

Controlling Financial Chaos: The Power and Limits of Law ¹

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I. INTRODUCTION

How can the law help to control financial chaos? By financial chaos, I mean the failure of a chain of financial markets or financial firms, or a chain of significant losses to financial firms, that results in increases in the cost of capital or decreases in its availability.³ The risk that financial chaos will occur is often referred to as systemic risk.⁴

Many regulatory responses to systemic risk, like the Dodd-Frank Act in the United States, consist largely of politically motivated reactions to the 2008 financial crisis, looking for villains (whether or not they exist).⁵ To be most effective, however, the regulation must be situated within a more analytical framework.

To create such a framework, we first need to consider what the scope of systemic risk regulation should be. There has been a great deal of regulatory focus on banks and other financial firms. Some of this is path dependent: historically, a chain of bank failures remains an important symbol of systemic risk. The media and politicians also have focused on financial firms because they are so visible and their problems have been so dramatic.

But we also need to recognize that the ongoing trend towards disintermediation—enabling companies to directly access the ultimate source of funds, the capital markets,

³ Cf. Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193, 204 (2008) (defining systemic risk in these terms).

⁴ *Id.*

⁵ The Dodd-Frank Act delegates much of the regulatory details to administrative rulemaking, in many cases after the relevant government agencies engage in further study. Perhaps even more significantly, the Act creates a Financial Stability Oversight Council, part of whose mission is to monitor and identify potential systemic threats in order to find regulatory gaps. Dodd-Frank Act § 112. The Council will be aided in this task by a newly-created and, hopefully, nonpartisan Office of Financial Research. *Id.* Regulators therefore will have the ability to look beyond the Act's confines.

without going through financial intermediaries—is making financial markets themselves increasingly central to any examination of systemic risk.⁶

For example, although the bankruptcy of Lehman Brothers in 2008 filled the headlines, its trigger was the collapse of the market for mortgage-backed securities. Many of these securities were collateralized in part by risky subprime home mortgages, which were expected to be refinanced through home appreciation. When home prices stopped appreciating, the borrowers could not refinance. In many cases, they defaulted. These defaults caused substantial amounts of investment-grade rated mortgage-backed securities to be downgraded and, in some cases, to default. Investors began losing confidence in these and other rated securities, and their market prices started falling.

Lehman Brothers, which held large amounts of mortgage-backed securities, was particularly exposed. Lehman's counterparties began demanding additional safeguards, which Lehman could not provide. Absent a government bailout, Lehman filed for bankruptcy. That, in turn, caused securities markets to panic; even the short-term commercial paper market virtually shut down, and the market prices of mortgage-backed securities collapsed substantially below the intrinsic value of the mortgage loans backing those securities.⁷ That accelerated the death spiral, causing financial firms holding mortgage-backed securities to appear, if not be, more financially risky; requiring highly leveraged firms to engage in fire-sales of assets (thereby exacerbating the fall in prices); and shutting off credit markets, which impacted the real economy.

This demonstrates that both financial firms and financial markets can, if they fail, be triggers and transmitters of systemic risk. The scope of any regulatory framework for managing systemic risk should therefore include both financial firms and markets.

⁶ *Systemic Risk*, *supra* note 3, at 200.

⁷ Even prior to Lehman's collapse, MBS may have been undervalued in the market. For example, in July 2008 I was an expert in the Orion Finance SIV case in the English High Court of Justice. Orion's mortgage-backed securities had a market value of around 22 cents on the dollar, whereas the present value of its reasonably-expected cash flows was around 88 cents on the dollar because most of the mortgages were prime.

Before attempting to design such a regulatory framework, we need to examine what the framework's goals should be. The primary goal for regulating financial risk is micro-prudential: maximizing economic efficiency within the financial system. Systemic risk is a form of financial risk, so efficiency should certainly be a goal in its regulation. But systemic risk also represents risk to the financial system itself. Any framework for regulating systemic risk therefore should also include that macro-prudential goal: protecting the financial system itself.⁸

II. MAXIMIZING ECONOMIC EFFICIENCY WITHIN THE FINANCIAL SYSTEM

Financial regulation can help to maximize economic efficiency by correcting market failures. As discussed below, at least four types of partly interrelated market failures occur within the financial system: information failure, rationality failure, principal-agent failure, and incentive failure.

A. Correcting Information Failure

Complexity is the main cause of financial information failure.⁹ Financial markets and products are already incredibly complex, and that complexity is certain to increase. Profit opportunities are inherent in complexity, due in part to investor demand for securities that more precisely match their risk and reward preferences. Regulatory arbitrage increases complexity as market participants take advantage of inconsistent

⁸ For a critical discussion of the rationale of financial regulation, see EMILIOS AVGOULEAS, *GOVERNANCE OF GLOBAL FINANCIAL MARKETS: THE LAW, THE ECONOMICS, THE POLITICS* (2012).

⁹ See generally Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASHINGTON UNIVERSITY LAW REVIEW 211 (2009/2010). Information failure can arise from other causes as well, including the potential for transaction costs relating to information acquisition to diminish the value of new information (and thus the incentive to acquire such information). Sanford J. Grossman & Joseph E. Stiglitz, *On the Impossibility of Informationally Efficient Markets*, 70 AM. ECON. REV. 393 (June 1980).

regulatory regimes both within and across national borders. And new technologies continue to add complexity not only to financial products but also to financial markets.¹⁰

Complexity has been undermining disclosure, which has been the chief regulatory response to financial information failure.¹¹ Although most, if not all, of the risks on complex mortgage-backed securities were disclosed prior to the 2008 financial crisis, many institutional investors—including even the largest, most sophisticated, firms—bought these securities without fully understanding them.¹²

The Dodd-Frank Act puts great stock in the idea of improving disclosure,¹³ but its efficacy will be limited. Some financial structures are getting so complex that they are incomprehensible.¹⁴ Furthermore, it may well be rational for an investor to invest in high-

¹⁰ I have argued that there are two aspects to complexity: cognitive complexity, meaning that things are too complicated and non-linear to understand; and temporal complexity, meaning that systems work too quickly and interactively to control. *Regulating Complexity in Financial Markets*, *supra* note 9, at 214-15. Engineers sometimes refer to temporal complexity as tight coupling. *Id.*

¹¹ *See, e.g.*, Cynthia A. Williams, *The Securities and Exchange Commission and Corporate Social Transparency*, 112 HARVARD LAW REVIEW 1197, 1209-35 (1999) (discussing the general purpose of disclosure in the Exchange Act and the Securities Act).

¹² *See* Steven L. Schwarcz, *Disclosure's Failure in the Subprime Mortgage Crisis*, 2008 UTAH LAW REVIEW 1109, 1110 (2008). *Cf.* 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).

¹³ *See, e.g.*, Dodd-Frank Wall Street Reform and Consumer Protection Act, Pub. L. No. 111-203 (2010), § 1103 (requiring additional disclosure); § 942(b) (requiring issuers of asset-backed securities to disclose information on the assets backing each tranche of security); § 945 (requiring the SEC to issue rules requiring issuers of asset-backed securities to disclose the nature of the underlying assets); § 951 (requiring persons who make solicitations for the sale of all or substantially all of a corporation's assets to disclose their compensation arrangements to shareholders).

¹⁴ *See, e.g.*, Lee C. Buchheit, *Did We Make Things Too Complicated?*, 27 INT'L FIN. L. REV. 24, 24 (2008) (U.K.); David Barboza, *Complex El Paso Partnerships Puzzle Analysts*, N.Y. TIMES, July 23, 2002, at C1 (discussing that "one industry giant, the El Paso Corporation, is growing ever more reliant on deals [using off-balance sheet partnerships] so complex that securities experts call them incomprehensible"). It appears hyperbolic to say that structures created by humans cannot be understood by humans. The

yielding complex securities without fully understanding them. Among other reasons,¹⁵ the investor simply may not have the staffing to evaluate the securities, whereas failure to invest would appear to—and in fact could—competitively prejudice the investor vis-à-vis others who invest.

This begs the question whether institutional investors will hire experts as needed to decipher complex deals. The evidence suggests they do not always do so, and theory explains why. Although experts may be hired to the extent that their costs do not exceed the benefits gained from more fully understanding the complexity, at some level of complexity those costs will exceed—or at least appear to exceed—any potential gain. This is because the cost of hiring experts is tangible, whereas the benefit gained from fully understanding complex transactions is intangible and harder to quantify—especially since constantly innovating markets cause rapid informational obsolescence. Managers attempting a cost-benefit analysis may well give greater weight to the tangible cost and less credence to any intangible benefit. The more complex the transaction, the higher the costs, and thus the more likely it is that the cost-benefit balance will be out of equilibrium.¹⁶

Information failure not only undermines investor disclosure. It also undermines the ability of regulators themselves to keep up with the financial industry, and indeed regulators have extreme difficulty keeping up with financial innovation.¹⁷

larger problem may be that relatively few people can understand the structures and that many structures may not be able to be understood by any single person.

¹⁵ For a comprehensive review of these reasons, see *Disclosure's Failure in the Subprime Mortgage Crisis*, *supra* note 12, at 1113-15.

¹⁶ The analysis above is taken from *Disclosure's Failure in the Subprime Mortgage Crisis*, *id.*

¹⁷ See, e.g., Dan Awrey, "Complexity, Innovation and the Regulation of Modern Financial Markets," at 37-51 (Univ. of Oxford Legal Research Paper Series, Paper No. 49/2011, Sept. 2011), available at <http://www.ssrn.com/abstract=1916649> (discussing the relationship between complexity and financial innovation in the regulation of OTC derivatives).

A possible way to address information failure resulting from complexity would be to require investments and other financial products to become more standardized. One of the goals of the Dodd-Frank Act, for example, is to standardize more derivatives transactions. To this end, the Act requires many derivatives to be cleared through clearinghouses,¹⁸ which generally require a high degree of standardization in the derivatives they clear.¹⁹

But standardization can backfire. Dodd-Frank's clearinghouse requirement might inadvertently increase systemic risk by concentrating derivatives exposure at the clearinghouse level.²⁰ And the overall economic impact of standardization is unclear because standardization can stifle innovation and interfere with the ability of parties to achieve the efficiencies that arise when firms craft financial products tailored to the particular needs and risk preferences of investors.

Dodd-Frank also attempts to address information failure by requiring sellers of securitization products to retain a minimum unhedged position in each class of securities they sell—the so-called “skin in the game.”²¹ This too can backfire. By retaining residual risk portions of certain complex securitization products they were selling, underwriters may actually have fostered false investor confidence, contributing to the 2008 financial crisis. Complexity, in other words, not only can cause information asymmetry but also mutual misinformation.²²

¹⁸ Dodd-Frank Act sec. 723(a), § 2.

¹⁹ This can become a little circular, though, because Dodd-Frank includes an exception for derivatives that a clearinghouse will not accept for clearing. Dodd-Frank Act sec. 723(a), § 2(h)(3).

²⁰ Iman Anabtawi & Steven L. Schwarcz, *Regulating Systemic Risk: Towards an Analytical Framework*, 86 NOTRE DAME LAW REVIEW 1349, 1395 (2011) (observing that “central clearing merely shifts counterparty risk to a clearinghouse, reducing that risk only to the extent that clearinghouses can manage risk better or are more creditworthy than individual firms”).

²¹ See Dodd-Frank Act sec. 941, § 15G (directing the SEC to require sponsors of asset-backed securities to retain at least five percent of the credit risk of the underlying assets).

²² See *Regulating Complexity in Financial Markets*, *supra* note 9, at 241-42 (discussing mutual misinformation).

In a world of complexity, disclosure will not always be sufficient to correct information failure. Moreover, even perfect disclosure would be insufficient to mitigate information failures that cause systemic risk. Individual market participants who fully understand the risk will be motivated to protect themselves but not necessarily the financial system as a whole. A market participant may well decide to engage in a profitable transaction even though doing so could increase systemic risk, since much of the harm from a possible systemic collapse would be externalized onto other market participants as well as onto ordinary citizens impacted by an economic collapse.²³

There are, therefore, no complete solutions to the problem of financial information failure.

B. Correcting Rationality Failure

Even in financial markets, humans have bounded rationality—a type of information failure, but one distinct and important enough to merit a separate category. Investors are complacent, following the herd in their investment choices and over-relying on heuristics, such as rating-agency ratings.²⁴ And market participants are also prone to panic.²⁵

²³ See *Systemic Risk*, *supra* note 3, at 206 (explaining this concept and describing it as a type of “tragedy of the commons”). It is a tragedy of the commons insofar as market participants suffer from the actions of other market participants; it is a more standard externality insofar as non-market participants suffer from the actions of market participants.

²⁴ Steven L. Schwarcz, *Protecting Financial Markets: Lessons from the Subprime Mortgage Meltdown*, 93 MINNESOTA LAW REVIEW 373, 379-83 & 404-05 (2008).

²⁵ For a thoughtful analysis of how rationality failures help to explain the 2008 financial crisis, see 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 (2010). One of the causes of the financial crisis may have been intellectual hazard, “the tendency of behavioral biases to interfere with accurate thought and analysis within complex organizations.” *Id.* at 808. Some examples of behavioral biases include complexity bias, the tendency to analyze a situation wrongly because of inadequate ability to interpret complex information; incentive bias, the tendency to see the world in accordance with their own self-interest; and asymmetry bias, the tendency to rely on pre-formed and fixed ideas, judgments, or attitudes. *Id.* at 813-818. During the financial crisis, actors in complex organizations enabled the spread of systemic risk by

Dodd-Frank attempts to fix a sliver of this problem by attempting to improve rating-agency ratings.²⁶ But the greater regulatory hurdle is that human nature cannot be easily changed. It is unclear—and Dodd-Frank does not address—how complacency, for example, can be remedied. And although panics are often the triggers that commence a chain of systemic failures, it is impossible to identify all the causes of panics that can trigger systemic risk.

C. Correcting Principal-Agent Failure

Scholars have long studied inefficiencies resulting from conflicts of interest between managers and owners of firms. The Dodd-Frank Act attempts to fix this traditional type of conflict. It ignores, however, a much more insidious principal-agent failure: the intra-firm problem of secondary-management conflicts.²⁷ The nub of the problem is that secondary managers are almost always paid under short-term compensation schemes, misaligning their interests with the long-term interests of the firm.

Complexity exacerbates this problem by increasing information asymmetry between technically sophisticated secondary managers and the senior managers to whom they report. For example, as the VaR, or value-at-risk, model for measuring investment-portfolio risk became more accepted, financial firms began compensating secondary managers not only for generating profits but also for generating profits with low risks, as measured by VaR.²⁸ 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.

failing to properly acquire, process, transmit, and implement key risk-related information. *Id.* at 810.

²⁶ Dodd-Frank Act §§ 931-939H.

²⁷ See Steven L. Schwarcz, *Conflicts and Financial Collapse: The Problem of Secondary-Management Agency Costs*, 26 YALE J. ON REG. 457 (2009).

²⁸ See, e.g., PHILIPPE JORION, VALUE AT RISK: THE NEW BENCHMARK FOR MANAGING FINANCIAL RISK 568 (3d ed. 2006).

In theory, firms can solve this principal-agent failure by paying managers, including secondary managers, under longer-term compensation schemes—e.g., compensation subject to clawbacks or deferred compensation based on long-term results.²⁹ In practice, however, that solution would confront a collective action problem: firms that offer their secondary managers longer-term compensation might not be able to hire as competitively as firms that offer more immediate compensation.³⁰ Regulation may be needed to help solve this collective action problem not only within nations but also across nations,³¹ because good secondary managers can work in financial centers worldwide.

D. Correcting Incentive Failure

Risk dispersion can create benefits, such as investment diversification and more efficient allocation of risk. But risk can be marginalized, becoming so widely dispersed that rational market participants individually lack the incentive to monitor it.³² This problem is not unlike the tragedy of the *anticommons* in property law; where too many

²⁹ It appears that at least two financial firms, Goldman Sachs and Morgan Stanley, are beginning to implement this type of compensation policy. *See* Liz Moyer, *On ‘Bleak’ Street, Bosses in Cross Hairs*, WALL ST. J., Feb. 8, 2012 (reporting that these firms “would seek to recover pay from any employee whose actions expose the firms to substantial financial or legal repercussions”).

³⁰ *See, e.g.*, Kimberly D. Krawiec, *The Return of the Rogue*, 51 ARIZ. L. REV. 127, 157-58 (2009) (arguing that financial firms have had trouble balancing the discouragement of excessive risk-taking against the need to create profit-maximizing incentives and preferences).

³¹ The Basel capital accords exemplify global rules intended to help avoid prejudicing the competitiveness of firms—in this case, banks—in any given nation or region. *See, e.g.*, Clyde Stoltenberg et al., *The Past Decade of Regulatory Change in the U.S. and EU Capital Market Regimes: An Evolution from National Interests toward International Harmonization with Emerging G-20 Leadership*, 29 BERKELEY J. INT’L L. 577, 615-44 (2011) (examining U.S. and E.U. efforts to adopt harmonized financial standards); Arie C. Eernisse, *Banking on Cooperation: The Role of the G-20 in Improving the International Financial Architecture*, 22 DUKE J. COMP. & INT’L L. 239, 254-56 (2012) (discussing the Basel III capital and liquidity framework and its emphasis on consistent global standards).

³² *See* Steven L. Schwarcz, *Marginalizing Risk*, 89 WASHINGTON UNIVERSITY LAW REVIEW issue no. 3 (forthcoming 2012), available at <http://ssrn.com/abstract=1721606>.

owners have rights to exclude others from a scarce resource, no individual owner has an effective privilege of use and the resource becomes prone to underuse.³³ In a financial market context, where too many owners (e.g., investors) have rights in a scarce resource (a class of securities), no single investor will have a sufficient amount at risk to individually motivate monitoring. Undermonitoring caused by this incentive failure appears to have contributed, at least in part, to the 2008 financial crisis.³⁴

The problem of incentive failure is difficult to solve. Although regulation could require—perhaps for certain large issuances of complex securities—that a minimum unhedged position be held by a single sophisticated investor in each class of securities,³⁵ regulatory attempts to limit risk dispersion would have tradeoffs: increasing the potential for regulatory arbitrage, impairing the ability of parties to achieve negotiated market efficiencies, and possibly even increasing financial instability.³⁶

³³ See Michael Heller, *The Tragedy of the Anticommons*, 111 HARVARD LAW REVIEW 621 (1998). The tragedy of the anticommons is not a perfect analogy because it occurs when too many owners have the right to exclude others from a scarce resource, whereas marginalization of risk (and its resulting undermonitoring) does not necessarily involve excluding others. Perhaps a more apt analogy for undermonitoring caused by marginalization of risk is the collective action problem of “rational apathy.” See, e.g., Julian Velasco, *Taking Shareholder Rights Seriously*, 41 U.C. DAVIS L. REV. 605, 622-25 (2007) (discussing that problem).

³⁴ Cf. Jean-Claude Trichet, President of the European Central Bank, Speech before the Fifth ECB Central Banking Conference (Nov. 13, 2008) (arguing that ‘the root cause of the [financial] crisis was the overall and massive undervaluation of risk across markets, financial institutions and countries’); Joe Nocera, *Risk Mismanagement*, N.Y. TIMES, Jan. 4, 2009, § 6 (Magazine).

³⁵ For a discussion of this type of regulation, see *Marginalizing Risk*, *supra* note 32. Securitization sellers are required by the Dodd-Frank Act to keep “skin in the game” by retaining risk in the form of at least a 5% unhedged vertical slice of risk. Problematically, such retention would only mitigate conflicts between the parties retaining and those taking on the risk, not between financial market participants and the non-financial market participants who bear the burden of externalized risk in a systemic collapse of the financial system. *Id.* Cf. Kevin Villani, *Risk-Retention Rules Set Up the Private Investor for Failure*, AM. BANKER (Aug. 29, 2011), <http://www.americanbanker.com/bankthink/QRM-qualifying-residential-mortgage-risk-retention-housing-private-investor-1041645-1.html> (arguing that lack of “skin in the game” was not responsible for financial firms’ “astronomical leverage”).

³⁶ *Marginalizing Risk*, *supra* note 32. Risk dispersion can create benefits such as reducing the asymmetry in market information and more efficiently allocating risks. This is

E. Summary

The first goal of any regulatory framework for managing systemic risk is maximizing economic efficiency within the financial system, and there are at least four types of market failures that impair efficiency. Information failure is primarily caused by complexity, for which there are no perfect solutions. Rationality failure is difficult, if not virtually impossible, to correct because human nature cannot be easily changed. Principal-agent failure can theoretically be addressed by paying managers—including secondary managers—under longer-term compensation schemes; but in practice that solution must overcome collective action problems, both within and across national borders. And the problem of incentive failure has only second-best solutions. Regulation therefore cannot completely prevent market failures within the financial system.³⁷

Next consider the second goal of any regulatory framework for managing systemic risk—protecting the financial system itself. In that context, I will show, among other things, that uncorrected market failures not only can impair efficiency within the financial system but also can contribute to a breakdown of the financial system.

III. PROTECTING THE FINANCIAL SYSTEM ITSELF

accomplished by shifting risk on financial assets to investors and other market participants who are better able to assess risk. Risk dispersion can, however, also create market failures that cause market participants to misjudge or ignore potential correlations. A prime example is investors' mistaken belief that asset-backed securities provided an investment market that was uncorrelated with traditional debt markets. To investors' surprise, when ABS investments backed by subprime mortgage loans began defaulting, so did other ABS investments backed by other types of assets. *Id.*

³⁷ In other contexts, I have summarized these markets failures more intuitively as the “3Cs” of complexity, conflicts, and complacency—complexity corresponding to information failure and incentive failure; conflicts corresponding to principal-agent failure; and complacency corresponding to rationality failure. *See, e.g.*, Steven L. Schwarcz, *Understanding the Subprime Financial Crisis*, 60 SOUTH CAROLINA LAW REVIEW 549 (2009) (first suggesting the 3Cs categorization). Combined with the tragedy of the commons (*see infra* note 58), these failures collectively can be referred to as the 3Cs and the TOC.

There are at least three ways that regulation could protect the financial system itself. First, regulation could attempt to limit the triggers of systemic risk. Second, regulation could attempt to limit the transmission of systemic shocks. Third, regulation could attempt to stabilize the financial system when afflicted by systemic shocks.

A. Limiting the Triggers of Systemic Risk

Ideal regulation would act *ex ante*, eliminating the triggers of systemic risk.³⁸ Realistically, however, we cannot eliminate those triggers. As mentioned, although panics are often the triggers that commence a chain of systemic failures, it is impossible even to identify all the causes of panics.

To some extent also, the market failures discussed³⁹ could trigger panics or other systemic shocks. For example, information failure, principal-agent failure, and incentive failure could, individually or in combination, cause one or more large firms to overinvest, leading to bankruptcy; and rationality failure could cause prices of securities in a large financial market to collapse. As shown, these market failures cannot be completely corrected.

Furthermore, market realities can increase the magnitude of these shocks. For example, credit markets often provide short-term funding of long-term capital needs because the interest rate on short-term debt is usually lower than that on long-term debt.⁴⁰ This can create the financial market equivalent of bank runs if, due to investor anxiety, firms are unable to roll over, or refinance, their short-term debt.⁴¹

³⁸ Cf. Steven L. Schwarcz, Keynote Address: *Ex Ante Versus Ex Post Approaches to Financial Regulation*, 15 CHAPMAN LAW REVIEW 257, 258 (2011) (observing that “[o]nce a failure occurs, there may already be economic damage, and it may be difficult to stop the failure from spreading and becoming systemic”).

³⁹ See *supra* Part II.

⁴⁰ Short-term debt is less risky—and therefore bears a lower interest rate—than long-term debt, other things being equal, because it is easier to assess an obligor’s ability to repay in the short term than in the long term.

⁴¹ Gary Gorton & Andrew Metrick argue, for example, that the precipitous 2008 decline in value of mortgage-backed securities used as collateral for short-term repo loans prompted repo lenders to demand additional collateral. Gary Gorton & Andrew Metrick,

It is inevitable, therefore, that the financial system will face systemic shocks from time to time. Consider next how to limit the transmission of these shocks.

B. Limiting the Transmission of Systemic Shocks

Second-best regulation could act ex post, after a systemic shock is triggered, by limiting the transmission of the shock—i.e., limiting its contagion. This approach takes inspiration from chaos theory, which holds that in complex engineering systems—and, I have argued, also in complex financial systems—failures are almost inevitable.⁴² Therefore remedies should focus on breaking the transmission of these failures.⁴³

To break the transmission of systemic failures would require that the transmission mechanisms all be identifiable. It probably is not feasible, though, to identify all those mechanisms in advance. Nonetheless, based on a study of four financial crises in the past century, Professor Iman Anabtawi of UCLA and I have attempted to describe at least one such transmission mechanism.⁴⁴

Regulating the Shadow Banking System, at 15 (2010), available at SSRN: <http://ssrn.com/abstract=1676947>. They contend that these demands approximated bank runs—in which panicked depositors withdraw funds from their banks—to the extent bank repo-borrowers were forced to sell assets to generate the additional collateral. *Id.* They also argue that these demands were caused primarily by opacity about the exposure of different borrowers to the flagging real estate market and the value of borrowers' collateral in the event of defaults. Gary Gorton & Andrew Metrick, *Securitized Banking and the Run on Repo*, 2012 J. FIN. ECON. 1, 23 (forthcoming 2012). Insofar as that opacity resulted from complexity, Gordon and Metrick's argument supports my observation that complexity, one of the four market failures discussed, can trigger panics or other systemic shocks.

⁴² See *Regulating Complexity in Financial Markets*, *supra* note 9, at 248-49. One aspect of chaos theory is deterministic chaos in dynamic systems, which recognizes that the more complex the system, the more likely it is that failures will occur. Thus, the most successful (complex) systems are those in which the consequences of failures are limited. In engineering design, for example, this can be done by decoupling systems through modularity that helps to reduce a chance that a failure in one part of the system will systemically trigger a failure in another part.

⁴³ *Id.*

⁴⁴ Anabtawi & Schwarcz, *supra* note 20.

We argue that two otherwise independent correlations can combine to transmit localized economic shocks into broader systemic crises. The first is an intra-firm correlation between a firm's financial integrity and its exposure to risk from low-probability adverse events that either constitute or could lead to economic shocks. The second is a system-wide correlation among financial firms and markets.

The 2008 financial crisis, for example, almost certainly was caused, or at least made worse, by the two correlations working in combination. Subprime mortgage loans were bundled together as collateral to partially support the payment of complex mortgage-backed securities that were sold to banks and other financial firms worldwide.⁴⁵ When home prices began falling, some of these mortgage-backed securities began defaulting, requiring financial firms heavily invested in these securities to write down their value, causing these firms to appear, if not be, more financially risky.⁴⁶ This represented a failure of these firms to see, or at least to fully appreciate, the intra-firm correlation between low-probability risk—in this case, the risk that home prices would significantly fall—and firm integrity.⁴⁷

⁴⁵ To some extent, the U.S. government itself pressured banks and other mortgage lenders to make and securitize subprime mortgage loans, in order to expand homeownership. *See, e.g.*, PETER J. WALLISON, *THE LOST CAUSE: THE FAILURE OF THE FINANCIAL CRISIS INQUIRY COMMISSION* (2011), <http://www.aei.org/docLib/FSO-2011-02-g.pdf>. Misguided government policy can certainly contribute to systemic risk. *See, e.g.*, e-mail from Charles Calomiris, Henry Kaufman Professor of Financial Institutions, Columbia University Graduate School of Business, to the author (Oct. 13, 2011) (observing that “[g]overnment policy is the main contributor to systemic risk, not just in the recent crisis, but more generally”).

⁴⁶ *See supra* note 7 and accompanying text.

⁴⁷ The problem of assessing the risk of low-probability adverse events is especially acute during periods in which there have been no major adverse economic shocks. Recent stability then allays fears of adverse occurrences, and market participants begin to view the recent event-data as following a normal distribution, in which observations that deviate dramatically from the mean lie in the distribution's thin tails. In reality, however, longer-term data may reveal a distribution of outcomes with higher kurtosis, or “fat tails,” so that the true risk of extreme events is far greater than it is under a normal distribution. Market participants may also underestimate mundane low-probability events. Unusual events, such as a large meteor hitting the earth, are highly salient, whereas more mundane events, such as changes in collateral value, are commonplace, possibly existing on a continuum. The very familiarity with collateral of individuals working in the financial

The 2008 financial crisis also involved a failure to see system-wide correlations—*not only* the tight interconnectedness among banks and non-bank financial firms *but also* the tight interconnectedness between financial firms and markets.⁴⁸ What made the financial crisis so devastating was that these failures combined to facilitate the transmission of economic shocks.

Regulation should try to increase awareness of these types of correlations and limit their potential to combine. Prof. Anabtawi and I have shown, however, that the same types of market failures that impair efficiency—which, this essay has just demonstrated, cannot be completely prevented by regulation⁴⁹—make it unlikely that financial market participants will use sufficient effort to either identify the correlations or attempt to prevent their combining.⁵⁰ Furthermore, we have identified only one of potentially many transmission mechanisms for systemic failure.⁵¹ We therefore need to turn to ways to stabilize the financial system that go beyond limiting the transmission of systemic shocks.

C. Stabilizing the Afflicted Financial System

Regulation could also work *ex post* even after a systemic shock has been triggered and is being transmitted. The regulation would then attempt to stabilize the afflicted

sector might have led them to underestimate the potential consequences of a drop in collateral prices. *See* Anabtawi & Schwarcz, *supra* note 20.

⁴⁸ The tight interconnectedness described above also can have a temporal component insofar as the connections, being interactive, work too quickly to control. *See supra* note 10.

⁴⁹ *See supra* note 37 and accompanying text.

⁵⁰ Information and incentive failure, for example, can cause failures to identify or fully appreciate both correlations: between low-probability risk and firm integrity, and among financial firms and markets. Rationality failure can also foster failures to identify or fully appreciate the first correlation: between low-probability risk and firm integrity. And principal-agent failure can result in a failure to identify or fully appreciate the first correlation: between low-probability risk and firm integrity. *See* Anabtawi & Schwarcz, *supra* note 20.

⁵¹ *Cf. supra* note 45 (noting that misguided government policy can contribute to systemic risk). Being driven by short-term political decisions and other non-economic factors, government policy will always be a risk factor.

financial system. This could be done by trying to stabilize systemically important firms and financial markets impacted by the transmission.⁵² This approach again takes inspiration from chaos theory, insofar as that theory holds that remedies should also focus on limiting the consequences of failures.⁵³

There are at least two ways that regulation could stabilize systemically important firms and financial markets: by ensuring liquidity to those firms and markets, and by requiring those firms and markets to be more internally robust.

1. *Ensuring Liquidity to Firms and Markets.* Liquidity has traditionally been used, especially by government central banks, to help prevent financial firms from defaulting. The U.S. Federal Reserve Bank, for example, has had this role of lender of last resort to banks.⁵⁴ And the European Commission is in the process of attempting to help recapitalize European banks that are exposed to sovereign-debt risk.

Ensuring liquidity to stabilize systemically important firms would follow this pattern, except that the source of the liquidity could at least be partly privatized by taxing those firms to create a systemic risk fund.⁵⁵ There is strong precedent for requiring the private sector to contribute to funds that would help to internalize externalities. The Federal Deposit Insurance Corporation, for example, requires member banks to

⁵² To the extent regulation stabilizes a systemically important firm that otherwise would be failing due to endogenous or non-systemic exogenous causes, the regulation could also be viewed as an ex ante solution.

⁵³ See *supra* note 42 and accompanying text.

⁵⁴ Federal Reserve Act of 1913 § 13(3), 12 U.S.C. § 343 (2010).

⁵⁵ Although it is possible that the financial industry itself might voluntarily create and contribute to such a fund, I believe that is highly unlikely. Because systemic financial externalities are imposed on parties outside the financial industry, the industry, qua industry, would not necessarily have an incentive to do that. See *supra* notes 22-23 and accompanying text. Moreover, even if there were incentive, the financial industry may be too fragmented and heterogeneous to efficiently self-coordinate. See Saule T. Omarova, *Wall Street as Community of Fate: Toward Financial Industry Self-Regulation*, 159 U. PA. L. REV. 411, 420 (2011) (observing “regulatory fragmentation and heterogeneity of interests throughout the [financial] industry” as well as “the lack of a ‘community of fate’ mentality”).

contribute to a Deposit Insurance Fund to ensure that depositors of failed banks are repaid.⁵⁶ In the nuclear industry, the Price-Anderson Act requires a first tier funding of \$375 million by each owner of a nuclear reactor, to compensate for possible reactor accidents. The Act also requires a \$11.6 billion self-insurance fund, funded collectively by all owners of nuclear reactors.⁵⁷

In the systemic risk context, privatizing the source of liquidity would likewise help to internalize externalities by addressing the dilemma that market participants are economically motivated to create externalities that could have systemic consequences.⁵⁸ Privatization would not only offset the cost to taxpayers of liquidity advances that are not repaid but also, if structured appropriately,⁵⁹ should discourage fund contributors—including those that believe they are “too big to fail”—from engaging in financially risky activities.

Perversely, the Dodd-Frank Act undercuts liquidity by sharply limiting the power of the Federal Reserve to make emergency loans to individual or insolvent financial firms.⁶⁰ That categorical limitation appears somewhat excessive, if not dangerous; a

⁵⁶ See *infra* note 59.

⁵⁷ U.S. NUCLEAR REG. COMM’N, *Fact Sheet on Nuclear Insurance and Disaster Relief Funds*, <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/funds-fs.html> (last updated June 9, 2011).

⁵⁸ Cf. *supra* notes 22-23 and accompanying text.

⁵⁹ For example, required contributions could be sized as a function, among other factors, of the contributor’s financially risky activities. This essay does not, however, purport to set formulas for required contributions, other than observing that there is precedent for sizing required private sector contributions on risk. The Federal Deposit Insurance Corporation, for example, assesses risk-based premiums on its member banks. FED. DEPOSIT INS. CORP., *Capital Groups and Supervisory Groups*, http://www.fdic.gov/deposit/insurance/risk/rpps_ovr.html (last updated July 13, 2007) (stating that member banks are assessed based on the risk they pose to the Deposit Insurance Fund). Assessment rates for member banks in 2011 ranged from 2.5 cents to 45 cents on every \$100 of assessable deposits. FED. DEPOSIT INS. CORP., *Deposit Insurance Assessments*, <http://www.fdic.gov/deposit/insurance/assessments/proposed.html> (last updated May 24, 2011). For more information on FDIC assessments, see 12 C.F.R. pt. 327, available at <http://www.fdic.gov/regulations/laws/rules/2000-5000.html#fdic2000part327.10>.

⁶⁰ Dodd-Frank Act § 1101.

lender of last resort can be an important safeguard if it acts judiciously. Even more perversely, the idea of a systemic risk fund was originally included in the bill that would become the Dodd-Frank Act but was taken out before enactment because of opposition by politicians who believed that the fund would increase moral hazard by institutionalizing bailouts.⁶¹ I believe that belief is misguided. The likelihood that systemically important firms will have to make additional contributions to the fund to replenish bailout monies should motivate those firms to monitor each other and help control each other's risky behavior.⁶² Because their own funds would be at risk, for example, fund contributors would have incentives to inform regulators when other firms take unwise risks.⁶³ If the required contributions to the fund are risk-adjusted, fund contributors would also have incentives to report firms that are underpaying.⁶⁴

The European Commission apparently has been considering the idea of a systemic risk fund in connection with its proposal to tax the financial sector.⁶⁵ Although the ultimate use of the tax revenues is currently unresolved,⁶⁶ news reports indicate that an originally contemplated use was a systemic risk fund.⁶⁷ The IMF also appears to be using the European Commission tax proposal as a platform to announce that “new taxes on banks [are] needed to provide an insurance fund for future financial meltdowns and to

⁶¹ S. Amdt. 3827, 111th Cong. (2010) (eliminating the proposed \$50 billion dollar fund, financed by a tax on banks, that would help wind down failed financial companies).

⁶² *Marginalizing Risk*, *supra* note 32.

⁶³ Jeffrey N. Gordon & Christopher Muller, *Confronting Financial Crisis: Dodd-Frank's Dangers and the Case for a Systemic Emergency Insurance Fund*, 28 YALE J. ON REG. 151, 156 (2011) (calling for a systemic emergency insurance fund that is funded by the financial industry).

⁶⁴ *Id.*

⁶⁵ European Commission, *Taxation of the Financial Sector*, a Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: (Brussels COM (2010) 549/5; SEC (2010) 1166). *See also* European Draft Directive on a Common System of Financial Tax (Sept. 28, 2011), available at http://ec.europa.eu/taxation_customs/taxation/other_taxes/financial_sector/index_en.htm.

⁶⁶ *Id.* (indicating that one of the possible uses of the tax would be to provide a source of funds for the EU).

⁶⁷ *Commission Proposes a Bank Tax to Cover the Costs of Winding Down Banks that Go Bust* (May 26, 2010), available at http://ec.europa.eu/news/economy/100526_en.htm (last visited Mar. 1, 2011).

curb excessive risktaking.”⁶⁸ Ideally, any tax on the financial sector should be global to avoid prejudicing the competitiveness of firms located in particular taxing jurisdictions.⁶⁹

Besides stabilizing systemically important firms, it is important to remember that financial markets, too, can be triggers and transmitters of systemic risk. Liquidity can also be used to stabilize systemically important financial markets.⁷⁰ For example, in response to the post-Lehman collapse of the commercial paper market, the Federal Reserve created the Commercial Paper Funding Facility (“CPFF”) to act as a lender of last resort for that market, with the goal of addressing “temporary liquidity distortions” by purchasing commercial paper from highly rated issuers that could not otherwise sell their paper.⁷¹ The CPFF apparently helped to stabilize the commercial paper market.⁷² This is different from quantitative easing, in which a central bank purchases securities as

⁶⁸ Larry Elliott & Jill Treanor, *IMF: Supervise and Tax Banks or Risk Crisis*, THE GUARDIAN, Oct. 8, 2010, at 25 (London-final ed.) (paraphrasing an announcement by the IMF’s then-Managing Director Dominique Strauss-Kahn). Previously, the IMF issued a report in response to a G-20 request, detailing “how the financial sector could make a fair and substantial contribution toward paying for any burden associated with government interventions to repair the banking system.” International Monetary Fund, *A Fair and Substantial Contribution by the Financial Sector: Final Report for the G-20*, at 4 (June 2010), <http://www.imf.org/external/np/g20/pdf/062710b.pdf>.

⁶⁹ The European Commission has recognized this in connection with its proposal to impose a tax on the financial sector. Cf. Clients & Friends Memorandum from Cadwalader, Wickersham & Taft LLP, *Proposals for a European Union Financial Transactions Tax*, at 10 (Oct. 26, 2011), http://www.cadwalader.com/assets/client_friend/102511_-_EU_FTT.pdf (noting that unless all key financial jurisdictions are included in a financial transaction tax, investors will be tempted to “relocate” their financial transactions).

⁷⁰ This was first proposed in *Systemic Risk*, *supra* note 3, at 225-30.

⁷¹ See Tobias Adrian, Karin Kimbrough, & Dina Marchioni, *The Federal Reserve’s Commercial Paper Funding Facility*, FED. RESERVE BANK OF N.Y. STAFF REPORT NO. 423 (April 1, 2010).

⁷² *Id.* at 11 (concluding that “[t]he CPFF indeed had a stabilizing effect on the commercial paper market”).

a form of monetary policy.⁷³ The task of a market liquidity provider of last resort would be more targeted: to prevent specific financial market collapses due to panic.⁷⁴

To illustrate how this approach can be applied more broadly, consider the following example. The intrinsic value—effectively the present value of the expected value of the underlying cash flows—of a type of mortgage-backed security is estimated to be in the range of 80 cents on the dollar. If, due to panic, the market price of those securities had fallen significantly below that number, say, to 20 cents on the dollar, the market liquidity provider could purchase these securities at, say, 60 cents on the dollar, thereby stabilizing the market and still making a profit. To induce a holder of the mortgage-backed securities to sell at that price, the market liquidity provider could, for example, agree to pay a higher “deferred purchase price” if the securities turn out to be worth more than expected.⁷⁵ This is just one (simplified) example of the flexible pricing approaches used in structured financing transactions to buy financial assets of uncertain value which could be adapted to a market liquidity provider’s purchases.⁷⁶

⁷³ The U.S. Federal Reserve, for example, has been engaging in quantitative easing programs, purchasing U.S. Treasury securities in order to hold down long-term interest rates.

⁷⁴ One might ask why, if a market liquidity provider of last resort can invest at a deep discount to stabilize markets and still make money, private investors would not also do so, thereby eliminating the need for some sort of governmental market liquidity provider. One answer is that individuals at investing firms will not want to jeopardize their reputations (and jobs) by causing their firms to invest at a time when other investors have abandoned the market. Another answer is that private investors usually want to buy and sell securities, without having to wait for their maturities; whereas a market liquidity provider of last resort should be able to wait until maturity, if necessary.

⁷⁵ See Steven L. Schwarcz, *Too Big To Fail?: Recasting the Financial Safety Net*, in *THE PANIC OF 2008* (Lawrence E. Mitchell & Arthur E. Wilmarth, Jr. eds., Edward Elgar 2010), available at <http://ssrn.com/abstract=1352563> (using this example).

⁷⁶ Alternatively, a market liquidity provider of last resort could attempt to stabilize the market by entering into derivatives contracts to strip out risks that the market has the greatest difficulty hedging—in effect, the market’s irrationality element—thereby stimulating private investment. By hedging—and not actually purchasing securities directly—the market liquidity provider would appear to be taking less investment risk, and thus its function may be seen as more politically acceptable. *Id.*

2. *Requiring Firms and Markets to be More Internally Robust.* Regulation could also help to stabilize systemically important firms and markets by requiring them to be more internally robust.⁷⁷ This could be accomplished in various ways. First consider firms.

The Dodd-Frank Act, for example, requires banks and, to the extent designated as “systemically important,” other financial firms to be subject to a range of capital and similar requirements.⁷⁸ Addressing the possibility that a firm could nevertheless end up failing, the Act also requires these firms to submit a resolution plan—a so-called “living will”—that sets forth how the firm would liquidate in an orderly manner to minimize further systemic impact.⁷⁹

The extent to which these types of approaches will work, and their potential impact on efficiency, are open questions. Reducing a firm’s leverage, for example, can certainly enable the firm to withstand economic shocks and reduce its chance of failure.⁸⁰ The Basel capital requirements, however, did not prevent the many bank failures resulting from the 2008 financial crisis. Setting regulatory limits on leverage could also backfire because some leverage is good but there is no optimal across-the-board amount of leverage that is right for every firm.⁸¹ Regulation should at least focus, however, on

⁷⁷ Although I refer to regulation requiring firms to become more internally robust as ex post (in the sense that more robust firms can better withstand a systemic shock), such regulation could also be viewed as ex ante in the sense that robust firms are less likely to fail and thereby trigger a systemic shock. I am still pondering the appropriate ex-ante/ex-post distinction.

⁷⁸ Dodd-Frank Act §§ 115(b) & 165(i). The Dodd-Frank Act directs the Federal Reserve, for example, to set “prudential” capital standards for certain large financial firms, including a maximum debt-to-equity ratio of 15:1. *Id.* § 165(j).

⁷⁹ *Id.* § 165(d).

⁸⁰ *Cf.* text following note 7, *supra* (discussing highly leveraged firms engaging in fire-sales of assets).

⁸¹ *Systemic Risk*, *supra* note 3, at 224. The Basel Committee has introduced a binding three percent leverage ratio that will take effect in 2018 and will require banks to hold three percent of Tier 1 capital, which is primarily comprised of common equity. The leverage ratio will prevent banks from accumulating assets worth more than 33 times their Tier 1 capital. Members of the Basel Committee have argued that a binding leverage ratio is critical since “risk-based measures alone are vulnerable to gaming.” Hervé

attempting to prevent firms from opportunistically overleveraging themselves during boom times, thereby correcting that type of cyclical imbalance.⁸²

One also might question Dodd-Frank's living-will requirement. Ex ante plans (such as a liquidation plan made when a financial firm is healthy) rarely match ex post realities (such as the realities facing the firm when financially challenged). Moreover, it is uncertain whether future politicians would, or should, force the liquidation of a large financial firm, even pursuant to its living will, without considering the consequences at that time.

The Dodd-Frank Act also includes procedures for limiting a systemically important firm's right to make risky investments—often referred to as the Volcker Rule.⁸³ This is a highly paternalistic approach, substituting a blanket regulatory

Hannoun, Deputy Gen. Manager, Bank for Int'l Settlements, Introductory Remarks at the International Association of Deposit Insurers 2011 Research Conference on Financial crises: the Role of Deposit Insurance 3 (June 8, 2011), <http://www.bis.org/speeches/sp110609.pdf> (highlighting the importance of the Basel III commitment to move toward a binding leverage ratio). Of course, national regulators will have to implement such international requirements on a domestic level before they take effect, and the idea has prompted considerable criticism from European leaders. Jim Brunsten & Meera Louis, *Germany, France Said to Fight Basel Bank-Leverage Disclosure*, BLOOMBERG BUS. WEEK, Mar. 11, 2011, <http://www.businessweek.com/news/2011-03-11/germany-france-said-to-fight-basel-bank-leverage-disclosure.html> (noting that France and Germany are “fiercely against” Basel proposals for lenders to reveal as soon as 2015 whether they would meet the leverage ratio); Jim Brunsten, *Banks in Europe May Win EU Exemption From Basel Leverage Ratio*, BLOOMBERG, Nov. 17, 2010, <http://www.bloomberg.com/news/2010-11-17/banks-in-europe-said-to-be-poised-to-escape-basel-rules-that-curtail-debt.html> (stating that a majority of EU members oppose the new Basel leverage ratio and may seek an exemption from it).

⁸² The Basel Committee has attempted to address overleveraging in part by introducing a counter-cyclical capital requirement of up to 2.5% of common equity or other loss-absorbing capital (above the new Basel III regulatory minimum) that national regulators can impose when they suspect the emergence of credit bubbles. The buffer can be drawn down in periods of financial stress. Press release, BIS, Group of Governors and Heads of Supervision Announces Higher Global Minimum Capital Standards, Sept. 12, 2010, at 2, <http://www.bis.org/press/p100912.pdf>.

⁸³ See Dodd-Frank Act sec. 619, § 13 (codifying steps to implement the Volcker Rule limiting proprietary trading). Several federal agencies—the Federal Reserve Bank, the

prescription for a firm's own business judgment.⁸⁴ One should be generally skeptical of any rule that attempts to protect a sophisticated financial firm from itself⁸⁵—and indeed, Moody's has warned that a leaked early draft of interagency rules implementing the Volcker Rule would, if adopted, probably “diminish the flexibility and profitability of banks' valuable market-making operations and place them at a competitive disadvantage to firms not constrained by the rule.”⁸⁶

Dodd-Frank appropriately does require many large public firms to institute internal governance procedures to protect the firm, including establishing risk committees (with at least one risk-management expert) responsible for enterprise-wide risk-management oversight.⁸⁷ Well managed firms should—and in my experience already do—have these types of procedures and committees.

Also appropriately, the Dodd-Frank Act does not attempt to artificially limit the size of financial firms. Some have argued that size limits would minimize the potential moral hazard from firms that believe they are “too big to fail.” There is, however, no clear evidence of such risky behavior, and financial firm losses can be explained by other

Federal Deposit Insurance Corporation (FDIC), and the Office of the Comptroller of the Currency—recently proposed rules to implement this.

⁸⁴ The Volcker Rule might be considered, conceptually, as a subset of ring-fencing. *See infra* notes 93-97 and accompanying text. Ring-fencing, however, could impose regulation that goes beyond investment limitations, potentially restricting other business decisions of banks and systemically important firms.

⁸⁵ I recognize that even sophisticated financial firms sometimes might not fully understand a highly complex investment. *Cf. supra* note 22 and accompanying text (discussing misinformation). The ultimate question of the value of the Volcker Rule will therefore be empirical: whether the benefits of its limitation on proprietary trading will outweigh profits lost by losing the ability to engage in such trading. Although some may argue that those benefits, which accrue to all, should be more highly weighted than profits, which accrue only to the financial firms themselves, my proposal for a privatized systemic risk fund should help to internalize any harm of proprietary trading. *See supra* notes 54-68 and accompanying text.

⁸⁶ Edward Wyatt, *Regulators to Set Forth Volcker Rule*, N.Y. TIMES, Oct. 10, 2011 (quoting Moody's).

⁸⁷ Dodd-Frank Act § 165(h).

reasons. Size should be governed by the economies of scale and scope needed for firms to successfully compete, domestically and abroad—so long as that size is manageable.

We should be cautious, however, of financial firms that increase their size, especially by acquisition of other firms, primarily to satisfy senior management egos.⁸⁸ Dodd-Frank indirectly addresses this concern (at least weakly) by linking senior executive compensation to long-term results—for example, requiring stock exchanges to adopt standards whereby listed companies implement policies to recoup senior executive compensation in the event of an accounting restatement.⁸⁹

Another way that regulation could make systemically important firms more internally robust is by requiring at least some portion of their debt to be in the form of so-called contingent capital.⁹⁰ Contingent capital debt would automatically convert to equity upon the occurrence of pre-agreed events. Requiring contingent capital is therefore effectively like requiring a pre-planned debt restructuring or workout.

It is unclear if regulatory-imposed contingent capital would be efficient.⁹¹ If contingent capital is a good idea, markets themselves should implement it; but there is no

⁸⁸ I thank my colleague, Lawrence Baxter—a banking law professor, turned senior bank executive, and recently returned to the academy—for this observation.

⁸⁹ Dodd-Frank Act § 954.

⁹⁰ See, e.g., John C. Coffee, Jr., *Systemic Risk After Dodd-Frank: Contingent Capital and the Need for Regulatory Strategies Beyond Oversight*, 111 COLUMBIA LAW REVIEW 795 (2011). Coffee’s proposal for “bail in” contingent capital conversion calls for conversion on a gradual, incremental basis. Debt would convert to a senior, nonconvertible preferred stock with cumulative dividends and voting rights. This structure would allow for the dilution of equity to deter excessive risk taking, the creation of a class of risk-averse preferred shareholders to counteract the risk-favoring tendencies of common shareholders, and the avoidance of an “all-or-nothing” transition. *Id.*

⁹¹ As of July 2011, the Basel Committee has determined that systemically important financial firms will only be allowed to meet their additional loss absorbency requirement with common equity Tier 1 capital, not contingent capital. The Basel Committee will, however, “continue to review contingent capital, and support the use of contingent capital to meet higher national loss absorbency requirements than the global requirement, as high-trigger contingent capital could help absorb losses on a going concern basis.” Bank for Int’l Settlements, *Consultative Document: Global Systemically Important Banks:*

evidence of that implementation (nor is there evidence of market failures impeding that implementation). One should also be skeptical whether regulatory-imposed contingent capital might have unforeseen consequences. For example, automatic conversions of debt claims to equity interests might create counterparty risk by reducing the value of firms holding those claims.⁹²

Finally, regulation could focus on making systemically important firms more internally robust at least to the extent such firms provide public goods. In the United States, for example, the Glass-Steagall Act (which has since been revoked) had created a separation between commercial and investment banking—the former including deposit taking and lending, the latter including securities underwriting and investing. Although the Dodd-Frank Act does not reinstitute this separation, the final report of the U.K. Independent Commission on Banking (often called the Vickers Report⁹³) recommends a more limited form of separation, which it calls ring-fencing, intended to protect the “basic banking services of safeguarding retail deposits, operating secure payments systems, efficiently channelling savings to productive investments [i.e., making loans], and managing financial risk.”⁹⁴ The ring-fencing proposed in the Vickers Report appears to have similarities to ring-fencing used in the United States to protect essential public utilities, which often operate as subsidiaries within holding-company structures.⁹⁵

Assessment Methodology and the Additional Loss Absorbency Requirement, at 19-20 (July 2011), <http://www.bis.org/publ/bcbs201.pdf>.

⁹² The conversion would constitute an actual reduction in value if the pre-agreed trigger is sensible.

⁹³ Although I provided input for this Report in a November 12, 2010 meeting at All Souls College, University of Oxford, with Commission Chairman Sir John Vickers and other members of the Commission’s Secretariat, I did not suggest the ring-fencing procedure that the Report eventually adopted.

⁹⁴ Vickers Report, at 7.

⁹⁵ In expert testimony to a state public service commission, I have recently defined utility ring-fencing as follows: “The term ring-fencing is not always clearly defined. By ‘ring-fencing,’ I mean protection of [the utility subsidiary] and its assets from harm caused by the [utility subsidiary’s] affiliates. A primary goal of ring-fencing is protecting the [utility subsidiary] from harm caused by a possible bankruptcy of one or more of its affiliates. This is achieved by making it unlikely that an affiliate’s bankruptcy will involuntarily force the [utility subsidiary] into bankruptcy or cause a substantive consolidation of the affiliate and the [utility subsidiary] or cause the [utility subsidiary] to voluntarily file for

Ring-fencing is more of a micro- than macro-prudential approach since its focus is more on protecting retail banking activities rather than on preventing systemic collapse.⁹⁶ Nonetheless, to the extent it improves consumer confidence, ring-fencing of retail banking might be beneficial to the real economy.⁹⁷

D. Summary

Regulation could protect the financial system in at least three ways: by limiting the triggers of systemic risk, by limiting the transmission of systemic shocks, and by attempting to stabilize the system. Eliminating the triggers of systemic risk is not feasible. Eliminating the transmission of systemic shocks is likewise not feasible.

It therefore is critical to try to stabilize the financial system against the consequences of systemic shocks. This will involve stabilizing both systemically important financial firms and markets impacted by the shocks. This essay has examined two approaches to stabilization: ensuring liquidity to those firms and markets, and requiring those firms and markets to be more internally robust.

The first approach—ensuring liquidity—would help to stabilize firms and markets. It also would help to control the motivation of systemically important firms to

bankruptcy. Another goal of ring-fencing is protecting the [utility subsidiary's] assets from being raided by an affiliate. This can be achieved by imposing dividend restrictions on the [utility subsidiary] and by restricting non-arm's length transactions that are unfair to the [utility subsidiary]." The Vickers Report similarly proposes that the "banks' UK retail activities [] be carried out in separate subsidiaries. The UK retail subsidiaries would be legally, economically and operationally separate from the rest of the banking groups to which they belonged." Vickers Report at 11.

⁹⁶ Cf. Laurence Kotlikoff, *Why the Vickers Report Failed the UK and the World*, FIN. TIMES, Sept. 20, 2011 (observing, among other things, that the flaw of "ring-fencing good banks and letting bad banks do their thing" is demonstrated by "the collapse of Lehman Brothers [which Prof. Kotlikoff likens to a bad bank], whose failure nearly destroyed the global financial system").

⁹⁷ In addition to helping to stabilize firms, regulation could help to stabilize systemically important markets, such as by requiring appropriate circuit breakers. *See, e.g.*, Anabtawi & Schwarcz, *supra* note 20, at 1398-1401 (discussing market circuit breakers).

externalize their costs. If the source of the liquidity could be privatized, public costs would be even further reduced. The extent to which regulation can efficiently require systemically important firms and markets to be more internally robust is, however, a more open question.

IV. CONCLUSIONS

This essay examines how the law can help to control financial chaos. To that end, regulation should strive not only to maximize economic efficiency within the financial system but also to protect the financial system itself. Any regulatory framework for achieving these goals, however, will be imperfect and have tradeoffs.

Market failures that impair efficiency are not always susceptible to legal solutions. For example, increasing financial complexity has created information failures that even disclosure cannot remedy, whereas law-imposed standardization would have its own flaws. Bounded human rationality limits the effectiveness of even otherwise ideal laws. And the increasing dispersion of financial risk is undermining monitoring incentives.

One type of market failure—principal-agent failure—is theoretically susceptible to legal solutions. To the extent financial firms do not change their compensation schemes, regulation could require them to pay managers, critically including secondary managers, under longer-term compensation arrangements. But because financial managers can work in money centers worldwide, this type of regulation ideally should be global to avoid prejudicing the competitiveness of firms subject to particular national rules.

Regulation should also strive to protect the financial system itself. Because we do not yet know enough about how systemic risk is triggered and spread, this type of regulation should operate primarily to help reduce systemic consequences by stabilizing parts of the financial system afflicted by systemic shocks. That could be done in two

ways: by ensuring liquidity to systemically important firms and markets, and by requiring those firms and markets to be more internally robust.

The extent to which regulation could efficiently require systemically important firms and markets to be more internally robust is unclear. Ensuring liquidity to those firms and markets could increase stability, however, especially if the liquidity sources are required (at least partly) to be privatized. That not only would help to internalize externalities but also would motivate systemically important firms to monitor each other and help control each other's risky behavior. Again, this type of regulation ideally should be global to avoid prejudicing the competitiveness of firms subject to particular national regulatory requirements.