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Systematic Regulation of Systemic RiskSteven L. Schwarcz¹

Abstract: A decade after the financial crisis, regulators worry that the regulation enacted to help stabilize the financial system may be insufficient to prevent another crisis. Examining that regulation with the benefit of hindsight, this Article finds that much has been accomplished but much remains to be done. Most of the existing regulation is ad hoc, providing “tools” rather than a coherent framework. It also is unduly entity-based, largely ignoring markets and other critical elements of the financial system. Furthermore, some of that entity-based regulation is punitive and misguided, responding to the human intuition to assign blame for harm. Financial stability requires a more systematic regulatory framework. The Article builds that framework on normative foundations, recognizing that the fundamental reason to regulate finance should be to correct market failures. Regulation intended to stabilize the financial system should focus on correcting market failures that could trigger and transmit systemic risk—the risk that financial instability will significantly impair the real economy. The Article attempts to identify and better understand those triggers and transmission mechanisms, and their underlying market failures. Finally, it analyzes how regulation could help to correct those market failures, revealing important new insights into regulatory design.

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INTRODUCTION

Regulation designed to protect financial stability by reducing systemic risk—the risk that instability in the financial system will cause a recession or otherwise significantly impair the real economy—is referred to as “macroprudential.”² Regulators worry, however, that the macroprudential regulation enacted in response to the global financial crisis of 2007-2008 (“financial crisis”) may be inadequate to prevent another crisis.³ This Article examines that regulation with a decade of hindsight.

Post-crisis macroprudential regulation focuses primarily on regulating banks and other systemically important financial institutions (“SIFI”s).⁴ This entity-based focus may be too narrow. Macroprudential regulation should protect the overall stability of the financial system; an entity-based approach, however, largely ignores other critical elements of the system such as financial markets. Arguably, the financial crisis was more fundamentally caused by a collapse in the market for mortgage-backed securities than by the failure of SIFIs, such as Lehman Brothers.⁵

Even to the extent it focuses on regulating SIFIs, some post-crisis macroprudential regulation is flawed. For example, political and media pressure to assign blame for the crisis has resulted in regulation that sometimes is punitive or seeks to correct non-existent wrongdoing.

² See, e.g., Luis E. Jácome & Erlend W. Nier, *Macroprudential Policy: Protecting the Whole*, INTERNATIONAL MONETARY FUND, <http://www.imf.org/external/pubs/ft/fandd/basics/macropriu.htm>.

³ See *infra* notes 75-77 and accompanying text.

⁴ Specific definitions of a SIFI vary, but it generally refers to a financial institution that cannot exit the market without causing major disruption to the financial system. See, e.g., Christian Weistroffer, *Identifying Systemically Important Financial Institutions (SIFIs)*, DEUTSCHE BANK RESEARCH (Aug. 11, 2011).

⁵ See *infra* notes 104-108 and accompanying text.

Regulators have also reacted to the pressure by promulgating ad hoc regulation, rather than taking a systematic approach to regulatory design.

To design regulation that more effectively protects financial stability, we need a more systematic regulatory framework. Such a framework would not only provide a coherent analytical approach to regulatory design; it also would help to correct the flawed political process and increase the transparency, and hence the legitimacy, of macroprudential regulation.

The Article envisions this more systematic regulatory framework as follows. Part I reviews the current macroprudential regulation, classifying that regulation in Part I.A and then critiquing it in Part I.B. Thereafter, Part II examines how macroprudential regulation should be designed. Part II.A explains why a more systematic regulatory framework could improve regulatory design. It also begins constructing the framework by engaging the normative justification for financial regulation: to correct market failures. The justification for macroprudential regulation thus should be to correct market failures that could trigger and transmit systemic risk, which could disrupt financial stability.

To correct those market failures, we need to identify and better understand those triggers and transmission mechanisms. Part II.B attempts to identify and understand those triggers and their underlying market failures. Part II.C then attempts to identify and understand systemic risk's transmission mechanisms and their underlying market failures. With that foundation, Part II.D analyzes how to design regulation that corrects those market failures, revealing important new insights into financial regulatory design. Finally, Part II.E explains that any macroprudential regulatory framework is limited by our imperfect understanding of systemic risk. It also examines the importance of globally coordinating macroprudential regulation, while cautioning that coordination can go too far, creating a global correlation of rules that can exacerbate systemic risk.

I. REVIEWING CURRENT REGULATION

A. Classifying the Current Regulation

The financial crisis has spurred several approaches to macroprudential regulation. Most of these approaches are designed to protect against, or to mitigate the systemic impact of, the failure of SIFIs. Part (1) discusses these entity-based approaches. Part (2) then discusses other approaches that focus on regulating the types of transactions—securitization and derivative transactions—believed to be responsible for causing the financial crisis. Thereafter, Part (3) discusses approaches that focus on regulating the financial products—residential mortgage loans—underlying the most problematic securitization transactions.⁶ Part (4) discusses approaches that focus on regulating the organizations—“rating agencies”—that assessed the creditworthiness of securities issued in those transactions. Finally, Part (5) discusses the macroprudential regulation of monetary policy.

(1) *Regulating SIFIs.*

The primary focus of post-crisis macroprudential regulation has been to protect against the failure of SIFIs or to mitigate the systemic impact of their failure. This reflects concern that SIFIs may engage in morally hazardous risk-taking because they deem themselves “too big to fail” (“TBTF”). The Financial Stability Board, an organization established by the G20 nations to monitor and make recommendations about regulating the global financial system, has made ending TBTF a central part of its policy agenda.⁷

(a) Capital requirements: Capital requirements represent the most widespread approach to protect against the failure of SIFIs. They are intended to protect SIFIs both against unexpected

⁶ Others refer to the transaction-regulation and financial-product-regulation approaches collectively as financial-activities regulation. This is purely semantic. *Cf.* Jeremy C. Kress, Patricia A. McCoy, & Daniel Schwarcz, “Regulating Entities and Activities: Complementary Approach to Nonbank Systemic Risk” (draft on file with author) (referring to those approaches collectively as targeting “financial activities that could create systemic risk”).

⁷ *See, e.g.,* John Glover & Ilya Arkhipov, *End of ‘Too-Big-To-Fail’ Banking Era Endorsed by World Leaders*, BLOOMBERG (Nov. 15, 2015), <http://www.bloomberg.com/news/articles/2015-11-15/end-of-too-big-to-fail-banking-era-endorsed-by-world-leaders> (“World leaders [from the G20 nations] are set to endorse plans by regulators to end the era of too-big-to-fail banks, forcing them to raise as much as \$1.2 trillion, and backed proposals to wrap up sweeping reforms of rules for the global banking system.”). Even the preface to the Dodd-Frank Act states it is “[a]n Act . . . to end ‘too big to fail’.”

losses⁸ and against becoming excessively leveraged⁹ by requiring them to hold minimum levels of capital.¹⁰ Capital requirements are implemented by setting minimum capital adequacy ratios¹¹: the ratio of a SIFI's capital to its risk-weighted assets.¹²

The earliest worldwide capital requirements were promulgated by the Basel Committee on Banking Supervision.¹³ Referred to as Basel I and II,¹⁴ they took what some consider a somewhat liberal approach to risk-weighting and defining what would qualify as capital.¹⁵ Because those requirements did not prevent bank failures during the financial crisis, the Basel Committee on Banking Supervision promulgated a post-crisis version of capital requirements. This version, known as Basel III, sets higher minimum capital adequacy ratios (and also provides for countercyclicality, raising the ratios during economic upturns and lowering them during downturns), defines capital more strictly, takes a stricter approach to risk-weighting, requires liquidity reserves, and applies not only to banks but also to certain non-bank SIFIs.¹⁶

⁸ Kern Alexander & Steven L. Schwarcz, *The Macroprudential Quandary: Unsystematic Efforts To Reform Financial Regulation*, in RECONCEPTUALISING GLOBAL FINANCE AND ITS REGULATION 127, 136 (Ross Buckley et al. eds., 2016).

⁹ Hervé Hannoun, Gen. Manager, Bank for Int'l Settlements, *The Basel III Capital Framework: A Decisive Breakthrough*, BoJ-BIS High Level Seminar on Financial Regulatory Reform: Implications for Asia and the Pacific Hong Kong SAR, at 2 (Nov. 22, 2010), <http://www.bis.org/speeches/sp101125a.pdf>.

¹⁰ In its most pristine form, capital consists of equity.

¹¹ Steven L. Schwarcz, *Banking and Financial Regulation*, in OXFORD HANDBOOK OF LAW AND ECONOMICS (Francesco Parisi, ed. 2015). A capital adequacy ratio is often abbreviated as "CAR."

¹² Being a financial institution, a SIFI's assets consist primarily of rights to repayment of loans and other monetary investment rights.

¹³ Alexander & Schwarcz, *supra* note 8.

¹⁴ The Basel Committee on Banking Supervision is composed of bank regulators from various industrialized nations, including the United States, Japan, and certain European countries.

¹⁵ *Banking and Financial Regulation*, *supra* note 11, at 11.

¹⁶ Hannoun, *supra* note 9, at 2-3; *Basel III: A global regulatory framework for more resilient banks and banking systems*, BASEL COMMITTEE ON BANKING SUPERVISION 12 (Dec. 2010), http://www.bis.org/publ/bcbs189_dec2010.pdf.

Capital requirements, and indeed most forms of SIFI regulation, are primarily “microprudential” because they are intended to protect individual financial institutions.¹⁷ Nonetheless, SIFI regulation is often categorized as macroprudential because its secondary effect is to reduce systemic risk; the logic is that if no SIFI fails, no such firm’s failure would trigger a systemic collapse.¹⁸ Some question that logic, though, contending that it overlooks correlations among SIFIs and ignores other sources of systemic risk.¹⁹

(b) Liquidity requirements: Liquidity requirements are sometimes discussed in the context of capital requirements because both are currently promulgated under Basel III.²⁰ Basel III implements the former by requiring certain SIFIs to meet a “Net Stable Funding Ratio.”²¹ This ratio is designed to assure sufficient cash on hand to protect against the default risk of maturity transformation, the asset-liability mismatch that results from the short-term funding of long-term projects.²² Although essential to providing funding (including using short-term retail bank deposits to make longer-term corporate loans),²³ maturity transformation can create a

¹⁷ See, e.g., Behzad Gohari & Karen E. Woody, *The New Global Financial Regulatory Order: Can Macroprudential Regulation Prevent Another Global Financial Disaster?*, 40 JOURNAL OF CORPORATION LAW 403, 406–07 (2015). Microprudential regulation is often simply called prudential regulation.

¹⁸ Cf. Steven L. Schwarcz, *Beyond Bankruptcy: Resolution as a Macroprudential Regulatory Tool*, 94 NOTRE DAME LAW REVIEW (forthcoming 2018-2019), available at https://scholarship.law.duke.edu/faculty_scholarship/3755/ (observing that regulators commonly embrace that argument).

¹⁹ See *id.* (examining those arguments). Cf. Douglas J. Elliott, et al., *The History of Cyclical Macroprudential Policy in the United States* 6 (Fed. Reserve Bd., Finance and Economics Discussion Series No. 2013-29, 2013), <http://www.federalreserve.gov/pubs/feds/2013/201329/201329pap.pdf> (observing that the goal of macroprudential regulation “is to manage factors that could endanger the financial system as a whole, even if they would not be obvious as serious threats when viewed in the context of any single institution”).

²⁰ Cf. *supra* note 16 and accompanying text (observing that Basel III requires liquidity reserves).

²¹ Steven L. Schwarcz, *Securitization and Post-Crisis Financial Regulation*, 101 CORNELL LAW REVIEW ONLINE 115, 120 (2016).

²² Jeanne Gobat, *The Net Stable Funding Ratio: Impact and Issues for Consideration* 3 (INT’L. MONETARY FUND, Working Paper No. 14/106, 2014), <https://www.imf.org/external/pubs/ft/wp/2014/wp14106.pdf>; *Banking and Financial Regulation*, *supra* note 11.

²³ Douglas J. Elliot, *Bank Liquidity Requirement: An Introduction and Overview*, BROOKINGS INSTITUTION (June 23, 2014), available at <https://www.brookings.edu/wp->

maturity gap—the risk that cash flows from long-term projects may be insufficient to pay maturing short-term liabilities, leading to a default.²⁴ A SIFI default can cause a systemic shock.

(c) Risk committees: Many SIFIs are required to establish risk committees. The Dodd-Frank Act²⁵ directs the U.S. Federal Reserve Board to require each publicly traded nonbank financial company supervised by the Board and each publicly traded bank holding company with total consolidated assets of ten billion dollars or more to establish a risk committee, which will be responsible for overseeing the company’s risk-management practices.²⁶ The Basel Committee on Banking Supervision also sets guidelines for banks to create risk committees.²⁷

(d) Ring-fencing: Ring-fencing represents another form of SIFI regulation. It refers to steps taken to “protect a firm from becoming subject to liabilities and other risks associated with bankruptcy; to help ensure that a firm is able to operate on a standalone basis even if its affiliated firms fail; to protect a firm from being taken advantage of by affiliated firms, thereby preserving the firm’s business and assets; and to limit a firm from engaging in risky activities.”²⁸ U.K. law, for example,²⁹ ring-fences “retail” banking services—those provided to individuals and small businesses—by requiring banking groups with aggregate retail deposits in excess of £25 billion to segregate those deposit-taking activities from affiliate risks and by restricting retail deposit-taking banks from transferring capital to affiliates.³⁰ In the United States, the Volcker Rule

content/uploads/2016/06/23_bank_liquidity_requirements_intro_overview_elliott.pdf. Retail bank deposits are those made by individuals and small businesses. *See infra* notes 29-30 and accompanying text.

²⁴ Gobat, *supra* note 22, at 4-6 & 10-12.

²⁵ Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203 (2010).

²⁶ 12 U.S.C. § 5365(h).

²⁷ *See* BASEL COMM. ON BANKING SUPERVISION, GUIDELINES: CORPORATE GOVERNANCE PRINCIPLES FOR BANKS (2015), <http://www.bis.org/bcbs/publ/d328.pdf>.

²⁸ Steven L. Schwarcz, *Ring-Fencing*, 87 SOUTHERN CALIFORNIA LAW REVIEW 69, 81-82 (2013).

²⁹ United Kingdom Financial Services (Banking Reform) Act 2013.

³⁰ *Ring-Fencing: Guidance on the FCA’s Approach to the Implementation of Ring-Fencing and Ring-Fencing Transfer Schemes*, FINANCIAL CONDUCT AUTHORITY (Sept. 2015), <https://www.fca.org.uk/publication/guidance-consultation/gc15-05.pdf>.

imposes a form of ring-fencing by prohibiting deposit-taking banks from making risky investments.³¹

(e) Stress tests: Stress tests examine a SIFI's response to hypothetical "stressed" adverse financial conditions, such as high unemployment, stock-market crashes, liquidity shortages, and debt defaults.³² The Dodd-Frank Act mandates that SIFIs engage in periodic stress testing.³³ The European Banking Authority (EBA) is in charge of administering stress tests on banks in the European Union.³⁴

(f) Resolution: Resolution seeks to mitigate the systemic impact of a SIFI's failure. The term generally refers to reorganizing the capital structure of,³⁵ or else liquidating with minimal systemic impact, SIFIs that become financially troubled.³⁶ The Dodd-Frank Act, for example, requires SIFIs to create "living wills" to facilitate their liquidation with minimal systemic risk, in

³¹ *Ring-Fencing*, *supra* note 28. The Volcker Rule prohibits banks from engaging in proprietary trading, which means "engaging as a principal for the trading account of [a bank] in any transaction to purchase or sell, or otherwise acquire or dispose of, any security, any derivative, any contract of sale of a commodity for future delivery, any option on any such . . . [aforementioned] financial instrument." 12 U.S.C. 1851(a)(1)(A) & (h)(4). The Volcker Rule also prohibits banks from "acquir[ing] or retain[ing] any equity, partnership, or other ownership interest in or sponsor[ing] a hedge fund or private equity fund." 12 U.S.C. 1851(a)(1)(B). However, the Volcker Rule has been criticized for "imposing a static business model on modern financial markets." Charles K. Whitehead, *The Volcker Rule and Evolving Financial Markets*, 1 HARVARD BUSINESS LAW REVIEW 39, 73 (2011).

³² Robert Weber, *A Theory for Deliberation-Oriented Stress Testing Regulation*, 98 MINNESOTA LAW REVIEW 2236, 2238–39 (2014).

³³ Dodd-Frank Act § 165(i).

³⁴ Council Regulation 1093/2010, art. 21(2)(b), 2010 O.J. (L 331) 12, 29 (EU) (directing the EBA to "initiate and coordinate Union-wide stress tests . . . to assess the resilience of financial institutions").

³⁵ The capital structure of a firm refers to the "mix of debt and equity by which a corporation finances its operations." A HANDBOOK OF BUSINESS LAW TERMS 96 (Bryan A. Garner, ed., 1999). One of the principal goals of a reorganization under Chapter 11 of the Bankruptcy Code is determining what the firm's new capital structure will be. Mark J. Roe, *Bankruptcy and Debt: A New Model for Corporate Reorganization*, 83 COLUM. L. REV. 527, 528 (1983).

³⁶ *Resolution as a Macroprudential Regulatory Tool*, *supra* note 18, at 5.

the event of financial distress.³⁷ Some SIFIs are required to issue a minimum portion of their debt securities as contingent convertible “CoCo” bonds, which facilitate the conversion of debt to equity under specified conditions and decrease the firm’s indebtedness.³⁸ The Federal Deposit Insurance Corporation (FDIC) also now has the power to put certain troubled SIFIs into receivership.³⁹

(2) *Regulating Transactions.*

Other approaches to macroprudential regulation focus on regulating the securitization and derivatives transactions that are believed to be responsible for causing the financial crisis.

(a) Regulating securitization: Securitization depends in part on an originate-to-distribute (OTD) model, in which banks or other lenders make loans with the intention of selling them off in securitization transactions.⁴⁰ Because the lenders do not hold onto, and thus do not bear risk for the ultimate performance of, the loans, the OTD model discourages lender monitoring and is believed to encourage lenders to make riskier loans.⁴¹ That riskier lending, in turn, is blamed for causing the high rate of residential mortgage-loan defaults that contributed to the financial crisis.⁴² In an effort to align incentives and reduce moral hazard—the temptation of persons protected from the negative consequences of their risky actions to take more risks—post-crisis macroprudential regulation typically requires originators of loans that are intended to be sold off

³⁷ Jessica Silver-Greenberg & Nelson D. Schwartz, ‘Living Wills’ for Too-Big-to-Fail Banks Are Released, N.Y. TIMES (July 3, 2012), <https://www.nytimes.com/2012/07/04/business/living-wills-of-how-to-unwind-big-banks-are-released.html>.

³⁸ Ceyla Pazarbasioglu et al., *Contingent Capital: Economic Rationale and Design Features*, INTERNATIONAL MONETARY FUND (Jan 25, 2011), <https://www.imf.org/external/pubs/ft/sdn/2011/sdn1101.pdf>.

³⁹ See 12 U.S.C. §§5381-5394.

⁴⁰ Vitaly M. Bord & João A. C. Santos, *The Rise of the Originate-to-Distribute Model and the Role of Banks in Financial Intermediation*, 18 FED. RESERVE BANK ECON. POL’Y REV. 21, 21 (2012).

⁴¹ Antje Berndt & Anurag Gupta, *Moral Hazard and Adverse Selection in the Originate-to-Distribute Model of Bank Credit*, 56 J. OF MONETARY ECO. 725, 741–42 (2009).

⁴² *Id.*

in securitization transactions to retain a minimum unhedged position (usually 5%) in the risk on those loans.⁴³

(b) Regulating derivatives: Many have blamed derivative transactions for contributing to the financial crisis.⁴⁴ In response, the Financial Stability Board⁴⁵ urged all standardized over-the-counter (OTC) derivative contracts to be cleared through central counterparties (CCPs).⁴⁶ Regulators in the United States,⁴⁷ Europe,⁴⁸ and other G20 nations have been implementing central clearing regulation. CCPs are well-capitalized entities which serve as “buyer to every seller and seller to every buyer.”⁴⁹ CCPs absorb counterparty risk and also help to net offsetting payment obligations among its members.⁵⁰

(3) *Regulating Mortgage Lending.*

Still other approaches to macroprudential regulation focus on regulating residential mortgage lending. These loans constituted the most typical financial product underlying securitization transactions.⁵¹ A collapse in U.S. housing prices—the so-called bursting of the housing bubble—led to the widespread mortgage-loan defaults that caused many of those transactions to default.⁵² In response, post-crisis regulation imposes risk-retention requirements

⁴³ See, e.g., Dodd-Frank Act, 15 U.S.C. §78o-11(c)(1)(B); Article 4 of Proposal for a Regulation of the European Parliament and of the Council (EC) No. 472/2015 of 30 Sep. 2015, 2015/0226 (COD) (proposing a similar risk-retention requirement for securitizations in the European Union). The media often refers to risk-retention requirements as maintaining “skin in the game.”

⁴⁴ Gregory Meyer, *CFTC Head Blames OTC Derivatives for Crisis*, FIN. TIMES, Jan 6, 2010, available at <https://www.ft.com/content/3be62c7a-fae8-11de-94d8-00144feab49a>.

⁴⁵ See *supra* note 7.

⁴⁶ G20 Leaders’ Statement: The Pittsburg Summit, (Sept 24-25, 2009), https://www.treasury.gov/resource-center/international/g7-g20/Documents/pittsburgh_summit_leaders_statement_250909.pdf.

⁴⁷ Paul M. McBride, *The Dodd-Frank Act and OTC Derivatives: The Impact of Mandatory Central Clearing on the Global OTC Derivatives Market*, 44 INT’L LAW. 1077, 1101–05 (2010).

⁴⁸ Regulation (EU) No 648/2012 on OTC Derivatives, Central Counterparties and Trade Repositories, 2012 O.J. L 201/1.

⁴⁹ Richard Heckinger, *Derivatives Overview*, in UNDERSTANDING DERIVATIVES: MARKETS AND INFRASTRUCTURE 1, 8 (2014).

⁵⁰ *Id.*

⁵¹ See *supra* note 42 and accompanying text.

⁵² RICHARD A. POSNER, *A FAILURE OF CAPITALISM: THE CRISIS OF ’08 AND THE DESCENT INTO DEPRESSION* 75–76 (Harvard Univ. Press 2009).

to try to reduce moral hazard in the origination of mortgage loans.⁵³ Post-crisis regulation also imposes conditions to help ensure that mortgage-loan borrowers are able to repay their loans.⁵⁴ Under one such ability-to-repay requirement, for example, mortgage lenders must make a “reasonable and good faith determination . . . that, at the time the loan is consummated, the consumer has a reasonable ability to repay the loan.”⁵⁵ This requirement effectively prohibits lenders from making “subprime” mortgage loans, which are the most likely to default.⁵⁶

(4) *Regulating Rating Agencies.*

Rating agencies (also called credit-rating agencies, or CRAs) have been criticized for contributing to the financial crisis by giving unduly high ratings to complex and highly leveraged mortgage-backed securities (“MBS”), and subsequently downgrading those ratings, causing large market-value losses and a rapid drying up of liquidity.⁵⁷ The Dodd-Frank Act has authorized the Securities and Exchange Commission to supervise rating agencies’ internal record-keeping processes and to regulate their potential conflicts of interest.⁵⁸ The European Union has also adopted regulations to reduce overreliance on credit ratings,⁵⁹ to mitigate potential conflicts of interest,⁶⁰ and to make rating agencies more accountable for their actions.⁶¹

⁵³ See *supra* notes 41-43 and accompanying text.

⁵⁴ Ryan Bubb & Prasad Krishnamurthy, *Regulating Against Bubbles: How Mortgage Regulation Can Keep Main Street and Wall Street Safe—From Themselves*, 163 UNIVERSITY OF PENNSYLVANIA LAW REVIEW 1539, 1542 (2015).

⁵⁵ Dodd-Frank Act, 15 U.S.C. § 1639c.

⁵⁶ Cf. *infra* notes 104-106 and accompanying text (discussing how defaulting subprime mortgage loans contributed to the financial crisis).

⁵⁷ See, e.g., Amadou N.R. Sy, *The Systemic Regulation of Credit Rating Agencies and Rated Markets* 3 (INT’L. MONETARY FUND, Working Paper No. 09/129, 2009), <https://www.imf.org/en/Publications/WP/Issues/2016/12/31/The-Systemic-Regulation-of-Credit-Rating-Agencies-and-Rated-Markets-23030>.

⁵⁸ Dodd-Frank Act, § 932; Credit Rating Agencies, SEC, <https://www.sec.gov/spotlight/dodd-frank/creditratingagencies.shtml>.

⁵⁹ Regulation (EU) No 462/2013 of the European Parliament and of the Council of 21 May 2013 amending Regulation (EC) No 1060/2009 on credit rating agencies, 2013 O.J. (L 146) 1, 13 (prohibiting certain financial institutions and regulatory entities from mechanically relying on credit ratings).

⁶⁰ *Id.* at art. 1(8) at 14–15 (addressing alleged conflicts of interest caused by the issuer-pays model).

⁶¹ *Id.* art. 1(22) at 20–22 (allowing civil actions to be brought against rating agencies).

(5) *Regulating Monetary Policy.*

Post-crisis macroprudential regulation also relies to an extent on monetary policy. For example, central banks have been managing short-term interest rates to try to control asset-price bubbles.⁶² They also have attempted to use monetary policy to increase financial stability by engaging in quantitative easing (QE),⁶³ in which they purchase long-term securities from banks, thereby enabling the banks to make more loans and investments.⁶⁴

These uses of monetary policy are relatively marginal to controlling systemic risk.⁶⁵ Managing interest rates may not work because asset-price bubbles are difficult to identify before they burst.⁶⁶ Furthermore, “raising interest rates to prick asset bubbles can risk increasing unemployment.”⁶⁷ QE is seen as ineffective⁶⁸ and possibly counterproductive, causing excessive

⁶² See, e.g., BD. OF GOVERNORS OF THE FED. RES. SYS., *THE FEDERAL RESERVE SYSTEM: PURPOSES & FUNCTIONS* 21 (10th ed. 2016).

⁶³ The Bank of England implemented its QE program in March 2009. Victor Lyonnet & Richard Werner, *Lessons from the Bank of England on ‘Quantitative Easing’ and Other ‘Unconventional’ Monetary Policies*, 25 *INTERNATIONAL REVIEW OF FINANCIAL ANALYSIS* 94, 97 (2012). The U.S. Federal Reserve implemented a series of QE programs between 2008 and 2014. Stephen D. Williamson, *Quantitative Easing: How Well Does This Tool Work?*, FEDERAL RESERVE BANK OF ST. LOUIS (2017), <https://www.stlouisfed.org/publications/regional-economist/third-quarter-2017/quantitative-easing-how-well-does-this-tool-work>.

⁶⁴ R.A., *What is Quantitative Easing?*, *ECONOMIST* (Mar. 9, 2015), <https://www.economist.com/the-economist-explains/2015/03/09/what-is-quantitative-easing>. Central banks started using QE when post-crisis efforts to stimulate the economy by reducing interest rates failed because rates had already fallen to zero. Yair Listokin, *Law and Macroeconomics: The Law and Economics of Recessions*, 34 *YALE JOURNAL ON REGULATION* 791, 815 (2017).

⁶⁵ Cf. Jeanna Smialek, *Fed’s Williams Says Monetary Policy Not Best Tool to Stop Crises*, *BNA’s BANKING REPORT* (June 2, 2015) (reporting that Federal Reserve Bank of San Francisco President John Williams said “the U.S. should use financial regulation and supervision to prevent future crises instead of monetary policy tools” and also that “[m]onetary policy is poorly suited for dealing with financial stability concerns, even as a last resort”).

⁶⁶ Neil Kashkari, *Monetary Policy and Bubbles*, *FED. RES. BANK OF MINN.* (May 17, 2017), <https://minneapolisfed.org/news-and-events/messages/monetary-policy-and-bubbles>.

⁶⁷ KERN ALEXANDER, *REGULATING FINANCIAL SYSTEMS*, Preface, at 7 (forthcoming 2018-19) (calling this use of monetary policy a “blunt instrument”).

⁶⁸ Lyonnet & Werner, *supra* note 63, at 94 (concluding that UK’s QE program “had no apparent effect on the UK economy”); Williamson, *supra* note 63 (finding no evidence that the Fed’s QE programs increased real GDP).

inflation⁶⁹ and asset-price bubbles.⁷⁰ Monetary policy is therefore not central to this Article’s analysis.

B. Critiquing the Current Regulation

(1) *Current Regulation is (mostly) a Good Start, but Vulnerabilities Remain.*

The current approaches to macroprudential regulation represent good faith and, in many cases, highly thoughtful efforts to control systemic risk. For example, Basel III’s liquidity requirements help to safeguard against the risk that maturity transformation will cause defaults that trigger systemic shocks.⁷¹ Similarly, stress testing⁷² is now considered the “most powerful prudential tool . . . for safeguarding the resilience of the financial system.”⁷³

Notwithstanding these efforts, regulators worry that vulnerabilities remain.⁷⁴ They fear they have made “little progress in figuring out how they might actually” prevent another

⁶⁹ Daniel L. Thornton, *The Downside of Quantitative Easing*, 34 FED. RES. BANK ST. LOUIS ECON. Synopses 1, 1-2 (2010) (arguing that QE can increase inflation rate well above inflation objective), <http://research.stlouisfed.org/publications/es/10/ES1034.pdf>.

⁷⁰ Thomas I. Palley, *Quantitative Easing: A Keynesian Critique* (Pol. Econ. Res. Inst., Working Paper No. 252, 2011), https://www.peri.umass.edu/fileadmin/pdf/working_papers/working_papers_251-300/WP252.pdf.

⁷¹ See *supra* notes 20-24 and accompanying text.

⁷² See *supra* notes 32-34 and accompanying text.

⁷³ Stephen G. Cecchetti, *On the Separation of Monetary and Prudential Policy: How Much of the Precrisis Consensus Remains?*, 66 J. INT’L. MONEY & FIN. 157, 167 (2016). See also Charles A. E. Goodhart, *In Praise of Stress Tests*, in STRESS TESTING AND MACROPRUDENTIAL REGULATION: A TRANSATLANTIC ASSESSMENT 149 (Ronald W. Anderson ed., 2016); Vítor Constâncio, *The Role of Stress Testing in Supervision and Macroprudential Policy*, in STRESS TESTING AND MACROPRUDENTIAL REGULATION: A TRANSATLANTIC ASSESSMENT 51-55 & 59-60 (Ronald W. Anderson ed., 2016).

⁷⁴ Scholars also worry that vulnerabilities remain. Cf. Association of American Law Schools, Section on Financial Institutions and Consumer Financial Services, “Call for Papers for Program at the 2019 AALS Annual Meeting” (Aug. 22, 2018) (stating that “questions have been raised about the limitations of regulation implemented in the wake of the last Financial Crisis, in terms of anticipating and addressing future threats to stability,” and soliciting papers for the Section’s January 2019 program on “The Next Financial Crisis”).

financial crisis.⁷⁵ Timothy Geithner, the former U.S. Secretary of the Treasury, has observed that “[a]lthough regulations [imposing specific requirements] have reined in banks’ risk-taking behavior, they can go only so far.”⁷⁶ Officials at the Bank of Spain believe that even well calibrated macroprudential tools cannot “cope perfectly” with the “objective[s] for which they are designed.”⁷⁷

That vulnerabilities remain should not be surprising. Although macroprudential regulation should protect the overall stability of the financial system,⁷⁸ the focus of macroprudential regulation has been narrower: to protect against (or to mitigate the impact of) SIFI failure and to regulate the types of transactions believed to be responsible for causing the financial crisis and the financial products underlying those transactions.⁷⁹ Even today’s best macroprudential regulation—stress testing, and the liquidity requirements that protect against defaults resulting from maturity transformation⁸⁰—applies only to SIFIs. This narrow focus may well result from a flawed regulatory process, discussed below, that overreacts to political and media pressure, takes an ad hoc rather than systematic approach, and relies almost entirely on theoretical economic models.

(2) *The Flawed Regulatory Process.*

The macroprudential rulemaking process has been strongly influenced by unproved perceptions, fostered by politicians and the media, that wrongdoing and wrongdoers caused the

⁷⁵ Binyamin Appelbaum, *Policy Makers Skeptical on Preventing Financial Crisis*, N.Y. TIMES, Oct. 5, 2015, at B1 (reporting the consensus view of an international conference of regulators at the Federal Reserve Bank of Boston). Donald Kohn, former Vice Chairman of the Federal Reserve Board, observed at that conference that the Federal Reserve “doesn’t really have the tools” to prevent another crisis. *Id.* at B3.

⁷⁶ Timothy F. Geithner, *Are We Safe Yet?: How to Manage Financial Crisis*, FOREIGN AFFAIRS (Dec. 12, 2016).

⁷⁷ Enrique Alberola et al., *Central Banks and Macroprudential Policy. Some Reflections from the Spanish Experience* 24 (2011), <https://www.bde.es/f/webbde/SES/Secciones/Publicaciones/PublicacionesSeriadas/DocumentosOcasionales/11/Fich/do1105e.pdf>.

⁷⁸ *Cf. supra* note 2 and accompanying text (observing that macroprudential regulation should protect financial stability by reducing systemic risk).

⁷⁹ *See supra* notes 2-9 and accompanying text.

⁸⁰ *See supra* notes 71-73 and accompanying text.

financial crisis.⁸¹ These perceptions follow human intuition to assign blame for harm.⁸² Politicians and the media have assumed, for example, that moral hazard caused SIFIs, which (by definition) are too systemically important to be allowed to fail, to engage in excessive risk-taking.⁸³ In response, regulators have framed TBTF, moral hazard, and associated wrongdoing as a central target of post-crisis macroprudential regulation.⁸⁴

That framing, however, is questionable. Although SIFIs engaged in excessive risk-taking,⁸⁵ there is no evidence it was caused by moral hazard. The economic studies purporting to “prove” that TBTF causes firms to engage in morally hazardous risk-taking merely show that SIFIs can borrow at lower-than-average cost.⁸⁶ Although economists presume this funding advantage derives from investor belief that these firms will be bailed out before they default, there are many other reasons besides the expectation of a bailout why SIFIs can borrow at lower-

⁸¹ See, e.g., FIN. CRISIS INQUIRY COMM’N, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES, at xvii (2011) (stating that the “crisis was the result of human action and inaction, not of Mother Nature or models gone haywire”); Gretchen Morgenson & Louise Story, *Naming Culprits in the Financial Crisis*, N.Y. TIMES (April 13, 2011), <https://www.nytimes.com/2011/04/14/business/14crisis.html> (arguing that the financial crisis was caused by the “financial industry [choosing] profits over propriety”). Although the Financial Crisis Inquiry Commission was supposed to be an independent, bipartisan body, it was subject to numerous limitations and political pressures. See Michael A. Perino, *The Financial Crisis Inquiry Commission and the Politics of Governmental Investigations* (2012), available at https://scholarship.law.stjohns.edu/faculty_publications/83.

⁸² Cf. Elaine Walster, *Assignment of Responsibility for Accidents*, 3 J. PERSONALITY & SOC. PSYCHOL. 73, 73 (1966) (observing the tendency to assign responsibility to someone when people hear about an accident); Dirk Jenter & Fadi Kannan, *CEO Turnover and Relative Performance Evaluation*, 70 J. FIN. 2155, 2179 (2015) (concluding that CEOs are systematically blamed for performance beyond their control).

⁸³ Cf. *supra* note 7 and accompanying text (discussing the concern that SIFIs may engage in morally hazardous risk-taking because they deem themselves TBTF).

⁸⁴ See *supra* note 7 and accompanying text.

⁸⁵ Cf. FIN. CRISIS INQUIRY COMM’N, THE FINANCIAL CRISIS INQUIRY REPORT: FINAL REPORT OF THE NATIONAL COMMISSION ON THE CAUSES OF THE FINANCIAL AND ECONOMIC CRISIS IN THE UNITED STATES xviii–xix (2011) (identifying excessive risk-taking by systemically important banks as a primary cause of the financial crisis).

⁸⁶ Steven L. Schwarcz, *Too Big to Fool: Moral Hazard, Bailouts, and Corporate Responsibility*, 102 MINNESOTA LAW REVIEW 761, 765–67 (2017).

than-average cost.⁸⁷ Furthermore, the idea that too-big-to-fail causes SIFIs to engage in morally hazardous risk-taking is antithetical to managerial incentives.⁸⁸ This Article later discusses other factors that may better explain excessive SIFI risk-taking.⁸⁹

Macroprudential regulation based on that questionable framing is sometimes problematic.⁹⁰ For example, the Dodd-Frank Act strips the Federal Reserve Bank of much of its last-resort-lending powers under section 13(3) of the Federal Reserve Act.⁹¹ Although intended to quash SIFI expectations of a government bailout (thereby reducing TBTF-induced moral hazard), this virtually assures a crisis if a SIFI fails and the law's resolution mechanisms are inadequate.⁹² Similarly, regulators are under great pressure to break up SIFIs into smaller firms that are not themselves TBTF. Any such breakups, however, might jeopardize economies of scale and scope, making firms less competitive in increasingly globalized financial markets, without necessarily correcting a real problem.⁹³

⁸⁷ *Id.* (discussing these other reasons, including economies of scale and better access to debt markets).

⁸⁸ *Id.* at 768-69. Managers are almost certain to lose their jobs if the government fails to bail out their firm, whereas a bailout may well be conditioned on culpable managers resigning or otherwise giving recompense. In either case, the reputational damage could destroy a manager's financial career. *Id.*

⁸⁹ See *infra* notes 204-206 and accompanying text.

⁹⁰ If individual wrongdoing by SIFI managers in fact caused the financial crisis, the post-crisis prosecution of SIFIs in their institutional capacity, instead of prosecuting individuals, has also been flawed. Cf. Steven L. Schwarcz, *Excessive Corporate Risk-Taking and the Decline of Personal Blame*, 65 EMORY LAW JOURNAL 533 (2015) (making that argument, and explaining why individuals were not prosecuted).

⁹¹ *Resolution as a Macroprudential Regulatory Tool*, *supra* note 18.

⁹² The current resolution mechanisms are almost certainly insufficient. *Id.* Cf. Andrew Metrick & June Rhee, "Regulatory Reform" (Aug. 10, 2018 draft, at 3), available at SSRN abstract no. 3236290 (observing that post-crisis reform decreasing the flexibility of emergency powers have made it "more difficult to deal with a truly systemic event").

⁹³ See *Too Big to Fool*, *supra* note 86, at 774-76. Cf. Anna Kovner et al., *Do Big Banks Have Lower Operating Costs?*, FEDERAL RESERVE BANK OF NEW YORK ECONOMIC POLICY REVIEW 22 (2014) (concluding that imposing size limits on banks would increase costs). Also, it would be difficult to identify which firms are so large that their size should be limited. Gary H. Stern & Ron Feldman, *Addressing TBTF by Shrinking Financial Institutions: An Initial Assessment*, REGION (Federal Reserve Bank of Minneapolis), June 2009, at 10, <https://www.minneapolisfed.org/~media/files/pubs/region/09-06/shrinking.pdf>.

That questionable framing is also distorting the application of capital requirements.⁹⁴ For example, the Minneapolis Federal Reserve Bank has proposed a plan to solve TBTF by requiring SIFIs to maintain extremely high levels of common-equity capital.⁹⁵ Although some argue that high capital requirements would have no associated public costs,⁹⁶ others believe they would impose significant social costs.⁹⁷ Concern over wrongdoing is also punitively distorting the application of capital requirements, such as by requiring investors in securitization transactions to hold more capital than they would be required to hold for investments in other types of securities—and in some cases, even to hold more capital than if they invested directly in the actual financial assets underlying those transactions.⁹⁸

The focus on TBTF, moral hazard, and associated wrongdoing has also produced macroprudential regulation that seeks to correct non-existent wrongs. Politicians and the media

⁹⁴ Capital requirements are discussed *supra* notes 9-19 and accompanying text. Moral hazard is said to justify capital requirements. *See, e.g.*, Hendrik Hakenes & Isabel Schnabel, *Bank Size and Risk-Taking Under Basel II*, 35 J. BANKING & FIN. 1436, 1437 n.5 (2011) (“Most of the existing [scholarly] literature focuses on moral hazard as the main motivation for capital requirements.”).

⁹⁵ Fed. Reserve Bank of Minneapolis, *Seeking Comment on Ending Too Big To Fail*, <https://minneapolisfed.org/publications/special-studies/endingtbtff/share-your-ideas>.

⁹⁶ *See, e.g.*, ANAT ADMATI & MARTIN HELLWIG, *THE BANKERS’ NEW CLOTHES: WHAT’S WRONG WITH BANKING AND WHAT TO DO ABOUT IT* 98 (2013).

⁹⁷ *See, e.g.*, Jean Dermine, *Bank Regulations After the Global Financial Crisis: Good Intentions and Unintended Evil*, 19 EUR. FIN. MGMT. 658, 662 (2013) (“Or, if capital is excessive, it might lead to inefficiently higher interest rates on bank loans . . . in a dynamic perspective, private costs may induce social costs as banks reduce their supply of loans or securitize assets.”); Reint Gropp et al., *Bank Response to Higher Capital Requirements: Evidence from a Quasi-Natural Experiment* (Sustainable Architecture for Fin. in Eur., Working Paper No. 156, 2016 <https://www.econstor.eu/bitstream/10419/148361/1/874406994.pdf> (finding that higher bank capital requirements cause banks to increase their capital ratios not by raising their levels of equity but by reducing their credit supply, resulting in lower firm, investment, and sales growth); Eduardo Porter, *Recession’s True Cost Is Still Being Tallied*, N.Y. TIMES (Jan. 21, 2014), <http://www.nytimes.com/2014/01/22/business/economy/the-cost-of-the-financial-crisis-is-still-being-tallied.html> (discussing the criticisms of capital requirements). Countercyclical capital buffers have also been criticized as being difficult to implement, easy to circumvent, and subject to regulatory arbitrage. *See Too Big to Fool, supra* note 86, at 779-81 (discussing these criticisms).

⁹⁸ Steven L. Schwarcz, *Securitization and Post-Crisis Financial Regulation*, 102 CORNELL LAW REVIEW ONLINE 115, 128-29 (2016).

have assumed that the high rate of mortgage-loan defaults that contributed to the financial crisis resulted from moral hazard resulting from the OTD model of making and then selling off loans in securitizations.⁹⁹ In response, the Dodd-Frank Act requires lenders to retain some risk on the loans they securitize.¹⁰⁰ That response, however, ignores that it was always common practice for sponsors of securitizations to retain substantial risk on the underlying loans. Among other reasons, they did this to signal the quality of the securities they were selling to investors.¹⁰¹ We now understand that the signaling inadvertently created a novel information failure: not the typical asymmetric information but, instead, a mutual misinformation problem caused by *complexity*: neither the sponsor of the securitization, nor the investors, fully understood the risks—especially those associated with highly leveraged re-securitizations of the underlying loans.¹⁰²

⁹⁹ See *supra* notes 40-43 and accompanying text. Politicians and the media have also assumed that that high rate of mortgage-loan defaults resulted from corruption in residential mortgage lending. The Dodd-Frank Act therefore strongly emphasizes improving that mortgage lending. That emphasis presumes that inadequate mortgage lending could trigger another financial crisis, but the reality is that financial crises tend to have very different triggers. Furthermore, the ability-to-pay prohibition of subprime mortgage lending (see *supra* notes 55-56 and accompanying text) effectively prevents lenders from financing homes for the poor. Some argue that a more effective way to reform mortgage lending would be to require minimum levels of overcollateralization for mortgage loans. Bubb & Krishnamurthy, *supra* note 54, at 1610–18. That not only would help to control another housing bubble but also would increase the likelihood of repayment. The U.S. Federal Reserve took this approach after the Great Depression, promulgating Regulations G, U, T and X, which required minimum levels of overcollateralization for “margin” loans made to enable borrowers to purchase shares of stock. Steven L. Schwarcz, *Macroprudential Regulation of Mortgage Lending*, 69 SMU LAW REVIEW 595, 602 (2016); 12 C.F.R. § 221.7(a). In the context of mortgage lending, however, a minimum-overcollateralization requirement would impose a social cost by restricting the availability of housing. *Macroprudential Regulation of Mortgage Lending*, *supra* at 602–03.

¹⁰⁰ See *supra* note 43 and accompanying text.

¹⁰¹ Bubb & Krishnamurthy, *supra* note 54, at 1591. In fact, sponsors often invested in the most junior “equity” tranches of the deals they were arranging, believing that putting their own money at stake in a first-loss position would signal the quality of the deals and also would generate additional value. Cf. Michael S. Gibson, *Understanding the Risk of Synthetic CDOs*, Federal Reserve (FEDS) working paper No. 2004-36 (rev. July 2004), at 17, available at <https://www.fdic.gov/bank/analytical/cfr/bank-research-conference/annual-4th/2004-14-gibson.pdf> (explaining that CDO sponsors often retain equity tranches for those reasons and also to limit informational asymmetry).

¹⁰² Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASHINGTON UNIVERSITY LAW REVIEW 211, 241–42 (2009). Cf. *infra* notes 154-159 and accompanying text (further discussing the mutual misinformation problem).

Additionally, the focus on TBTF, moral hazard, and associated wrongdoing may be obscuring other sources of systemic risk that need regulation. For example, current regulation rarely addresses financial market panics,¹⁰³ even though such panics not only arguably triggered the financial crisis but also may have triggered the stock-market collapse that led to the Great Depression. Prior to the financial crisis, for example, banks and private mortgage providers made loans to subprime borrowers, securing the loans with homes that the borrowers purchased with the loan proceeds.¹⁰⁴ These subprime loans then were used to support MBS that was sold to investors.¹⁰⁵ When housing price collapsed in 2007, many subprime borrowers defaulted on their loans, causing defaults on the MBS backed by those loans.¹⁰⁶ Market participants panicked and stopped dealing with firms that heavily invested in MBS,¹⁰⁷ leading to a lack of credit and liquidity that caused the collapse of the real economy.¹⁰⁸ Similarly, prior to the Great Depression, banks made loans to subprime borrowers, securing the loans with shares of stock that the

¹⁰³ Although the only U.S. regulation addressing financial market panics is limited to reducing run risks in money-market funds, some countries have gone further. *Cf.* Haocong Ren, *Countercyclical Financial Regulation*, at 5 (World Bank, Working Paper No. 5823, 2011), <http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5823> (discussing at 27-28 India’s implementation of certain time-varying risk weights and provisioning requirements).

¹⁰⁴ Iman Anabtawi & Steven L. Schwarcz, *Regulating Systemic Risk: Toward an Analytical Framework*, 86 NOTRE DAME LAW REVIEW 1349, 1359 (2018).

¹⁰⁵ *Id.* 1359.

¹⁰⁶ *Id.* at 1360.

¹⁰⁷ *Id.* Dion Harmon et al., *Anticipating Economic Market Crises Using Measures of Collective Panic*, 10 PLOS ONE 1, 3 (2015) (finding that the financial crisis followed a period of collective panic). *Cf.* Steven L. Schwarcz, *Regulating Complacency: Human Limitations and Legal Efficacy*, 93 NOTRE DAME LAW REVIEW 1073, 1082-83 (2018) (explaining that panic can cause market participants to engage in “collective flight”).

¹⁰⁸ Anabtawi & Schwarcz, *supra* note 104, at 1360-61. *See also* Sy, *supra* note 57 and accompanying text. *Cf. Resolution as a Macroprudential Regulatory Tool*, *supra* note 18 (providing the following more detailed chronology). In 2007, when home prices began declining, subprime borrowers could not refinance and, in many cases, defaulted, and even creditworthy borrowers were tempted to walk away when their mortgage loans exceeded home values. These mortgage defaults caused substantial amounts of mortgage-backed securities (“MBS”) to default and even some highly rated MBS to be downgraded. These defaults and downgradings unnerved investors, who believed that high credit ratings meant ironclad safety. Investors lost confidence in credit ratings and stopped buying MBS and other debt securities, causing market prices to plummet. Institutions with large MBS holdings, including Lehman Brothers, were viewed as financially risky; many parties stopped dealing with them, ultimately causing their collapse.

borrowers purchased with the loan proceeds.¹⁰⁹ When the stock market collapsed in 1929, many of these subprime borrowers defaulted on their loans, causing some banks to default on their own debt.¹¹⁰ Panicked depositors then withdrew funds from banks, creating bank runs that caused the collapse of the real economy.¹¹¹

Political pressure to find solutions also may have influenced politicians to apply old remedies to new problems without fully thinking through the consequences. In the United States, as mentioned, the FDIC now can put certain troubled SIFIs into receivership.¹¹² Although the FDIC successfully used this type of approach for decades to resolve insolvent banks, its success has always depended on finding larger healthy banks to acquire troubled banks.¹¹³ If a SIFI becomes troubled, however, there may not always be a larger healthy firm available to acquire it—especially if multiple SIFIs become troubled around the same time.¹¹⁴

The macroprudential regulatory process also has other flaws. Perhaps due to media and political pressure to react quickly, regulators have generally taken an ad hoc, rather than a

¹⁰⁹ Anabtawi & Schwarcz, *supra* note 104, at 1356.

¹¹⁰ *Id.* at 1357.

¹¹¹ *Regulating Complacency*, *supra* note 107, at 1086.

¹¹² *See supra* note 39 and accompanying text.

¹¹³ FED. DEPOSIT INS. CORP., *MANAGING THE CRISIS: THE FDIC AND RTC EXPERIENCE 1980-1984*, at 55–56 (1998).

¹¹⁴ *Cf.* Stephen J. Lubben, *Resolution, Orderly and Otherwise: B of A in OLA*, 81 UNIVERSITY OF CINCINNATI LAW REVIEW 485, 509 (2013) (observing that “in times of systemic crisis there might well be no buyers large enough or confident enough to perform a similar function with regard to a large financial institution”). The FDIC also developed the single-point-of-entry approach to orderly resolution of troubled SIFIs, under which it would take control of the parent of a distressed SIFI and use the parent’s resources to recapitalize the SIFI, thereby reducing systemic shocks. Paul H. Kupiec & Peter J. Wallison, *Can the “Single Point of Entry” Strategy be Used to Recapitalize a Failing Bank?* (AEI Econ. Working Paper 2014-08, 2014), <https://www.aei.org/wp-content/uploads/2014/11/SPOE-Working-paper-Nov-5.pdf>. This approach, however, is artificially dependent on SIFIs having a parent-subsidiary organizational structure in which a non-systemically-important parent holds the stock of the systemically important subsidiary. John Crawford, *‘Single Point of Entry’: The Promise and Limits of the Latest Cure for Bailouts*, 109 NW. U. L. REV. ONLINE 103, 107 (2014). At the start, therefore, the strategy faces implementation challenges for SIFIs that lack that organizational structure. This challenge might be especially high for cross-border SIFIs whose organizational structure is subject to regulation in multiple jurisdictions.

systematic, approach to devising macroprudential regulation.¹¹⁵ They often view macroprudential regulatory measures as a loose assortment of “tools” in their “toolkit.”¹¹⁶ Even the theoretical scholarship on law and finance takes a somewhat similar ad hoc approach, yielding “propositions [that] can serve as a tool kit” for regulatory scrutiny.¹¹⁷ The result is “unsystematic” macroprudential regulation that “almost certainly will not optimally reduce, and might even increase, systemic risk.”¹¹⁸

Another flaw is that regulators have relied almost entirely on theoretical economic models, making macroprudential regulation a rare body of law that is not closely informed by lawyers and legal scholarship.¹¹⁹ Although these models can provide value, they sometimes mis-describe reality. Theoretical economic models of SIFI resolution, for example, provide value by embracing bail-in, not bail-out—requiring shareholders and sometimes creditors, as opposed to the government and taxpayers, to bear the first losses of failing SIFIs, thereby internalizing externalities.¹²⁰ These models mis-describe reality, however, because they assume that

¹¹⁵ Cf. Metrick & Rhee, *supra* note 92, at 2 (observing that post-crisis regulatory “policy was made in politically driven processes without much academic input”).

¹¹⁶ See, e.g., Robert Hockett, Implementing Macroprudential Finance-Oversight Policy: Legal Considerations 12–13 (Jan. 20, 2013) (Drafted for the International Monetary Fund, http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2340316).

¹¹⁷ Daniel Awrey, et al., An Overview of the Legal Theory of Finance 2 (2014) (unpublished manuscript) (on file with author).

¹¹⁸ Alexander & Schwarcz, *supra* note 8, at 129. For example, G20 nations (as discussed) have been requiring most derivatives to be cleared and settled through CCPs. See *supra* notes 44-50 and accompanying text. This central clearing requirement, however, concentrates systemic risk in the CCP, and it is uncertain whether the net effect is to reduce, or inadvertently to increase, systemic risk. See Steven L. Schwarcz, *Central Clearing of Financial Contracts: Theory and Regulatory Implications*, 167 UNIVERSITY OF PENNSYLVANIA LAW REVIEW (forthcoming issue no. 6, May 2019) (manuscript at 7–8), available at <https://ssrn.com/abstract=3104079>. The extent to which derivatives themselves are inherently systemically risk is also uncertain. See *id.*

¹¹⁹ In my experience, virtually no economic research on macroprudential regulation relies on or cites any legal scholarship on the subject—of which there is a substantial and serious body. At a recent conference organized by the author, for example, an economist purported to map the “academic literature” on regulating systemic risk. That mapping failed to include any legal academic literature.

¹²⁰ Jianping Zhu et al., *From Bailout to Bail-in: Mandatory Debt Restructuring of Systemic Financial Institutions*, at 5 (IMF Staff Discussion Note, SDN/12/03, Apr. 2012), available at <http://www.imf.org/external/pubs/ft/sdn/2012/sdn1203.pdf>.

bankruptcy and other resolution mechanisms automatically internalize the relevant externalities.¹²¹ As lawyers could have pointed out,¹²² that assumption is wrong; corporate bankruptcy law operates to benefit the “parties in interest”—that is, the firm and its investors (its creditors and shareholders)¹²³—whose interests are fundamentally misaligned with the public’s interests.¹²⁴ Wiping out a failing SIFI’s shareholders, and even its creditors, will not internalize the systemic harm to the public.¹²⁵

In addition to mis-describing reality, the theoretical economic models are “dominated by . . . decisionmaking under risk.”¹²⁶ The modern financial system, however, is characterized by complexity,¹²⁷ which “generates uncertainty, not risk.”¹²⁸ Uncertainty requires a radically different regulatory response than does risk.¹²⁹ Economists have yet to adapt to an “uncertainty” model of finance.¹³⁰ Lawyers, whose work is grounded in reality, might help to inform a more realistic regulatory response.

¹²¹ Emilios Avgouleas & Charles Goodhart, *Critical Reflections on Bank Bail-ins*, 1 J. FIN. REGULATION 1, 2 (2015).

¹²² Cf. Erik F. Gerding, *Code, Crash, and Open Source: The Outsourcing of Financial Regulation to Risk Models and the Global Financial Crisis*, 84 WASHINGTON LAW REVIEW 127, 184-86 & 198 (2009) (arguing that legal scholars can greatly improve financial regulation by correcting errors in applying economic models). Legal scholars also could help to reduce the homogeneity resulting from economic risk-modeling, which could backfire by increasing correlated risks. *Id.* at 184-85. Cf. *infra* notes 329-335 and accompanying text (making that argument in an international context).

¹²³ See, e.g., 11 U.S.C. § 1109(b) (listing the parties in interest).

¹²⁴ See *infra* note 203 and accompanying text.

¹²⁵ Moreover, in making decisions about investing in risky projects, the expected value of an investment could well be positive to the firm and its investors but negative to society because existing law does not require SIFIs to internalize systemic harm. Cf. *infra* note 203 and accompanying text (discussing this misalignment of interests).

¹²⁶ Andrew G. Haldane & Vasileios Madouros, “The Dog and the Frisbee,” Proceedings, Economic Policy Symposium 109, 110 (Jackson Hole 2012).

¹²⁷ See *supra* note 102 & *infra* notes 153-159 and accompanying text.

¹²⁸ Haldane & Madouros, *supra* note 126, at 152. Cf. *id.* at 111 (contrasting studying decisionmaking “under risk” with studying decisionmaking “under uncertainty”).

¹²⁹ *Id.* at 112 (observing that if the consequences of complexity were “risk and rational expectations,” the optimal response would be a “fine-tuned,” “fully state-contingent rule”; but if the consequences are uncertainty rather than risk, “that logic is reversed”).

¹³⁰ *Id.* at 152 (arguing that changing from a risk model of finance to an uncertainty model “would require an about-turn from the regulatory community from the path followed for the better part

(3) *The Limits of Our Understanding.*

Macroprudential regulation is also subject, of course, to our limited understanding of systemic risk, including its triggers and transmission mechanisms.¹³¹ There is controversy, for example, over such basic questions as the ability of capital requirements to control systemic risk.¹³² The cost of imposing capital requirements is also uncertain.¹³³

II. DESIGNING FUTURE REGULATION

For the reasons discussed, current macroprudential regulation has serious limitations. This Part argues that a more systematic regulatory framework could improve the design of macroprudential regulation, and examines how to construct such a framework.

A. Towards a More Systematic Regulatory Framework

A more systematic regulatory framework could improve the design of macroprudential regulation in at least three ways. On a basic level, it would help to increase the transparency, and hence the legitimacy, of macroprudential regulation.¹³⁴ The very existence of such a framework would also provide pushback to the political and media pressure that has flawed the post-crisis regulatory process, resulting in over-reactive, under-reactive, or otherwise misguided

of the past 50 years,” and observing that even the financial crisis was “not able to deliver that change”).

¹³¹ Steven L. Schwarcz, *Managing Systemic Risk: An American View*, 18 ONE ISSUE, TWO VOICES 3, 3, 6 (2016), https://www.wilsoncenter.org/sites/default/files/ci_160516_one_issue_v3_0.pdf.

¹³² Cf. *Resolution as a Macroprudential Regulatory Tool*, *supra* note 18 (discussing the uncertainty whether protecting SIFIs individually against unexpected losses will protect the financial system); Haldane & Madouros, *supra* note 126, at 126 (observing that in an uncertain financial environment, “complex risk-weighting may be suboptimal”).

¹³³ Cf. *supra* notes 96-97 and accompanying text (observing the uncertainty whether high capital requirements would impose public costs).

¹³⁴ Cf. Robert F. Weber, *New Governance, Financial Regulation, and Challenges to Legitimacy: The Example of Internal Models Approach to Capital Adequacy Regulation*, 63 ADMINISTRATIVE LAW REVIEW 783, 850–55 (2010) (discussing issues with legitimacy in the context of capital adequacy regulation).

macroprudential regulation.¹³⁵ The need to resist this type of pressure is not unique to the financial crisis; it applies to any boom-and-bust cycle. During any period of economic prosperity, for example, there is strong popular and industry pressure to deregulate,¹³⁶ which can leave markets under-protected. When the prosperity inevitably ends, “investor confidence in the integrity of the market and its institutions” dissipates,¹³⁷ leading to “a public demand for new [over-protective] laws and regulations to punish [alleged] malfeasance in the market.”¹³⁸ This cycle often results in “grossly inefficient”¹³⁹ under-protective and over-protective laws—as occurred with post-crisis macroprudential regulation.

Perhaps most significantly, a more systematic framework would provide a coherent analytical approach to designing macroprudential regulation, in contrast to the current ad hoc approach.¹⁴⁰ As the discussion below will show, an analytical approach provides additional insights into the deficiencies of current regulation.¹⁴¹ It also reveals how new regulation should be designed, including how to design regulation to prevent shocks that could trigger a systemic economic collapse¹⁴² and to control the transmission of systemic risk.¹⁴³

¹³⁵ See *supra* notes 81-114 and accompanying text. Cf. HENRY N. BUTLER & LARRY E. RIBSTEIN, *THE SARBANES-OXLEY DEBACLE* (2006) (describing the Sarbanes-Oxley Act of 2002, enacted in response to the Enron scandal, as “a colossal failure, poorly conceived and hastily enacted during a regulatory panic”); Larry E. Ribstein, *Market vs. Regulatory Responses to Corporate Fraud: A Critique of the Sarbanes-Oxley Act of 2002*, 28 JOURNAL OF CORPORATION LAW 1, 19 (2003) (stating that the Sarbanes-Oxley Act was “passed in a hectic environment in which politicians played on public misperceptions of risk and eschewed careful balancing of costs and benefits”).

¹³⁶ Erik F. Gerding, *The Next Epidemic: Bubbles and the Growth and Decay of Securities Regulation*, 38 CONN. L. REV. 393, 418, 421–22 (2006). Behavioral biases, especially the availability bias, also influence lawmakers. *Id.* at 422. “The availability bias means that, as time passes since the last financial crisis, regulators and policymakers discount the potential for new crises and the need for regulations to avert those crises. . . . Regulators and policymakers may also excessively and subconsciously discount the expected future costs of a burst bubble.” *Id.*

¹³⁷ *Id.*

¹³⁸ *Id.* at 423.

¹³⁹ *Id.*

¹⁴⁰ Cf. *supra* notes 116-118 and accompanying text (explaining why the current approach to designing macroprudential regulation is ad hoc).

¹⁴¹ See, e.g., *infra* notes 291-292 and accompanying text (explaining why stripping the Federal Reserve of its lender-of-last-resort powers is misguided).

¹⁴² See *infra* notes 226-282 and accompanying text.

¹⁴³ See *infra* notes 283-314 and accompanying text.

Constructing such a systematic framework should start by engaging the normative justification for financial regulation: to correct market failures.¹⁴⁴ The justification for macroprudential regulation thus should be to correct market failures that could trigger and transmit systemic risk.¹⁴⁵ To accomplish that, Parts II.B and II.C attempt to identify and better understand those triggers and transmission mechanisms.

B. Identifying the Triggers of Systemic Risk

The term “shock” refers to the event triggering the collapse of a system.¹⁴⁶ Economists and finance scholars have identified three categories of shocks that can trigger the collapse of the financial system: bank runs, asset-price falls, and foreign exchange mismatches.¹⁴⁷ Current regulation addresses some of those categories of shocks, albeit not always perfectly.¹⁴⁸ Those

¹⁴⁴ Cf. PAUL A. SAMUELSON & WILLIAM D. NORDHAUS, *ECONOMICS* 756 (15th ed. 1995) (observing that primary goal of financial regulation should be to correct market failures); DAVID GOWLAND, *THE REGULATION OF FINANCIAL MARKETS IN THE 1990S* 21 (1990) (characterizing regulating markets to correct market failure as the “public interest theory”).

¹⁴⁵ This Article uses the term “market failure” loosely because the economic literature defines the term loosely. Economists define market failure as a “situation” in which there is an economic inefficiency. Traditionally, market failures are often associated with imperfect information (such as information asymmetries), non-competitive factors (such as a monopoly), principal-agent conflicts, or externalities. The market “failures” discussed in this Article are, more precisely, factors that, individually or in combination, could cause shocks that “trigger” a systemic economic collapse. This terminology follows the convention describing the event triggering the collapse of a system as a “shock.” See *infra* notes 287-288 and accompanying text.

¹⁴⁶ Cf. *supra* note 145 (noting that the event triggering the collapse of a system is called a “shock”).

¹⁴⁷ See, e.g., Franklin Allen & Elena Carletti, *Systemic Risk from Real Estate and Macroprudential Regulation*, 5 *INTERNATIONAL JOURNAL OF BANKING, ACCOUNTING, AND FINANCE* 29 (2013); MILTON FRIEDMAN & ANNA SCHWARTZ, *A MONETARY HISTORY OF THE UNITED STATES, 1867–1960* (1963) (identifying bank runs as the most important systemic shock).

¹⁴⁸ For example, regulation limits bank runs by providing government guarantees of bank deposits up to specified limits. Such government deposit insurance, however, allegedly creates moral hazard, which is itself a source of market failure. See, e.g., Speech by Thomas M. Hoenig, Vice Chairman of the FDIC, “Deposit Insurance: Addressing Its Moral Hazard Effect,” presented to the 16th Annual IADI General Meeting and Annual Conference, Quebec City, Canada (Oct. 11, 2017), available at <https://www.fdic.gov/news/news/speeches/spoct1117.pdf>.

scholars have not, however, tried to identify the market failures that could cause those shocks. Ideally, regulation should be designed to correct those market failures.¹⁴⁹

I have separately argued that at least five types of market failures could cause shocks that trigger a systemic economic collapse: complexity, conflicts, behavioral limitations, change, and a type of tragedy of the commons.¹⁵⁰ Also, maturity transformation could cause a maturity gap, which in turn could lead to a default that triggers a systemic shock.¹⁵¹ Consider each in turn.¹⁵²

(1) *Complexity.*

This represents a market failure insofar as it can distort information and impair disclosure as a means to reduce asymmetric information.¹⁵³ Complexity can also, as mentioned, result in mutual misinformation.¹⁵⁴ Prior to the financial crisis, for example, financial institutions that sponsored certain re-securitization transactions grossly misjudged the risk and invested in the most junior, and thus risky, of the securities issued in those transactions. This not only exposed

¹⁴⁹ See *supra* note 144 and accompanying text.

¹⁵⁰ I have elsewhere referred to these market failures, collectively, as the 4Cs and the TOC, characterizing behavioral limitations as “complacency” in the expansive sense of that term. See *Complacency*, MERRIAM-WEBSTER DICTIONARY (Nov. 15, 2017), <https://www.merriam-webster.com/dictionary/complacency> (defining “complacency” as “self-satisfaction especially when unaccompanied by awareness of actual dangers or deficiencies”).

¹⁵¹ See *supra* notes 23-24 and accompanying text.

¹⁵² Even if a reader disagrees with one or more of these triggers, or with one or more of the transmission mechanisms of systemic risk later identified by this Article, or even with the Article’s analysis of the underlying market failures or how regulation could help to correct those market failures, the Article’s methodology should remain important: to try to secure financial stability by identifying market failures that could trigger and transmit systemic risk, and then to analyze how regulation could help to correct those market failures. See text following note 339, *infra*.

¹⁵³ See, e.g., Steven L. Schwarcz, *Disclosure’s Failure in the Subprime Mortgage Crisis*, 2008 UTAH LAW REVIEW 1109, 1111 (2008) (observing that even sophisticated institutional investors did not fully understand certain complex financings). Cf. Andrew G. Haldane & Vasileios Madouros, “The Dog and the Frisbee,” Proceedings, Economic Policy Symposium 109, 149 (Jackson Hole 2012) (observing that “[c]omplexity has externality type properties, making risk more difficult to monitor and manage”); John D. Finnerty & Kishlaya Pathak, *A Review of Recent Derivatives Litigation*, 16 FORDHAM J. CORP. & FIN. L. 73, 74 (2011) (observing that court records reveal investors’ misunderstandings about the nature of derivative financial instruments).

¹⁵⁴ See *supra* notes 101-102 and accompanying text.

those financial institutions to significant investment risk but also misled investors generally about the safety of—thereby attracting massive investments in—the more senior securities.¹⁵⁵ When housing prices declined, many of those securities defaulted, jeopardizing the solvency of investors holding those securities and causing their counterparties to demand collateral. These investors included Lehman Brothers, which filed for bankruptcy protection in response to the demands,¹⁵⁶ leading to the “near collapse of the financial system.”¹⁵⁷

Traditional approaches to solving imperfect information problems, such as risk-retention requirements,¹⁵⁸ cannot solve mutual misinformation problems; mutual misinformation creates a fundamental information failure on all sides. For these reasons, complexity may well pose the greatest 21st century challenge to the financial system.¹⁵⁹

(2) *Conflicts.*

This represents a market failure insofar as it can distort incentives. Scholars have long studied conflicts of interest between managers and owners of firms within the broader context of principal-agent problems and agency costs. Post-financial-crisis regulation attempts to fix this traditional type of conflict. For example, the Dodd-Frank Act requires better alignment of senior executive pay with firm performance.¹⁶⁰

¹⁵⁵ *See id.*

¹⁵⁶ *See, e.g.,* Laurence Ball, “The Fed and Lehman Brothers” 7-8 (July 2016), available at www.econ2.jhu.edu/People/Ball/Lehman.pdf (observing that collateral calls by counterparties, including demands for collateral from JP Morgan Chase, the clearing bank for Lehman’s tri-party repos, contributed to Lehman’s collapse).

¹⁵⁷ *See, e.g.,* Viral Acharya et al., *The Financial Crisis of 2007-2009: Causes and Remedies*, 18 FIN. MARKETS INSTITUTIONS & INSTRUMENTS 89, 93 (2009) (stating that Lehman’s bankruptcy “led to the near collapse of the financial system”).

¹⁵⁸ *See supra* notes 43 and accompanying text.

¹⁵⁹ *Cf. The Causes of Systemic Risk—and Ways to Prevent Them*, WHARTON (June 30, 2016), <http://knowledge.wharton.upenn.edu/article/causes-systemic-risk-ways-prevent/> (reporting that the most complicated MBS could “each have about 750,000 mortgages with 30,000 pages of accompanying documentation”); Haldane & Madouros, *supra* note 126, at 149 (observing that “[c]omplexity has externality type properties, making risk more difficult to monitor and manage”).

¹⁶⁰ Dodd-Frank Act § 951-4 (instituting mandatory “say-on-pay” and “golden parachute” votes from shareholders, independent compensation committees, executive compensation disclosures, and compensation “clawbacks”). Even this alignment, however, may be imperfect. *See, e.g.,*

Post-crisis regulation, however, overlooks two important conflicts of interest: the intra-firm problem of secondary-management conflicts, and the broader conflict between a SIFI and its investors and managers, on the one hand, and society on the other hand. Secondary-management conflicts, discussed below, represent a special form of principal-agent and agency-cost problem. The broader conflict between SIFIs and society is another category of market failure and not strictly a principal-agent problem.¹⁶¹

Secondary-management conflicts are an intra-firm principal-agent failure.¹⁶² It arises because secondary managers are almost always paid under short-term compensation schemes, misaligning their interests with the long-term interests of the firm.¹⁶³ Complexity exacerbates this problem by increasing information asymmetry between those managers, who often are technically sophisticated, and the senior managers to whom they report.

Kent Smetters & Christopher Pericak, *Regulating “Too Big to Fail,”* PENN WHARTON PUBLIC POLICY INITIATIVE ISSUE BRIEF (2013), available at <https://publicpolicy.wharton.upenn.edu/issue-brief/v1n4.php> (arguing that executive “clawback” provisions in the Dodd-Frank Act fail to disincentivize executives from making big bets because the bets are hard to understand and bonuses only would be returned upon “material noncompliance” that is hard to prove); Troy S. Brown, *Legal Political Moral Hazard: Does the Dodd-Frank Act End too Big to Fail?*, ALABAMA CIVIL RIGHTS AND CIVIL LIBERTIES LAW REVIEW, 72 (2012) (arguing that the Dodd-Frank Act fails to address issues of short-term profit maximization that can have long-term negative effects).

¹⁶¹ See *infra* notes 204-206 and accompanying text (discussing that market failure as a type of tragedy of the commons). *But cf.* Kern Alexander, *Corporate Governance and Banks: The Role of Regulation in Reducing the Principal-agent Problem*, JOURNAL OF BANKING REGULATION 17, 18 (2006) (characterizing this broader conflict as a principal-agent problem on the basis that banks are such an integral part of the economy that they should be regarded as agents acting on behalf of the economy).

¹⁶² See Steven L. Schwarcz, *Conflicts and Financial Collapse: The Problem of Secondary-Management Agency Costs*, 26 YALE J. ON REG. 457 (2009).

¹⁶³ *Id.* at 460. *Cf.* James Dow, *What Is Systemic Risk? Moral Hazard, Initial Shocks, and Propagation*, MONETARY AND ECONOMIC STUDIES 16-17 (2000), available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.201.983&rep=rep1&type=pdf> (stating that the short-term compensation structure for traders incentivizes riskier behavior that may hurt the firm).

Prior to the financial crisis, for example, financial firms began compensating secondary managers not only for generating profits but also for generating profits with low risks, as measured by the VaR, or value-at-risk, model for measuring investment-portfolio risk.¹⁶⁴ Secondary managers turned to investment products with low VaR risk profile, like credit-defaults swaps that generate small gains but only rarely have losses. They knew, but did not always explain to their superiors, that any losses that might eventually occur would be huge.¹⁶⁵ The resulting losses ultimately jeopardized the solvency of numerous major financial institutions.¹⁶⁶

(3) *Behavioral Limitations.*

These limitations represent a market failure because they can undermine two perfect-market assumptions that underlie financial regulation—that parties have full information, and that they will act in their rational self-interest.¹⁶⁷ Although there is no generally accepted way to categorize these limitations, scholars often associate them with herd behavior, cognitive biases, and overreliance on heuristics.¹⁶⁸ In the context of financial regulation, I have proposed a fourth category: the tendency to panic, which is strongly connected to the stability of financial markets.¹⁶⁹ Consider each category.

¹⁶⁴ See, e.g., PHILIPPE JORION, *VALUE AT RISK: THE NEW BENCHMARK FOR MANAGING FINANCIAL RISK* 568 (3d ed. 2006).

¹⁶⁵ *Conflicts and Financial Collapse*, *supra* note 162, at 460.

¹⁶⁶ See Adam Davidson, *How AIG Fell Apart*, REUTERS (2008), <https://www.reuters.com/article/us-how-aig-fell-apart-idUSMAR85972720080918> (explaining how credit-default swaps threatened AIG, Lehman Brothers, and Bear Stearns). Although post-crisis the SEC originally had contemplated issuing a rule that might have addressed certain secondary-management conflicts, it never followed through. See, e.g., Michael S. Melbinger, Winston & Strawn LLP, *Goodbye to the Rules on Incentive Compensation Risk for Financial Institutions?* (July 26, 2017), available at <https://www.winston.com/en/executive-compensation-blog/goodbye-to-the-rules-on-incentive-compensation-risk-for.html>.

¹⁶⁷ *Perfect Market Assumptions*, FARLEX FREE FINANCIAL DICTIONARY (2012), <http://financial-dictionary.thefreedictionary.com/Perfect+market+assumptions> (discussing perfect-market assumptions, including that market participants have equal access to information and are completely rational).

¹⁶⁸ See RICHARD H. THALER & CASS R. SUNSTEIN, *NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS* 23–31 & 53–71 (2008).

¹⁶⁹ *Regulating Complacency*, *supra* note 107, at 1082–83. Cf. *supra* notes 103–111 and accompanying text (discussing financial market panics as a trigger of systemic risk).

Herd behavior refers to the human tendency to follow others. Although this can be beneficial if a firm’s managers follow the behavior of other firms whose managers have more or better information, it becomes problematic if followers act against their self-interest. This occurs when a firm’s managers follow the behavior of other firms’ managers whom they mistakenly think have more or better information, whereas in fact they are following a misleading information cascade—a convergence of action that reflects imitation more than good information.¹⁷⁰ The frenzied worldwide demand to purchase certain highly leveraged MBS in the years prior to the financial crisis almost certainly represented herd behavior of investors following a misleading information cascade about the value of that MBS.¹⁷¹

Cognitive biases refer to implicit simplifications of our perceptions of reality.¹⁷² The most prominent are availability bias¹⁷³ and optimism bias.¹⁷⁴ Availability bias is the tendency to over-emphasize a recent or especially vivid event and to under-emphasize a long-past event.¹⁷⁵ For example, people with recently divorced friends tend to overestimate the divorce rate.¹⁷⁶ Optimism bias is the tendency to be unrealistically positive when thinking about negative events with which one has no recent experience.¹⁷⁷ This helps to explain the reputed interpretation of the Delphic

¹⁷⁰ Sushil Bikhchandani et al., *A Theory of Fads, Fashion, Custom, and Cultural Change as Informational Cascades*, 100 J. POL. ECON. 992, 993–94 (1992). A good example of an information cascade occurs when early diners arbitrarily choose restaurant *A* over nearby restaurant *B*, “conveying information to later diners about what they knew. A cascade then develops when people abandon their own information in favor of inferences based on earlier people’s actions,” i.e., that restaurant *A* is better than restaurant *B*. DAVID EASLEY & JON KLEINBERG, NETWORKS, CROWDS, AND MARKETS: REASONING ABOUT A HIGHLY CONNECTED WORLD 426 (2010).

¹⁷¹ *Regulating Complacency*, *supra* note 107, at 1078.

¹⁷² *Id.* at 1079.

¹⁷³ *See, e.g.*, Norbert Schwarz et al., *Ease of Retrieval as Information: Another Look at the Availability Heuristic*, 61 J. PERSONALITY & SOC. PSYCHOL. 195, 195 (1991).

¹⁷⁴ *See, e.g.*, Tali Sharot, *Optimism Bias: Why the Young and the Old Tend to Look on the Bright Side*, WASH. POST (Dec. 31, 2012), https://www.washingtonpost.com/national/health-science/optimism-bias-why-the-young-and-the-old-tend-to-look-on-the-bright-side/2012/12/28/ac4147de-37f8-11e2-a263-f0ebffed2f15_story.html.

¹⁷⁵ Anabtawi & Schwarcz, *supra* note 104, at 1366–67.

¹⁷⁶ *Id.* at 1367 n.72.

¹⁷⁷ *Id.* at 1366.

Oracle by King Croesus of Lydia, who wanted to make war on Cyrus. The Oracle advised that the war “would destroy a mighty kingdom.”¹⁷⁸ Croesus heard what he wanted to hear—that Cyrus would fall—but in fact, his empire was the one destroyed.¹⁷⁹

By distorting the internalization of information,¹⁸⁰ cognitive biases violate the perfect-market assumption that parties have full information. That, in turn, can trigger financial market failures.¹⁸¹

Overreliance on heuristics refers to undue reliance on explicitly adopted simplifications of reality. These simplifications can distort the perfect-market assumption that parties have full information. Although overreliance on heuristics superficially overlaps with cognitive biases, the former usually refers to *explicitly* adopted simplifications whereas the latter refers to simplifications that *implicitly* occur as a psychological coping mechanism.¹⁸²

Without reliance on heuristics, financial markets could not operate.¹⁸³ Investors routinely use credit ratings, for example, to help estimate risks associated with securities.¹⁸⁴ Overreliance, however, can cause problems. Prior to the financial crisis, investors rarely questioned the accuracy of credit ratings because of their long record for reliably assessing the creditworthiness of relatively

¹⁷⁸ T. DEMPSEY, *THE DELPHIC ORACLE: ITS EARLY HISTORY, INFLUENCE, AND FALL* 70 (1972).

¹⁷⁹ *Id.* at 71 & 105–07.

¹⁸⁰ See Christine Jolls & Cass R. Sunstein, *Debiasing Through Law*, 35 J. LEGAL STUD. 199, 204–05, 207 (2006).

¹⁸¹ *Cf. Regulating Complacency*, *supra* note 107, at 1085 (discussing certain parallels between the Great Depression and the financial crisis that show how cognitive biases can combine to create a tendency to define future events by the recent past, causing shocks that can trigger a systemic economic collapse).

¹⁸² Steven L. Schwarcz & Lucy Chang, *The Custom-to-Failure Cycle*, 62 DUKE LAW JOURNAL 767, 768 & 768 n.2 (2012) (defining heuristics as “simplifications of reality that allow us to make decisions in spite of our limited ability to process information”).

¹⁸³ *Id.* at 769. *Cf. Haldane & Madouros*, *supra* note 126, at 113 (arguing that “heuristics may be the optimizing response to a complex environment”).

¹⁸⁴ Schwarcz & Chang, *supra* note 182, at 769, 772.

simple debt instruments, such as corporate bonds.¹⁸⁵ But that unquestioning faith continued even when ratings were extrapolated to much more complex and highly leveraged MBS.¹⁸⁶

The tendency to panic refers to the flight reflex to run from a perceived danger.¹⁸⁷ Sudden financial market changes, for example, can cause an “information overload” that we perceive as a danger, sparking a panic.¹⁸⁸ A panicked person will rarely attempt to deal rationally with the threat, distorting the perfect-market assumptions that parties have full information and act in their rational self-interest. Prior to the financial crisis, the unexpected defaults on MBS¹⁸⁹ caused uncertainty and investor loss of confidence in credit ratings as a gauge of risk.¹⁹⁰ Investors not only stopped buying MBS—which caused prices in the MBS market to collapse even further¹⁹¹—but also stopped buying even the most highly rated corporate debt securities,¹⁹² collapsing the credit market.¹⁹³

(4) *Change.*

This represents a market failure insofar as it can cause regulation to become obsolete or insufficient. Although the financial system is constantly changing, regulation normally is tethered to the distinctive design and structure of firms, markets, and products in existence when the regulation is promulgated.¹⁹⁴ Without continuous monitoring and updating—which rarely

¹⁸⁵ *Id.* at 772–73.

¹⁸⁶ *Id.* at 774–75.

¹⁸⁷ E. L. Quarantelli, *The Nature and Conditions of Panic*, 60 AM. J. SOC. 267, 269 (1954).

¹⁸⁸ Geoffrey P. Miller & Gerald Rosenfeld, *Intellectual Hazard: How Conceptual Biases in Complex Organizations Contributed to the Crisis of 2008*, 33 HARV. J.L. & PUB. POL’Y 807, 820 (2010).

¹⁸⁹ *See supra* notes 106–108 and accompanying text.

¹⁹⁰ *See, e.g.*, Mortimer B. Zuckerman, *Preventing a Panic*, U.S. NEWS & WORLD REP. (Feb. 1, 2008), <https://www.usnews.com/opinion/mzuckerman/articles/2008/02/01/preventing-a-panic> (arguing that “the credit system has been virtually frozen” because “few people even know where the liabilities and losses are concentrated”).

¹⁹¹ Schwarcz & Chang, *supra* note 182, at 778.

¹⁹² *Id.*

¹⁹³ Steven L. Schwarcz, Keynote Address, *The Financial Crisis and Credit Unavailability: Cause or Effect?*, 72 THE BUSINESS LAWYER 409 (Spring 2017).

¹⁹⁴ Steven L. Schwarcz, *Regulating Financial Change: A Functional Approach*, 100 MINNESOTA LAW REVIEW 1441, 1442 (2016). *Cf.* Charles K. Whitehead, *Reframing Financial Regulation*, 90 BOSTON UNIVERSITY LAW REVIEW 1, 2 (2010) (describing financial regulation as reactive in

occurs because it is costly and subject to political interference—present-day regulation can quickly become outmoded.¹⁹⁵

Prior to the financial crisis, for example, the financial regulatory framework was designed for bank-intermediated funding.¹⁹⁶ This framework failed to adapt to the rise of the so-called shadow-banking sector,¹⁹⁷ which is characterized by non-bank-intermediated funding.¹⁹⁸ Although that funding involved highly risky “bank-like” functions, including maturity transformation,¹⁹⁹ it was unregulated. This unregulated maturity transformation may have contributed to the financial crisis.²⁰⁰

(5) *Tragedy of the Commons.*

The shareholder-primacy model of corporate governance encourages firms to engage in risk-taking that has a positive expected value to the firm and its shareholders, regardless of harm to third parties—unless, of course, that harm is prohibited by other law or internalized through

nature, “seal[ing] up leaks in the financial system,” rather than proactively finding future problems and solving them before an issue arises).

¹⁹⁵ *Regulating Financial Change*, *supra* note 194, at 1443.

¹⁹⁶ *Id.* at 1443-44.

¹⁹⁷ Shadow banking is a loose term that refers to the provision of financing outside of traditional banking channels, and thus without the need for traditional modes of bank intermediation between capital markets and the users of funds. The sources of such financing include securitization, money-market mutual funds, hedge funds, securities lending, asset-backed commercial paper (ABCP) conduits, structured investment vehicles (SIVs), and repo financing. *See* Steven L. Schwarcz, *Regulating Shadow Banking*, 31 *REVIEW OF BANKING & FINANCIAL LAW* 619, 620 (2012).

¹⁹⁸ *See id.* *Cf.* FINANCIAL STABILITY BOARD, *GLOBAL SHADOW BANKING MONITORING REPORT 2017*, 3 available at <http://www.fsb.org/wp-content/uploads/P050318-1.pdf> (showing that in 2016, shadow banking already accounted for \$45 trillion in assets out of \$340 trillion in total financial assets, or roughly 13%).

¹⁹⁹ *Id.* at 1.

²⁰⁰ *Regulating Financial Change*, *supra* note 194, at 1471.

tort law.²⁰¹ This governance model is problematic for SIFIs because systemic harm is neither prohibited by other law nor internalized through tort law.²⁰²

SIFIs therefore are motivated to engage in “excessive” risk-taking—effectively risk-taking that has a positive expected value to the firm and its shareholders but a negative expected value to the public, who would suffer the externalized systemic harm if the firm fails.²⁰³ This externalization of harm evidences a market failure.²⁰⁴ The market failure could be described as a type of tragedy of the commons insofar as market participants suffer from the actions of other market participants (SIFIs), depleting the shared resource of a common financial market.²⁰⁵ It also could be described as a more standard externality insofar as nonmarket participants (i.e., the public) suffer from the actions of market participants (SIFIs).²⁰⁶

(6) *Maturity Transformation.*

Recall that maturity transformation refers to the asset-liability mismatch that results from the short-term funding of long-term projects.²⁰⁷ Although not itself a market failure,²⁰⁸ maturity transformation could cause a maturity gap that could lead to a default if cash flows from those

²⁰¹ Steven L. Schwarcz, *Misalignment: Corporate Risk-Taking and Public Duty*, 92 NOTRE DAME LAW REVIEW 1 (Nov. 2016). I am not claiming that tort or other law perfectly internalizes non-systemic costs. Cf. Matthew Waldoct, *Fossil Fuels’ Hidden Cost Is in Billions, Study Says*, N.Y. TIMES (Oct. 19, 2009) (observing that polluters rarely bear the full cost of polluting).

²⁰² *Misalignment*, *supra* note 201, at 18–21.

²⁰³ *Id.* at 10.

²⁰⁴ Cf. Paul Kiel & Dan Nguyen, *Bailout Tracker*, PRO PUBLICA (July 20, 2018) (reporting as a result of the financial crisis, more than \$500 billion of public money was used to bail out financial institutions); John Kell, *U.S. Recovers All Jobs Lost in Financial Crisis*, FORTUNE (June 6, 2014) (observing that it took more than four years of recovery to regain the 8.7 million jobs loss as a result of the financial crisis).

²⁰⁵ See generally Steven L. Schwarcz, *Systemic Risk*, 97 GEORGETOWN LAW JOURNAL 193, 206 (2008).

²⁰⁶ *Id.* at 206.

²⁰⁷ See *supra* note 22 and accompanying text.

²⁰⁸ Cf. Borys Grochulsky & Wendy Morrison, *Understanding Market Failure in the 2007-08 Crisis*, FEDERAL RESERVE BANK OF RICHMOND ECONOMIC BRIEF, EB14-12, at 2 (Dec. 2014) (observing that a potential market failure known as a “pecuniary externality” may be associated with maturity transformation).

projects are not received in time to pay maturing short-term liabilities.²⁰⁹ And a SIFI default could trigger a systemic shock.²¹⁰

C. Identifying Systemic Risk's Transmission Mechanisms

The mechanisms by which systemic risk, once triggered, can be transmitted have not formally been identified. Nonetheless, certain factors including interconnectedness, size, and lack of substitutability are associated with the transmission of systemic risk.²¹¹ These factors are not market failures per se. Instead, one could think of them as providing fuel and oxygen to sustain a fire. Just as a spark is needed to actually start the fire, one of the previously discussed triggers is needed to spark a systemic shock; but the shock would not spread without a transmission mechanism.²¹²

(1) *Interconnectedness.*

Historically, interconnectedness was thought to increase financial system resilience by dispersing risk and liabilities among many parties, who could better absorb them.²¹³ The financial crisis revealed, however, that interconnectedness can also propagate an economic shock throughout the financial system.²¹⁴ This is common sense; the failure of a SIFI may cause it to

²⁰⁹ See *supra* notes 23-24 and accompanying text.

²¹⁰ See *id.*

²¹¹ INTERNATIONAL MONETARY FUND ET AL., GUIDANCE TO ASSESS THE SYSTEMIC IMPORTANCE OF FINANCIAL INSTITUTIONS, MARKETS AND INSTRUMENTS: INITIAL CONSIDERATIONS 13 (Oct. 2009); BASEL COMMITTEE ON BANKING SUPERVISION, CONSULTATIVE DOCUMENT: GLOBAL SYSTEMICALLY IMPORTANT BANKS: ASSESSMENT METHODOLOGY AND THE ADDITIONAL LOSS ABSORBENCY REQUIREMENT 1 (July 2011). Complexity and leverage also are thought to contribute to the transmission of systemic risk. Cf. *infra* notes 287-290 and accompanying text (observing that interactive complexity can facilitate the transmission of systemic risk).

²¹² I thank research assistant James Crisp for this helpful analogy.

²¹³ See, e.g., Franklin Allen & Douglas Gale, *Financial Contagion*, 108 JOURNAL OF POLITICAL ECONOMY 1, 4 (1998) (finding that an interbank market can increase resilience of the financial system).

²¹⁴ Cf. CARLOS LEÓN ET AL., TOO-CONNECTED-TO-FAIL INSTITUTIONS AND PAYMENTS SYSTEM'S STABILITY: ASSESSING CHALLENGES FOR FINANCIAL AUTHORITIES 39 (2011) (arguing that interconnectedness is as serious a potential threat to financial stability as size); Jorge A. Chan-Lau, *Balance Sheet Network Analysis of Too-Connected-to-Fail Risk in Global and Domestic Banking Systems* 3 (IMF, Working Paper No. 10/197, 2010),

default on its obligations to other firms, including SIFIs with which it is contractually or otherwise connected.²¹⁵ The most appropriate level of interconnectedness will therefore always be a balance.²¹⁶

(2) *Size.*

Associating size with the transmission of systemic risk is, again, common sense. Other things being equal, the larger the size of a financial firm, the greater the impact of its failure. Indeed, the very concern over TBTF assumes that the bigger a financial firm, the greater the capacity of its failure to transmit systemic risk.²¹⁷

(3) *Lack of Substitutability.*

Financial firms sometimes provide essential services that few other firms provide. For example, CCPs²¹⁸ help to ensure the ongoing operation of the financial system by clearing²¹⁹ and settling²²⁰ derivatives and other securities contracts.²²¹ There are few CCPs, and they have few if

<https://www.imf.org/en/Publications/WP/Issues/2016/12/31/Balance-Sheet-Network-Analysis-of-Too-Connected-to-Fail-Risk-in-Global-and-Domestic-Banking-23809> (arguing that the failure of a systemically important firm can “lead to successive rounds of failures of other institutions in the system”).

²¹⁵ The exposure of those other firms to the SIFI’s failure is sometimes called counterparty risk. *Cf. supra* note 50 and accompanying text (observing that CCPs can absorb counterparty risk).

²¹⁶ *Cf. Anabtawi & Schwarcz, supra* note 104, at 1355 (“The transmission of risk through a network can serve to absorb shocks, dispersing risk among members. But it can also amplify shocks, potentially leading to systemic collapse.”); Daron Acemoglu, Asuman Ozdaglar, & Alireza Tahbaz-Salehi, *Systemic Risk and Stability in Financial Networks*, 105 *AMERICAN ECONOMIC REVIEW* 566 (2008) (discussing the history of economic thought surrounding interconnectedness and current research in the area).

²¹⁷ This follows from the “B” in TBTF standing for “Big.”

²¹⁸ *See supra* notes 46-50 and accompanying text (describing CCPs).

²¹⁹ Clearing is “the process of transmitting, reconciling and, in some cases, confirming transfer orders prior to settlement” European Central Bank, Glossary of Terms Related to Payment, Clearing and Settlement Systems, available at https://www.ecb.europa.eu/pub/pdf/other/glossaryrelatedtopaymentclearingandsettlementsystems_en.pdf. It involves identifying the obligations of the parties to the transaction.

²²⁰ Settlement is “the completion of a transaction or of processing with the aim of discharging participants’ obligations through the transfer of funds and/or securities.” *Id.*

²²¹ *Cf. Richard Squire, Clearinghouses as Liquidity Partitioning*, 99 *CORNELL LAW REVIEW* 857, 862 (2014) (“The [CCP] clearinghouse interposes itself between the parties, serving as the

any substitutes.²²² Most CCPs are large firms,²²³ but sometimes even small firms uniquely provide critical financial services, such as payment processing.²²⁴

D. Regulating the Triggers and Transmission Mechanisms

Having identified (at least certain) triggers and transmission mechanisms of systemic risk, this Part examines how regulation could help. Subpart (1) focuses on regulating the triggers; thereafter, subpart (2) focuses on regulating the transmission mechanisms. This Part does not necessarily conclude that regulation that “could” help, “should” help; any such conclusion would require a showing that the benefits of the regulation are likely to exceed its costs.²²⁵

(1) *Regulating the Triggers.*

Next examine how regulation could help to correct the market failures that cause shocks that trigger a systemic economic collapse.

counterparty to each. Instead of selling the cattle future to Buyer, Seller sells it to the clearinghouse, which sells an identical future to Buyer”).

²²² Robert T. Cox & Robert S. Steigerwald, *A CCP is a CCP is a CCP*, FED. RES. BANK OF CHICAGO WORKING PAPER No. PDP 2017-01 (Apr. 5, 2017 final revised draft), at 14 (observing that “there are few substitutes for most systemically important CCPs”).

²²³ In the United States, the CCPs include CME Clearing Services, which provides clearing and settlement of exchange trades on the Chicago Mercantile Exchange and the Chicago Board of Trade; ICE Clear U.S., which is owned by Intercontinental Exchange, which owns the New York Stock Exchange; and LCH, which is a unit of the London Stock Exchange Group. See <https://www.reuters.com/article/us-cftc-clearing-tests/three-biggest-u-s-clearing-houses-pass-liquidity-stress-tests-cftc-idUSKBN1CL09Q>; and CME Group, *Clearing Firms*, available at <http://www.cmegroup.com/clearing/financial-and-regulatory-surveillance/clearing-firms.html?redirect=/tools-information/clearing-firms.html>.

²²⁴ Stern & Feldman, *supra* note 93.

²²⁵ For a detailed examination of applying cost-benefit analysis to macroprudential regulation, see Steven L. Schwarcz, *Changing Law to Address Changing Markets: A Consequence-Based Inquiry*, 80 LAW & CONTEMPORARY PROBLEMS 163, 169 (2017). Cf. *infra* note 225 and accompanying text (referencing a cost-benefit analysis for deciding whether to impose a public governance duty).

(a) Correcting the market failures underlying complexity: As discussed, complexity may pose one of the most intractable problems for financial regulation.²²⁶ Top-down approaches to try to reduce complexity would likely be costly and futile. For example, mandating more simplified finance could stifle innovation and interfere with the ability of parties to achieve the efficiencies that arise when firms tailor securities and other financial products to the particular needs and risk preferences of investors.²²⁷ Standardizing securities and other financial products could also backfire, potentially increasing systemic risk by correlating investments.²²⁸

Incentive-based approaches to try to control complexity would have greater flexibility and less downside risk. For example, the European Union is creating a regulatory framework favoring simple, transparent, and standardized (STS) securitization transactions.²²⁹ This framework incentivizes (rather than mandates) STS transactions by reducing regulatory capital requirements for investors therein, thereby allowing for potential innovation.²³⁰ That potential plus the framework's flexible definition of what could qualify as an STS transaction help to provide balance, reducing the general complexity of securitizations while increasing the diversification (and thus minimizing the correlation) of securitized financial products.²³¹

²²⁶ *Cf. supra* notes 154-159 and accompanying text (discussing, among other things, the potential of complexity to create mutual misinformation).

²²⁷ Steven L. Schwarcz, *Controlling Financial Chaos: The Power and Limits of Law*, 2012 WISCONSIN LAW REVIEW 815, 820 (2012).

²²⁸ *Cf. infra* notes 328-335 and accompanying text (discussing how lack of investment diversity contributed to the financial crisis); Steven L. Schwarcz, Keynote Address: *Understanding the Subprime Financial Crisis*, 60 SOUTH CAROLINA LAW REVIEW 549, 552 (2009) (explaining why the financial crisis was exacerbated by an unexpected correlation between the MBS market and other debt markets). *But cf.* Saule T. Omarova, *License to Deal: Mandatory Approval of Complex Financial Products*, 90 WASHINGTON UNIVERSITY LAW REVIEW 63, 84 (2012) (arguing for requiring approval of complex financial products: “adopting and operationalizing the general concept of precaution in the context of post-crisis financial systemic risk regulation may be a worthwhile, and even necessary, exercise”).

²²⁹ *See generally* Proposal for a Regulation of the European Parliament and of the Council (EC) No. 472/2015 of 30 Sep. 2015, 2015/0226 (COD).

²³⁰ Steven L. Schwarcz, *A Global Perspective on Securitization Debt*, in CAPITAL MARKETS UNION IN EUROPE (Oxford University Press ed., 2017).

²³¹ *But cf.* Haldane & Madouros, *supra* note 126, at 149 (arguing for taxing complexity directly in order to mitigate externalities).

(b) Correcting the market failures underlying conflicts: As discussed, post-crisis regulation overlooks the intra-firm problem of secondary-management conflicts.²³² Regulation should require SIFIs to mitigate these conflicts by paying secondary managers under longer-term compensation schemes—e.g., compensation subject to clawbacks or deferred compensation based on long-term results.²³³ In practice, however, that solution would confront a collective action problem: firms that offer their secondary managers longer-term compensation might be unable to hire as competitively as firms that offer more immediate compensation.²³⁴ Because good secondary managers can work in financial centers worldwide, regulation may also be needed to help solve this collective action problem not only within, but also across, nations.²³⁵

(c) Correcting the market failures underlying behavioral limitations: Recall that these limitations include herd behavior, cognitive biases, overreliance on heuristics, and, in the context of financial regulation, the tendency to panic.²³⁶ I have separately examined how regulators could improve financial regulation by addressing these limitations.²³⁷ For example, by studying how information cascades develop and requiring increased due diligence on market information, regulators could help to reduce herd behavior.²³⁸ Cognitive biases could be regulated through “debiasing through law.”²³⁹ Optimism bias, for example, could be addressed by requiring investor warnings to be framed more concretely. Requiring investors to attend lectures that emphasize these warnings and caution against overconfidence has also been shown to help

²³² See *supra* notes 160-166 and accompanying text.

²³³ The Capital Requirements Directive IV (2013) requires EU banks to provide long-term compensation to “material risk takers” in their institution. This includes a three-to-five-year deferral period for payouts and claw-back provisions. It also appears that US investment banks may be implementing longer-term compensation schemes. See, e.g., Liz Moyer, *On ‘Bleak’ Street, Bosses in Cross Hairs*, WALL ST. J., Feb. 8, 2012 (reporting that Goldman Sachs and Morgan Stanley “would seek to recover pay from any employee whose actions expose the firms to substantial financial or legal repercussions”).

²³⁴ *Conflicts and Financial Collapse*, *supra* note 162, at 468.

²³⁵ *Id.* Solving that collective action problem could not, however, control excessive risk-taking that results from a misalignment of interests between the private sector—the firm and its managers and investors—and the public sector. See *supra* notes 204-206 and accompanying text.

²³⁶ See *supra* notes 168-169 and accompanying text.

²³⁷ See *Regulating Complacency*, *supra* note 107.

²³⁸ *Regulating Complacency*, *supra* note 96, at 1084-90.

²³⁹ Jolls & Sunstein, *supra* note 180, at 200.

reduce optimism bias.²⁴⁰ Requiring more concretely framed warnings could also help to reduce availability bias.²⁴¹

Overreliance on heuristics could be regulated by trying to increase the accuracy of heuristics. U.S. and E.U. post-crisis regulation, for example, attempts to make credit ratings more accurate and the credit-rating process more transparent.²⁴² Society benefits when heuristics reasonably approximate reality.²⁴³ Overreliance on heuristics could also be reduced by requiring firms to engage in more self-aware and transparent operational risk management and reporting.²⁴⁴ For example, stress tests and living wills serve as reminders of economic mortality, motivating firms to engage in more accurate risk assessment.²⁴⁵

The proclivity to panic could be regulated by trying to promote financial stability, even after an economic shock.²⁴⁶ To try to prevent banks runs, for example, the FDIC guarantees deposit accounts up to specified limits.²⁴⁷ Regulation might also create a market liquidity provider of last resort to try to stabilize securities prices after a market panic.²⁴⁸

Notwithstanding our best efforts, financial regulation will remain imperfect because we do not yet fully understand human behavior.²⁴⁹ For example, regulation cannot eliminate all panics.²⁵⁰ As a result, future financial failures are inevitable.²⁵¹ Financial regulation should

²⁴⁰ See Markku Kaustia & Milla Perttula, *Overconfidence and Debiasing in the Financial Industry*, 4 REVIEW OF BEHAVIORAL FINANCE 46, 48 (2012).

²⁴¹ *Regulating Complacency*, *supra* note 107, at 1093.

²⁴² See *supra* notes 58-61 and accompanying text.

²⁴³ Schwarcz & Chang, *supra* note 182, at 769. Cf. *The Financial Crisis and Credit Unavailability*, *supra* note 193, at 415 (observing that “credit ratings can perform a public good, helping to close the information gap between borrowers and lenders”).

²⁴⁴ *Regulating Complacency*, *supra* note 107, at 1094.

²⁴⁵ *Id.*

²⁴⁶ *Id.*

²⁴⁷ 12 U.S.C. § 1811 (2012).

²⁴⁸ *Regulating Complacency*, *supra* note 107, at 1094 (arguing that such a liquidity provider should be at least partly privatized in order to reduce moral hazard, and comparing that to the FDIC’s assessing deposit-taking banks to fund its deposit-insurance guarantees).

²⁴⁹ *Regulating Complacency*, *supra* note 107, at 1098-99.

²⁵⁰ *Id.* at 1098.

²⁵¹ *Id.*

therefore be designed not only to try to deter financial crises but also to mitigate their inevitable harm.²⁵²

(d) Correcting the market failures underlying change: This cannot be done without stultifying innovation. Also, change makes it impossible to always predict the future based on information about the past.²⁵³ That presents yet another reason why, despite our best efforts, financial regulation will remain imperfect.²⁵⁴

(e) Correcting the market failures underlying the tragedy of the commons: This would require SIFIs to internalize systemic costs. In theory, resolution—which seeks to mitigate the systemic impact of a SIFI’s failure—could help to “internalize” those costs, by reducing them.²⁵⁵ In practice, however, most resolution approaches are microprudential,²⁵⁶ focusing on protecting individual SIFIs.²⁵⁷

Even the most perfect resolution approaches, however, could not fully correct the market failures underlying the tragedy of the commons. These market failures, which encourage excessive SIFI risk-taking, stem from the shareholder-primacy model of corporate governance.²⁵⁸

²⁵² *Id.*

²⁵³ [In that context, consider among other things S&P’s pre-crisis model that housing prices could fall as much as 20%, whereas they actually fell around 33 %—more than their fall in the Great Depression.]

²⁵⁴ *But cf. Regulating Financial Change*, *supra* note 194 (arguing that a more functional regulatory approach could better address financial change).

²⁵⁵ *See supra* notes 35-39 and accompanying text. *Cf.* John Crawford, *Resolution Triggers for Systemically Important Financial Institutions*, NEBRASKA LAW REVIEW (forthcoming 2018-19) (discussing resolution as a mechanism to internalize the systemic costs of a SIFI’s failure).

²⁵⁶ *Resolution as a Macroprudential Regulatory Tool*, *supra* note 18, at 9-13 (also examining “reactive,” “proactive,” and “counteractive” approaches to resolution).

²⁵⁷ *See supra* note 17 and accompanying text.

²⁵⁸ *See supra* notes 201-206 and accompanying text (explaining that governance model encourages risk-taking that has a positive expected value to the firm and its shareholders, even if it harms the public who would suffer the externalized systemic harm if the firm fails). *Cf.* Governor Daniel K. Tarullo, Fed. Reserve Sys., Remarks at the Association of American Law Schools Midyear Meeting: Corporate Governance and Prudential Regulation 7–8 (June 9, 2014) (arguing that “prudential regulation [should] need to involve itself with corporate governance” because “risk-taking” by systemically important financial intermediaries “carries substantial potential societal consequences”).

Therefore, the most direct way of correcting those failures (and controlling excessive risk-taking) would be to modify that model by imposing some type of a public governance duty that requires SIFI managers to also consider the public consequences of their firm's actions.²⁵⁹

Proposing such a duty would engage the longstanding debate whether corporate governance law should require a duty to the public. The accepted wisdom is not to require such a duty because corporate profit maximization provides jobs and other public benefits that exceed any harm.²⁶⁰ The assumption underlying that wisdom is that any significant public harm would be prohibited by other law or internalized through tort law.²⁶¹ That assumption fails, however, for systemic public harm.²⁶²

In other writing, I have extensively examined the merits and design, as well as the possible costs and benefits, of imposing a public governance duty.²⁶³ Such a duty could be performed, for example, by a SIFI's risk committee, including risk committees mandated by post-crisis financial regulation.²⁶⁴ Most such risk committees, however, are not yet required to consider systemic risk or public harm.²⁶⁵ For example, risk committees required under the Dodd-Frank Act are only mandated to focus on risks to the SIFI itself, not to the public.²⁶⁶ Even the guidelines of the Basel Committee on Banking Supervision merely require SIFI managers to “look after the interests of the bank as a whole” and do not require them to take into account the possibility of systemic externalities.²⁶⁷

²⁵⁹ *Cf. Misalignment*, *supra* note 201, at 21-29 (arguing for a SIFI public governance duty and explaining why it could be feasibly implemented).

²⁶⁰ *Id.*

²⁶¹ *Id.*

²⁶² *See supra* note 202 and accompanying text (observing that systemic public harm is neither prohibited by other law nor internalized through tort law).

²⁶³ *See Misalignment*, *supra* note 201.

²⁶⁴ *Id.*

²⁶⁵ SIFI risk committees, in other words, are not required to undertake the most important job they should be performing—to reduce systemic harm.

²⁶⁶ 12 C.F.R. § 252.20–35 (2017).

²⁶⁷ *See* BASEL COMM. ON BANKING SUPERVISION, *supra* note 26.

(f) Addressing maturity transformation: As discussed, the Net Stable Funding Ratio imposed on designated SIFIs by the Basel III liquidity requirements already helps to reduce the risk that maturity transformation will result in defaults that could trigger a systemic economic collapse.²⁶⁸ Significant risk remains, however, because not all financial firms that engage in maturity transformation have been designated as SIFIs.²⁶⁹ Furthermore, a recent policy trend might disfavor SIFI designation and regulation, substituting for it the regulation of financial activities that could create systemic risk.²⁷⁰ That creates a new macroprudential regulatory challenge: How should maturity transformation be regulated as an activity?

A threshold question is whether maturity transformation should always be regulated as an activity. All maturity transformation can result in defaults, but not all defaults—even defaults by financial firms—have systemic consequences. This suggests that maturity transformation as an activity should only be regulated for financial firms whose default could have systemic consequences. SIFI designation has provided a clear basis for identifying those firms. Absent SIFI designation, it is unclear how those firms should be identified. A middle ground might be to designate certain financial firms as SIFIs for limited purposes, such as regulating maturity transformation, in contrast to imposing capital and other substantive entity-based requirements.²⁷¹

For whichever financial firms it should apply, next consider how maturity transformation should be regulated as an activity. One possible approach is inspired by banking law, which authorizes the FDIC to guarantee deposit accounts in order to reduce the risk that long-term bank assets (such as principal due in the future on corporate loans) will be insufficient to pay short-term liabilities consisting of depositor cash withdrawals.²⁷² That approach, however, still leaves a guarantor that pays the maturing short-term liabilities with a short-term subrogation claim. It also

²⁶⁸ See *supra* notes 21-24 and accompanying text.

²⁶⁹ See Kress et al., *supra* note 6. Cf. *supra* notes 197-200 and accompanying text (discussing the rise of shadow banking, which increases maturity-transformation activity).

²⁷⁰ Cf. Kress et al., *supra* note 6 (arguing that the Trump Administration is driving that policy trend).

²⁷¹ Cf. *supra* notes 4-5 and accompanying text (discussing entity-based regulatory approaches).

²⁷² See *supra* note 247 and accompanying text.

is expensive and bureaucratic because it would require establishing and funding a governmental entity that would provide the guarantee.

Another possible approach is inspired by structured finance, in which special purpose entities (SPEs) routinely engage in maturity transformation. The most typical and widespread, and also most applicable, example is an asset-backed commercial paper SPE that invests in long-term financial assets, such as mortgage loans.²⁷³ Commercial paper refers to short-term (often as short as 30-day maturity) corporate promissory notes.²⁷⁴ The commercial paper issued by these SPEs normally receives the highest credit rating by the leading rating agencies.²⁷⁵ As a condition to giving that credit rating, rating agencies require the SPE to ensure that its maturity transformation activity—funding itself with short-term commercial paper to invest in long-term mortgage loans²⁷⁶—will not cause it to default on its commercial paper.²⁷⁷

Asset-backed commercial paper SPEs normally take two steps to comply with that condition. As a primary step, they carefully monitor the commercial paper maturing each month and plan to repay that commercial paper with a combination of cash collections on the mortgage loans and proceeds from the issuance of new commercial paper.²⁷⁸ As a fallback step, they enter

²⁷³ Such an asset-backed commercial paper SPE is often referred to as an ABCP conduit. The author has extensive experience, for example, with Corporate Asset Funding Company (“CAFCO”), an \$7 billion ABCP conduit. See *Corporate Asset Funding Co., Inc.*, FITCH INVESTORS SERVICE, STRUCTURED FINANCE, June 15, 1992, at 81.

²⁷⁴ Thomas K. Hahn, *Commercial Paper*, 79 FRB RICHMOND ECONOMIC QUARTERLY 45, 45 (1993).

²⁷⁵ Standard & Poor’s normally rates the commercial paper A-1+ and Moody’s normally rates the commercial paper Prime-1 (usually abbreviated P-1). Daniel Covitz et al., *The Evolution of a Financial Crisis: Collapse of the Asset-Backed Commercial Paper Market*, 68 JOURNAL OF FINANCE 815, 822 (2013).

²⁷⁶ The rationale for this maturity transformation activity includes that the interest rate on short-term commercial paper is lower than that on long-term mortgage loans, making the activity profitable. Steven D. Simpson, *The Banking System: Commercial Banking – Economic Concepts in Banking*, INVESTOPEDIA, available at <https://www.investopedia.com/university/banking-system/banking-system2.asp>.

²⁷⁷ *Corporate Asset Funding Co.*, *supra* note 273, at 83.

²⁷⁸ See, e.g., *Eureka Securitization Incorporated*, MOODY’S INVESTORS SERVICE, Dec. 3, 2004, at 349b (stating that Citibank, the administrative agent of a \$10 billion ABCP conduit, performs this type of monitoring to help avoid maturity gaps).

into “liquidity” facilities with creditworthy banks and other financial institutions (“liquidity providers”), obligating them to purchase the newly issued commercial paper if, due to market disruptions, the SPE cannot otherwise sell that paper.²⁷⁹ Liquidity providers are not obligated, however, to purchase commercial paper from an insolvent SPE.²⁸⁰ They therefore take only a temporary, or timing, risk: the risk of a mismatch between the receipt of cash collections on the mortgage loans and the short-term maturities on commercial paper. Because they do not bear credit risk, liquidity providers charge the SPE a very small fee.²⁸¹ This affords protection against the default risk of maturity transformation at a very low transaction cost. This same approach could serve as an economically feasible option to regulate the default risk of maturity transformation, as an activity.²⁸²

(2) *Regulating the Transmission Mechanisms.*

Next examine how regulation should address the factors associated with the transmission of systemic risk.

(a) Regulating interconnectedness: It is the very nature of a financial system to be interconnected. Financial firms routinely do business with each other. Restricting that interconnectedness would restrict finance. Interconnectedness therefore should be indirectly regulated.

Current macroprudential regulation provides some indirect regulation of interconnectedness, first by identifying interconnectedness as an important factor for designating

²⁷⁹ See, e.g., *Corporate Asset Funding Co.*, *supra* note 273, at 83.

²⁸⁰ *Id.* (noting that liquidity facilities “may be terminated upon the bankruptcy of” the SPV).

²⁸¹ In the author’s experience, liquidity providers normally charge a fee between 5 and 15 basis point (a basis point being 1/100 of a percentage point).

²⁸² Another regulatory approach could require the SPE to be sufficiently well capitalized to avoid defaulting. That approach, however, would likely be prohibitively expensive. For example, CAFCO had to seek an exemption from the Investment Company Act of 1940, which would require high capitalization, because that would prevent CAFCO from being economically viable. STEVEN L. SCHWARCZ, *STRUCTURED FINANCE, A GUIDE TO THE PRINCIPLES OF ASSET SECURITIZATION* 6-3 (3d ed. & supps. 2010).

a financial firm as a SIFI²⁸³ and then by requiring SIFIs to be financially robust²⁸⁴ or, in the event of their failure, to be resolved in ways that have minimum systemic impact.²⁸⁵

Regulation could also indirectly address interconnectedness by strengthening the resilience of the financial system, as a “system.” Systems in general—and the financial system in particular—that are both tightly coupled²⁸⁶ and interactively complex²⁸⁷ are “prone to catastrophic failures” because that combination “obfuscate[s] risk and present[s] little opportunity for intervention following a local shock.”²⁸⁸ Financial regulators would have little time to identify and understand the problem.²⁸⁹ Regulation could therefore indirectly address interconnectedness by reducing the financial system’s tight coupling and interactive complexity.²⁹⁰

²⁸³ INTERNATIONAL MONETARY FUND ET AL., *supra* note 211.

²⁸⁴ *Cf. supra* Part I.A.1 (discussing current regulation that protects against the failure of SIFIs). The Basel Committee on Banking Supervision also treats interconnectedness as a factor for imposing additional capital requirements on global SIFIs. *See* Consultative Document: Global Systemically Important Banks: Assessment Methodology and the Additional Loss Absorbency Requirement ¶ 15 (July 2011).

²⁸⁵ *Cf. supra* Part I.A.1(f) (discussing current regulation that mitigates the systemic impact of the failure of SIFIs).

²⁸⁶ A “tightly coupled system is one that is highly interdependent, so that a disturbance to one part of the system can spread almost instantaneously to other parts of the system.” Iman Anabtawi & Steven L. Schwarcz, *Regulating Ex Post: How Law Can Address the Inevitability of Financial Failure*, 92 TEXAS LAW REVIEW 75, 94 (2013).

²⁸⁷ An “interactively complex system is one whose components can interact in unexpected or varied ways . . .” As a result, a shock to one component can lead to “. . . failures that seem to come out of nowhere or that appear unfathomably improbable.” RICHARD BOOKSTABER, *DEMON OF OUR OWN DESIGN* 154-55 (2007). *Cf. supra* notes 226-230 and accompanying text (discussing the regulation of complexity).

²⁸⁸ Anabtawi & Schwarcz, *supra* note 286, at 112. *Cf.* Peter Cebon, *Innovating our Way to a Meltdown*, 50 MIT SLOAN MANAGEMENT REVIEW 13, 14 (Jan. 7, 2009), <https://sloanreview.mit.edu/article/innovating-our-way-to-a-meltdown/> (arguing that interconnectedness combined with complexity causes financial crashes to spread quickly and in unpredictable ways).

²⁸⁹ Anabtawi & Schwarcz, *supra* note 286, at 112.

²⁹⁰ *Cf. id.* (observing that a “system that is interactively complex but only loosely coupled . . . is likely to produce unpredictable interactions among its elements because of the system’s interactive complexity. However, the ultimate damage to such a system from a failure at the level of its elements is likely to be manageable because loose coupling presents opportunities for early intervention.”). Regulation probably cannot eliminate interactive complexity because information failures, which underlie the complexity, are inherent in human arrangements.

Regulation could reduce the financial system's tight coupling by providing for central bank last-resort lending. By providing liquidity to a SIFI to prevent its default, such lending would help to prevent a disturbance (a SIFI default) to one part of the financial system from spreading rapidly to other parts of the system, including the SIFI's counterparties. As discussed, however, the Dodd-Frank Act strips the Federal Reserve Bank of much of its last-resort-lending powers, in order to try to reduce moral hazard.²⁹¹ The importance of reducing tight coupling provides yet another reason why stripping the Fed of those powers is misguided.²⁹²

Regulation could also reduce the financial system's tight coupling by controlling marking-to-market. That refers to the common requirement that a securities account be adjusted in response to a change in the market value of the securities.²⁹³ Although marking to market is generally believed to reduce risk, it can cause "perverse effects on systemic stability" during times of market volatility, when forcing sales of assets to meet margin calls can depress asset prices, requiring more forced sales (which, in turn, will depress asset prices even more), causing a downward spiral.²⁹⁴ At least some portion of the financial

Complexity itself can also sometimes be beneficial; for example, derivatives can be used to better allocate risk among market participants.

²⁹¹ See *supra* notes 91-93 and accompanying text.

²⁹² See *id.*

²⁹³ An investor, for example, may buy securities on credit from a securities broker-dealer, securing the purchase price by pledging the securities as collateral. To guard against the price of the securities falling to the point where their value as collateral is insufficient to repay the purchase price, the broker-dealer requires the investor to maintain a minimum collateral value. If the market value of the securities falls below this minimum, the broker-dealer will issue a "margin call" requiring the investor to deposit additional collateral, usually in the form of money or additional securities, to satisfy this minimum. Failure to do so triggers a default, enabling the broker-dealer to foreclose on the collateral.

²⁹⁴ Rodrigo Cifuentes, Gianluigi Ferrucci & Hyun Song Shin, *Liquidity Risk and Contagion 2* (Bank of Eng. Working Paper No. 264, 2005), <http://www.bankofengland.co.uk/publications/workingpapers/wp264.pdf>); see also Clifford De Souza & Mikhail Smirnov, *Dynamic Leverage: A Contingent Claims Approach to Leverage for Capital Conservation*, J. PORTFOLIO MANAGEMENT, Fall 2004, at 25, 28 (arguing that, in a bad market, short-term pressure to sell assets to raise cash for margin calls can lead to further mark-to-market losses for remaining assets, which triggers a whole new wave of selling; the process repeating itself until markets improve or the firm is wiped out; and referring to this process as a "critical liquidation cycle").

crisis appears to have resulted from this downward spiral.²⁹⁵ Regulators could reduce marking-to-market's flaws by "allow[ing] firms to substitute other measures of investor comfort for marking-to-market" when marking-to-market "might distort value, such as when it would require a securities account—especially an account whose securities have long-term maturities—to be adjusted in response to short-term pricing fluctuations."²⁹⁶ One such measure of investor comfort might be a firm's "full disclosure of its underlying asset portfolio."²⁹⁷ Regulators could also use liquidity to stabilize systemically important financial markets impacted by a downward spiraling asset market.²⁹⁸

Regulation could reduce the financial system's interactive complexity by requiring SIFIs to disclose more detailed information about their securities holdings and contractual obligations. SIFIs cause at least two sources of interactive complexity in the financial system, both resulting from information failures. The first source is that market participants do not know what securities other firms hold.²⁹⁹ As a form of risk aversion, they therefore assume that distressed securities owned by a given firm are also held by similarly situated firms.³⁰⁰ If any of those firms fails, market participants may become reluctant to extend credit to similar firms—even those that, in fact, are financially healthy.³⁰¹ The loss of credit can then trigger unpredictable failures of healthy firms, hastening a financial crisis.³⁰² Regulation could help to reduce this source of interactive complexity by requiring SIFIs to disclose—at least periodically, if not also on demand—the amount and identity of their securities holdings.

Another source of interactive complexity is that market participants do not know the contractual obligations of other firms.³⁰³ Yet if a firm defaults on its obligations, its

²⁹⁵ See, e.g., Rachel Evans, *Banks Tell of Downward Spiral*, INTERNATIONAL FINANCIAL LAW REVIEW, June 2008, at 16.

²⁹⁶ Anabtawi & Schwarcz, *supra* note 286, at 119.

²⁹⁷ *Regulating Complexity*, *supra* note 102, at 246-47.

²⁹⁸ For an analysis of how liquidity could stabilize financial markets, see *Controlling Financial Chaos*, *supra* note 227, at 829-30.

²⁹⁹ Anabtawi & Schwarcz, *supra* note 286, at 94.

³⁰⁰ *Id.* at 95.

³⁰¹ *Id.* at 95-96.

³⁰² *Id.* at 94 (discussing that interactive complexity causes that unpredictability).

³⁰³ *Id.* at 114.

counterparties may be forced to default on their own obligations.³⁰⁴ Again, risk-averse market participants may refuse to extend credit to firms that appear similar to a defaulting firm but in fact are financially healthy, thereby triggering unpredictable failures of those healthy firms and hastening a financial crisis.³⁰⁵ Regulation could help to reduce this source of interactive complexity by again requiring SIFIs to disclose the amount and nature of their contractual obligations.³⁰⁶

(b) Regulating size: Recall that the current approach to regulating size focuses on ending the TBTF problem.³⁰⁷ To try to accomplish that, regulators have been advocating massively increasing capital requirements for TBTF firms in order to prevent them from failing³⁰⁸ and also breaking up such firms so they are no longer TBTF.³⁰⁹ If (as this Article argues) the TBTF problem is exaggerated,³¹⁰ such measures could be inefficient or even harmful.³¹¹

This Article's framework suggests a less intrusive regulatory approach. Size is a transmission mechanism, not a trigger, of systemic risk. Regulation should therefore focus on protecting large SIFIs from the systemic risk triggers discussed elsewhere in this Article.³¹² By analogy, this approach is similar to keeping firewood and other sources of fuel away from sparks.

³⁰⁴ *Id.* at 88.

³⁰⁵ *See id.* at 95–96.

³⁰⁶ *Cf. Regulating Complexity, supra* note 102, at 203-207 & 246 (discussing disclosure as an option to help avoid a “crisis of confidence”). Generally accepted accounting principles (GAAP) do not require sufficient disclosure of contractual obligations, especially contingent obligations, to reduce interactive complexity. GAAP requires parties to disclose contingent liabilities only if the contingency is a “reasonable possibility,” which itself is a subjective determination. *Id.* at notes 181-83.

³⁰⁷ *See supra* notes 7 & 84 and accompanying text.

³⁰⁸ *See supra* notes 94-98 and accompanying text.

³⁰⁹ *See supra* notes 92-93 and accompanying text.

³¹⁰ *See supra* notes 85-90 and accompanying text.

³¹¹ *See supra* notes 90-98 and accompanying text.

³¹² For example, large SIFIs could have more stringent regulation of their secondary-management conflicts (*see supra* notes 232-235 and accompanying text) or could be subjected more stringently to a public governance duty (*see supra* notes 259-264 and accompanying text).

(c) Regulating lack of substitutability: Regulation can protect against the lack of substitutability by protecting the non-substitutable firms that provide essential financial services. Providing that protection is called “ring-fencing.”³¹³ Ring-fencing is already an essential part of macroprudential regulation.³¹⁴

E. Additional Considerations

In designing a systematic framework for macroprudential regulation, two issues remain: how to overcome our limited understanding of systemic risk, and how to adapt regulation to a global financial system.

(1) *We Need to Better Understand Systemic Risk.*

The regulatory analysis is limited by our imperfect understanding of systemic risk.³¹⁵ There may well be other triggers or transmission mechanisms not yet identified. Also, we do not yet know how to correct all of the market failures, or how to address all of the transmission mechanisms, that have been identified.

We need to improve that understanding, such as by monitoring and collecting data about systemic risk and its transmission. To that end, the Dodd-Frank Act created a nonpartisan Office of Financial Research (OFR)³¹⁶ as well as a Financial Stability Oversight Council (FSOC)³¹⁷ to find gaps in macroprudential regulation and to monitor and identify potential systemic threats. The Bank of England similarly established a Financial Policy Committee (FPC) to identify, monitor, and reduce systemic risk.³¹⁸ In the European Union, a European Systemic Risk Board (ESRB) was established to monitor and assess potential threats to financial stability, including

³¹³ See *supra* note 28-31 and accompanying text (discussing ring-fencing).

³¹⁴ See *id.* (discussing current macroprudential ring-fencing regulation).

³¹⁵ See *supra* notes 131-97 and accompanying text.

³¹⁶ Dodd-Frank Act § 152.

³¹⁷ Dodd-Frank Act § 111.

³¹⁸ Robert Peston, *The FPC: Running the Financial Economy?*, BBC NEWS (Feb 17, 2011), http://www.bbc.co.uk/blogs/thereporters/robertpeston/2011/02/the_fpc_running_the_financial.html.

providing early warning of system-wide risks that may be building up and issuing recommendations for dealing with the risks.³¹⁹

Unfortunately, at least in the United States, politics is currently undermining the efficacy of these efforts.³²⁰ As a result (and also as a result of the inevitability of financial change³²¹ and our failure to fully understand human behavior³²²), at least in the foreseeable future, systemic collapses may be inevitable. For that reason, macroprudential regulation should be designed to work not only *ex ante*, to try to prevent systemic collapses, but also *ex post* to try to mitigate the harmful consequences of such collapses.³²³

As discussed, we also may reach a better understanding of systemic risk by bringing legal and economic scholars together and integrating their scholarship. Lawyers can inform economists in numerous ways.³²⁴ A legal perspective also can add value because macroeconomic policies are implemented through legal rules.³²⁵

³¹⁹ Press Release, European Commission, A Comprehensive EU Response to the Financial Crisis: Substantial Progress Toward a Strong Financial Framework for Europe and a Banking Union for the Eurozone, (Mar 28, 2014), http://europa.eu/rapid/press-release_MEMO-14-244_en.htm.

³²⁰ [Key this into the forthcoming CIGI book chapter by Prof. Kathryn Judge & Richard Berner, former head of the OFR.]

³²¹ See *supra* notes 253-254 and accompanying text.

³²² See *supra* notes 249-252 and accompanying text.

³²³ Cf. Anabtawi & Schwarcz, *supra* note 286 (discussing the importance and providing examples of *ex post* macroprudential regulation). Also cf. *supra* notes 251-252 and accompanying text (arguing that financial regulation should be designed to also mitigate the harm of future financial failures made inevitable by our failure to fully understand human behavior).

³²⁴ See *supra* notes 119-130 and accompanying text.

³²⁵ See, e.g., Bruno Meyerhof Salama, *The Art of Law & Macroeconomics*, 74 UNIVERSITY OF PITTSBURGH LAW REVIEW 131, 175 (2012). Cf. Zachary Liscow, *Counter-Cyclical Bankruptcy Law: An Efficiency Argument For Employment-Preserving Bankruptcy Rules*, 116 COLUMBIA LAW REVIEW 1416 (2016) (arguing that bankruptcy law should seek to preserve employment in recessions); Sarah P. Woo, *Micro-Prudence, Macro-Risk: Where Financial Regulation Meets Bankruptcy* (5th Annual Conference on Empirical Legal Studies Paper, 2010), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1639606&download=yes (arguing that certain types of regulation can inadvertently increase systemic risk).

(2) *We Need to Globally Coordinate Regulation.*

As vividly shown by the bankruptcy of Lehman Brothers,³²⁶ the cross-border nature of finance makes it important to globally coordinate macroprudential regulation. Regulators are beginning to strive for cross-border regulatory harmonization. For example, U.S. regulators have been studying a more coordinated regulatory framework for swaps.³²⁷ Also, the Basel Committee on Banking Supervision has proposed new global liquidity standards to “introduce more consistency.”³²⁸

Global coordination is important, but regulators should be cautious to avoid coordination that inadvertently could lead to global correlation of macroprudential rules; such correlation would exacerbate systemic risk by decreasing the flexibility and resilience of the financial system. In our “rapidly changing financial system,” there also is “a very real danger that the wrong rules will be” coordinated.³²⁹

Some argue, for example, that the Basel II capital requirements contributed to the financial crisis by globally correlating faulty rules.³³⁰ Basel II mandated lower capital requirements for MBS than for other types of investments, thereby incentivizing banks

³²⁶ See, e.g., Matthew Jaffe, *Lessons to be Learned One Year After Lehman Brothers Collapse Roiled the World*, ABC NEWS, Sept. 14, 2009, <https://abcnews.go.com/Business/lessons-learned-year-financial-crisis-began/story?id=8563814> (“Lehman’s failure sen[t] shockwaves around the world and spark[ed] a global crisis”).

³²⁷ Cf. Dodd-Frank Act § 719(c) (directing regulators to engage in that study).

³²⁸ Basel Comm. on Banking Supervision, *The Basel Committee’s Response to the Financial Crisis: Report to the G20*, BANK FOR INT’L SETTLEMENTS 5 (Oct. 2015), <https://www.bis.org/publ/bcbs179.pdf>.

³²⁹ RICHARD J. HERRING & ROBERT E. LITAN, FINANCIAL REGULATION IN THE GLOBAL ECONOMY 134–35 (1995); see also Roberta Romano, *For Diversity in the International Regulation of Financial Institutions: Critiquing and Recalibrating the Basel Architecture*, 31 YALE J. ON REG. 1, 5–7 (2014). Cf. Roberta Romano, “Pitfalls of Global Harmonization of Systemic Risk Regulation in a World of Financial Innovation” (Aug. 13, 2018 draft, on file with author) (arguing that the benefits of introducing diversity into international financial regulation would outweigh the costs).

³³⁰ See Romano, *supra* note 329, at 13–20.

worldwide to invest heavily in MBS.³³¹ That not only concentrated investment in, but also increased demand for, MBS.³³²

Regulatory harmonization also, paradoxically, can invalidate existing risk-management strategies that are premised on randomness and independent action.³³³ For example, the value-at-risk (VaR) model presumes that portfolio managers act independently of each other.³³⁴ Incorporating VaR into regulation, however, can incentivize managers to act more uniformly, thereby undermining VaR's utility as a risk-management tool.³³⁵

CONCLUSIONS

Regulators worry that the post-crisis regulation enacted to help stabilize the financial system may be inadequate to prevent another crisis.³³⁶ This Article examines that regulation with the benefit of a decade of hindsight. Although much has been accomplished, much remains to be done. Most of that regulation, for example, is ad hoc and unduly entity-based, largely ignoring markets and other critical elements of the financial system. In accord with the human intuition to assign blame for harm, some of it is even punitive.

The Article argues for a more systematic regulatory framework. The fundamental normative justification for financial regulation is to correct market failures. Regulation intended to stabilize the financial system should thus focus on correcting market failures that could trigger and transmit systemic risk—the risk that financial instability will cause a recession or otherwise significantly impair the real economy. The Article attempts to identify and better understand

³³¹ *Id.* at 13.

³³² *Id.* at 17.

³³³ Charles K. Whitehead, *Destructive Coordination*, 96 CORNELL LAW REVIEW 323, 347 (2011).

³³⁴ *Id.* at 341.

³³⁵ *Id.* at 347–51. *See also* INT'L MONETARY FUND, GLOBAL FINANCIAL STABILITY REPORT: FINANCIAL MARKET TURBULENCE: CAUSES, CONSEQUENCES, AND POLICIES 62 (2007) (finding that having institutions employing the same risk model has destabilizing effects.)

³³⁶ *See supra* notes 73-77 and accompanying text (discussing the widespread concern by regulators in the United States and abroad that they have made little progress in figuring out how they might actually prevent another financial crisis, and that vulnerabilities remain).

those triggers and transmission mechanisms, and their underlying market failures. It then analyzes how regulation could help to correct those market failures.

This analysis reveals important new insights into regulatory design. For example, it shows that incentive-based approaches to try to control complexity, such as the European Union’s “simple, transparent, and standardized” approach, would have greater flexibility and less downside risk than top-down approaches, which can stifle innovation, undermine efficiencies, and potentially increase systemic risk by correlating investments.³³⁷

The analysis also calls into question the current financial regulation that attempts to limit excessive risk-taking by resolving financial firms that are “too big to fail.” Although the media and politicians often tout a too-big-to-fail theory of such risk-taking, no evidence supports that theory. The analysis shows that excessive risk-taking more likely stems from the shareholder-primacy model of corporate governance, which favors shareholder profits and largely ignores systemically harmful externalities. What is “excessive,” in other words, is a matter of perspective. The Article proposes controlling excessive risk-taking by requiring directors of systemically important financial firms to also consider the public consequences of their firm’s actions, thereby engaging the longstanding debate whether corporate governance law should require a duty to the public.³³⁸

Post-financial-crisis regulation also struggles with the short-term funding of long-term projects, known as maturity transformation. Although essential to finance, maturity transformation creates the liquidity risk that cash flows from long-term projects may be insufficient to pay maturing short-term liabilities, leading to a default. Although current regulation limits this risk for some of the largest financial firms, many remain unregulated. Regulators are now trying to address maturity transformation as an essential but risky financial activity.

³³⁷ See *supra* notes 226-231 and accompanying text.

³³⁸ See *supra* notes 255-267 and accompanying text.

The analysis suggests this could be done by innovating on a low-transaction-cost approach used for years in structured finance to control the risk of maturity transformation. Financial firms, just like issuers of short-term structured finance securities, could carefully monitor and try to cover payment of their maturing securities with cash received from their long-term projects and from issuing new short-term securities. Financial firms, again like those issuers, could also enter into “liquidity” facilities with creditworthy banks that obligate the banks to purchase the newly issued securities if the financial firm/issuer remains solvent but, due to market disruptions, it cannot otherwise sell those securities. Because the banks only take the timing risk of a cash-flow mismatch and do not bear any credit risk, these liquidity facilities have been—and as applied to financial firms, should likewise be—low cost and practical.³³⁹

Some readers might disagree with one or more triggers or transmission mechanisms of systemic risk identified by this Article, or their underlying market failures. Some might disagree with the Article’s analysis of how regulation could help to correct those market failures. Notwithstanding any such disagreement, the Article’s methodology should remain important: to try to secure financial stability by identifying market failures that could trigger and transmit systemic risk, and then to analyze how regulation could help to correct those market failures.

³³⁹ See *supra* notes 273-282 and accompanying text.