largely moved out of mainstream finance and was the domain of specialists in international finance and macroeconomics. Financial crises were seen (except by a few intrepid scholars, mostly at central banks and international institutions) as an affliction of developing countries. Monetary economists, once actively engaged with financial stability, had largely moved on to other topics. One prominent scholar of financial crises recalls paper rejections accompanied by editorial comments that “the topic is better suited for a journal in economic history.”

Into this scholarly lacuna, the GFC swept. Beginning in 2009, as major economies began overhauling their regulatory structure, there was little academic work upon which to base the new laws. What is the optimal level of capital for large banks to protect against financial crises without stifling growth? How should the growing shadow-banking sector be regulated? What is the best design of a lender of last resort (LOLR) function to protect in a systemic event without inducing the moral hazard of some institutions becoming too big to fail? How should the massive market for swaps be regulated to ensure financial stability? These important questions had received far less attention than they deserved. When disaster struck, policy was made in politically driven processes without much academic input. This was our own fault as scholars: We did not have consensus on even the right framework for asking some of the questions. The authors of this article count themselves among the guilty and hope this article can be one part of our penance.

The good news is that the past decade has seen a resurgence of research on financial regulation, particularly focused on systemic-risk regulation and the challenge of financial stability in developed countries. In this journal alone, we conservatively count 14 articles since 2012 (Acharya & Richardson 2012, Adrian & Ashcraft 2012, Bisias et al. 2012, Strahan 2013, White 2013, Flannery 2014, Thakor 2014, Claessens 2015, Hirtle & Lehnert 2015, Calomiris & Jaremski 2016, Lewis 2016, Bookstaber 2017, Ryan 2017, Richardson et al. 2018). This literature did not take off until after the major reforms took effect, and there is still much to do. International agreements and major domestic legislation are typically only a blueprint, with more detailed work left to administrative rulemaking and regulatory guidance. Furthermore, regulatory discretion, particularly around systemic issues, is often wide and crucial. Where the legal authority is broad, ongoing academic work can do more to inform policy. In the remainder of this article, we suggest and discuss a set of important open questions selected considering both academic interest and policy relevance.

In Section 2, we summarize the major international agreements and domestic legislation since the crisis. Section 2.1 discusses the key framework changes related to systemic risk in the Basel III accord; in the Dodd–Frank Wall Street Reform and Consumer Protection Act (DFA) of the United States; in the European Union (EU), where some changes are restricted to EU members that use the euro; and in the United Kingdom, which, while still a member of the EU as of this writing, does not use the euro and has some legislation independent of the Eurozone.

Section 2.2 provides a holistic view of the regulatory changes. Looking at the full range of regulation of systemic risk, we divide legal authority into three groups: preventative powers, emergency powers, and resolution and restructuring powers. Post-GFC reform has had the overall effect of empowering prevention, decreasing the flexibility of emergency powers, and adding powerful (but somewhat inflexible) new tools for resolution. We believe that this shift of powers has made it easier to deal with a modest shock (through both better preparation and cleaner resolution) but more difficult to deal with a truly systemic event.

The rest of this article proposes a set of important open questions about regulation and discusses the related literature for each. In some cases, such as for optimal bank capital, stress tests, and measurement of systemic risk, the recent literature is large and has been covered well elsewhere, including in past articles from this journal. In those cases, we provide only a short discussion along with citations to recent reviews. For the questions discussed at length, either we believe that no recent comprehensive review exists or such a review has not covered what we believe to be the main issues. Because of the lack of published literature on these issues, we do not provide a comprehensive literature review for these questions. Instead, for each question, we highlight a few key papers that have started the ball rolling and we discuss where the ball needs to be pushed next.

Section 3 covers prevention, the regulatory changes intended to prevent a financial crisis. Of the three main groups of reforms, prevention has received the most attention, perhaps because central banks and other major regulatory authorities have been tasked with many preventative responsibilities and thus have tasked their well-trained staffs to work on these topics. As mentioned above, several of the topics here are well covered elsewhere. But we identify three questions that we believe deserve further study: the new liquidity guidelines prescribed by the Basel III accord, the optimal design and oversight of central counterparties for swaps, and the migration of traditional banking activity to the shadow-banking sector.

The GFC witnessed many emergency interventions in the United States and Europe, some of which creatively used legal authorities and pushed the boundary of statutory power. The political reaction to these emergency interventions was largely negative, on both sides of the political spectrum. As a result, regulatory reform restricted or entirely removed some of these powers, especially in the United States. With the new limitations, both legal and political, it is crucial that we understand how best to use our remaining powers. Section 4 reviews what we learned from the GFC interventions in the two areas most affected by reform: LOLR activities (Section 4.1) and broad-based guarantees (Section 4.2).

The widespread political backlash to the use of emergency powers can be understood as a reaction to real and perceived bailouts of financial institutions. Part of the regulatory response was to give governments an alternative to bailouts through resolution and liquidation. Reforms both added to this authority and created restrictions on its use to prevent the perception that resolution would be used as a backdoor bailout. In Section 4.3, we discuss open questions about these new tools.

Section 5 summarizes this article with a list of key open questions in each of the six topics discussed in Sections 3 and 4. Section 6 provides a more detailed description of the institutional background and framework changes discussed in Section 2.1.

Dodd–Frank Wall Street Reform and Consumer Protection Act

(DFA): main US financial reform legislation following the GFC, adopted in 2010

European Union (EU): political and economic union among 28 European countries

Basel Committee on Banking Supervision (BCBS): primary

global standard setter for banking regulation

Liquidity coverage ratio (LCR): liquidity requirement calculated by dividing high-quality liquid assets by total net liquidity outflows over a 30-day stress period under Basel III

Net stable funding ratio (NSFR): liquidity requirement calculated by dividing available stable funding by the required stable funding over a one-year stress period under Basel III

Financial Stability Oversight Council (FSOC): US government organization responsible for monitoring and responding to risks to US financial stability

Systemically important financial institutions (SIFIs): financial institutions whose failure could endanger financial stability

Federal Deposit Insurance Corporation (FDIC): US government corporation providing deposit insurance to US bank depositors

2. INSTITUTIONAL BACKGROUND

2.1. Overview of Key Framework Changes

The Basel Committee on Banking Supervision (BCBS), which was established to strengthen the capital resources of international banks, updated its preexisting Basel agreement in December 2010. The new framework, Basel III, addressed three main problems revealed in the crisis: inadequate quantity and quality of capital, insufficient liquidity, and interconnectedness of the financial system. The reforms, therefore, included a capital framework raising the quality, consistency, and transparency of the capital base and a liquidity framework consisting of the liquidity coverage ratio (LCR), which promotes the short-term resilience of a bank's liquidity risk profile, and the net stable funding ratio (NSFR), which reduces the likelihood that disruptions to a bank's regular sources of funding could increase the risk of its failure and potentially lead to broader systemic stress (BIS 2010, 2013, 2014). In the United States, as a response to the GFC, President Barack Obama introduced in June 2009 a proposal for a new law, which was a "sweeping overhaul of the financial regulatory system, a transformation on a scale not seen since the reforms that followed the Great Depression" (White House 2009). The final law, the DFA, was signed into law in July 2010, bringing significant changes to financial regulation in the United States.

Key systemic-risk elements of the DFA include the establishment of the Financial Stability Oversight Council (FSOC), which is charged with identifying risks to the financial stability of the United States, promoting market discipline, and responding to emerging risks to the stability of the US financial system. The DFA also includes stress tests for systemically important financial institutions (SIFIs) (Board Gov. Fed. Reserve Syst. 2017), which are FSOC-designated systemically important nonbank financial companies and bank holding companies with \$50 billion (subsequently amended to \$250 billion as of 2018 under Section 401 of the Economic Growth, Regulatory Relief, and Consumer Protection Act) or more in consolidated assets. SIFIs, subject to a new insolvency regime under Title II of the DFA,¹ are also required to periodically submit a resolution plan to the Federal Reserve (Fed), the Federal Deposit Insurance Company (FDIC), and the FSOC. The DFA limits the Fed's emergency assistance power and the FDIC's authority to provide assistance to individual banks. Lastly, Title VII of the DFA includes a mandatory central clearing requirement for financial entities participating in the swap market (US Gov. Publ. Off. 2011a). In Europe, the EU introduced the European System of Financial Supervisors (ESFS), which became operational on January 1, 2011, and consisted of both microprudential and macroprudential supervision powers. The ESFS was given a general power to facilitate and coordinate national supervisory responses in emergency situations. The EU Bank Recovery and Resolution Directive (BRRD) sets forth an orderly resolution plan and provides for a bail-in tool. This bail-in tool allows for regulators to write down or convert into equity certain liabilities of the firm in resolution. The European Market Infrastructure Regulation establishes rules regarding over-the-counter (OTC) derivatives, central counterparties (CCPs), and trade repositories, aiming to reduce systemic risk, increase transparency in the OTC market, and preserve financial stability.

Additionally, in acknowledgment of the need for stronger coordinated supervision, the EU Banking Union was established in 2012. It introduced a single rulebook for supervision, the Single Supervisory Mechanism (SSM), the Single Resolution Mechanism (SRM), and the European Deposit Insurance Scheme (Eur. Parliam. 2017). The SRM, in particular, allows banks in the

¹Technically, the definition of a SIFI for Title II resolution is not necessarily the same as its definition for designation in Title I, which among other things grants authority for FSOC to designate certain nonbank financial companies for heightened prudential supervision. We ignore this distinction and use the generic term of SIFI for both purposes.

SSM to resolve through a single resolution board and a single resolution fund that is financed by the banking sector (Eur. Comm. 2014).

In the United Kingdom, the Financial Services Act 2012, which came into effect on April 1, 2013, reformed the regulatory structure and created a new regulatory framework for the supervision of the banking and financial services industry. This act gave the Bank of England macroprudential oversight power for the financial system and primary operational responsibility for financial crisis management. It also extended the Special Resolution Regime, which designates the Bank of England as the resolution authority, to bank holding companies, central counterparties, and certain investment firms and their group companies.

2.2. Framework of Post-Global Financial Crisis Reform

As an organizing framework, it is useful to divide post-GFC reforms into three groups. The first group is preventative powers: the authority to monitor, regulate, and supervise healthy institutions. The second group includes all emergency powers to fight an active panic. The third group is resolution and restructuring powers for use when failure is imminent or has already occurred. The main effect of post-GFC reforms was to shift powers away from the second group and into the first and the third. This shift has been profound, particularly in the United States, and raises many questions for researchers.

Preventive powers include capital and liquidity regulations (as implemented in Basel III), the assignment of supervision of the largest institutions to central banks in both the United States and Europe, new techniques for stress tests and financial stability monitoring, and requirements for central clearing of derivatives. In all jurisdictions, these preventative powers have been strengthened. Governments learned both the pain of having a crisis and the backlash of trying to fight it, and the reaction to this experience was to do as much as possible to avoid another crisis. Some of these preventative measures have been well studied, but others, such as liquidity regulation and central clearing, have received less attention from scholars.

The same political considerations that led to greater preventative powers also reduced emergency powers. Politicians burned by bailouts, both real and perceived, sought to demonstrate that no institution was too big to fail and placed constraints on regulators' powers to aid troubled institutions. This is seen most clearly in the United States, where the reduction in the Fed's lending authority and the FDIC's guarantee authority leaves policymakers with weaker emergency tools than in the GFC. The explicit motivation for this change was to force the government to liquidate SIFIs, and Title II of the DFA does increase the power to do this. But Title II is, of course, untested, and little academic work has been done to inform policy. In Europe, the shift away from emergency powers has been more subtle, but there too a new and untested resolution regime is in place, with the efficacy of the BRRD's bail-in requirement being the largest unknown.

3. PREVENTION

Crisis prevention has received the most attention from researchers in post-GFC regulatory reform. Some of the topics in crisis prevention have significant literatures that have been covered previously in this journal, and are not discussed in any depth here; these topics include bank capital (Thakor 2014, Flannery 2014), stress testing (Hirtle & Lehnert 2015), macroprudential policy tools (Claessens 2015), and financial stability monitoring (Adrian, Covitz & Liang 2015). Instead, we focus on three other prevention topics that are crucial in this round of regulatory reform, but with a smaller current literature: liquidity rules, central clearing, and shadow banking.

European System of Financial Supervisors (ESFS): system of microprudential and macroprudential authorities in the EU comprising the ESRB and ESAs

Bank Recovery and Resolution Directive (BRRD): main directive adopted in 2014 governing bank resolution in the EU

Over-the-counter (OTC): trading conducted directly between two parties without using an exchange

Central counterparties (CCPs): organizations that facilitate trading in derivatives and equities markets

Single Supervisory Mechanism (SSM): EU mechanism transferring banking supervision authority to the ECB

Single Resolution Mechanism (SRM): central institution for banking resolution in the EU

3.1. Liquidity Rules

The liquidity rules introduced in Basel III are discussed in Sections 2.1 and 6. These rules represent a significant shift for the Basel agreements, which had previously focused exclusively on capital. The motivation for liquidity rules is straightforward and can be paraphrased as: “Financial crises are caused by problems of both solvency and liquidity. We fix the first problem with more capital in banks; we should fix the second problem with more liquidity in banks.”

At first glance, this motivation would appear to be sensible: Banks borrow short and lend long, and if they do too much of this, then they will be vulnerable to runs after even small shocks. The specific rules in Basel III target banks’ stability for both assets (LCR) and liabilities (NSFR).

But the simple logic of liquidity rules is also paradoxical. We must recognize that these rules target a core function of banks. Borrowing short and lending long, that is, maturity transformation, is essentially what a bank does. Maturity transformation is not a tangential function or accidental by-product of banking; it is banking. Thus, it would be a mistake to assume that we can suppress it just by targeting a specific type of institution. Indeed, it was the movement of maturity transformation out of traditional banks and into the shadow-banking sector that led to the initial panics of the GFC. Securitization, asset-backed commercial paper, and repurchase agreements (repo) can be done outside of the regulated banking sector, and Basel III remains silent there.

Because the liquidity rules are so new, the postreform research on these questions is limited. Also, owing to a lack of data, most of this research is from theorists. Perotti & Suarez (2011) take a principled approach and ask whether we should be using price or quantity tools to regulate liquidity, ultimately finding a role for both. Calomiris, Heider & Hoerova (2015) use a general setting to show that liquidity requirements can be optimal but would not necessarily take the form used in Basel III. In a recent paper, Kashyap, Tsomocos & Vardoulakis (2017) modify the classic framework of Diamond & Dybvig (1983) so that banks face both credit risk and run risk. In this setting, the social planner cares about both sides of bank balance sheets and thus needs two different instruments, capital and liquidity.

With the rules so new and still not implemented in many places, empirical researchers must look to history for examples that could shed light on the present. Gorton & Muir (2016) argue that Basel’s LCR is an analog to the collateral requirements introduced in the United States by the National Bank Act of 1864, where issuance of private banknotes was required to be backed by federal government bonds. In both settings, the regulation required the substitution of one form of money-like short-term debt for another, which (the authors argue) does not reduce financial fragility, as evidenced by the many panics of the late nineteenth century in the United States. Carlson (2013) also draws lessons from US history to learn about modern liquidity requirements, concluding that liquidity requirements (in the form of reserve requirements) for banks are not a stand-alone tool for dealing with runs, but rather are closely tied to the policies of the central bank.

To go beyond partial equilibrium models and historical examples, researchers will need to both expand the theoretical framework of this early work and search for clever empirical studies in modern financial markets. With a staggered rollout of Basel’s liquidity rules over many countries in the next few years, it should be possible to identify some quasi-natural experiments. One early attempt in this vein is by Bonner & Eijffinger (2016), who use the rollout of an LCR-like rule in the Netherlands. This rule, which preceded Basel III, is similar enough to allow some inference to today, with the main conclusion being that the rule decreased net-interest margins at banks, with costs not passed along to borrowers. It remains to be seen whether this finding would still be true in a world where all banks in the EU (or the world) faced similar rules, and what the implications of such global rules would be on the migration of maturity transformation out of the regulated banking sector. This point is discussed further in Section 3.3.

3.2. Central Clearing

Prior to the post-GFC reforms, the vast majority of swaps were traded OTC and cleared bilaterally between the parties. This decentralized system has two main drawbacks: opacity and bankruptcy inefficiency.

Opacity occurs because the pre-GFC system had very limited disclosure requirements for transactions, and this created a challenge for understanding market exposures. With exposure opacity, a single institution can amass large exposures to any specific risk without informing counterparties or regulators. In the GFC, such opacity was most acute for AIG, which had large positions insuring subprime securitizations, the size of which was underappreciated both by counterparties and by regulators. By the time the scale of AIG's losses on these contracts became apparent, it was too late for intervention using existing regulatory tools.

Bankruptcy inefficiency results from chains of defaults through a bilateral settlement system. This inefficiency was a major vector for contagion after the failure of Lehman Brothers in September 2008. Interestingly, Lehman did not have significant net positions in derivatives, serving instead as a dealer with largely offsetting positions. Nevertheless, the vagaries of bankruptcy rules led to enormous costs for the Lehman estate as these positions were wound down.

CCPs are a potential remedy to these problems. With CCPs handling clearing, large institutions' net positions are more transparent, and collateral rules and risk apply to net rather than gross exposures. New rules in the United States and Europe, as discussed in Sections 2.1 and 6, are intended to move OTC activity into these CCPs. But, while we have long experience with CCPs in some markets, we have no experience with a shift in activity of this magnitude. Many fundamental questions remain unanswered, starting with whether a system with CCPs is in fact more stable than what we had before.

Darrell Duffie has led the scholarly charge on this topic, and any researcher looking to work in this area would be well advised to start by reading his work. Duffie & Zhu (2011) present a model designed to answer the main question about central clearing: Does a central clearing counterparty reduce counterparty risk? They point out a key trade-off introduced by CCPs: While a central counterparty can efficiently allow netting across multiple counterparties in a single type of swap, this multilateral netting might impede the bilateral master netting agreements frequently used between large dealers. Under plausible parameter values, they show that this trade-off can tip in either direction. Furthermore, they show that competition between CCPs—when, as in reality, there is more than one central counterparty—will increase counterparty risk relative to a single CCP case.

Much of the work since Duffie & Zhu (2011) has been by operations researchers focused on technical issues of CCP design and by asset-pricing researchers working on the price of counterparty risk. Duffie (2014) and Duffie, Scheicher & Vuillemeys (2015) have continued investigating the key issue of systemic-risk implications of CCPs, and the Duffie–Zhu model is extended by Menkveld (2017). But the theory literature here is still in its early and explorative phase. We have more questions than answers.

Empirical work here is sparse. A recent working paper by Bignon & Vuillemeys (2017) studies the 1974 failure of the Caisse de Liquidation, a derivative clearinghouse. This case study demonstrates the importance of understanding clearinghouse incentives, which in this case induced delays in containing and then liquidating a large position and complicated attempts to restructure privately prior to bankruptcy. Boissel et al. (2017) provide a more modern example of systemic risk in clearinghouses, and a cautionary one. They study two CCPs for general collateral repo during the GFC and its aftermath in Europe in the period 2008–2011. General collateral repo is the safest sector of the repo market; nevertheless, they find that in 2011, at the peak of the EU sovereign

debt crisis, repo rates suggested a significant probability of clearinghouse failure, a surprising and sobering finding for this relatively safe sector.

3.3. Shadow Banking

The majority of post-GFC reforms were aimed at large commercial banks and other large non-bank financial institutions. But the decades prior to the GFC witnessed a dramatic increase in market-based finance, with maturity transformation taking place though a chain of counterparties and being intermediated through OTC markets. This collection of market-based financial intermediation activities is often grouped under the name of shadow banking. For this discussion, we define shadow banking as maturity transformation done outside of the traditional banking system, without any access to the explicit safety net of central-bank borrowing or deposit insurance. Shadow banking includes, for example, money-market mutual funds (MMMFs), securitization, asset-backed commercial paper, and repo. The role of shadow banking is particularly large in the United States, where the traditional banks are a smaller part of overall financial activity than they are in other developed economies.²

There has been significant research into the role played by shadow banking in the GFC (see, e.g., McCabe 2010; Gorton & Metrick 2012; Covitz, Liang & Suarez 2013). Most of this research was not carried out until post-GFC reforms were well under way, however, so that research into the regulation of shadow banking came even later and did not meaningfully inform the reform efforts. Adrian & Ashcraft's (2012) survey of the literature on shadow-banking regulation provides an extensive framework for such regulation. Despite this earlier survey, we still include shadow banking in the present article because we believe the ratio of unanswered questions to existing research is higher than for any other topic on the post-GFC reform agenda. Indeed, the two topics discussed in Sections 3.1 and 3.2 (liquidity regulation and central clearing, respectively) both involve migration to shadow banking as a key concern. This also holds for other topics in prevention: For example, the vast majority of the bank-capital literature ignores the migration of maturity transformation activity to shadow banking, a migration incentivized by even small private costs of capital requirements. This point is made clearly and convincingly by Kashyap, Stein & Hanson (2010).

While this migration to shadow banking is now a major concern, we are still a long way from having any effective regulation to manage it. Proposals in the literature range from ideal-world solutions ("how should we regulate shadow banking if we could pass any law we want?") to attempts to wrangle something using the limited scope of powers now available. The most ambitious ideal-world approach is provided by Ricks (2016), who compellingly argues for government regulation of all financial intermediation that creates money-like instruments. In a less sweeping approach, Gorton & Metrick (2010) argue that much of shadow banking still relies on various government exemptions from bankruptcy law, and that much can be accomplished by using these exemptions as a carrot to get more congruent regulation between market-based and bank-based activities. Their proposals make use mostly of existing authorities to cobble together an overall framework of shadow-banking regulation. Finally, taking the most practical approach, Adrian, Ashcraft & Cetorelli (2013) describe how the shadow-banking sector can be monitored using currently available tools, providing some guidance for regulators who have the mandate (but not yet the

²Shadow banking is sometimes given a broader interpretation that includes all traditional banking activity (not just maturity transformation) that takes place outside of the regulated banking sector. This broader definition, which would include small or medium-sized bank lending by the shadow-banking sector in China, is not considered in our review (for further discussion, see Hachem 2018).

framework) to carry out this work. This list of regulatory proposals is not comprehensive, but it does represent well-known examples of the main strategies.

Since we do not yet have any strong regulation of shadow banking, the lack of empirical studies of efficacy of such nonexistent regulation is not surprising. But there is still much important empirical work to do: The post-GFC regulatory reforms will create strong incentives for migration to the shadow-banking sector, and we have a chance to witness this migration in real time under a wide variety of policy implementations. In the next decade, scholars will have the opportunity to trace these migration incentives and to suggest flexible policies to manage them.

4. EMERGENCY MEASURES AND RESOLUTION

In the immediate aftermath of the GFC, there was a burst of research into the efficacy of emergency measures. After GFC reform, the attention of central banks necessarily shifted to prevention, and the literature on emergency measures is not as active. This is a shame: Hundreds of interventions were tried during the crisis, and only a few of them have been carefully studied. While every crisis is unique, and every country has idiosyncratic legal and political constraints, there is still much to be learned from studying the interventions of the past. Given the new constraints placed on emergency action, particularly in the United States, it is crucial that we learn what worked, since we may not have as much room for mistakes in the future.

We focus on the two major types of emergency measures where legal authority changed the most in post-GFC reforms: LOLR (Section 4.1) and broad-based guarantees (Section 4.2). When emergency measures are insufficient to rescue failing institutions, it is necessary to enter a resolution or restructuring process. The rules around such processes changed significantly in both the United States and the EU after the GFC. Open questions about these postfailure policies are discussed in Section 4.3.

4.1. Lender of Last Resort

The LOLR function is at least as old as central banking itself, and the principles of use for the LOLR have held steady since Bagehot (1873). This principle can be paraphrased as: “In a panic, lend freely at a penalty rate against good collateral.” While most central bankers will obediently cite Bagehot’s dictum, the GFC saw many examples where each of its clauses were violated. In the aftermath of the GFC, the DFA restricted the use of the LOLR by the Fed, and political backlash to its use worldwide has left many central bankers skittish about its use in the future.

With this context, researchers’ main challenge is to update Bagehot’s dictum for the twenty-first century. The key questions are, in a panic:

1. Who is eligible to borrow?
2. Under what collateral rules may they borrow?
3. At what rates may they borrow?

In the GFC, the Fed eventually extended its lending to most financial institutions, against an ever-expanding set of collateral types, at rates explicitly designed not to stigmatize borrowers. Indeed, it is this last challenge of avoiding stigma that has drawn the most research attention since the GFC. In answering questions 1–3, a LOLR must balance the potential short-term stigma to potential borrowers (which makes some potential borrowers stay away and can harm those who don’t) against the long-term moral hazard if institutions believe that lending terms in a future crisis will be very lenient. The trade-off between stigma and moral hazard is the main tension in LOLR design, a tension with both economic and political dimensions.

Term Auction Facility (TAF):

temporary program established by the Fed to improve liquidity during GFC

European Central Bank (ECB): central bank for the Eurozone

Temporary Liquidity Guarantee Program (TLGP):

temporary FDIC program that guaranteed noninterest-bearing transaction accounts and newly issued senior unsecured debt

Troubled Asset Relief Program (TARP):

US government program that purchased toxic assets and equity from financial institutions during the GFC

The stigma problem is not new. Gorton & Metrick (2013) trace the stigma versus moral hazard tension to the first 20 years of the Fed, with moral hazard concerns dominating and leading the Fed to discourage borrowing from the discount window in the late 1920s. Anbil (2017) uses a clever natural experiment to show that stigma had a significant negative effect on borrowers from the Reconstruction Finance Corporation during the Great Depression. Stigma-induced reluctance to borrow from the discount window was a continuing problem in the early stages of the GFC, leading to the creation of the Term Auction Facility (TAF), which made use of several design features to minimize stigma. Armantier et al. (2015) persuasively argue that these design features were valuable to borrowers, who paid higher rates for TAF funds than at the discount window. Overall, the evaluation of the efficacy of TAF has motivated a healthy debate: The most recent work is by McAndrews, Sarkar & Wang (2017), who conclude that the facility was effective at easing liquidity pressures in interbank markets.

The TAF is the most studied of the GFC LOLR interventions. Other programs, many just as large, have not received nearly as much attention. Scholars looking for a place to start should read the comprehensive overviews of GFC emergency lending programs by Fleming (2012) (for the Fed), Drechsler et al. (2016) [for bank lending by the European Central Bank (ECB)], and Domanski, Moessner & Nelson (2014) (for multiple jurisdictions). In each jurisdiction, there are many emergency programs waiting for the detailed scholarly treatment that TAF has received, with researchers analyzing the impact of each program and the role played by the specific program design (questions 1–3 above) in achieving that impact.

4.2. Guarantees

Most developed countries maintain insurance to guarantee bank deposits for small depositors. These deposit-insurance plans are well studied and have been previously reviewed in this journal by Calomiris & Jaremski (2016). But in the GFC, many countries extended guarantees far beyond their standard plans to include large depositors, nondeposit debt of banks, and even holdings in certain kinds of investment vehicles. These emergency extended-guarantee programs played an important role in fighting the panic phase of the GFC (Geithner 2014).

As with the LOLR authorities, post-GFC reforms restricted the use of such guarantees in the United States and left regulators in other countries fearful of public backlash for future uses. Going forward, researchers have two tasks. First, they should evaluate the efficacy of various extended-guarantee plans and recommend future policy rules. Second, they should evaluate and advise about changes to guarantee authority. As with LOLR programs, a key trade-off is between fighting an active panic versus inducing moral hazard that could lead to risk shifting and future crises.

These areas of research are wide open. The evaluation work on extended guarantees during the GFC is remarkably thin. The main challenge for answering these questions is a lack of any clean experiments. During the GFC, the two most prominent examples of broad-based guarantee programs were both in 2008, in Ireland and in the United States. In the Irish case, the guarantee became toxic to the sovereign, leading to a bailout of the Irish government in 2010. The main conclusion of this intervention is that explicit government guarantees beyond a nation's debt capacity can cause major problems. This conclusion does not require complex models or fancy econometrics.

In the United States, the FDIC's Temporary Liquidity Guarantee Program (TLGP) was announced in October 2008. The TLGP had two components: one to guarantee newly issued bank debt and one to guarantee noninterest-bearing transaction accounts with no limit. The TLGP was announced at the same time as the first round of capital injections under the Troubled Asset Relief Program (TARP). This simultaneity clouds inference; apparently the US government

was more concerned with saving the financial system than with providing a clean experiment for researchers. Importantly, the FDIC's authority to implement similar guarantees in the future was sharply restricted by the DFA, as described in Sections 2.1 and 6.

Veronesi & Zingales (2010) attempt to value these simultaneous programs, which they estimate had an overall net benefit of between \$86 billion and \$109 billion (for a broader analysis of the budgetary impact and subsidy cost of the Fed's programs during the GFC, going beyond the TLGP and TARP, see CBO 2010). This positive net benefit is attributed mostly to reduced deadweight loss from avoiding disruptive bank failures. While their methodology does not allow for a direct estimate of the net benefit of the TLGP in isolation, they do find that it would not have been cost-effective to obtain the same gross benefit with capital injections alone. (While they conclude that the guarantee was more efficient than capital injections, they also calculate that the most efficient plan would have been a forced debt-to-equity swap, which was quite different than the plan ultimately adopted.)

This important result has not been adequately followed up. As of this writing, Veronesi & Zingales (2010) have over 400 citations. However, most of these citations are from papers studying the TARP capital injections and not the TLGP. Another large group of citations is from papers studying the value of implicit guarantees against failure that include all implicit government support for the financial industry. We are unable to identify a single citation that focuses exclusively on the TLGP. This is a major gap. Banks used these guarantees in different ways, and those cross-sectional differences may have had differential impacts. While banks' choices about use are certainly endogenous, we should look for some clever instruments to tease out the precise roles played by the different parts of the programs.

4.3. Resolution and Restructuring

The bankruptcy of Lehman Brothers in September 2008 was the seminal event of the panic phase of the GFC. The Lehman bankruptcy was complex, with thousands of subsidiary entities and hundreds of thousands of financial contracts. Cross-border issues between the United States and the United Kingdom led to the temporary freezing of assets and further destabilized markets. But the US government, unlike in the resolution of banks, had no authority to resolve Lehman, which was a broker-dealer. Once Lehman was deemed to have insufficient collateral for emergency lending, the options were either bankruptcy or bailout. Later that week, faced with the same choices for nonbank AIG, the government took the bailout option. In both cases, neither bankruptcy nor bailout was a clean solution, and the panic intensified. In Europe, major multinational financial institutions failed or required massive rescue programs during the crisis, including Fortis and Dexia in the EU and all three of the major banks in Iceland.

In response to these complex failures, regulatory reform gave governments new powers to restructure and liquidate large financial institutions, including powers over systemically important nonbanks. Some important details about these powers are discussed in Section 6. For researchers, the central challenge is that these rules are untested, and we have no direct empirical evidence to shed light on their efficacy. Instead, it is necessary to look for indirect evidence in past crises. This work is needed most for understanding cross-border resolutions and for the bail-in rules introduced by the EU.

One challenge for research into resolution policy is that modern financial institutions are now far more complex than at any previous time, so the technical aspects of SIFI failure often have no precedents before the GFC. Scholars planning work in this area should first familiarize themselves with some of these complexities, and we refer them to summaries of failures in US and European institutions [e.g., Lehman Brothers (Fleming & Sarkar 2014), Northern Rock (Shin 2009), Fortis

Group of Ten (G10):
a group of eleven
countries that
cooperate on
international financial
matters

(Wiggins, Tente & Metrick 2015a), Dexia (Wiggins, Tente & Metrick 2015b), and Icelandic banks (Zeissler, Piontek & Metrick 2015)]; Valukas (2010) gives a detailed deconstruction of the Lehman failure. An excellent general treatment of the failure mechanics of dealer banks is provided by Duffie (2010). Moreover, although not much has been written on this topic, international coordination in resolving international institutions is an important issue to explore.

A central plank of the BRRD in the EU is the required use of bail-in capital prior to any government capital injections. This bail-in is meant to mitigate moral hazard and to presumably mitigate the political backlash of any rescue efforts. But bail-in rules have political challenges of their own.³ Since the adoption of the BRRD, European authorities have found it difficult to impose bail-in for creditors. In Italy, some banks had issued bail-in debt to retail depositors, and the political pressure to spare these depositors led to a workaround of the BRRD rules (Econ. Intell. Unit 2017). A key research topic is the proper design of bail-in rules and whether such rules could work at all. This is a topic for both theorists (to propose mechanisms better than the current version) and empiricists (to carefully analyze our experience so far).

5. OPEN QUESTIONS

This article reviews the institutional details and nascent economic research about post-GFC regulatory reform. We focus on six topics that have many open questions for researchers:

- What are the implications of Basel III's liquidity rules for systemic risk?
- How do CCPs affect the probability and costs of a financial crisis? How should CCPs be designed and regulated to maximize their net benefits?
- How do post-GFC regulations affect migration to the shadow-banking sector? What tools should we use to monitor and regulate that sector?
- How should LOLR policies be designed for modern panics? How can we minimize the stigma of LOLR facilities and the moral hazard of their use?
- How exactly did the extended guarantees of the GFC work to fight the panic? How restrictive are the new rules in the United States that limit such guarantees?
- Can the new regimes for resolution and restructuring of SIFIs work? If not, how should they be altered?

6. APPENDIX

6.1. International Framework: Basel III

In 1974, the central bank governors of the Group of Ten (G10) countries established a Committee on Banking Regulations and Supervisory Practices, later renamed the BCBS. In December 1987, the BCBS issued a consultative paper aimed at strengthening the capital resources of international banks. On the basis of feedback received for this paper, the BCBS adopted Basel I, requiring international banks in G10 nations to maintain a minimum level of capital based on the amount of their assets adjusted for the credit risk associated with those assets (BIS 1988). In 1996, an amendment incorporated a consideration for market risks of the assets in addition to credit risks (BIS 2005), and a more significant update was agreed on in June 2006 as Basel II (BIS 2006).

³Note that bail-in capital is different from contingent-capital instruments, which can be counted toward capital requirements. In the former case, the bail-in can occur for debt instruments that otherwise have no equity-like features and would not be included in capital ratios. Contingent-capital instruments, the use of which is greatly expanded under Basel III, are discussed as part of the large capital-requirements literature (Flannery 2014) and are not covered in this article.

The GFC set the stage for the next major reform of the Basel framework. In December 2010, the BCBS introduced Basel III, which reformed the capital framework of Basel II. The reforms included (a) raising the quality, consistency and transparency of the capital base; (b) enhancing risk coverage; (c) supplementing the risk-based capital requirement with a leverage ratio; and (d) reducing procyclicality and promoting countercyclical buffers (BIS 2010). Moreover, global systemically important financial institutions designated by BCBS must have higher loss absorbency capacity to reflect the greater risks that they pose to the financial system (BIS 2010).

Additionally, Basel III added a liquidity framework. The LCR was set forth to promote the short-term resilience of a bank's liquidity risk profile. The LCR aims to ensure that a bank has an adequate stock of unencumbered high-quality liquid assets consisting of cash or assets that can be converted into cash at little or no loss of value in private markets to meet its liquidity needs for a 30-calendar-day liquidity-stress scenario (BIS 2013). The NSFR was set forth to reduce the likelihood that disruptions to a bank's regular sources of funding will erode its liquidity position in a way that could increase the risk of its failure and potentially lead to broader systemic stress. The NSFR requires banks to maintain a stable funding profile in relation to their on- and off-balance sheet activities (BIS 2014).

6.2. United States

This section discusses the key systemic-risk elements of the DFA.

6.2.1. The Financial Stability Oversight Council. Established under the DFA, the FSOC is charged with identifying risks to the financial stability of the United States, promoting market discipline, and responding to emerging risks to the stability of the US financial system. The FSOC consists of 10 voting members and 5 nonvoting members (FSOC 2010). The FSOC is held accountable to Congress through the publication of an annual report and testimony provided by the chairman regarding the FSOC's activities and emerging threats to financial stability.

One of the FSOC's major powers is to identify systemically important nonbank financial companies, financial activities and practices, financial market utilities and payments, and clearance and settlement activities. The DFA establishes that the identified systemically important nonbank financial companies are subject to the Fed's supervision, along with bank holding companies with \$50 billion (subsequently amended to \$250 billion as of 2018 under Section 401 of the Economic Growth, Regulatory Relief, and Consumer Protection Act) or more in consolidated assets, which are automatically treated as systemically important and automatically come under the Fed's supervision. These systemically important nonbank financial companies and bank holding companies are referred to as SIFIs.

The FSOC is also authorized to recommend that the Fed apply stricter standards for the largest, most interconnected firms, including designated nonbank financial companies, as described above. Moreover, where the FSOC determines that certain practices or activities pose a threat to financial stability, it may make recommendations to the primary financial-regulatory agencies for new or heightened regulatory standards. The FSOC can determine whether to break up firms that pose a grave threat to the financial stability of the United States.

6.2.2. Stress tests. The DFA requires the Fed to conduct annual stress tests for SIFIs under at least three scenarios (baseline, adverse, and severely adverse) and to publish a summary of the results of these stress tests (Board Gov. Fed. Reserve Syst. 2017). Each SIFI must also conduct semiannual internal stress tests, report the results of these stress tests to the Fed and its primary financial-regulatory agency, and publish a summary of the results as required by implementing regulations. Financial companies with \$10 billion or more in assets must also conduct annual internal stress tests

under at least the three scenarios and publish a summary of the results as required by implementing regulations. As of 2018, Section 401 of the Economic Growth, Regulatory Relief, and Consumer Protection Act has amended this stress test requirement to apply only to financial companies with \$250 billion or more in assets and to require internal stress tests periodically and under at least two instead of three scenarios. The Fed has discretion to order stress tests for non-SIFIs.

6.2.3. Emergency powers of the Fed and the Federal Deposit Insurance Company. The DFA brings some changes to the Fed and FDIC's emergency powers. First, the DFA limits the emergency assistance power of the Fed under Section 13(3) of the Federal Reserve Act to a program or facility with broad-based eligibility. The Fed is no longer able to provide lending assistance to any single and specific individual, partnership, or corporation that is not part of a broad-based program. The Fed cannot use the facility or program to assist a company to avoid bankruptcy or resolution proceedings nor lend to insolvent borrowers. The Fed must establish policies and procedures that assign a value to all collateral for an emergency loan and that are designed to ensure that the collateral is sufficient to protect taxpayers from losses. The Fed is obligated to obtain the Secretary of the Treasury's approval before establishing a program or facility under Section 13(3). The DFA also imposes certain requirements concerning publication and reporting to Congress.

Second, the DFA adds new substantive and procedural requirements that govern the FDIC's ability to establish programs. It limits the FDIC's authority to provide assistance to individual banks upon a systemic-risk finding to only those banks that have been placed in receivership and only for the purpose of winding up the institution. The Secretary of the Treasury is required to report to Congress on the systemic-risk finding within 3 days.

As for solvent depository institutions, the FDIC can create a widely available program to guarantee obligations of these depository institutions, depository institution holding companies, and affiliates during times of severe economic distress. This authority replaced Section 13(c)(4)(G)(i) of the Federal Deposit Insurance Act as the source of authority for widely available guarantee programs. The terms and conditions of any guarantee program must be established by the FDIC with the concurrence of the Secretary of the Treasury. The establishment of a guarantee program requires a finding by two-thirds of the Board of Directors of the FDIC and the Board of Governors of the Fed that there has been a liquidity event and that a failure to take such action would have serious adverse effects on the financial stability or economic conditions in the United States, as well as a joint resolution of Congressional approval of the maximum amount of debt that can be guaranteed. The guarantee cannot include the provision of equity in any form.

6.2.4. Living wills and the Orderly Liquidation Authority. Effective November 30, 2011, the Fed and the FDIC implemented a requirement mandating that SIFIs periodically submit a plan to the Fed, the FDIC, and the FSOC for the company's rapid and orderly resolution in the event of material financial distress or failure of the company. Each SIFI also must report on the nature and extent of its credit exposure to significant bank holding companies⁴ and other SIFIs, as well as the credit exposure of these companies and institutions to itself.

⁴A significant bank holding company is any company that is, or is treated in the United States as, a bank holding company and that had \$50 billion (subsequently amended to \$250 billion as of 2018 under Section 401 of the Economic Growth, Regulatory Relief, and Consumer Protection Act) or more in total consolidated assets as of the end of the most recently completed calendar year, as reported on the Fed's FR Y-9C (Consolidated Financial Statement for Bank Holding Companies) form, the Fed's FR Y-7Q (Capital and Asset Report for Foreign Banking Organizations) form, or any successor form thereto (12 CFR §242.2).

Additionally, Title II of the DFA creates the Orderly Liquidation Authority (OLA), a new insolvency regime for SIFIs.⁵ The Treasury noted that the OLA was to close the regulatory gap seen in the case of Lehman Brothers and AIG during the GFC. The FDIC is appointed as a receiver to liquidate and wind up the company. To determine whether a financial company is to be placed under the OLA, the Secretary of the Treasury considers (a) whether the financial company is in default or in danger of default, (b) whether the potential default would have an adverse effect on the financial stability of the United States, and (c) whether taking emergency action as provided for in the law would avoid or mitigate those adverse effects. Relevant officials also consider any viable private-sector alternatives and the effects that placing the company under the OLA might have on the general fund of the Treasury and on the creditors, counterparties, and shareholders in the failing company.

6.2.5. Central clearing of swaps. Before the GFC, OTC derivatives were generally negotiated privately. Therefore, information concerning them was available only to the contracting parties, which made it difficult to identify the nature and level of risks involved. This became problematic during the GFC, and Title VII of the DFA establishes a framework to reduce the risk, increase the transparency, and promote the market integrity of the OTC derivatives market by authorizing the US Commodities Futures Trading Commission (CFTC) to set rules to standardize derivatives and move these derivatives into clearinghouses (US Gov. Publ. Off. 2011a).

More specifically, financial entities participating in the swap market must clear all swaps under the mandatory clearing requirement with a derivatives clearing organization (DCO). Nonfinancial entities that use swaps to hedge or mitigate commercial risk and notify the CFTC how they meet their financial obligations associated with noncleared swaps are not subject to the mandatory clearing and exchange-trading requirements. A DCO must submit to the CFTC its intention to clear a swap or class of swaps, and the CFTC decides whether clearing should be required. For a DCO to be registered and maintain registration, it must comply with 18 core principles in the Commodity Exchange Act, as well as CFTC regulations (GMAC 2010).

6.3. European Union

This section covers a large number of systemic risk-related changes in the EU, some of which are restricted to EU members that use the euro.

6.3.1. The European System of Financial Supervisors. In response to the GFC, the ESFS was introduced in 2010 and became operational on January 1, 2011, under Articles 114 and 127(6) of the Treaty on the Functioning of the European Union. The ESFS consists of the European Systemic Risk Board (ESRB), the three European Supervisory Authorities (ESAs), and national supervisors (Eur. Parliam. 2017).

The ESFS consists of both microprudential and macroprudential supervision. Its main objective is to ensure adequate implementation of the rules across Member States to preserve financial stability, promote confidence, and provide protection for consumers. The objectives of the ESFS also include developing a common supervisory culture and facilitating a single European financial market (Eur. Parliam. 2017).

Within the ESFS, the ESRB is responsible for the macroprudential supervision of the EU financial system, while the microprudential oversight is performed by the ESAs. The ESAs consist of

Orderly Liquidation Authority (OLA): the new insolvency regime for SIFIs established under the DFA

Commodities Futures Trading Commission (CFTC): US independent agency regulating futures and options markets

Derivatives clearing organization (DCO): entity that intermediates derivatives trades as stipulated by the DFA

European Systemic Risk Board (ESRB): independent body responsible for macroprudential oversight in the EU

European Supervisory Authorities (ESAs): three authorities responsible for microprudential oversight in the EU

⁵Technically, the definition of SIFI for the purpose of Title II resolution is not necessarily the same as its definition for the purpose of designation in Title I. We ignore this distinction and use the generic term SIFI for both purposes.

European Stability Mechanism (ESM):

intergovernmental organization providing emergency lending to Eurozone Member States

European Market Infrastructure Regulation (EMIR):

main EU legislation regulating OTC derivatives, adopted in 2012

the European Banking Authority, the European Insurance and Occupational Pensions Authority, and the European Securities and Markets Authority. The ESAs work primarily on harmonizing financial supervision in the EU by developing the single rulebook, a set of prudential standards for individual financial institutions (Eur. Parliam. 2017).

The GFC also showed that simple coordination of financial supervision via the ESFS was not sufficient to prevent fragmentation of the European financial market. Therefore, the EU Banking Union was established in 2012. It introduced a single rulebook for supervision, the SSM, the SRM, and the European Deposit Insurance Scheme (Eur. Parliam. 2017).

The SSM's objective is to ensure consistent and coherent supervision of credit institutions to prevent regulatory arbitrage and fragmentation of the financial services market in the EU. The SSM consists of all Eurozone Member States plus any non-Eurozone Member States that decide to join. The ECB is responsible for the effective and consistent functioning of the SSM, and for the direct supervision of significant banks while national authorities supervise other less significant institutions (Eur. Parliam. 2017).

6.3.2. Emergency powers of the European System of Financial Supervisors and the European Stability Mechanism. The ESAs have the general power to facilitate and coordinate national supervisory responses in emergency situations. If certain conditions are fulfilled, an ESA can intervene on an expedited basis without the need to go through the European Commission. Additionally, European Stability Mechanism (ESM) Member States, currently consisting of all Eurozone states, can apply for ESM financial assistance programs up to €500 billion if they are in financial difficulty or if their financial sector is a stability threat in need of recapitalization.

6.3.3. EU Bank Recovery and Resolution Directive and Single Resolution Mechanism. Similar to Title II of the DFA, the BRRD allows national authorities to put banks into an orderly resolution in which their critical functions would be preserved while the noncritical parts of the failed institution would be wound down. However, when it would be in the public interest to restore an institution to financial viability, the BRRD also allows authorities to write down and convert some of the bank's liabilities through bail-in and enables the bank to continue in business. The BRRD provides comprehensive and effective arrangements to deal with failing banks at the national level, as well as arrangements to tackle cross-border banking failures. It relies on a network of national authorities and resolution funds to resolve banks (Eur. Comm. 2014).

The BRRD was, however, considered insufficient for Member States sharing the euro as currency, and therefore, in December 2012, the European Council recognized that bank supervision and resolution needed to be exercised by the same level of authority. The SRM applies to banks covered by the SSM. The SRM allows bank resolution to be managed effectively through a single resolution board and a single resolution fund that is financed by the banking sector (Eur. Comm. 2014).

6.3.4. The European Market Infrastructure Regulation. Similar to Title VII of the DFA, the European Market Infrastructure Regulation (EMIR) establishes rules regarding OTC derivatives, CCPs, and trade repositories. The EMIR requires that all information on all European derivative contracts be reported to trade repositories and made accessible to supervisory authorities. Standard OTC derivative transactions are cleared, and all financial firms and nonfinancial firms with large holdings of OTC derivatives must clear and report all their obligations. CCPs responsible for clearing standard OTC derivative transactions must comply with requirements relating to organizational, business conduct, and prudential obligations set forth by the EMIR.

6.4. United Kingdom

The United Kingdom, while still a member of the EU as of this writing, does not use the euro and has some legislation independent of the Eurozone, which we discuss in this section.

6.4.1. The Financial Services Act 2012. The Financial Services Act 2012, which came into effect on April 1, 2013, reformed the regulatory structure and created a new regulatory framework for the supervision of the banking and financial services industry. It gave the Bank of England macroprudential oversight power for the financial system, replaced the Financial Services Authority, and formed three new bodies: the Financial Policy Committee (FPC) of the Bank of England, the Prudential Regulatory Authority (PRA), and the Financial Conduct Authority (FCA).

The Financial Services Act 2012 establishes that the FPC is primarily responsible for assisting the Bank of England in achieving its financial stability objective and has the power to recommend and direct actions required to address systemic risk to the PRA and FCA. The PRA is responsible for promoting the stable and prudent operation of the financial system through the regulation of all deposit-taking institutions, insurers, and major investment firms. The FCA regulates conduct in retail and wholesale financial markets and the infrastructure that supports those markets, and it has responsibility for the prudential regulation of firms that do not fall under the PRA's scope.

6.4.2. Emergency powers of the Bank of England. Under the Financial Services Act 2012, the Bank of England has the primary operational responsibility for financial crisis management. The Chancellor and the Treasury have sole responsibility for any decision involving public funds. Where the Bank is able to manage a financial crisis without putting the public funds at risk, it will have autonomy in exercising its responsibilities. However, if there is a risk to the public fund, the Bank will lead the operational response to the crisis in cooperation with the Treasury to develop options to mitigate the risk.

6.4.3. Special Resolution Regime. The Special Resolution Regime (SRR) was first established by the Banking Act 2009, and the Financial Services Act 2012 extended the scope of the regime to bank holding companies, CCPs, and certain investment firms and their group companies. The Bank of England is the designated resolution authority and makes the decision to put a firm into the SRR in consultation with relevant prudential supervisors and the Treasury. The Bank also chooses the tool for resolution, but in case of temporary public ownership, the Treasury conducts the resolution together with the Bank.

The Financial Services Compensation Scheme (FSCS) pays out or funds the transfer of deposits protected by a deposit guarantee scheme, up to a limit of £85,000 per person per authorized firm. The FSCS may also protect investors for losses up to £50,000 (Davies & Dobler 2011). From January 2015, the rules on resolution and recovery have been amended to implement the BRRD. For example, the bail-in tool has been added to the resolution toolkit (HM Treas. 2014).

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Financial Policy Committee (FPC): Bank of England committee responsible for monitoring the UK economy

Prudential Regulatory Authority (PRA): regulator of deposit-taking institutions, insurers, and major investment firms in the United Kingdom

Financial Conduct Authority (FCA): independent regulator of retail and wholesale financial services firms in the United Kingdom

Special Resolution Regime (SRR): legal framework governing bank resolution in the United Kingdom

Financial Services Compensation Scheme (FSCS): statutory fund providing deposit insurance and compensation to UK depositors and investors

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