

# Systemic Risk

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*Governments and international organizations worry increasingly about systemic risk, under which the world's financial system can collapse like a row of dominoes. There is widespread confusion, though, about the causes and even the definition of systemic risk, and uncertainty about how to control it. This Article offers a conceptual framework for examining what risks are truly "systemic," what causes those risks, and how, if at all, those risks should be regulated. Scholars historically have tended to think of systemic risk primarily in terms of financial institutions such as banks. However, with the growth of disintermediation, in which companies can access capital-market funding without going through banks or other intermediary institutions, greater focus should be devoted to financial markets and the relationship between markets and institutions. This perspective reveals that systemic risk results from a type of tragedy of the commons in which market participants lack sufficient incentive, absent regulation, to limit risk-taking in order to reduce the systemic danger to others. Law, therefore, has a role in reducing systemic risk.*

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#### INTRODUCTION

Governments and international organizations are calling for increased regulation of systemic risk. In the United States, for example, Congress has been holding hearings on systemic risk in response to the recent subprime mortgage crisis and its impact on the mortgage-backed securities and commercial paper markets.<sup>1</sup> The U.S. Federal Reserve, the European Central Bank, and other

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1. See, e.g., *Systemic Risk: Examining Regulators’ Ability To Respond to Threats to the Financial System: Hearing Before the H. Comm. on Financial Services*, 110th Cong. (2007), available at [http://www.house.gov/apps/list/hearing/financialsvcs\\_dem/ht1002072.shtml](http://www.house.gov/apps/list/hearing/financialsvcs_dem/ht1002072.shtml) (follow “Printed Hearing: 110-65” hyperlink) [hereinafter *Systemic Risk Hearing*]. References in this Article to “mortgage-backed securities” include not only traditional mortgage-backed securities but also collateralized-debt obligations securities backed by mortgage loans and “ABS CDO” securities backed by mortgage loans. For a detailed description of these types of securities and how they differ, see Steven L. Schwarcz, *Protecting*

monetary agencies worldwide have likewise expressed concern about this crisis and its potential systemic effects,<sup>2</sup> dramatically illustrated by the collapse of investment bank Bear Stearns.<sup>3</sup> Governments also have been concerned about the potential for systemic failure stemming from hedge-fund collapses,<sup>4</sup> originally raised by the near-failure of Long-Term Capital Management<sup>5</sup> and more recently prompted by the unregulated spread of hedge funds as a favored

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*Financial Markets: Lessons from the Subprime Mortgage Meltdown*, 93 MINN. L. REV. (forthcoming 2008).

2. See, e.g., Martin Crutsinger, *Housing Construction Keeps Falling*, HOUS. CHRON., Dec. 19, 2007, at 3 (“[T]he European Central Bank[] move[d] to inject money into the European banking system to combat the global credit crunch triggered by the meltdown in subprime mortgages in the United States.”); Sumeet Desai & Gernot Heller, *G-7 To Weigh Global Response to Credit Crisis*, REUTERS, Feb. 8, 2008, <http://www.reuters.com/article/politicsNews/idUST29356920080208> (“Financial leaders from the world’s richest nations stood ready to discuss a global policy response to the [subprime mortgage] crisis, which has unleashed economic downdrafts and market turbulence that knows no borders.”); Matthew Saltmarsh, *Europe Fears U.S. Slump*, INT’L HERALD TRIB. (Paris), Dec. 5, 2007, at 12 (“In the strongest warning yet from a European Central Bank official that the 13-nation euro area is at risk from the U.S. subprime mortgage crisis, [Bank board member Christian Noyer] said optimism among consumers and executives was already deteriorating.”); Randal Smith et al., *Loosening Up: How a Panicky Day Led the Fed To Act*, WALL ST. J., Aug. 20, 2007, at A1; Lauren Young, *Bernanke’s New Entourage*, BUS. WK., Feb. 11, 2008, at 60 (discussing the Federal Reserve’s concern over the subprime mortgage crisis and its potential systemic effect); Robert A. Eisenbeis et al., *An Analysis of Systemic Risks Posed by Fannie Mae and Freddie Mac and an Evaluation of the Policy Options for Reducing Those Risks* 13 (Fed. Reserve of Atlanta, Working Paper 2006-2, 2006) (warning that the failure of Fannie Mae or Freddie Mac could create credit restraints having negative real effects on liquidity and the issuance of mortgages). Concern about systemic risk also has arisen in the insurance industry. The fear is that the collapse of an insurer or reinsurer could cause a chain reaction of collapses, depriving business of the insurance needed to operate. *Buddy, Could You Spare Us \$15 Billion?*, ECONOMIST, Jan. 24, 2008, at 38 (reporting that in the aftermath of the subprime mortgage crisis insurers are increasingly at risk for being downgraded by ratings agencies, and that “from a systemic point of view, when a monoline [insurer] is downgraded all of the paper it had insured must be downgraded too”); cf. Chris Mundy, *The Nature of Systemic Risk: Trying To Achieve a Definition*, BALANCE SHEET, Oct. 24, 2004, at 30 (discussing that post-9/11—“the insurance industry’s biggest ever disaster”—the aviation insurance industry temporarily had to reduce insurance coverage below the level at which airlines could, according to their loan covenants and regulatory restrictions, continue to operate and that governments had to intervene to provide coverage).

3. See, e.g., Edmund L. Andrews, *Fed Acts To Rescue Financial Markets*, N.Y. TIMES, Mar. 17, 2008, at A1; Andrew Ross Sorkin, *JP Morgan Pays \$2 a Share for Bear Stearns*, N.Y. TIMES, Mar. 17, 2008, at A1; Landon Thomas, Jr., *Fears that Bear Stearns’s Downfall May Spread*, N.Y. TIMES, Mar. 17, 2008, at C1 (quoting Treasury Secretary Henry Paulson as being less concerned at the moment about moral hazard than about the stability of the financial system).

4. A hedge fund is, essentially, a private and unregistered investment vehicle. Registration Under the Advisers Act of Certain Hedge Fund Advisers, 69 Fed. Reg. 72,054, 72,055 (Dec. 10, 2004) (to be codified at 17 C.F.R. pts. 275, 279). In today’s market environment, hedge funds commonly take investor “equity” money and also borrow money to make market bets, including leveraged bets (through derivatives) on market movements. From the standpoint of investors, the goal of hedge funds is to achieve high rates of return. From the standpoint of hedge-fund managers, the goal is to earn substantial management fees. Hedge funds are estimated to have assets exceeding a trillion dollars. See Troy A. Paredes, *On the Decision To Regulate Hedge Funds: The SEC’s Regulatory Philosophy, Style, and Mission*, 2006 U. ILL. L. REV. 975, 981–82.

5. See *infra* notes 35–40 and accompanying text.

investment tool.<sup>6</sup> Financial leaders also are calling for increased focus on systemic risk that extends past the traditional, bank-oriented approach.<sup>7</sup>

There is, nonetheless, a great deal of confusion about what types of risk are truly “systemic”—the term meaning “[o]f or pertaining to a system”<sup>8</sup>—and what types of systemic risk should be regulated. Alan Greenspan has summed up the confusion, observing that although “[i]t is generally agreed that systemic risk represents a propensity for some sort of financial system disruption[,] one observer might use the term ‘market failure’ to describe what another would deem to have been a market outcome that was natural and healthy, even if harsh.”<sup>9</sup> As a result, the “very definition [of systemic risk] is still somewhat unsettled.”<sup>10</sup>

Some commentators, for example, define systemic risk as “the probability

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6. See, e.g., PRESIDENT’S WORKING GROUP ON FIN. MKTS., HEDGE FUNDS, LEVERAGE, AND THE LESSONS OF LONG TERM CAPITAL MANAGEMENT 31–32 (1999) [hereinafter PRESIDENT’S WORKING GROUP] (recommending measures to restrain excessive leverage of hedge funds); STAFF REPORT TO THE U.S. SEC, IMPLICATION TO THE GROWTH OF HEDGE FUNDS 89 (2003) (recommending that the SEC amend Rule 203(b)(3)-1 to redefine “client” such that most hedge funds would require registration with the SEC); U.S. GEN. ACCOUNTING OFFICE, LONG TERM CAPITAL MANAGEMENT: REGULATORS NEED TO FOCUS GREATER ATTENTION ON SYSTEMIC RISK 14–15 (1998) (discussing the concern of regulators for the potential risks posed by hedge funds during a period of declining credit standards); Anthony W. Ryan, Assistant Sec’y for Fin. Mkts., U.S. Dep’t of the Treasury, Remarks Before the Managed Funds Association Conference (June 11, 2007) (transcript on file with author); see also Ben S. Bernanke, Chairman, Bd. of Governors, U.S. Fed. Reserve Sys., Remarks at the Federal Reserve Bank of Atlanta’s 2006 Financial Markets Conference, Sea Island, Georgia (May 16, 2006), available at <http://www.federalreserve.gov/Boarddocs/speeches/2006/200605162/default.htm> (offering thoughts on the systemic risk implications of the rapid growth of the hedge fund industry and on ways that policymakers might respond to those risks); Comments by Richard Blumenthal, Att’y Gen. of Conn., The Diane Rehm Show, National Public Radio, May 9, 2007 (arguing that hedge funds should be regulated to avoid systemic risk).

7. See John Gieve, Deputy Governor, Bank of Eng., Speech at the Centre for the Study of Financial Innovation Roundtable: Financial System Risks in the UK—Issues and Challenges (July 25, 2006) (observing the shift away from bank-dominated finance); Andre Icard, Deputy Manager, Bank for Int’l Settlements [BIS], Risk Measurement and Systemic Risk, Speech at the Fourth Joint Central Bank Research Conference on Risk Management and Systemic Risk (Nov. 8, 2005), available at [www.bis.org/speeches/sp051108.htm](http://www.bis.org/speeches/sp051108.htm) (discussing the “evolution of systemic risk” to include interdependencies among banks, financial markets, and market infrastructure); Yutaka Yamaguchi, Deputy Governor, Bank of Japan and Chairman of the Comm. on the Global Fin. Sys., Triangular View of Systemic Risk and Central Bank Responsibility, Speech for the Third Conference on Risk Measurement and Systemic Risk, Bank for Int’l Settlements 2 (Mar. 7, 2002), available at <http://www.bis.org/cgfs/conf/mar02h.pdf> (warning that in order to understand systemic risk, one must investigate the nexus among the banking system, financial markets, and the real economy); cf. Gabriel Kolko, *Weapons of Mass Financial Destruction*, LE MONDE DIPLOMATIQUE (Eng.), Oct. 2006, at 1, 2, available at <http://mondediplo.com/2006/10/02finance> (observing that the IMF is concerned that bank deregulation has allowed financial systems to become more vulnerable to systemic risk and to a growing number of financial crises); Henry Paulson, Sec’y, U.S. Dep’t of the Treasury, Remarks on Recommendations from the President’s Working Group on Financial Markets (Mar. 13, 2008), available at <http://www.ustreas.gov/press/releases/hp872.htm> (focusing on a similar concern among markets in addition to banks).

8. OXFORD ENGLISH DICTIONARY 499 (2d ed. 1989).

9. George G. Kaufman, *Bank Failures, Systemic Risk, and Bank Regulation*, 16 CATO J. 17, 21 n.5 (1996) (quoting Alan Greenspan, Remarks at a Conference on Risk Measurement and Systemic Risk, Board of Governors of the Federal Reserve System (Nov. 16, 1995)), available at <http://www.cato.org/pubs/journal/cj16n-2.html>.

10. *Id.*

that cumulative losses will occur from an event that ignites a series of successive losses along a chain of [financial] institutions or markets comprising . . . a system.”<sup>11</sup> Others, however, define it as “the potential for a modest economic shock to induce substantial volatility in asset prices, significant reductions in corporate liquidity, potential bankruptcies and efficiency losses.”<sup>12</sup> Still others define it as “[t]he risk that a default by one market participant will have repercussions on other participants due to the interlocking nature of financial markets. For example, Customer A’s default in X market may affect Intermediary B’s ability to fulfill its obligations in Markets X, Y, and Z.”<sup>13</sup>

These definitions are inconsistent in several ways. For example, the trigger event in the first is merely an “event,” in the second a “modest economic shock,” and in the third a “default by one market participant.” The consequences of the trigger event are also different: in the first definition being “a series of successive [and cumulative] losses along a chain of institutions or markets,” in the second being “substantial volatility in asset prices, significant reductions in corporate liquidity, potential bankruptcies and efficiency losses,” and in the third being merely “repercussions on other [market or interlocking market] participants.” There is not even agreement on whether systemic risk should be defined by reference to market losses or just market participant losses.<sup>14</sup> The only common factor in these definitions is that a trigger event causes a chain of bad economic consequences.

If a problem cannot be defined, it cannot be solved—or, at least, it cannot be efficiently solved—because confusion over the nature of the problem can obscure attempts to provide solutions. This Article therefore proceeds by attempting, in Part I, to define systemic risk and then by examining, in section II.A, what it is about this risk that is most problematic. Building on that foundation, sections II.B and II.C of the Article offer a conceptual framework for solving the problem of systemic risk, focusing on regulatory solutions. In that context,

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11. *Id.* at 20. Kaufman points out that this definition is consistent with that of other leaders in the banking and regulatory field. For example, the Bank for International Settlements (BIS) has defined systemic risk as the “risk that the failure of a participant to meet its contractual obligations may in turn cause other participants to default.” *Id.* at 21 n.5. The head of the San Francisco Federal Reserve Bank has defined it as the “risk that one bank’s default may cause a chain reaction of . . . failures and even threaten the solvency of institutions.” *Id.*

12. Paul Kupiec & David Nickerson, *Assessing Systemic Risk Exposure from Banks and GSEs Under Alternative Approaches to Capital Regulation*, 48 J. REAL EST. FIN. & ECON. 123, 123 (2004) (“[A] key feature in the propagation of such a systemic shock is acute uncertainty regarding an institution’s ability to satisfy its immediate payment obligations and a simultaneous inability of counterparties to hedge such risk.”).

13. This is the definition favored by the U.S. Commodity Futures Trading Commission. See U.S. Commodity Futures Trading Comm’n, CFTC Glossary, [http://www.cftc.gov/educationcenter/glossary/glossary\\_s.html](http://www.cftc.gov/educationcenter/glossary/glossary_s.html) (last visited May 13, 2008); cf. Nicholas Chan et al., *Systemic Risk and Hedge Funds 1* (MIT Sloan Sch. of Mgmt., Working Paper No. 4535-05, 2005), available at <http://ssrn.com/abstract=671443> (defining systemic risk as “the possibility of a series of correlated defaults among financial institutions—typically banks—that occurs over a short period of time, often caused by a single major event”).

14. The third definition focuses solely on repercussions to market participants.

the Article examines how risk itself—in particular, financial risk—should be regulated and then inquires how that regulatory framework should change by reason of the financial risk being systemic. Section II.D of the Article provides specific recommendations. Finally, Part III of the Article focuses on systemic risk in an international context since, finance and markets being global, systemic collapse in one country can affect markets and institutions in other countries. To this end, the Article examines the feasibility of international regulation, the extent to which regulatory solutions are universal or should be different for different countries, and the potential for a regulatory race to the bottom if regulation is done on only a national level.

A threshold question is whether regulatory solutions are appropriate. This Article argues they are because, like a tragedy of the commons,<sup>15</sup> no individual market participant has sufficient incentive, absent regulation,<sup>16</sup> to limit its risk taking in order to reduce the systemic danger to other participants and third parties.<sup>17</sup>

## I. DEFINING SYSTEMIC RISK

A common factor in the various definitions of systemic risk is that a trigger event, such as an economic shock or institutional failure, causes a chain of bad economic consequences—sometimes referred to as a domino effect. These consequences could include (a chain of) financial institution and/or market failures. Less dramatically, these consequences might include (a chain of) significant losses to financial institutions or substantial financial-market price volatility. In either case, the consequences impact financial institutions, markets, or both.

### A. FINANCIAL INSTITUTIONS

Banks and other financial institutions (collectively, “institutions”) are important sources of capital. Therefore, their failure, especially in large numbers, can deprive society of capital and increase its cost. Increases in the cost of capital, or decreases in its availability, are the most serious direct consequences of a

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15. The classic example of a tragedy of the commons is an overgrazed pasture resulting from common ownership so that no individual owner has the right to exclude use by other owners. See Garret Hardin, *The Tragedy of the Commons*, 162 *SCIENCE* 1243, 1244 (1968). The original concept of a tragedy of the commons can be traced back to Aristotle. ARISTOTLE, *POLITICS* 57 (Benjamin Jowett trans., Courier Dover 2000) (“[T]hat which is common to the greatest number has the least care bestowed upon it. Every one thinks chiefly of his own, hardly at all of the common interest.”).

16. Tragedies of the commons sometimes can be addressed by regulators informally pressuring parties to work collectively. See Armin Falk et al., *Appropriating the Commons: A Theoretical Explanation*, in *THE DRAMA OF THE COMMONS* 158 (Elinor Ostrom et al. eds., 2002). For a discussion of the market discipline approach and why it is insufficient, see *infra* notes 245–61 and accompanying text.

17. See *infra* notes 65–68 and accompanying text.

systemic failure.<sup>18</sup>

The classic example of systemic risk in this context is a “bank run,” in which the inability of a bank to satisfy withdrawal-demands causes its failure, in turn causing other banks or their creditors to fail.<sup>19</sup> The original failure can occur when depositors panic, converging on the bank to quickly withdraw their monies. Because banks keep only a small fraction of their deposits on hand as cash reserves, a bank may have insufficient cash to pay all withdrawal-demands, causing it to default and ultimately fail.<sup>20</sup> The chain of subsequent failures can occur because banks are closely intertwined financially. They lend to and borrow from each other, hold deposit balances with each other, and make payments through the interbank clearing system (whereby banks with equity and deposit accounts exceeding their liabilities can offer these excess funds to other banks who wish to increase loans to their customers).<sup>21</sup> Because of this interconnectedness, one bank’s default on an obligation to another may adversely affect that other bank’s ability to meet its obligations to yet other banks, and “so on down the chain of banks and beyond.”<sup>22</sup>

This scenario is most graphically illustrated by the Great Depression.<sup>23</sup> In response to the stock market downturn of August 1929 and the crash of October 1929, depositors en masse attempted to convert their bank deposits into cash.<sup>24</sup> Many banks were unable to satisfy all of these demands, causing them to fail and contracting the money supply.<sup>25</sup> These failures, in turn, caused many otherwise solvent banks to default,<sup>26</sup> and many companies, deprived of liquid-

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18. William J. McDonough, President, Fed. Reserve Bank of N.Y., Statement Before the United States House of Representatives Committee on Banking and Financial Services (Oct. 1, 1998), in FED. RES. BULL., Dec. 1998, available at <http://newyorkfed.org/newsevents/speeches/1998/mcd981001.html> (stating that the most important direct consequence of systemic risk brought on by a failure of Long-Term Capital Management would have been “increases in the cost of capital to American businesses”); see also E.P. DAVIS, DEBT, FINANCIAL FRAGILITY, AND SYSTEMIC RISK 117 (1992) (describing the worst consequence of systemic risk as “disrupt[ing] the payments mechanism and capacity of the system to allocate capital”).

19. Mundy, *supra* note 2, at 29.

20. R.W. HAFER, THE FEDERAL RESERVE SYSTEM 145 (2005) (observing that a bank’s cash reserves are often less than five percent of its deposits).

21. Kaufman, *supra* note 9, at 20; see also Jürgen Eichberger & Martin Summer, *Bank Capital, Liquidity and Systemic Risk* 14 (Oesterreichische Nationalbank, Working Paper No. 87, 2004).

22. Kaufman, *supra* note 9, at 20–21; see also Icard, *supra* note 7 (discussing how disturbances could arise and spread within the banking sector).

23. Michael D. Bordo et al., *Real Versus Pseudo-International Systemic Risk: Some Lessons from History* 21 (Nat’l Bureau of Econ. Research, Working Paper No. 5371, 1995).

24. *Id.* To some extent, this was in order to obtain funds to satisfy margin calls, and to some extent this was simply in panic.

25. *Id.*

26. *Id.*; Gary Richardson, *Bank Distress During the Great Contraction, 1929 to 1933, New Data from the Archives of the Board of Governors* 24 (Nat’l Bureau of Econ. Research, Working Paper No. 12590, 2006) (concluding that between one-third and one-half of bank failures were due to contagion and illiquidity chains). *But cf.* Charles W. Calomiris & Joseph R. Mason, *Causes of U.S. Bank Distress During the Depression* 32–33 (Nat’l Bureau of Econ. Research, Working Paper No. 7919, 2000)

ity, were forced into bankruptcy.<sup>27</sup> During the height of the Great Depression, from 1930 to 1933, there were approximately two thousand bank failures yearly.<sup>28</sup>

Although a chain of bank failures remains an important symbol of systemic risk, the ongoing trend towards disintermediation—or enabling companies to access the ultimate source of funds, the capital markets, without going through banks or other financial intermediaries<sup>29</sup>—is making these failures less critical than in the past.<sup>30</sup> Companies today are able to obtain most of their financing through the capital markets without the use of intermediaries.<sup>31</sup> As a result, capital markets themselves are increasingly central to any examination of systemic risk.<sup>32</sup> Systemic disturbances can erupt outside the international banking system and spread through capital-market linkages, rather than merely through banking relationships.<sup>33</sup>

#### B. MARKETS

Under modern finance theory, investors and other market participants can protect themselves from risk by diversifying their investments. To the extent risk is negatively correlated, or uncorrelated, with market risk, the randomly distributed risks of a diversified investment portfolio “would tend to cancel out, producing a riskless portfolio.”<sup>34</sup> To the extent systemic risk affects markets, however, it is positively correlated with the markets and cannot be diversified away.<sup>35</sup>

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(arguing that most banks failed during the Great Depression for endogenous reasons and not because of financial intertwining).

27. Bordo et al., *supra* note 23, at 21.

28. FREDERIC S. MISHKIN, *THE ECONOMICS OF MONEY, BANKING, AND FINANCIAL MARKETS* 261 (7th ed. 2006).

29. Steven L. Schwarcz, *Enron and the Use and Abuse of Special Purpose Entities in Corporate Structures*, 70 U. CIN. L. REV. 1309, 1315 (2002). Capital markets are now the nation’s and the world’s most important sources of investment financing. See, e.g., MCKINSEY GLOBAL INST., *MAPPING THE GLOBAL CAPITAL MARKET: THIRD ANNUAL REPORT 7* (2007), available at [http://www.mckinsey.com/mgi/publications/third\\_annual\\_report/index.asp](http://www.mckinsey.com/mgi/publications/third_annual_report/index.asp) (reporting that as of the end of 2005, the value of total global financial assets, including equities, government and corporate debt securities, and bank deposits, was \$140 trillion).

30. Cf. Bordo et al., *supra* note 23, at 4 (“[R]ecent literature is less concerned than it was in earlier times with contagious banking panics as the key source of systemic risk.”).

31. WESLEY B. TRUITT, *THE CORPORATION* 107–09 (2006). Firms often use capital markets to turn illiquid assets into cash. For instance, through securitization, banks can turn long-term mortgages into easily tradable securities. MEIR KOHN, *FINANCIAL INSTITUTIONS AND MARKETS* 381 (2d ed. 2004). Firms can also borrow more cheaply through bonds and commercial paper than they can from banks. See *id.* at 145.

32. Yamaguchi, *supra* note 7, at 1. Yamaguchi, the former Deputy Governor of the Bank of Japan, warns that financial markets now play a role as sources of systemic disturbances. *Id.*

33. Icard, *supra* note 7.

34. RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 446 (6th ed. 2003).

35. *Id.* (arguing that risk that is positively correlated with the market itself cannot be diversified away). Judge Posner implicitly assumes, of course, that the market risk at issue cannot be diversified away by investing in unlinked diverse markets.



The near-failure of Long-Term Capital Management (“LTCM”) helps to illustrate the potential for this type of systemic risk. Although LTCM itself engaged in a diversified (and therefore inherently protective) hedging strategy, temporary market irrationality in bond pricing during August 1998—touched off by the Russian government’s default on its bonds—caused LTCM to lose hundreds of millions of dollars and approach a default.<sup>36</sup> The Board of Governors of the U.S. Federal Reserve System was concerned that LTCM’s default might shake confidence in worldwide financial markets:

Had Long-Term Capital been suddenly put into default, its [derivatives] counterparties would have immediately “closed out” their positions. If counterparties would have been able to close-out their positions at existing market prices, losses, if any, would have been minimal. However, if many firms had rushed to close-out hundreds of billions of dollars in transactions simultaneously, they would have been unable to liquidate collateral or establish offsetting positions at the previously-existing prices. Markets would have moved sharply and losses would have been exaggerated . . . .

. . . .

. . . [Moreover, as a result of these market moves,] there was a likelihood that a number of credit and interest rate markets would . . . possibly cease to function for a period of one or more days and maybe longer. This would have caused a vicious cycle: a loss of investor confidence, leading to a rush out of private credits, leading to further widening of credit spreads, leading to further liquidations of positions, and so on.<sup>37</sup>

To avoid this scenario from playing out and raising the cost of capital,<sup>38</sup> the Federal Reserve proactively stepped in to broker a settlement of LTCM’s debts.

There are overall similarities, however, between bank systemic risk and the kind of systemic risk represented by LTCM. In both, market shocks triggered institutional failures which in turn led, or could have led, to a chain of institutional and market failures. Both also were transmitted through linkages in a chain of relationships: in bank systemic risk, the linkages are interbank borrowings and the interbank clearing system for payments;<sup>39</sup> in LTCM, the linkages arose from its derivatives-based hedging strategy with other institutions,<sup>40</sup> which, in turn, had linkages with yet other institutions and markets.

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36. ROGER LOWENSTEIN, *WHEN GENIUS FAILED: THE RISE AND FALL OF LONG-TERM CAPITAL MANAGEMENT* 144–46, 164, 169–70 (2000).

37. McDonough, *supra* note 18 (describing ways that the problems of LTCM could have caused more widespread financial troubles).

38. *See id.* (concluding that the most important consequence of systemic risk brought on by a failure of LTCM would have been increasing the cost of capital).

39. *See supra* note 21 and accompanying text.

40. A derivative is a contract under which the parties agree to exchange payments calculated by reference to the price of a commodity or financial instrument, a rate, index, or some other economic measurement. *See* CHRISTIAN A. JOHNSON, *A GUIDE TO USING AND NEGOTIATING OTC DERIVATIVES DOCUMENTATION 1* (2005).

## C. AN INTEGRATED PERSPECTIVE

Institutional systemic risk and market systemic risk therefore should not be viewed each in isolation. Institutions and markets can be involved in both. Perhaps a better way to think about systemic risk is that its focus is sometimes on critical financial intermediaries, like banks, that are pivotal to the funding of companies, and other times its focus is on markets and/or institutions, such as hedge funds, that are either not financial intermediaries or at least not critical financial intermediaries.

This integrated perspective is useful because a chain of failures of critical financial intermediaries, by definition, would significantly affect the availability and cost of capital. These failures, therefore, implicitly become a proxy for market consequences.<sup>41</sup> In contrast, a chain of failures of institutions that are not critical financial intermediaries could only significantly affect the availability or cost of capital when those failures are large enough to jeopardize the viability of capital markets. As disintermediation increases, therefore, systemic risk should increasingly be viewed by its impact on markets, not institutions *per se*.

This perspective also reveals that the business or legal characterization of any given institution should be far less important, from the standpoint of systemic risk, than whether such institution is, in fact, a critical financial intermediary. Hedge funds, for example, are not critical financial intermediaries since they are not necessarily pivotal to the funding of companies. The likelihood that systemic risk would result from LTCM's failure or from the failure of any other hedge fund therefore depends not on such entity's characterization as a hedge fund *per se*, but rather on the likelihood that its failure would jeopardize the viability of capital markets.<sup>42</sup> Other than their lack of transparency—making it

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41. *Cf.* PRESIDENT'S WORKING GROUP, *supra* note 6, at 23 (observing that the indirect impact on markets of the failure of individual market participants is potentially more serious than such failure itself: "[v]olatility and sharp declines in asset prices can heighten uncertainty about credit risk and disrupt the intermediation of credit," which in turn "could cause a contraction of credit and liquidity, and ultimately, heighten the risk of a contraction in real economic activity"); *see also supra* notes 37–40 and accompanying text.

42. Although the above paragraph focuses on systemic risk resulting from hedge-fund failure, hedge funds might indirectly contribute to *bank* systemic risk insofar as hedge-fund lack of regulation enables them to make relatively risky investments, including risky loans. This may be forcing banks to make loans without financial covenants in order to compete. Interview with Douglas Rosefsky, Managing Director, Alvarez & Marsal, in Durham, N.C. (Mar. 21, 2007). This dilemma, however, does not arise out of the nature of hedge funds *qua* hedge funds but, rather, out of their unregulated nature, enabling them to make risky investments if they choose to do so. Moreover, it is questionable whether making loans without financial covenants (sometimes called "covenant-lite loans") even constitutes "safe and sound" banking practice. *Cf.* JOËL BESSIS, *RISK MANAGEMENT IN BANKING* 514 (2d ed. 2002) ("Covenants become essential whenever the credit standing of the borrower and/or the collateral do not provide adequate protection."); Grover R. Castle, *Term Lending—A Guide to Negotiating Term Loan Covenants and Other Financial Restrictions*, *J. COM. BANK LENDING*, Nov. 1980, at 26, 30–39 (tables showing that most bank loans contain financial covenants); Jyrki Niskanen & Mervi Niskanen, *Covenants and Small Business Lending: The Finnish Case*, 23 *SMALL BUS. ECON.* 137, 137 (2004) (observing that the norm in bank loan agreements in the United States is to include covenants).

difficult to publicly determine the size of hedge fund exposures—there is little inherently unique about hedge funds from the standpoint of systemic risk.<sup>43</sup> Equity investors in a failed hedge fund may lose their investments, but that should not necessarily raise concerns over systemic risk because those investors are necessarily wealthy and sophisticated<sup>44</sup> and, if they are prudent, the hedge-fund investment will only be part of a diversified investment portfolio.<sup>45</sup> Lenders to a failed hedge fund may not be repaid in full, but this is no different than a company defaulting on its debt, which is addressed as a regulatory matter through bankruptcy law. Derivatives counterparties to a failed hedge fund may not be paid if the derivatives settle in their favor, but this is no different than a company defaulting on its obligations to derivatives counterparties, which again is addressed as a regulatory matter through bankruptcy law. In LTCM, the potential for systemic risk existed not by reason of its intrinsic status as a hedge fund but by the sheer size of its exposure to other institutions and market participants.<sup>46</sup> Size matters.<sup>47</sup>

Nevertheless, hedge funds, as operated in today's market environment, have greater systemic-risk potential than many other types of business organizations. Their managers aggressively seek above-market profits and quick returns<sup>48</sup> and

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43. But compare *infra* notes 48–51 and accompanying text for a discussion of why hedge funds, as operated in today's market environment, may pose greater risk potential than other types of business organizations.

44. There is, however, dissent within the SEC over whether the “retailization” of hedge funds is increasingly exposing ordinary people to hedge-fund risk. Amie Filipchuk, *Development in Banking and Financial Law: 2004—Securities: The Securities and Exchange Commission's Registration Requirement for Hedge Fund Advisers*, 24 ANN. REV. BANKING & FIN. L. 189, 191, 193–95 (2005).

45. Section 4(2) of the Securities Act, 15 U.S.C. § 77d(2) (2004), exempts from the registration-statement and prospectus requirements of section 5 of that Act “transactions by an issuer not involving any public offering.” This exemption has been interpreted to include a variety of different transactions where—taking into account the number of offerees, their relationship to each other and to the issuer, the number of units offered, and the manner of the offering—the SEC considers there is little benefit or no practical need for regulation. See L. LOSS & J. SELIGMAN, *FUNDAMENTALS OF SECURITIES REGULATION* 395 (5th ed. 2004).

46. For a description of LTCM's billions of dollars of exposure, see *supra* notes 36–37 and accompanying text; see also PRESIDENT'S WORKING GROUP, *supra* note 6, at 2 (comparing hedge funds to “other large highly leveraged financial institutions” in terms of their “potential to disrupt the functioning of financial markets”); Roger Ferguson & David Laster, *Hedge Funds and Systemic Risk*, FIN. STABILITY REV., Apr. 2007, at 45, 51 (arguing that the failure of Amaranth, unlike the case of LTCM, “posed little systemic risk because [the losses] occurred in a relatively small and isolated market”).

47. This “size matters” observation would apply not only to a single large hedge fund, but also to multiple, collectively large hedge funds adopting a similar investment strategy (“convergence”). Cf. Anthony Murphy, Managing Director, Citi Markets and Banking, *Understanding Derivatives: Dissecting Complex Financial Instruments*, Remarks at the International Insolvency Institute's Seventh Annual Conference (June 12, 2007) (on file with author).

48. Also, sometimes poor management controls can make hedge funds more “fragile” than other institutions. Cf. PRESIDENT'S WORKING GROUP, *supra* note 6, at 5 (observing that hedge funds sometimes take on “structured or illiquid positions whose full value cannot be realized in a quick sale,” which can “potentially make them somewhat fragile institutions” compared to other trading institutions because they are more “vulnerable to liquidity shocks”). Even though banks and securities firms sometimes take similar illiquid positions, “these organizations and their parent firms often have both liquidity sources

employ investing strategies that may converge.<sup>49</sup> But these characteristics are not intrinsic to the nature of a hedge fund as a private and unregistered investment vehicle,<sup>50</sup> and indeed other types of business organizations, including private-equity firms and even ordinary operating companies, can and sometimes do engage in aggressive or converging investment strategies similar to those used by hedge funds.<sup>51</sup>

Synthesizing these factors, we can reach a working definition of systemic risk: the risk that (i) an economic shock such as market or institutional failure triggers (through a panic or otherwise) either (X) the failure of a chain of markets or institutions or (Y) a chain of significant losses to financial institutions, (ii) resulting in increases in the cost of capital or decreases in its availability, often evidenced by substantial financial-market price volatility.<sup>52</sup> As clarified below, this definition of systemic risk will underlie the analysis in the remainder of this Article.

This definition must be clarified in two ways. First, systemic risk should be distinguished from downturns that are caused by normal market swings. Although these downturns are sometimes conflated with systemic risk, they are more appropriately labeled *systematic* risk, meaning risk that cannot be diversified away and therefore affects most, if not all, market participants.<sup>53</sup> As regulators call for management of systemic risk, it is important not to constrain market freedom in ways that deter systematic risk, which facilitates market equilibrium and curbs excessive interest rates or periods of inflation.<sup>54</sup> Second, systemic risk is an economic, not a political, definition. It should not be used uncritically as an *ex post* political label for any large financial failure or downturn.<sup>55</sup>

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and independent streams of income from other activities that can offset the riskiness of their positions.”  
*Id.*

49. See *supra* note 47.

50. See *supra* note 4.

51. See, e.g., Francesco Guerrera & James Politi, *Moody's Threat on 'Aggressive' Buy-outs*, FIN. TIMES, Jan. 15, 2008, at 1 (discussing many buy-out firms' converging propensity to take “dividend ‘recaps,’” which are “controversial because they allow private equity owners to extract profits quickly and eliminate risk from a deal, while often leaving portfolio companies in a more precarious financial position”).

52. For a discussion regarding why increases in the cost of capital or decreases in its availability are the main consequences of systemic risk, see *supra* note 18 and accompanying text.

53. Campbell R. Harvey's Hypertextual Finance Glossary [hereinafter Finance Glossary], [http://www.duke.edu/~7Echarvey/Classes/wpg/bfgloss.htm#systematic\\_risk](http://www.duke.edu/~7Echarvey/Classes/wpg/bfgloss.htm#systematic_risk); see also Bordo et al., *supra* note 23, at 8 (referring to this as the “financial fragility” approach). In an expanding market, for example, optimism accelerates as investors reach a state of over-indebtedness, followed by “insufficient cash flow[s] to service their liabilities.” Distressed selling may then occur. These inevitable market fluctuations appear to be systematic, not systemic, although they sometimes might trigger systemic problems. See Bordo et al., *supra* note 23, at 9.

54. *But cf. id.* at 10 (discussing how normal market expansions and contractions can turn into market crises in situations of “speculative mania”).

55. By the same token, politics should not impede attempts to reach realistic solutions to the problem of real systemic risk. In the present subprime mortgage crisis, for example, the author has seen many examples of “bottom-up” attempted political fixes, protecting homeowners who allegedly have

## II. REGULATING SYSTEMIC RISK

### A. THE APPROPRIATENESS OF REGULATION

Whether systemic risk should be regulated can be viewed, as a starting point for analysis, as a subset of the question of whether it is appropriate to regulate financial risk. This Article attempts to answer that general question and then examines how the answer should change if the financial risk is systemic.

#### 1. Regulating Financial Risk

Scholars argue that the primary, if not sole, justification for regulating financial risk<sup>56</sup> is maximizing economic efficiency.<sup>57</sup> Efficiency is thus a central goal of U.S. securities laws,<sup>58</sup> and it likewise appears to be a central goal of securities laws worldwide.<sup>59</sup> It includes “maintaining competition,” “protecting

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been taken advantage of by “predatory” mortgage lenders. These approaches focus on micromanaging the loan terms and foreclosure process for, potentially, millions of defaulting mortgagors. For instance, the Federal Housing Administration has been helping individual borrowers refinance their mortgages. Brad Finkelstein, *Securing Your Borrowers: The FHA Secure Program Is Good News for Originators and Consumers*, *BROKER*, Jan. 2008, at 32–34. In contrast, this Article’s recommendation—to create a “liquidity-provider of last resort” to fund illiquid financial markets, *see infra* section II.D—is more of a top-down approach. It does not focus directly on individual homeowners, and therefore is not as politically acceptable. Nonetheless, such a top-down approach, by restoring financial-market confidence, would increase the availability of home mortgages, causing home prices to rise and thereby greatly reducing mortgagor defaults.

56. Although scholars also view regulation through public choice theory, that is not a normative goal but, rather, a descriptive explanation of what actually occurs. “Public choice theory views regulation as the outcome of the efforts of interest groups, politicians, and bureaucrats to use the political process for their own personal benefit,” generating regulations in the absence of market failures. RICHARD J. HERRING & ROBERT E. LITAN, *FINANCIAL REGULATION IN THE GLOBAL ECONOMY* 82–83 (1995).

57. *See* W. KIP VISCUSI, JOHN M. VERNON, & JOSEPH E. HARRINGTON, JR., *ECONOMICS OF REGULATION AND ANTITRUST* 9 (3d ed. 2000) (arguing that, where health and safety are not at issue, the rationale for regulatory policy is “foster[ing] improvements judged in efficiency terms”); Gillian K. Hadfield, *Privatizing Commercial Law: Lessons from the Middle and the Digital Ages* 58 (Stanford Law Sch., John M. Olin Program on Law and Econ., Working Paper No. 195, 2000), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=220252](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=220252) (“The public value at stake in relationships between commercial entities . . . is economic efficiency.”).

58. *See* THOMAS LEE HAZEN, *THE LAW OF SECURITIES REGULATION* 9 (3d ed. 1996); *see also* GEORGE J. STIGLER, *THE CITIZEN AND THE STATE* 88 (1975) (arguing that economic efficiency should be the central goal of U.S. securities laws because “efficient capital markets are the major protection of investors”); John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717, 751–52 (1984) (claiming that “the strongest arguments for the mandatory disclosure system” under securities law may be based on efficiency). Although some have suggested that fairness is also an important goal of securities regulation, fairness might only be relevant in this context as a means of achieving efficiency. *See, e.g., The Bond Price Competition Improvement Act of 1999: Hearing on H.R. 1400 Before the Subcomm. on Finance and Hazardous Materials of the H. Comm. on Commerce*, 106th Cong. 9 (1999) (statement of Hon. Arthur Levitt, Chairman, SEC) (“Informed investors, armed with accurate information, ensure that market prices represent fair values. And fair market prices, in turn, ensure that the markets perform their economic function of efficiently allocating capital resources.”).

59. *Cf.* HAL S. SCOTT & PHILIP A. WELLONS, *INTERNATIONAL FINANCE* 46 (7th ed. 2000) (claiming that securities law provides an opportunity to “develop a global regulatory framework that preserves the efficiencies associated with international capital mobility”).

investors against fraud and similar abuses,”<sup>60</sup> preventing externalities (or requiring those causing externalities to internalize their costs),<sup>61</sup> and correcting other market failures.<sup>62</sup>

Because systemic risk is a form of financial risk, efficiency should be a central goal in regulating systemic risk. Without regulation, the externalities caused by systemic risk would not be prevented or internalized because the motivation of market participants “is to protect themselves but not the system as a whole . . . . No firm . . . has an incentive to limit its risk taking in order to reduce the danger of contagion for other firms.”<sup>63</sup> This observation holds true even for banks, which (absent regulation) will protect themselves but not the stability of the banking system.<sup>64</sup> Moreover, even if market participants were able to act collectively to prevent systemic risk, they might not choose to do so. This is because the externalities of systemic failure include social costs that can extend far beyond market participants.<sup>65</sup> Thus, market participants will not want to internalize those costs and will take an insufficient amount of care to prevent them.

As a result, there is a type of tragedy of the commons, in which the benefits of exploiting finite capital resources accrue to individual market participants, each of whom is motivated to maximize use of the resource, whereas the costs of exploitation, which affect the real economy, are distributed among an even wider class of persons.<sup>66</sup> Furthermore, even though individual market participants will want to avoid the impact of systemic risk on themselves, behavioral psychology predicts they will discount that impact because it is so rare relative to other market risks.<sup>67</sup> For these reasons, regulation of systemic risk appears not only appropriate, but necessary.<sup>68</sup>

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60. HENDRIK S. HOUTHAKKER & PETER J. WILLIAMSON, *THE ECONOMICS OF FINANCIAL MARKETS* 285 (1996).

61. See HERRING & LITAN, *supra* note 56, at 79–80.

62. See DAVID GOWLAND, *THE REGULATION OF FINANCIAL MARKETS IN THE 1990s* 21 (1990). Regulating markets to correct market failure is sometimes referred to as the “public interest theory.” *Id.*

63. See PRESIDENT’S WORKING GROUP, *supra* note 6, at 31.

64. See Rodrigo Cifuentes et al., *Liquidity Risk and Contagion* 17–18 (Bank of Eng., Working Paper No. 264, 2004), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=824166](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=824166) (“[W]hen choosing their portfolio allocation banks do not internalise the positive externalities that holding more liquidity has on the stability of the system. Therefore, the privately determined liquidity will be suboptimal.”).

65. For a discussion of the social impact of a systemic collapse of the financial system, see *infra* note 70 and accompanying text.

66. Hardin, *supra* note 15, at 1244–45.

67. In other words, individual market participants may choose to act selfishly because their returns are assured, whereas a systemic collapse is not necessarily inevitable. LTCM, for instance, knew there was a risk of failure if the markets became irrational, but chose to trust models that made it money. See LOWENSTEIN, *supra* note 36, at 71–75, 173.

68. Cf. Cifuentes et al., *supra* note 64, at 20 (observing that because banks do not internalize externalities regarding financial-system stability, “liquidity and capital requirements . . . need to be externally imposed”). The need for regulation must be balanced, of course, by its cost. The extent to which the benefits of systemic-risk regulation exceed its costs, and the extent to which such regulation

## 2. Beyond Economic Efficiency

Efficiency, however, should not be the only goal of regulating systemic risk. Even though systemic risk is a form of financial risk, it stands apart and should be differentiated from traditional financial risk. Traditional financial risk focuses on risks *within* the financial system, and so efficiency should be the central goal. Conversely, systemic risk focuses on risks *to* the financial system.<sup>69</sup>

This distinction reveals that systemic risk transcends economic efficiency *per se*. Failure of the financial system can generate social costs in the form of widespread poverty and unemployment, which in turn can destroy lives and foster crime.<sup>70</sup> Although efficiency in a broad sense includes health and safety, these are sometimes viewed from a regulatory standpoint as going beyond efficiency.<sup>71</sup> Protecting health and safety therefore should be additional goals of regulating systemic risk.

These additional goals can be reduced, however, to the single goal of preserving stability of the financial system, since preserving stability would prevent the breakdown that could lead to health and safety concerns. This approach finds a measure of indirect empirical support in the report recently issued by the U.S. Department of Homeland Security (DHS) in connection with an anticipated bird-flu pandemic.<sup>72</sup> DHS has prepared a list of seventeen industry sectors, including banking and finance, that might be affected by a pandemic and whose breakdown could have a debilitating impact on national economic security, public health, and safety.<sup>73</sup> In each case, DHS's primary goal

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is more cost-effective when implemented on an *ex ante* preventative or *ex post* reactive basis, is discussed *infra* sections II.C and II.D.

69. I thank my colleague, Ralf Michaels, for this insight into differentiating risks within, and to, the financial system.

70. The widespread poverty and unemployment caused by the Great Depression, for example, apparently fostered a significant increase in crime. See Jeffrey L. Kirchmeier, *Another Place Beyond Here: The Death Penalty Moratorium Movement in the United States*, 73 U. COLO. L. REV. 1, 11 (2002) (discussing an explosion of executions as probably resulting from increased crime due to the Great Depression); cf. Erin Ryan, *Federalism and the Tug of War Within: Seeking Checks and Balance in the Interjurisdictional Gray Area*, 66 MD. L. REV. 503, 636–37 (2007) (“[P]ragmatism . . . seems well-suited to the circumstances of the time: massive unemployment, farmer uprisings and hunger marches, public rioting, and widespread fear of revolt.”).

71. VISCUSI ET AL., *supra* note 57, at 9.

72. See U.S. DEP'T OF HOMELAND SEC., PANDEMIC INFLUENZA: PREPAREDNESS, RESPONSE, AND RECOVERY—GUIDE FOR CRITICAL INFRASTRUCTURE AND KEY RESOURCES (2006), available at <http://www.pandemicflu.gov/plan/pdf/CIKRpandemicInfluenzaGuide.pdf>.

73. Critical industry sectors are broken down into critical infrastructure and key resources. Critical infrastructure is defined as “systems and assets . . . so vital to the United States that [their] incapacity or destruction . . . would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.” *Id.* at 20. Critical infrastructure includes thirteen sectors: banking and finance, food and agriculture, national monuments and icons, chemical and hazardous materials, defense industrial base, water, public health and healthcare, energy, emergency services, information technology, telecommunications, postal and shipping, and transportation. *Id.* at 7. Key resources include: commercial facilities, government facilities, dams, and nuclear power plants. *Id.*

is to preserve the stability of these industry sectors in the face of a pandemic.<sup>74</sup>

For analysis purposes, the remainder of this Article will assume that preservation of the financial system is socially desirable<sup>75</sup> and that stability should therefore be an important regulatory goal.<sup>76</sup> The goals of regulating systemic risk thus should include both efficiency and stability.<sup>77</sup>

### 3. Regulatory Costs and “Efficiency”

These goals can help to identify potential approaches to regulating systemic risk. Any regulatory regime incorporating these goals should be carefully crafted, however, because regulation carries costs.<sup>78</sup> Indeed, its direct and

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74. *Id.* at 20. DHS is concerned that a pandemic, by disturbing these industry sectors, might cause “economic disruption” and “social disturbance.” *Id.* at 28.

75. This is not to say that preserving the financial system will always be socially optimal. An iconoclast might contend that a collapse of the financial system could, in the long run, sometimes be beneficial for society, such as by redistributing wealth (although there is no assurance how wealth would be redistributed, and it is likely that overall wealth would be much diminished). Even the Great Depression arguably resulted in some desirable changes, such as social security, that might not otherwise have been politically feasible. *But see* Milton Friedman, *Social Security Chimeras*, N.Y. TIMES, Jan. 11, 1999, at A17 (finding it “hard to justify requiring 100 percent of the people to adopt a Government-prescribed [social security] straitjacket”).

76. Another way to view stability as a goal of systemic-risk regulation derives from the recognition that, in matters of health and safety, increasing social well-being and not economic efficiency alone is generally understood to be the goal of regulation. Because it is difficult to identify non-efficiency goals for traditional financial regulation, *see* Steven L. Schwarcz, *Private Ordering*, 97 NW. U. L. REV. 319, 331–32 (2002), it might seem that any ultimate inquiry into consequences would require empirical testing and, to some extent, may be more of a political than a legal determination. In the case of systemic risk, however, the answer may be more straightforward: the non-efficiency goals should be those needed to prevent systemic risk’s devastating consequences to health and safety. It is these consequences, not the inherent nature of systemic risk per se, that makes the question of regulating systemic risk most important. *Cf.* RICHARD A. POSNER, LAW, PRAGMATISM, AND DEMOCRACY 59–85 (2003) (arguing for pragmatism by paying attention to consequences, and contending this is more important than legal formalism or seeking high principles); Yamaguchi, *supra* note 7, at 2–3 (considering the importance of consequences in the context of strategic interactions and central banks). These consequences can be prevented, however, by preventing the collapse of the financial system.

77. Although I recognize that efficiency, in a broad sense, includes not only health and safety, *see supra* note 71 and accompanying text, but also stability, it will be analytically useful to view stability as separate from efficiency per se.

78. *See, e.g.*, JOHN EATWELL & LANCE TAYLOR, GLOBAL FINANCE AT RISK 19 (2000) (“[R]egulation can be expensive and oppressive or even downright wrongheaded. Overly fastidious regulation may result in risks being overpriced, and hence will stifle enterprise . . . . A balance needs to be struck . . . .”); *see also* EDITH STOKEY & RICHARD ZECKHAUSER, A PRIMER FOR POLICY ANALYSIS 309–10 (1978) (“[T]he history of [government] interventions to deal with market failure is a history of disappointments[, and hence one] should recognize that market failure does not mandate government intervention; it just suggests the possibility that such intervention might prove beneficial.”); *cf.* Steven L. Schwarcz, *The Easy Case for the Priority of Secured Claims in Bankruptcy*, 47 DUKE L.J. 425, 475 n.225 (1997) (discussing the ability of market participants, in this case lenders, to find alternative markets, but that in the case of systemic risk, shifting investments to foreign markets (capital flight) would harm the domestic economy). Regulation also can be misguided or counterproductive, sometimes even conflating cause and effect. *Cf.* POSNER, *supra* note 34, at 457 (observing that securities market regulation is “founded on the premise that without such regulation [such markets] would not function satisfactorily,” but then arguing that this premise “is rooted in part in a misconception about the great depression of the 1930s”—the misconception being the natural tendency to think of the 1929 stock market crash as



indirect costs can be high.<sup>79</sup> The former include the cost of hiring government (or government-delegated) employees to enforce the regulation as well as associated monitoring and compliance costs.<sup>80</sup> The latter include unintended consequences of regulation, such as moral hazard (the greater tendency of people who are protected from the consequences of risky behavior to engage in such behavior),<sup>81</sup> loss of economic welfare caused by firms performing fewer transactions, and the dynamic costs of regulations acting as a barrier to innovation.<sup>82</sup> For example, government intervention (or bailout loans) to prop up a failing company can foster moral hazard by making companies take more risks and investors act less diligently or cautiously.<sup>83</sup> Regulation also can disrupt the efficient evolution of markets and can be downright counterproductive if the market would naturally adjust to information that caused its failure. According to the late Milton Friedman, for example, the government's reactive policy of contracting the capital supply in the banking market exacerbated the severity of the Great Depression.<sup>84</sup>

In identifying regulatory approaches, the discussion below therefore takes into account not only the goals of stability and efficiency but also the costs of regulation based on these goals. Although the concept of efficiency technically should embody costs, there are two notions of efficiency at issue here. The first notion concerns efficiency in the context of systemic risk, which means preventing or internalizing externalities and correcting market failures.<sup>85</sup> Because

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resulting from abuses and, in turn, being a cause of the depression, whereas a precipitous decline in stock prices is more likely to result from the expectation of a decline in economic activity).

79. Even where there is market failure, "government intervention may not [always] yield a superior outcome." VISCUSI ET AL., *supra* note 57, at 10; *see also id.* at 13 ("[G]overnment failure' may be of the same order of importance as market failure.'").

80. *See, e.g.*, David T. Llewellyn, *Competition and the Regulatory Mix*, NAT'L WESTMINSTER BANK Q. REV., Aug. 1987, at 4-5; *see also* EATWELL & TAYLOR, *supra* note 78, at 19 (observing that overly fastidious regulation may result in risks being overpriced).

81. *See* Charles G. Hallinan, *The "Fresh Start" Policy in Consumer Bankruptcy: A Historical Inventory and an Interpretive Theory*, 21 U. RICH. L. REV. 49, 84 (1986) (relying on the economic definition of moral hazard: debtors and creditors that are protected from the consequences of default "could be expected to increase both excessive borrowing and excessive resort to bankruptcy"). In the insurance context, in which the term "moral hazard" arose, it means "the deliberate efforts by the insured to bring about the insured event, as when the owner of life insurance commits suicide." Richard A. Epstein, *Products Liability as an Insurance Market*, 14 J. LEGAL STUD. 645, 653 (1985).

82. *See* GOWLAND, *supra* note 62, at 21.

83. In a non-financial context, an example would be government aid (somewhat analogous to bailout loans) to flood-plain homeowners that encourages those homeowners to rebuild in the flood plain. *See* Robert McLeman & Barry Smit, *Vulnerability to Climate Change Hazards and Risks: Crop and Flood Insurance*, 50 CAN. GEOGRAPHER 217 *passim* (2006).

84. *See* Milton Friedman, *Have Monetary Policies Failed?*, 62 AM. ECON. REV. 11, 12 (1972) ("There was no need for monetary authorities to permit a decline of one-third in the quantity of money. They could have prevented a decline and produced an increase. If they had, I do not believe the great depression would have occurred. In that sense, monetary policy failed."); *see also* Francis A. Bottini, Jr., Comment, *An Examination of the Current Status of Rating Agencies and Proposals for Limited Oversight of Such Agencies*, 30 SAN DIEGO L. REV. 579, 610 (1993) ("Too much regulation inhibits economic growth by increasing costs and making capital harder to raise.").

85. *See supra* notes 62-63 and accompanying text.

systemic risk can cause market failures and associated externalities,<sup>86</sup> any regulatory approach that reduces systemic risk—and thus presumably any of the regulatory approaches identified below—will be efficient under that first notion. The discussion below therefore need not focus on this first notion of efficiency. The second notion of efficiency concerns the costs of regulation. Because regulation can be costly, efficiency also demands that the costs of regulation do not exceed its benefits.<sup>87</sup> This second notion of efficiency thus becomes more transparent by separately recognizing those costs.<sup>88</sup>

## B. IDENTIFYING REGULATORY APPROACHES

To understand how systemic risk should be regulated, it is helpful to first examine historical approaches.

### 1. Historical Approaches

Historically, regulation of systemic risk has focused largely on preventing bank failure.<sup>89</sup> For example, federal insurance of bank deposits through the Federal Deposit Insurance Corporation (“FDIC”) is intended to prevent bank runs by alleviating fear that banks will default on deposit accounts.<sup>90</sup> Also, capital adequacy requires banks to hold minimum levels of capital, a requirement intended to limit excessive risk taking and buffer against financial crisis.<sup>91</sup> In an international context,<sup>92</sup> the Basel II Capital Accord (“Basel II”) recently articulated a system of capital holding requirements based on banks’ risk exposures as the first of three regulatory “pillars.”<sup>93</sup> Basel II outlines credit risk, operational risk, and market risk as the three issues that should influence capital holding requirements.<sup>94</sup> The benefits of Basel II are said to include greater

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86. Whether efficiency should also be judged by whether the financial system being stabilized is itself efficient is beyond the scope of this Article, which assumes for analysis purposes that the existing financial system is efficient and thus preserving it is a public good. For a discussion of whether the collapse of a financial system sometimes could, in the long run, be beneficial for society, see *supra* notes 75–77 and accompanying text.

87. See RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* § 1.2, at 13–14 (4th ed. 1992) (discussing this “Kaldor-Hicks” standard as the operating standard of efficiency); accord Louis Kaplow & Steven Shavell, *Fairness Versus Welfare*, 114 HARV. L. REV. 961, 1015 (2001).

88. See *infra* notes 273–80 and accompanying text (computing the cost-benefit efficiency of regulating systemic risk by separately recognizing *R*, the cost of regulation).

89. See Yamaguchi, *supra* note 7, at 2.

90. See Steven A. Ramirez, *The Law and Macroeconomics of the New Deal at 70*, 62 MD. L. REV. 515, 543–44 (2003). The FDIC scheme insures each depositor’s accounts up to \$100,000 at each insured institution. Certain accounts may have higher limits, such as Individual Retirement Accounts, which have a limit of \$250,000. FED. DEPOSIT INS. CORP., *INSURING YOUR DEPOSITS*, available at <http://www.fdic.gov/deposit/deposits/insuringdeposits/iyd.pdf>.

91. DAVIS, *supra* note 18, at 124–26; see Eichberger & Summer, *supra* note 21, at 1.

92. For an analysis of the international dimensions of regulating systemic risk, see *infra* Part III.

93. See BASEL COMM. ON BANKING SUPERVISION, *INTERNATIONAL CONVERGENCE OF CAPITAL MEASUREMENT AND CAPITAL STANDARDS: A REVISED FRAMEWORK 2–5* (2006), available at <http://www.bis.org/publ/bcb128.pdf>.

94. *Id.*

transparency and a state-of-the-art approach to risk management that “make banking safer and more profitable.”<sup>95</sup>

Even in their limited contexts, these approaches are imperfect. Some economists argue, for example, that rules preventing bank failure can cause moral hazard. Banks may increase risk exposures and reduce their capital ratios, knowing that the safety net will protect against sudden runs.<sup>96</sup> And the creation of the FDIC safety net of deposit insurance removed “a major automatic mechanism by which troubled banks were previously closed and resolved” when depositors withdrew funds from insolvent banks.<sup>97</sup> Deposit insurance also can permit insolvent banks to remain in operation and continue to generate losses,<sup>98</sup> such as the \$150 billion of losses generated by the ongoing operation of insolvent savings and loan associations.<sup>99</sup>

Capital requirements are similarly imperfect. Constraining lending activities of banks can redirect funds to lenders whose constraints are not binding.<sup>100</sup> Capital requirements also are said to undercut the ability of banks to build equity value.<sup>101</sup> These requirements also can be imprecise, since the standards by which they are imposed are imprecise.<sup>102</sup>

After the near-failure of LTCM, several U.S. government agencies have attempted to study how to mitigate systemic risk arising from hedge-fund failure.<sup>103</sup> However, the main government report—spearheaded by the Federal Reserve Board—provided only general recommendations such as increased public disclosure of hedge fund activity, increased disclosure by public companies of exposures to highly-leveraged hedge funds, enhanced private sector risk-management practices, expanded risk-assessment authority for regulators over unregulated broker dealers and futures commission merchants, and in-

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95. MARC B. LAMBRECHT, *THE BASEL II RATING: ENSURING ACCESS TO FINANCE YOUR BUSINESS* 9 (2005); *see also* Jaime Caruana, *A Review of the New Basel Capital Accord*, in *MARKET DISCIPLINE ACROSS COUNTRIES AND INDUSTRIES* 25 (Claudio Borio et al. eds., 2004).

96. *See* Kaufman, *supra* note 9, at 23; *cf.* POSNER, *supra* note 34, at 461 (arguing that the widespread bank failures during the 1930s were “thought, perhaps erroneously, to have been an important cause of the severity of the business contraction,” resulting in excessive banking regulation).

97. Kaufman, *supra* note 9, at 24.

98. *Id.*

99. *Id.*

100. *See* Jane D’Arista, *Financial Regulation in a Liberalized Global Environment*, in *INTERNATIONAL CAPITAL MARKETS: SYSTEMS IN TRANSITION* 75, 76 (John Eatwell & Lance Taylor eds., 2002) (discussing reciprocal flight of American and British banking activity to avoid domestic regulation).

101. Eichberger & Sumner, *supra* note 21, at 22 (“Banks which face a binding capital adequacy constraint and whose firms are successful will end up with positive, but lower equity value than in a situation without regulation. Thus, in the following period, they are likely to be constrained again. Hence, capital adequacy constraints affect[] also the capacity of banks to build up equity value.”).

102. *See* Frank Partnoy, *Why Markets Crash and What Law Can Do About It*, 61 U. PITT L. REV. 741, 781–82 (2000) (arguing that bank capital adequacy requirements are “seriously flawed” because their heavy reliance on credit ratings leads to inaccuracies, banks are able to use derivatives to add risk in ways that these requirements do not take into account, and such requirements also “rely on short-term measures of [earnings] volatility that do not capture the risks of bank failure”).

103. These agencies include the Department of the Treasury, the SEC, and the Commodity Futures Trading Commission. PRESIDENT’S WORKING GROUP, *supra* note 6, at cover page.

creased off-shore hedge-fund compliance with international standards.<sup>104</sup> Even the Chairman of the U.S. Federal Reserve Board acknowledges the ongoing challenge.<sup>105</sup>

Finally, although certain governmental bodies, such as the U.S. General Accounting Office and the Securities and Exchange Commission (SEC), have recommended specific oversight practices and reporting requirements for hedge funds,<sup>106</sup> these practices and requirements do not focus on systemic risk per se. The SEC, for example, is concerned about secret agreements that give some, but not all, hedge-fund investors privileged information about holdings or special redemption terms and about the tendency of some hedge-fund managers to overvalue fund assets to maximize performance-based management fees or to hide losses.<sup>107</sup> These problems are real,<sup>108</sup> but their significance pales in comparison to the problem of systemic risk.<sup>109</sup> Furthermore, the SEC appears to lack the jurisdiction to attack even these peripheral problems:

[M]anaging systemic risk in financial markets is a role that has fallen principally to the Treasury Department and the Fed, not the SEC. The SEC is not charged with managing systemic risk in financial markets by, say, trying to constrain leverage or certain speculative activities and complex derivatives transactions. Indeed, the SEC's expertise does not extend to managing systemic risk.<sup>110</sup>

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104. *Id.* at 29–43.

105. Bernanke has observed that “provisional[ly]” the recommendations of the President’s Working Group “apparently have been effective” in that hedge-fund failures have not, “for the most part,” resulted in losses to creditors and counterparties, and there is a “general perception among market participants . . . that hedge funds are less highly leveraged” (though he notes the possibility of non-transparent leverage). Bernanke, *supra* note 6, at 2. However, “some concerns about counterparty risk management remain and may have become even more pronounced given the increasing complexity of financial products” and the fact that “hedge funds have greatly expanded their activities and strategies.” *Id.* Subsequent to Bernanke’s report, a consensus has arisen—contrary to the “general perception” Bernanke refers to above—that hedge funds are now much more highly leveraged than ever. *See, e.g.*, Randall Smith & Susan Pulliam, *Outer Limits: As Funds Leverage Up, Fears of Reckoning Rise*, WALL ST. J., Apr. 30, 2007, at A1.

106. U.S. GEN. ACCOUNTING OFFICE, *supra* note 6, at 24; *see Investor Protection and the Regulation of Hedge Funds Advisers: Hearing Before the S. Comm. on Banking, Housing, and Urban Affairs*, 108th Cong. (2004) (testimony of William H. Donaldson, Chairman, SEC), available at <http://www.sec.gov/news/testimony/ts071504whd.htm>.

107. *See* Mara der Hovanesian, *The SEC Isn't Finished with Hedge Funds*, BUS. WK., July 17, 2006, at 34.

108. For additional non-systemic problems that might be within the province of SEC regulation, *see* Paredes, *supra* note 4, at 990–1004.

109. *See, e.g.*, PRESIDENT’S WORKING GROUP, *supra* note 6; Chan et al., *supra* note 13; Timothy F. Geithner, President and CEO, Fed. Reserve Bank of N.Y., *Hedge Funds and Their Implications for the Financial System*, Keynote Address Before the Federal Reserve Bank of New York 3 (Nov. 17, 2004), available at [www.newyorkfed.org/newevents/speeches/2004/gei041117.html](http://www.newyorkfed.org/newevents/speeches/2004/gei041117.html); *see also* COUNTERPARTY RISK MGMT. POLICY GROUP II, TOWARD GREATER FINANCIAL STABILITY: A PRIVATE SECTOR PERSPECTIVE (2005), available at <http://www.crmppolicygroup.org/docs/CRMPG-II.pdf> (recognizing systemic risk as the central issue of hedge-fund failure).

110. Paredes, *supra* note 4, at 999 (citations omitted); *accord* Goldstein v. SEC, 451 F.3d 873 (D.C. Cir. 2006).

The primary lesson of these historical approaches is that attempts to regulate systemic risk can be imperfect and messy. Other lessons are quite secondary because the historical focus has been on bank systemic risk whereas modern models of systemic risk should also focus on non-bank and market failures. To appreciate the difference, consider the recent subprime mortgage crisis. The Federal Reserve attempted to reduce the likelihood that this crisis might affect other financial markets by cutting the discount rate, which is the interest rate the Federal Reserve charges a bank to borrow funds when the bank is temporarily short of funds.<sup>111</sup> The European Central Bank and other central banks similarly cut the interest rate they charge to borrowing banks.<sup>112</sup> These steps, however, directly impacted banks, not financial markets.<sup>113</sup> Furthermore, changes in monetary policy, such as cutting interest rates, may not work quickly enough—or may even be too weak—to quell panics, falling prices, and systemic collapse.<sup>114</sup> The models advanced in this Article are intended to deter these failures by augmenting, not replacing, traditional monetary policy. The Article therefore next considers potential future regulatory approaches to complement monetary policy.<sup>115</sup>

## 2. Potential Future Approaches

To identify regulatory approaches, it is useful to think not only conceptually but also in concrete terms. For the latter purpose, it might be helpful to consider the following generic example, which is consonant with the working definition of systemic risk suggested here<sup>116</sup> and consistent with the supposition made by the President's Working Group on Financial Markets, Hedge Funds, Leverage, and the Lessons of Long-Term Capital Management,<sup>117</sup> as well as testimony before the U.S. House of Representatives Committee on Banking and Financial Services<sup>118</sup> of what a systemic market meltdown could look like. A large hedge fund or private-equity company defaults, for whatever reason. Its many contractual counterparties rush to try to close out or otherwise protect their positions on

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111. See Greg Ip et al., *Stronger Steps: Fed Offers Banks Loans To Ease Credit Crisis*, WALL ST. J., Aug. 18, 2007, at A1; Finance Glossary, *supra* note 53, at <http://www.duke.edu/%7Echarvey/Classes/wpg/bfglosd.htm> (last visited May 14, 2008).

112. Smith et al., *supra* note 2, at A1.

113. See Ip et al., *supra* note 111, at A1 (“[T]he [Fed’s] discount window’s reach in the current crisis is limited by the fact that only banks can use it, and they aren’t the ones facing the greatest strains.”).

114. Cf. Seth Carpenter & Selva Demiralp, *The Liquidity Effect in the Federal Funds Market: Evidence from Daily Open Market Operations*, 38 J. MONEY, CREDIT & BANKING 901, 918–19 (2006) (concluding that although a change in monetary policy can begin to affect the cost of capital within a day, its full effects can take much longer); Serena Ng, *Fed Fails So Far in Bid To Reassure Anxious Investors*, WALL ST. J., Aug. 21, 2007, at A1. Because financial markets are tightly coupled, spiraling events may well occur rapidly, within days. See *infra* note 120.

115. For an in-depth analysis of the subprime mortgage crisis, its impact on financial markets, and its application to the principles discussed in this Article, see Schwarcz, *supra* note 1.

116. See *supra* notes 46–55 and accompanying text.

117. See *supra* note 41 and references therein.

118. See *supra* notes 36–37 and accompanying text.

hundreds of billions of dollars in transactions. As a result, collateral is liquidated and assets are sold in “fire-sales,” causing prices to drop sharply.<sup>119</sup> The price-drops in turn exacerbate the rush to close out positions, which in turn causes prices to drop further. The price-drops become so severe that one or more capital markets stop functioning, at least temporarily. Investors lose confidence and begin withdrawing their money from the remaining capital markets, weakening those markets and—due to a perception, if not reality, of heightened default risk—leading to a significant widening of credit spreads and a resulting higher cost of capital. In a vicious cycle, the increased cost of capital triggers defaults and also causes further liquidations of positions (to generate cash) and thus, more price-drops.<sup>120</sup>

Based on the normative rationales for regulating systemic risk, the lessons of historical regulation, and the foregoing example, this Article next examines a range of potential regulatory approaches. Certain of these approaches are *ex ante* preventative, or prophylactic, to reduce the risk of systemic collapse; others are *ex post* reactive to mitigate the spread and consequences of systemic collapse.

*a. Averting Panics.* The ideal regulatory approach aims to eliminate the risk of systemic collapse, *ab initio*. Theoretically, this goal could be achieved by preventing financial panics, since they are often the triggers that commence a chain of failures. Economists sometimes refer to this approach as the “monetarist” approach, identifying systemic risk with banking panics that produce monetary contraction.<sup>121</sup> This approach appears to be a key feature of existing bank regulation, which endeavors to prevent bank runs through governmental deposit insurance.<sup>122</sup> Panics can trigger market failures even outside the banking arena, however, such as when doubt arising over a market’s future liquidity triggers a stampede to sell first while the market is still liquid, thereby inadver-

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119. *See, e.g.*, DAVIS, *supra* note 18, at 127–28 (describing how markets are depressed when failing institutions are forced by creditors to liquidate their assets in distress sales); *see also* Cifuentes et al., *supra* note 64, at 11 (“[R]ecent theoretical literature on banking and financial crises . . . has emphasizes [sic] the limited capacity of the financial markets to absorb sales of assets.”); *infra* note 125 and accompanying text.

120. These spiraling events may well occur rapidly, within days. *See, e.g.*, *Systemic Risk: Examining Regulators’ Ability To Respond to Threats to the Financial System: Hearing Before the H. Comm. on Financial Services*, 110th Cong. 1 (2007) (testimony of Richard Bookstaber), available at [http://www.house.gov/apps/list/hearing/financialsvcs\\_dem/ht1002072.shtml](http://www.house.gov/apps/list/hearing/financialsvcs_dem/ht1002072.shtml) (observing the “tendency for the markets to move rapidly into a crisis mode,” and referring to this tendency, by analogy to engineering, as “tight coupling”); *see also* Michael Mandel, *The Economy’s Safety Valve*, BUS. WK., Oct. 22, 2007, at 34, 37 (quoting Professor Barry Eichengreen that “[t]he different components of the financial system are tightly linked to each other”).

121. MILTON FRIEDMAN & ANNA JACOBSON SCHWARTZ, *A MONETARY HISTORY OF THE UNITED STATES 1867–1960*, at 311 (1963). Such a panic can occur, for example, when depositors and investors “fear that means of payment will be unobtainable at any price.” Bordo et al., *supra* note 23, at 7.

122. *Deposit Insurance: Hearing Before the S. Comm. on Banking, Housing, and Urban Affairs*, 108th Cong. (2003) (statement of Alan Greenspan, Chairman, U.S. Fed. Reserve Sys.), available at <http://www.federalreserve.gov/boarddocs/testimony/2003/20030226/default.htm>.

tently destroying the market's liquidity;<sup>123</sup> or, as in the generic example of a systemic market meltdown,<sup>124</sup> when contractual counterparties rush to try to close out their positions, causing prices to drop so sharply that one or more capital markets stop functioning (at least temporarily), which in turn leads to a vicious cycle in which investors lose confidence.<sup>125</sup>

Imposing regulation to help avert panics can facilitate the goal of stability. In the context of the above generic example, regulation might place conditions on closing capital markets and provide liquidity to keep them open, thereby obviating the vicious cycle that would be triggered if one or more such markets stopped functioning. Had this type of regulation been in place in the late 1990s, some believe it would have alleviated the East Asian capital crisis of 1997–98.<sup>126</sup> Incongruously, sometimes stability can be achieved by closing down capital markets to halt price-drops,<sup>127</sup> though this can backfire by actually

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123. See DAVIS, *supra* note 18, at 121.

124. See *supra* notes 116–20 and accompanying text.

125. To some extent this vicious cycle is exacerbated by the common requirement that a securities account be adjusted in response to a change in the market value of the securities. 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. ZVI BODIE, ALEX KANE & ALAN J. MARCUS, *INVESTMENTS* 78–79 (7th ed. 2008). Requiring investors to “mark-to-market” in this fashion is generally believed to reduce systemic risk. See, e.g., Gikas A. Hardouvelis & Panayiotis Theodossiou, *The Asymmetric Relationship Between Initial Margin Requirements and Stock Market Volatility Across Bull and Bear Markets*, 15 *REV. FIN. STUD.* 1525, 1554–55 (2002) (finding a correlation between higher margin calls and decreased systemic risk, and speculating that higher margin calls may bleed the irrationality out of the market until only sound bets are left). Nonetheless, it can cause “perverse effects on the stability of a financial system” during times of market turbulence, 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 the downward spiral. Cifuentes et al., *supra* note 64, at 32; see also Clifford De Souza & Mikhail Smirnov, *Dynamic Leverage: A Contingent Claims Approach to Leverage for Capital Conservation*, *J. PORTFOLIO MGMT.*, 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, with the process repeating itself until markets improve or the firm is wiped out, and referring to this process as a Critical Liquidation Cycle). The existence of leverage makes this cycle more likely and amplifies it if it occurs. *Id.* at 26–27, 37 (explaining that leverage decreases the amount of capital relative to potential cash obligations, and that the Critical Liquidation Cycle begins whenever this equity falls below the level necessary to meet the firm's obligations and equity cannot be raised by selling assets without incurring losses).

126. Cf. Andrew Elek & Dominic Wilson, *The East Asian Crisis and International Capital Markets*, *ASIAN-PAC. ECON. LITERATURE*, May 1999, at 1, 7 (describing investor withdrawal of capital and resulting large-scale insolvency due to market illiquidity).

127. See, e.g., Partnoy, *supra* note 102, at 782–83 (characterizing this approach as a “circuit breaker”). Capital markets in the United States, for example, were closed for this purpose following the 9/11 attacks. Margo McCall, *Uncertainty Follows Tragedy*, *WIRELESS WK.*, Sept. 17, 2001, at 1.

increasing investor panic.<sup>128</sup>

Any regulation aimed at preventing panics that trigger systemic risk, however, could fail to anticipate all the causes of these panics. Former Federal Reserve Vice Chairman Alan Blinder, for example, stated that financial “panics can be set off by any number of things.”<sup>129</sup> Furthermore, even when identified, panics cannot always be averted easily. Consider, for example, price shocks that cause panics.<sup>130</sup> These shocks should not result from known risks because rational investors will price-in the cost of those risks.<sup>131</sup> But investors are not always rational. Earlier this decade, “high-yield corporate bonds (formerly known as junk bonds) were able to attract buyers only by offering interest rates eight to ten percentage points higher than U.S. government bonds.”<sup>132</sup> By early 2007, however, high-yield bonds could attract investors by offering interest rates only a “little more than two percentage points” higher than government bonds.<sup>133</sup> Although the reason for this marked decline in the risk premium is unclear,<sup>134</sup> it may be attributable in part to the availability heuristic:<sup>135</sup> investors

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128. Partnoy, *supra* note 102, at 783 (arguing that closing down markets “may actually fuel panic,” and explaining that “[t]here is no empirical evidence supporting this point, but it seems equally plausible that investor cognitive error would increase more during the period in which the circuit breaker [closing down the market] is in effect than it would have increased during a period of panic selling”).

129. Eduardo Porter, *Shanghai What-If: How a Shock Can Become a Shock Wave*, N.Y. TIMES, Mar. 4, 2007, at WK3 (quoting observation by Alan Blinder, Princeton University economist and former Vice Chairman, Board of Governors, U.S. Fed. Reserve Sys.).

130. *Cf.* DAVIS, *supra* note 18, at 12 (observing that mispricing can lead to increased market vulnerability); Bordo et al., *supra* note 23, at 10 (discussing how “speculative mania” can turn into market crisis).

131. *Cf.* POSNER, *supra* note 34, at 446 (observing that investors, who are risk-averse, will want to be compensated for risk that cannot be eliminated).

132. Paul Krugman, Editorial, *The Big Meltdown*, N.Y. TIMES, Mar. 2, 2007, at A17.

133. *Id.* Internationally, the decline in the risk premium has been even more pronounced, with high-yield European bonds commanding nearly sixteen percent interest in 2002 but recently less than three percent. Ravi Balakrishnan et al., *Globalization, Gluts, Innovation or Irrationality: What Explains the Easy Financing of the U.S. Current Account Deficit?* 12 (Int’l Monetary Fund, Working Paper No. 07/160, 2007).

134. Balakrishnan argues that the decline in the risk premium is due to a liquidity glut. *See* Balakrishnan, *supra* note 133, at 11. A participant in a faculty workshop suggested, anecdotally, that the decline might result from hedging, whereby risk gets spread out. *Cf. infra* notes 159–72 and accompanying text. Risk-spreading, however, would not appear to have more than a marginal effect on risk premiums. In the face of actual risk, well-informed hedging parties would themselves price-in the risk and thereby require that amount to be paid as consideration by the hedged parties. The hedged parties, in turn, would have to pay that price out of the risk premium. This appears no different than banks diversifying risk through the sale of loan participations, which does not significantly reduce the risk premium for borrowers since buyers of loan participations demand compensation for the portion of the risk they are assuming. *See* Steven L. Schwarcz, *Intermediary Risk in a Global Economy*, 50 DUKE L.J. 1541, 1557–61 (2001) (discussing loan participations). This Article later argues that spreading risk may well reduce systemic risk by reducing the chance that any given default will cause a chain of institutions to fail, *see infra* note 172 and accompanying text, but it should not reduce risk *within* the financial system.

135. Under the availability heuristic, people overestimate the frequency or likelihood of an event when examples of, or associations with, similar events are easily brought to mind. For example, people typically overestimate the divorce rate if they can quickly find examples of divorced friends. Paul



became complacent after observing that “the bursting of the technology bubble of the 1990s failed to produce a global disaster.”<sup>136</sup> It may also be attributable to herd behavior, which economists call “bandwagon behavior,”<sup>137</sup> under which investors follow the trends in markets and potentially overvalue or undervalue assets,<sup>138</sup> thereby making irrational investment decisions.<sup>139</sup>

Furthermore, because the same trigger can foreshadow small consequences sometimes and large consequences other times, regulation intended to avert panics should attempt to take into account what it is beyond the triggering event that sorts the magnitude of the consequences and should apply only to deter panics that trigger large consequences. It is questionable, though, whether such a sorting mechanism is always discernible *ex ante*.<sup>140</sup> Without such a sorting mechanism, regulation can impede market growth or undermine the market experimentation and innovation on which growth depends. For example, an underlying cause of the recent subprime mortgage crisis was that mortgage loans turned out to be undercollateralized due to the drop in home prices. One

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Slovic, Baruch Fischhoff & Sarah Lichtenstein, *Facts Versus Fears: Understanding Perceived Risk, in JUDGMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES* 463, 465 (Daniel Kahneman et al. eds., 1982).

136. Krugman, *supra* note 132.

137. *See, e.g.*, THOMAS CARGILL ET AL., *THE POLITICAL ECONOMY OF JAPANESE MONETARY POLICY* 108 (1997) (discussing “bandwagon behavior” and explaining that even when investors believe prices are abnormally high, they may invest further under the assumption that prices will rise for some time, and they will be the first to sell before prices fall).

138. *Cf.* Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 2004 U. ILL. L. REV. 1, 14 (discussing this phenomenon).

139. A famous example of irrational investment arose out of the tulip trade in seventeenth-century Holland. Certain tulips were highly prized and sold for thousands of guilder. Almost everyone got caught up in the excitement of buying and selling tulip bulbs, usually on credit and with the intention of making a quick profit. When the market finally crashed, many who speculated on credit were left with crushing debts. Sam Segal, *Tulips Portrayed: The Tulip Trade in Holland in the 17th Century*, in *THE TULIP: A SYMBOL OF TWO NATIONS* 17–20 (Michiel Roding & Hans Theunissen eds., 1993). Irrational investment trends can start quite easily. If, for example, a particular stock unexpectedly gains in value, the losers (for example, those shorting the stock) will tend to withdraw from that market, and the winners will tend to increase their investment, driving up the price even further. Soon, other winners are attracted to the stock, and other losers cut their losses and stop shorting the stock. This process is aided by almost inevitable explanations of why it is “rational” for the price to keep going up and why the traditional relationship of price to earnings does not apply. Even investors who recognize the bubble as irrational may buy in, hoping to sell at the height of the bubble before it bursts. RICHARD BOOKSTABER, *A DEMON OF OUR OWN DESIGN: MARKETS, HEDGE FUNDS, AND THE PERILS OF FINANCIAL INNOVATION* 169–70 (2007). In these ways, price movements can become somewhat self-sustaining. *Id.*

140. In the banking context, some scholars argue that the degree of information asymmetry within a given banking system is the main determinant of whether a similar trigger event will lead to a small panic or a large one, and that systems with large or heavily interconnected banks are less likely—because of institutional system-wide self-monitoring (and correspondingly less information asymmetry among system participants)—to experience large panics, whereas systems characterized by small and highly independent banks lack the means for effective self-monitoring. Gary Gorton & Lixin Huang, *Bank Panics and the Endogeneity of Central Banking*, 53 J. MONETARY ECON. 1613, 1627–28 (2006). Outside of banking, however, there is uncertainty. If a particular financial system is linear, like a tree of dominoes, it should be possible to calculate possible consequences. *See* BOOKSTABER, *supra* note 139, at 155–56. But if the system is non-linear, like the weather, even minute changes in the triggering event could lead to large macro differences in the outcome, making it difficult to calculate long-term consequences. *Id.* at 228–30.

could deter a similar future crisis by regulating a collateral-value restriction on mortgage loans, perhaps akin to that imposed on so-called “margin” loans after the Great Depression.<sup>141</sup> Mortgage lenders would then have to discount home values to anticipate the possibility of falling home prices. But that would not only significantly impede the growth in home ownership, but also impose a high administrative cost on lenders as well as on government employees monitoring the regulation.

*b. Disclosure.* Another potential prophylactic approach is disclosure. Disclosing risks traditionally has been viewed, at least under U.S. securities laws, as the primary market-regulatory mechanism.<sup>142</sup> It works by reducing, if not eliminating, asymmetric information among market players, making the risks transparent to all.<sup>143</sup> It therefore might seem that financial panics would be minimized in a world of perfect disclosure because investors would price-in all risks.<sup>144</sup> Indeed, the government report issued after LTCM’s near-failure recommended increased public disclosure by hedge funds.<sup>145</sup>

In the context of systemic risk, however, individual market participants who fully understand that risk will be motivated to protect themselves but not the system as a whole.<sup>146</sup> Requiring non-public entities such as hedge or private-equity funds to disclose their financial condition or leverage would thus do relatively little to deter systemic risk, because investors or counterparties of those entities are unlikely to care about that disclosure to the extent it pertains to systemic risk.<sup>147</sup> Furthermore, those investors and counterparties already demand, and usually receive, disclosure to the extent it helps them assess the merits of their investments, qua investments.<sup>148</sup>

141. This collateral-value restriction on margin loans is imposed under Regulations G, T, U, and X, which require a two-to-one collateral-value-to-loan ratio on loans to purchase margin (that is, publicly-traded) stock, secured by such stock. 12 C.F.R. §§ 207, 220, 221, 224 (2008).

142. Greg Lumelsky, *Does Russia Need a Securities Law?*, 18 Nw. J. INT’L L. & BUS. 111, 122–23 (1997) (“Since before the New Deal, the U.S. philosophy of securities regulation has been based on the provision of continuous, accurate, public disclosure as a remedy against fraud and as a way to reduce risk associated with the purchase and sale of securities.”).

143. *Id.*

144. *Cf.* POSNER, *supra* note 34, at 146 (indicating that investors will want to be compensated for risk that cannot be eliminated).

145. *See supra* note 104 and accompanying text.

146. Systemic risk can be likened to a tragedy of the commons. *See supra* notes 63–67 and accompanying text.

147. *Cf.* Roberta Romano, *A Thumbnail Sketch of Derivative Securities and Their Regulation*, 55 MD. L. REV. 1, 79–80 (1998) (arguing that improved disclosure would not have prevented hedge-fund problems).

148. *See* STUART A. McCRARY, HEDGE FUND COURSE 255 (2005) (“Investors may demand more disclosures [from hedge funds] than the minimum required . . . [and] receive as much information as would be disclosed if the investment was registered.”); 2 HOUSE OF COMMONS TREASURY COMMITTEE, PRIVATE EQUITY: TENTH REPORT OF SESSION 2006–07, 2007, H.C. 567-II at 93 (Eng.) (“[Private equity] investors frequently demand, and receive, far more comprehensive and detailed disclosures than investors in public companies, both on the fund in which they have invested and on the companies represented in the fund’s portfolio.”).

Imposing additional disclosure requirements may even prove counterproductive, causing market participants to change their behavior. Thus, traders may become more cautious, demanding that prices move farther before making trades, thereby ultimately reducing market liquidity.<sup>149</sup>

The efficacy of disclosure is further limited by the increasing complexity of transactions and markets.<sup>150</sup> A contributing factor to the recent subprime crisis, for example, is allegedly that “[a] lot of institutional investors bought [mortgage-backed] securities substantially based on their ratings [without fully understanding what they bought], in part because the market has become so complex.”<sup>151</sup> The complexity increases to the extent derivatives are involved; it has been argued that investment strategies utilizing derivative instruments are so complex that, even if disclosure is provided, sophisticated investors (or regulators) might not be able to fully appreciate the risk of any given strategy.<sup>152</sup> This risk can be significant because derivatives can allow leverage up to one thousand times the amount of capital put down.<sup>153</sup>

This Article does not purport to resolve the ongoing broader debate of whether to regulate derivatives, absent effective disclosure.<sup>154</sup> In the context of systemic risk, however, the issue of derivatives regulation is best viewed as bifurcated: regulation of derivatives used for speculation and regulation of derivatives used for hedging. Derivatives used for speculation are thought to increase the potential for systemic risk.<sup>155</sup> Recently enacted derivatives-netting

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149. BOOKSTABER, *supra* note 139, at 221; *cf.* Romano, *supra* note 147, at 81 (arguing that if government imposes too much regulation, less experienced investors might be lulled into engaging in derivatives trading).

150. *See* Schwarcz, *supra* note 138, at 4 (arguing that the increasing complexity of transactions and markets is making disclosure less able to reduce information asymmetry and that supplementary approaches should be sought to reduce such asymmetry).

151. Aaron Lucchetti & Serena Ng, *Credit and Blame: How Rating Firms' Calls Fueled Subprime Mess*, WALL ST. J., Aug. 15, 2007, at A1 (quoting a market observer); *see also* Daniel Andrews, *The Clean Up: Investors Need Better Advice on Structured Finance Products*, 26 INT'L FIN. L. REV. 14, 14 (Sept. 2007) (“Investors have the prospectuses to rely on, but the reality is that they have not taken any responsibility for reading the detail of the documentation or digesting the risks involved.”); Steven L. Schwarcz, *Disclosure's Failure in the Subprime Mortgage Crisis*, 2008 UTAH L. REV. (forthcoming) (explaining why complexity caused disclosure to fail in the subprime mortgage crisis).

152. *See, e.g.*, LOWENSTEIN, *supra* note 36, at 231 (arguing that derivatives are too complex for regulators to understand the extent of the risks they create, and that disclosure alone will not enable investors to understand the risks).

153. *See* Adam R. Waldman, Comment, *OTC Derivatives & Systemic Risk: Innovative Finance or the Dance into the Abyss?*, 43 AM. U. L. REV. 1023, 1055–56 (1994).

154. For an analysis of that larger debate, *see* Romano, *supra* note 147.

155. *See, e.g.*, Ludger Hentschel & Clifford W. Smith, Jr., *Risks in Derivatives Markets: Implications for the Insurance Industry*, 64 J. RISK & INS. 323, 342 (1997) (arguing that derivatives can increase risk if they are used for speculation rather than hedging); Frank Partnoy & David A. Skeel, Jr., *The Promise and Perils of Credit Derivatives*, 75 U. CIN. L. REV. 1019, 1040 (2007) (same); Michel Aglietta, *Financial Market Failures and Systemic Risk* 7–12, 15–26 (Centre d'Études Prospectives et d'Informations Internationales, Working Paper No. 1996-01, 1996) (same); Michael R. Darby, *Over-the-Counter Derivatives and Systemic Risk to the Global Financial System* 6–18 (Nat'l Bureau of Econ. Research, Working Paper No. 4801, 1994) (same). *But cf.* Ludger Hentschel & Clifford W. Smith, Jr., *Derivatives Regulation: Implications for Central Banks*, 40 J. MONETARY ECON. 305, 320–23 (1997)

provisions in the U.S. Bankruptcy Code,<sup>156</sup> however, are aimed at mitigating this risk.<sup>157</sup> The extent to which these netting provisions will be effective to reduce systemic risk is ultimately an empirical question.<sup>158</sup>

Derivatives used for hedging, in contrast, may—although it is not free from doubt<sup>159</sup>—actually reduce the potential for systemic risk. Hedging is intended to protect institutions from risk by using credit derivatives to diversify that risk.<sup>160</sup> The most widely used derivative instrument for this purpose is the credit-default swap, under which one party agrees, in exchange for receiving a fee paid by a second party, to assume the credit risk of certain debt obligations of a specified borrower or other obligor. If a “credit event” (for example, default or bankruptcy) occurs in respect of that obligor, the first party will either (i) pay the

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(arguing that derivatives reduce systemic risk); Myron S. Scholes, *Global Financial Markets, Derivatives Securities, and Systemic Risks*, 12 J. RISK & UNCERTAINTY 271, 277–85 (1996) (same).

156. See, e.g., 11 U.S.C. § 546 (2000 & Supp. 2006). These derivatives-netting provisions apply to all derivatives, whether used for speculation or for hedging. See *id.*

157. See, e.g., *Enron Corp. v. J.P. Morgan Sec.*, 325 B.R. 671, 684 (Bankr. S.D.N.Y. 2005); Rhett G. Campbell, *Financial Markets Contracts and BAPCPA*, 79 AM. BANKR. L.J. 697 *passim* (2005); Ellen H. Clark, *Developments in Derivatives and Synthetic Securitization Following the US Bankruptcy Reforms of 2005*, in *INNOVATIONS IN SECURITISATION YEARBOOK* 96 (Jan Job de Vries Robbé & Paul U. Ali eds., 2006) (“By permitting solvent counterparties to terminate their contracts without incurring additional risk, close-out netting enhances liquidity, and the certainty provided by allowing a solvent counterparty to close-out its hedges will prevent market disruption.”); Edward R. Morrison & Joerg Riegel, *Financial Contracts and the New Bankruptcy Code: Insulating Markets from Bankrupt Debtors and Bankruptcy Judges*, 13 AM. BANKR. INST. L. REV. 641, 642, 647, 660, 663 (2005); Christopher J. Redd, *Treatment of Securities and Derivatives Transactions in Bankruptcy: Part I*, AM. BANKR. INST. J., July–Aug. 2005, at 36, 37.

158. It should be noted in this context that the potential for systemic risk from derivatives, absent these bankruptcy-netting provisions, primarily results from other U.S. bankruptcy law provisions that generally impose an automatic stay—the Bankruptcy Code’s prohibition on creditors seizing the assets of firms in bankruptcy—and invalidate ipso facto clauses. Franklin R. Edwards & Edward R. Morrison, *Derivatives and Systemic Risk: What Role Can the Bankruptcy Code Play?*, in *SYSTEMIC FINANCIAL CRISES: RESOLVING LARGE BANK INSOLVENCIES* 347–50 (Douglas D. Evanoff & George G. Kaufman eds., 2005). Although the insolvency laws of few, if any, foreign countries include netting provisions for derivatives, such provisions may be unnecessary to the extent those laws lack terms imposing automatic stays or invalidating ipso facto clauses. Foreign derivatives contracts, on the other hand, may engender other concerns, such as whether such contracts are enforceable or, instead, illegal as gambling contracts. Interview with Michael Crystal, Queen’s Counsel, at the International Insolvency Institute’s Seventh Annual Conference, “Understanding Derivatives: Dissecting Complex Financial Instruments” (June 12, 2007) (observing that, outside the United States, there are “huge re-characterization and fraud risks in credit derivatives”).

159. See, e.g., Cifuentes et al., *supra* note 64, at 24–28 (finding a non-linear response to a shock with respect to a number of bank interlinkages in that a credit structure diversified among two or three banks can trigger, in the case of a bank’s default, significant systemic contagion to other banks, whereas that “contagion disappears when the number of linkages is high enough to allow banks to stand the losses without selling illiquid assets”); see also Gretchen Morgenson, *Arcane Market Is Next To Face Big Credit Test*, N.Y. TIMES, Feb. 17, 2008, at A1 (questioning how the credit-default-swap market, which is untested and unregulated, will react to increases in corporate defaults); Gretchen Morgenson, *In the Fed’s Cross Hairs: Exotic Game*, N.Y. TIMES, Mar. 23, 2008, at BU1 (speculating that Bank of America’s takeover of Countrywide and J.P. Morgan’s takeover of Bear Stearns might have been arranged by regulators in part to eliminate credit-default swaps on Bear Stearns and Countrywide bonds).

160. See Partnoy & Skeel, *supra* note 155, at 1023.

second party an amount calculated by reference to post-default value of the debt obligations or (ii) buy the debt obligations (or other eligible debt obligations of the obligor) for their full face value from the second party.<sup>161</sup>

Hedging is also effected through risk securitization, in which a company, bank, or other entity (a “hedged party”) transfers the credit risk of a portfolio of corporate loans, bonds or other debt obligations to a special-purpose vehicle (“SPV”).<sup>162</sup> The SPV raises funds to support that assumption of risk by issuing securities to investors in the capital markets.<sup>163</sup> The SPV agrees to make certain predetermined payments to the hedged party if the credit risk of the portfolio increases (as determined by the default or bankruptcy of the borrowers or other parties obligated to the hedged party respecting debt obligations in the portfolio).<sup>164</sup> Because any such payments would reduce the SPV’s assets from which investors receive repayment of their securities, investors are exposed to the credit risk of the portfolio.<sup>165</sup> In return for assuming this risk, the hedged party pays the SPV fees that are applied, along with the SPV’s other assets, to repay the investors at a rate-of-return appropriate to the risk.<sup>166</sup>

These hedging strategies, at least theoretically, facilitate risk-spreading to parties better able to bear the risks, including the “deep pockets” of the global capital markets.<sup>167</sup> This diversification of risk also reduces the likelihood that a default will cause any given institution to fail and mitigates the impact of any such failure on other institutions—not unlike the effect of limiting financial-exposure limits.<sup>168</sup> On the other hand, diversifying risk through hedging increases linkages among market participants, which, at least in part, could offset the risk-spreading and foster systemic risk.<sup>169</sup> If an institution fails, it potentially would impact many more other institutions. Furthermore, hedging strategies sometimes fail,<sup>170</sup> and diversification increases the chance that some market participants may not fully understand the risks they are taking on.<sup>171</sup> The net effect of hedging strategies, however, appears to be a positive reduction of risk.<sup>172</sup>

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161. STEVEN L. SCHWARZ, *STRUCTURED FINANCE: A GUIDE TO THE PRINCIPLES OF ASSET SECURITIZATION* 12-14 n.37 (3d ed. supplemented through Mar. 2007).

162. *Id.* at 12-2.

163. *Id.* at 12-5.

164. *Id.* at 12-7.

165. *Id.*

166. *Id.* at 12-8.

167. See Moisés Naím, *Mexico’s Larger Story*, 99 *FOREIGN POL’Y* 112, 121–22 (1995).

168. See *infra* notes 173–77 and accompanying text.

169. Cf. *supra* note 159.

170. For example, convergent hedging strategies could concentrate rather than diversify risk. Cf. *supra* note 47. Hedging strategies are sometimes also unrealistic and, as illustrated by LTCM, can fail spectacularly when market liquidity dries up. See Waldman, *supra* note 153, at 1056.

171. Cf. *supra* note 159.

172. DAVIS, *supra* note 18, at 272 (arguing that although “derivatives have increased linkages between market segments, [causing] disruption in one [market] to more readily feed into others,” spreading the risk “more widely across the financial system . . . may help to diffuse financial instability

Requiring additional disclosure would thus appear to do relatively little to mitigate the potential for systemic risk, even to the extent that potential results from the use of derivatives.

*c. Financial-Exposure Limits.* The failure of one or more large institutions (such as a large hedge fund, like LTCM) could create defaults large enough to destabilize other highly-leveraged investors,<sup>173</sup> increasing the likelihood of a systemic market meltdown.<sup>174</sup> This suggests another possible approach to regulation: placing limits on inter-institution financial exposure.<sup>175</sup> Financial-exposure limits would facilitate stability by diversifying risk, in effect by reducing the losses of any given contractual counterparty and thus the likelihood that such losses would cause the counterparty to fail. Such limits also might reduce the urgency, and hence the panic, that contractual counterparties feel about closing out their positions.<sup>176</sup>

This approach already applies to banks through lending limits, which restrict the amount of bank exposure to any given customer's risk.<sup>177</sup> Its application beyond banks to other financial institutions is potentially appealing given the "definite trend toward a blurring of the lines between . . . banks and non-bank financial institutions"<sup>178</sup> and the high volumes of financial assets circulating among non-bank financial entities.<sup>179</sup> Evidence even suggests that non-bank

and prevent systemic risk"); Alan Greenspan, Chairman, Bd. of Governors, U.S. Fed. Reserve Sys., Risk Transfer and Financial Stability: Remarks at the Federal Reserve Bank of Chicago's Forty-First Annual Conference on Bank Structure (May 5, 2005), available at <http://www.federalreserve.gov/Boarddocs/Speeches/2005/20050505/default.htm> (arguing that hedging can create net protection).

173. See *supra* note 46 and accompanying text.

174. For an illustration of this potential occurrence, see the example discussed *supra* notes 116–20 and accompanying text.

175. The government report issued after LTCM's near-failure recommended a weak variant on this approach: increased disclosure by public companies of exposures to highly leveraged hedge funds. See *supra* note 104 and accompanying text.

176. Compare *supra* notes 118–20 and accompanying text, discussing in the context of a generic example how contractual counterparties rush to try to close out or otherwise protect their positions after a large hedge fund or private-equity company defaults.

177. Henry Ordower, *Demystifying Hedge Funds: A Design Primer*, 7 U.C. DAVIS BUS. L.J. 323, 370 (2007). Lending limits apply to both individual bank customers and lending between banks. See Federal Deposit Insurance Corporation Improvement Act of 1991, Pub. L. No. 102-242, § 308 (codified at 12 U.S.C. § 371B-2).

178. JOE REIF, SERVICES: THE EXPORT OF THE 21ST CENTURY 58 (1997); see also Stijn Claessens, *Benefits and Costs of Integrated Financial Services Provision in Developing Countries*, in BROOKINGS-WHARTON PAPERS ON FINANCIAL SERVICES 85, 106 n.50 (Richard Herring & Robert E. Litan eds., 2003) ("Non-bank financial institutions, not just banks, have the potential to be sources of systemic risk . . . [because] [i]n many countries, information service providers, such as credit-card companies, provide near-banking services . . . [and] non-banks are offering forms of payment services [that resemble services provided by banks]."); Timothy F. Geithner, Speech Before the Conference on Systemic Financial Crises at the Federal Reserve Bank of Chicago (Oct. 1, 2004), available at <http://www.ny.frb.org/newsevents/speeches/2004/gei041001.html> ("There has also been a substantial convergence in the types of financial transactions bank-centered and non-bank affiliated financial intermediaries perform.").

179. U.S. non-bank financial intermediaries, which are not regulated under the same constraints applied to banks, account for most of the assets of financial institutions. Geithner, *supra* note 178.

institutions are already adopting risk measures common to banks. An IMF Deputy Director has observed that many non-bank entities, including conduits and structured investment vehicles (SIVs), are proactively limiting their financial exposure by undertaking maturity mismatches traditionally associated with banks.<sup>180</sup>

However, Federal Reserve Chairman Ben Bernanke, in championing a market-based, invisible-hand approach to regulation,<sup>181</sup> has rejected the suggestion that government should enforce financial-exposure limits on financial institutions, specifically hedge funds.<sup>182</sup> Bernanke believes that large financial institutions that lend to hedge funds naturally “seek to protect themselves against large losses through risk management and risk mitigation . . . includ[ing] the use of stress tests to estimate potential exposure under adverse market conditions.”<sup>183</sup> Moreover, Bernanke argues, their incentives “line up well with regulators’ objectives, which include not only constraining excess risk-taking by hedge funds but also preventing losses that would threaten the stability of other major financial market participants.”<sup>184</sup> Empirical research supports focusing on the risk exposure of hedge fund counterparties rather than imposing financial-exposure limits on hedge funds themselves.<sup>185</sup>

*d. Reducing Leverage.* Reducing leverage is relevant to systemic risk insofar as it reduces the risk that a financial entity fails in the first place and also reduces the likelihood “that problems at one financial institution could be transmitted to other institutions.”<sup>186</sup> Absent leverage, institutions can absorb losses linearly, dollar for dollar. Institutions may shrink, but they would not

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180. See John Lipsky, First Deputy Managing Dir., Int’l Monetary Fund, Through the Looking Glass: The Links Between Financial Globalization and Systemic Risk, Speech at the Joint IMF Federal Reserve Conference (Sept. 27, 2007), available at <http://www.imf.org/external/np/speeches/2007/092707.htm>.

181. See Ben S. Bernanke, Chairman, Bd. of Governors, U.S. Fed. Reserve Sys., Remarks at the New York University Law School (Apr. 11, 2007), available at <http://www.federalreserve.gov/boardDocs/speeches/2007/20070411/default.htm> (observing that while “targeted government regulation and intervention can sometimes benefit the economy . . . the market itself can often be used to achieve regulatory objectives”).

182. *Id.* (noting that hedge-fund counterparties—most notably large commercial and investment banks—are creditors with “a clear economic incentive to monitor and perhaps impose limits on hedge funds’ risk-taking, as well as an incentive to protect themselves from large losses should one or more of their hedge-fund customers fail”).

183. *Id.*

184. *Id.*

185. See *Counterparty Credit Risk Management Is Best Defense Against Systemic Risk Linked to Hedge Funds*, RES. UPDATE (Fed. Reserve Bank of N.Y., New York, N.Y.), Oct. 2007, at 1, available at [http://www.ny.frb.org/research/research\\_update/10\\_07up.pdf](http://www.ny.frb.org/research/research_update/10_07up.pdf) (citing research indicating that “despite the unique risk challenges posed by hedge funds, the practices used by financial institutions to manage counterparty credit risk are still the best starting point for limiting the funds’ potential for generating systemic disruptions”).

186. Cover letter included at beginning of PRESIDENT’S WORKING GROUP, *supra* note 6 (observing that “excessive leverage can increase the likelihood of a general breakdown in the functioning of financial markets” by increasing the likelihood of transmitting problems).

default on debt. The less leverage, the less likely it is (other factors being equal) that an institution would fail to pay its debts as they mature.<sup>187</sup>

High leverage, however, can cause institutions to absorb losses “exponentially” in the sense that losses beyond a certain level—depending on the institution’s size and leverage—will precipitously degrade an institution’s ability to pay its debts. Default in paying debts might well cause the institution’s failure,<sup>188</sup> as well as trigger a potential chain of defaults as other institutions are not paid amounts owed to them (and in turn, if highly leveraged, such other institutions might then be unable to pay amounts owed to yet other institutions).

Reducing leverage is therefore primarily prophylactic: it is intended to reduce the risk and mitigate the spread and consequences of systemic collapse.<sup>189</sup> Reducing leverage would also strongly facilitate the goal of stability. It nonetheless could create significant costs. Some leverage is good,<sup>190</sup> though there is no optimal across-the-board amount of leverage that is right for every company.<sup>191</sup> Regulation that attempts to track optimal leverage thus would be nuanced and highly complex, as illustrated by the complexity of the Basel II capital adequacy requirements discussed above. These requirements, designed to reduce the leverage of banks, mandate that banks hold minimum amounts of capital as a function of the riskiness of their assets.<sup>192</sup> It has been observed, however, that “the advanced approaches of Basel II are ‘too complex’ for anyone to understand, and the mathematical formulas in various drafts of the framework can look like a foreign language to some readers.”<sup>193</sup> Imposing unnuanced limitations on leverage, however, could impair a firm’s ability to operate efficiently and impede economic growth.<sup>194</sup>

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187. DAVIS, *supra* note 18, at 40 (“[I]ncreased corporate debt in relation to equity, assets or cash flow is likely to lead to a greater probability of bankruptcy.”).

188. *Cf.* 11 U.S.C. § 303 (discussing failure to pay debts as the basis for involuntary bankruptcy).

189. Reducing leverage also occurs reactively insofar as investors experiencing a financial collapse will be more cautious and thus incur less leverage in the future. This, however, is a reaction to—not a means to mitigate—the collapse, and it does not reduce the harm that has been caused. Moreover, those investors may well, over time, fall into the pattern of alternating skittishness and optimism, discussed *infra* notes 255–59 and accompanying text, so that lessons about leverage learned from a collapse are eventually disregarded.

190. For example, at least in the United States, interest paid on debt is tax deductible whereas a dividend paid on equity is not. Also, the cost of debt is usually lower than the cost of equity because debt is a less risky investment than equity. *See* DAVIS, *supra* note 18, at 40.

191. According to financing “trade-off” theory, the optimal amount of leverage is determined by the amount of tax-breaks and other benefits received for debt assumed relative to the costs of that debt. James L. Berens & Charles J. Cuny, *The Capital Structure Puzzle Revisited*, 8 REV. FIN. STUD. 1185, 1185 (1995). Moderate leverage may prove beneficial, but too much leverage will hurt a company and its valuation. *See* Murillo Campello, *Debt Financing: Does It Boost or Hurt Firm Performance in Product Markets?*, 82 J. FIN. ECON. 135, 168 (2006).

192. *See supra* notes 91–93, 100–02 and accompanying text.

193. Susan Schmidt Bies, Governor, Bd. of Governors, U.S. Fed. Reserve Sys., *Basel II Developments in the United States*, Remarks Before the Institute of International Bankers (Sept. 26, 2005), available at <http://www.federalreserve.gov/boarddocs/speeches/2005/20050926/default.htm>.

194. *Cf. supra* note 191.



*e. Ensuring Liquidity.* Ensuring liquidity could facilitate stability in two ways: by providing liquidity to prevent financial entities from defaulting (or to prevent defaulting financial entities from failing),<sup>195</sup> and by providing liquidity to capital markets as necessary to keep them functioning.<sup>196</sup> This would strengthen these two key links in the systemic-meltdown chain,<sup>197</sup> thereby strongly facilitating the goal of stability. To the extent liquidity averts a collapse, it functions prophylactically; but its primary goal is reactive—to mitigate the spread and consequences of systemic collapse.

There are at least two possible regulatory ways to ensure liquidity: creating a lender/market-maker of last resort (hereinafter, generically, a “liquidity-provider of last resort” or “LPOLR”), and imposing entity-level liquidity requirements.<sup>198</sup> In the former context, economists argue that monetary contractions can occur when market crashes engender fears that lenders will lack resources to extend loans.<sup>199</sup> However, panic will not usually become contagious (and thus systemic), these economists contend, when a lender of last resort provides adequate liquidity.<sup>200</sup> Thus, in the case of the Great Depression, the negative effects would have been considerably muted, they argue, through actions by the government central bank to provide the needed liquidity to maintain stability within the monetary supply.<sup>201</sup>

Establishing a liquidity-provider of last resort could be an expensive proposition, potentially creating moral hazard and shifting costs to taxpayers.<sup>202</sup> Nonetheless, these costs may be controllable. The discussion below considers

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195. *Cf.* Schwarcz, *supra* note 78, at 444–45 (discussing lack of liquidity as the primary cause of bankruptcy).

196. *See infra* notes 222–35 and accompanying text. This also responds directly to the crux of a systemic collapse because systemic risk is (largely) a *liquidity* phenomenon: market systemic risk is systemic risk that impairs market liquidity, and institutional systemic risk is, at least to the extent it involves banks, systemic risk that impairs money liquidity.

197. *Cf. supra* notes 116–20 and accompanying text.

198. The “liquidity injection” by the U.S. Federal Reserve, in response to the recent subprime mortgage crisis, did not actually ensure liquidity but merely provided a more attractive borrowing environment for banks. *See, e.g.*, Jeremy W. Peters, *The Banks Roll Up Their Sleeves*, N.Y. TIMES, Aug. 19, 2007, at WK2 (observing that when the Federal Reserve makes “liquidity injections” into the banking system, “the Fed doesn’t even use real money,” and explaining that liquidity results from offering Fed loans to banks at the discount rate, a lower interest rate than the “fed funds rate” that banks would charge other banks on interbank loans). Moreover, that “liquidity injection” affected only banks, not financial markets, directly. *See supra* note 113 and accompanying text.

199. Bordo et al., *supra* note 23, at 19.

200. *Id.*

201. *Cf. id.* at 21 (“The Federal Reserve Bank of New York acted as an effective lender of last resort, providing needed liquidity to the money market and preventing panic.”).

202. *Cf.* Jonathan R. Macey & Maureen O’Hara, *Solving the Corporate Governance Problems of Banks: A Proposal*, 120 BANKING L.J. 326, 328–29 (2003) (discussing banks “foist[ing] some of their losses onto . . . the federal taxpayers whose funds replenish the federal insurance fund when it is depleted”); Partnoy, *supra* note 102, at 757–84 (discussing moral hazard in the context of market crashes and lenders of last resort); Steven L. Schwarcz, *Sovereign Debt Restructuring: A Bankruptcy Reorganization Approach*, 85 CORNELL L. REV. 956, 961–66 (2000) (discussing the moral hazard and other costs created when the IMF acts as a lender of last resort to financially troubled nations).

controlling these costs first in the context of providing liquidity to institutions by making loans, then in the context of providing liquidity to markets by purchasing securities.

In the first context, the moral-hazard cost could be controlled, for example, by following a policy of “constructive ambiguity,” under which the liquidity-provider of last resort would have the right but not the obligation to intervene. The rules by which it decides which to do would be uncertain to third parties.<sup>203</sup> Additional ways to control moral hazard might include setting qualification criteria for borrowing and repayment incentives for borrowers,<sup>204</sup> and requiring coinsurance.<sup>205</sup>

Any shifting of costs to taxpayers could also be controlled. Rather than using taxation to establish the pool of funds from which the liquidity-provider of last resort could make advances, the pool could be funded, for example, by charging “premiums” to market participants, not unlike insurance. FDIC deposit insurance, for example, is financed in this way.<sup>206</sup> Even if the pool of funds is raised by taxes, the funds could be invested to maintain their value until used, and loans could be advanced at a market interest rate. The failure of the IMF—when acting as a lender of last resort to sovereign states—to charge a market interest rate on its loans is precisely what shifts costs to the taxpayers of IMF member-nations, who fund the loans.<sup>207</sup> That failure, however, is political and not inherent in the concept of a lender of last resort.<sup>208</sup>

Yet another way to avoid shifting costs to taxpayers is to privatize the role of

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203. See DAVIS, *supra* note 18, at 123 (“An essential feature [of a liquidity-provider of last resort] is that its operation should be uncertain for any particular institution in difficulties . . . .”); Partnoy, *supra* note 102, at 784 (suggesting this approach). A policy of constructive ambiguity nonetheless is imperfect, requiring difficult political choices of whom to exclude. See *Systemic Risk Hearing*, *supra* note 1, at 11, 38.

204. Tobias Knedlik, *Implementing an International Lender of Last Resort* 9–10 (Halle Inst. for Econ. Research, IWH-Discussion Paper No. 20, 2006). Qualification criteria could include predictors related to the chance of default, such as bank independence and the presence of corruption. Repayment incentives may include disqualification for future help or “interest rate discounts for fast repayments.” *Id.* at 10.

205. Gregory Moore, *Solutions to the Moral Hazard Problem Arising from the Lender-of-Last-Resort Facility*, 13 J. ECON. SURV. 443, 470 (1999). Another approach to controlling moral hazard—shaming those who need to borrow from a liquidity-provider of last resort, *see id.*—is likely to backfire, because society wants the borrowing to occur to avoid systemic risk.

206. Kenneth B. Noble, *New Deal Bank Acts Turn 50*, N.Y. TIMES, June 17, 1983, at D1 (“The F.D.I.C. is financed by premiums paid by insured banks. Each bank is assessed one-twelfth of 1 percent of its insured deposits. Accounts are insured for up to \$100,000 each, although the agency commonly will reimburse depositors for more.”).

207. See, e.g., Adam Lerrick, *Funding the IMF: How Much Does It Really Cost?*, Q. INT’L ECON. REP., Nov. 2003, at 1, available at <http://www.house.gov/jec/imf/1-18-03.pdf> (observing that IMF participation is estimated to cost U.S. taxpayers \$1.9 billion annually because IMF loans have artificially low interest rates); Schwarcz, *supra* note 202, at 963–64 (discussing how the IMF raises money from taxpayers of member-nations); *id.* at 965–66 (observing that the return to IMF member-nations is not only “less than a market rate of interest” but, “[i]n some cases, . . . even below the member-State’s own cost of funds”).

208. Cf. Schwarcz, *supra* note 202, at 965 n.45 (“Only a foolish investor would seek a rate of return that is equal to or less than its cost of funds.”).

the liquidity-provider of last resort, or at least to reallocate the source of liquidity-funding from taxpayers to private credit and other capital markets.<sup>209</sup> Shifting the source of funding to capital markets would eliminate the need for taxpayers to pay for the funding because the size of these markets should be large enough to accommodate the legitimate financing needs of troubled institutions.<sup>210</sup> Such a shift would also significantly reduce the problem of moral hazard because, notwithstanding the size of these markets, an institution would have no assurance that private credit will be available.<sup>211</sup> The risk of potential default will make institutions more cautious. Furthermore, as explained below,<sup>212</sup> any conditions that a government-sponsored liquidity-provider of last resort imposes to minimize moral hazard could be similarly imposed in a capital-market context.

As a practical matter, this approach could only work if capital-market financiers obtained priority on their new loans to troubled institutions. Without a priority, the information asymmetry between the institution and potential financiers would likely be too large; after all, the institution will be collapsing, and time will be of the essence to avoid a systemic meltdown. A priority also will be needed because new-money financiers would not want to be “taxed” by the claims of existing creditors.<sup>213</sup> The law could create priorities in many ways, but the simplest is perhaps a statutorily mandated priority not unlike that set forth in bankruptcy law to attract new-money financing to help reorganize troubled companies.<sup>214</sup>

Giving priority to new-money financiers might create costs, most significantly by effectively subordinating the institution’s existing unsecured creditors, thereby affecting *ex ante* lending incentives and potentially driving up the cost of credit. These costs, however, do not appear unreasonable. Even a government-sponsored liquidity-provider of last resort is likely to demand priority,<sup>215</sup> so privatizing the funding would likely not create costs beyond that created by any liquidity-provider-of-last-resort scheme. Furthermore, granting priority to at-

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209. Privatization might even occur indirectly. *Cf.* Smith et al., *supra* note 2, at A8 (observing that, in response to the subprime mortgage crisis, several large banks in the United States “discussed with the Fed the possibility of borrowing a total of \$75 billion to be used to buy” mortgage-backed securities, to support their value).

210. The global capital markets had approximately \$65 trillion debt securities outstanding as of September 30, 2006. Bank for Int’l Settlements, BIS Q. REV., Dec. 2006, at Statistical Annex, A85–A100; *see also* Naím, *supra* note 167, at 122–23 (“Today, the magnitude of the funds controlled by private investment managers makes the volumes typically supplied by the IMF and the World Bank almost irrelevant.”).

211. Schwarcz, *supra* note 202, at 987, 993.

212. *See infra* note 222 and accompanying text.

213. *Cf.* Schwarcz, *supra* note 202, at 986 (discussing similar reasons why a priority would be needed in a sovereign-debt restructuring context to attract financing).

214. *See* 11 U.S.C. § 364 (2000) (authorizing priorities for so-called “DIP,” or debtor-in-possession, loans).

215. Even the IMF, when acting as a lender of last resort to sovereign nations, has priority over the nation’s existing creditors. Schwarcz, *supra* note 202, at 988.

tract new-money credit “tends to create value for unsecured creditors,”<sup>216</sup> even where those creditors’ claims are subordinated to the new money, because credit increases a borrower’s liquidity, thereby reducing its risk of failure and increasing the expected value of unsecured claims.<sup>217</sup>

New-money credit nonetheless could decrease value to unsecured creditors if overinvestment occurs.<sup>218</sup> Monitoring, though, can limit the risk of overinvestment.<sup>219</sup> Any law authorizing a priority therefore should enable existing creditors to “scrutinize and object to excessive amounts of new[-money] priority financing and to monitor its use when appropriate.”<sup>220</sup>

Under what conditions should the law authorize the priority (and concomitant monitoring)? Although the law could attempt to specify those conditions in advance, determining when a failing institution, absent liquidity, is likely to trigger a systemic meltdown is probably a judgment call that should be decided in light of all the circumstances. A neutral government-sponsored agency could be assigned this decisionmaking role.<sup>221</sup> It might then be possible to combine the best of both worlds by enabling the decisionmaking agency to disburse the capital-market funds through non-recourse, back-to-back lending, in which the agency borrows funds from the capital markets on a non-recourse basis and re-lends those funds to the institution, assigning the institution’s priority loan to the capital-market financiers as collateral.<sup>222</sup>

The foregoing examination focused on a liquidity-provider of last resort providing liquidity to institutions by making loans. Next, consider providing liquidity to markets by purchasing securities.<sup>223</sup> This is different in at least three ways: (i) it is less obvious who would request that liquidity be provided; (ii) it is less clear how priority would be achieved on the purchased securities; and (iii) because markets themselves would be at issue, it is dubious that capital markets would be sufficiently robust, at the time, as a source of privatized funding.<sup>224</sup>

The first difference is not problematic, because a government agency could

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216. Steven L. Schwarcz, *The Easy Case for the Priority of Secured Claims in Bankruptcy*, 47 DUKE L.J. 425, 425 (1997). Although that article deals with secured lending priorities, its argument applies equally to any set of lending priorities that arise merely by operation of law.

217. *See id.* at 430.

218. In this context, overinvestment means that a borrower invests proceeds of the new-money credit in a project that is less valuable than the proceeds. If the borrower fails, the prior creditors will suffer losses.

219. Schwarcz, *supra* note 202, at 989–90.

220. *Id.*

221. *See infra* note 232 and accompanying text.

222. *Cf.* Schwarcz, *supra* note 202, at 990 (suggesting a similar approach for the IMF to disburse capital-market funds, as a lender of last resort, to troubled nations). As a credit matter, the lenders would be in the same position as if they had made the loan directly to the institution. *Id.* at 990 & n.199.

223. *Cf.* DAVIS, *supra* note 18, at 268 (suggesting there may be a need for a “market maker of last resort” to protect financial markets).

224. *Cf.* Allaudeen Hameed et al., *Stock Market Declines and Liquidity* 34 (Mar. 28, 2007) (unpublished manuscript, on file with author) (finding that market shocks affect all prices, with “many asset holders [being forced] to liquidate, making it difficult to provide liquidity precisely when the market demands it”).

decide when liquidity should be provided. The second difference is likewise surmountable. For example, the law could grant the liquidity-provider of last resort a priority in the purchased securities over other securities of that type. Thus, a liquidity-provider of last resort purchasing bonds of XYZ Corporation would, if provided by law, obtain priority of repayment over all other holders of XYZ bonds. Even without a priority, however, the liquidity-provider of last resort should be able, in most cases, to purchase market securities at a deep enough discount to ensure ultimate repayment of its investment.<sup>225</sup> In cases where information needed to value the securities being purchased is unavailable or so imperfect that it is unclear “how to determine what discount from face value” should be taken,<sup>226</sup> the liquidity-provider of last resort could choose to err on the side of taking an extra-large discount. Buying at a discount would also help to reduce moral hazard—reinforcing that benefit of a policy of constructive ambiguity<sup>227</sup>—to the extent prices stabilize well below the levels paid by speculating investors. The only question would be whether market prices stabilize at a sufficient level to preserve a robust market if the necessary discount is very large.

One might ask why, if a liquidity-provider of last resort can invest at a deep discount to stabilize markets and still make money, private investors will not also do so, thereby eliminating the need for a liquidity-provider of last resort. The answer, at least in part, 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.<sup>228</sup> Empirical evidence confirms that individuals engage in this type of herd behavior.<sup>229</sup> A liquidity-provider of last resort is needed to correct these market failures.

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225. Even in the subprime mortgage crisis, with its plummeting prices on mortgage-backed securities, some discount should be sufficient because those prices appear to be well below the real value of the securities. *See, e.g.*, Chris Giles & Krishna Guha, *Mortgage Crisis Talks Under Way*, FIN. TIMES (London), Mar. 22, 2008, at 1 (reporting that at least one European central bank “strongly” believes “that prices of [mortgage-backed securities] have fallen to levels that imply unrealistically high rates of default”).

226. Chris Giles, *Mortgage Assets “Are Likely Target.”* FIN. TIMES (London), Mar. 24, 2008, at 3 (reporting that, in the subprime mortgage crisis, there appears to be imperfect information on the value of outstanding mortgage-backed securities); *cf.* Gillian Tett, *Securities Estimates Revealed in Court*, FIN. TIMES (London), Mar. 24, 2008, at 15 (“[T]rading [of mortgage-backed securities] has virtually dried up in many corners of the credit markets, and it is hard to compare prices for these instruments.”).

227. *Cf. supra* note 203 and accompanying text.

228. *See, e.g.*, Tyler Cowen, *It’s Hard To Thaw a Frozen Market*, N.Y. TIMES, Mar. 23, 2008, at BU5 (asking why, in the context of the subprime mortgage crisis, “asset prices don’t simply fall enough so that someone buys them and trading picks up again,” and answering, “why seek ‘fire sale’ prices when you might lose your job for doing so?”).

229. *See* Stephen M. Bainbridge, *Mandatory Disclosure: A Behavioral Analysis*, 68 U. CIN. L. REV. 1023, 1038 (2000) (discussing how herd behavior may have a reputational payoff even if the chosen course of action fails, and arguing that where “the action was consistent with approved conventional wisdom, the hit to the manager’s reputation from an adverse outcome is reduced”); Paul M. Healy & Krishna G. Palepu, *The Fall of Enron*, J. ECON. PERSP., Spring 2003, at 3, 18–19 (explaining that a risk-averse fund manager who estimates a stock is overvalued will be apt to “simply follow the crowd” and refrain from acting on his analysis because this course of action will ensure that he will not be

The third difference—that because markets themselves would be at issue, it is dubious that capital markets would be sufficiently robust as a source of funding—is less surmountable. There is, of course, a middle ground: look first to capital markets as a source of last-resort funding, but maintain some backup source of taxpayer-funded liquidity in case market funding is unavailable.<sup>230</sup> In any event, the availability of privatized funding is less important to the extent the liquidity-provider purchases securities with priority or at a deep discount, thereby ensuring repayment in either case.

Nothing in this discussion of liquidity-providers of last resort has necessarily differentiated between domestic and international liquidity demands. A threshold difference is identifying the entity that would act as liquidity-provider of last resort.<sup>231</sup> The Federal Reserve Bank appears to be best situated to act in that capacity in the U.S. domestic context, though its power to act is ambiguous under existing law.<sup>232</sup> This Article later examines who might act as an international liquidity-provider of last resort.<sup>233</sup>

The other possible regulatory means to ensure liquidity is to impose entity-level liquidity requirements. Even in the banking context, however, these types of requirements are expensive,<sup>234</sup> and they would be even harder to apply and manage in a broader context because the entities would be less uniform. Entity-level liquidity requirements would also be uncertain to ensure market liquidity.<sup>235</sup>

*f. Ad Hoc Approaches.* The extent to which ad hoc (that is, purely reactive) regulatory responses to systemic risk facilitate stability and efficiency is, of

blamed for a poor investment decision if the stock ultimately collapses “since other funds made the same mistake”).

230. To the extent these moneys are invested in market-rate securities, there should not be losses to taxpayers.

231. *Cf.* Yamaguchi, *supra* note 7, at 3 (arguing in favor of augmenting the functions of central banks to act, at least nationally, as lenders of last resort for large non-bank institutions and conglomerates); *see also* Vikas Bajaj, *Central Banks Intervene To Calm Volatile Markets*, N.Y. TIMES, Aug. 11, 2007, at A1 (reporting on efforts by the European Central Bank, the U.S. Federal Reserve Bank, and other central banks worldwide to coordinate liquidity infusions in their respective nations).

232. To the extent the Federal Reserve Bank has this power, its source would be section 13(3) of the Federal Reserve Act, which, in “unusual and exigent circumstances,” enables “the Board of Governors of the Federal Reserve System [to] authorize any Federal reserve bank . . . to discount for any individual, partnership, or corporation, notes, drafts, and bills of exchange” if such individual, partnership, or corporation is “unable to secure adequate credit accommodations from other banking institutions.” 12 U.S.C. § 343 (2000). Although this may well enable the Federal Reserve to fund failing institutions, it is dubious that it enables the Fed to purchase securities in falling markets.

233. *See infra* text accompanying notes 338–45.

234. *See* CHARLES GOODHART ET AL., *FINANCIAL REGULATION: WHY, HOW, AND WHERE NOW?* 192 (1998) (explaining that rigorous liquidity requirements and other banking regulations create “an overly expensive, intrusive and rigid system, with costs that greatly exceed the benefits”).

235. *See* DIMITRIS N. CHORAFAS, *LIABILITIES, LIQUIDITY, AND CASH MANAGEMENT: BALANCING FINANCIAL RISK* 143–44 (2002) (distinguishing market liquidity from institutional liquidity and positing that “it is wise to differentiate between liquidity in a general market sense and an entity’s own liquidity, or illiquidity in terms of not meeting liabilities as they fall due, which is default”).

course, partly dependent on what those responses turn out to be. Nonetheless, some general observations can be made. For example, ad hoc approaches do not always work. Sometimes they may be too late and the harm has been done or no longer can be prevented, and sometimes there may be insufficient time to fashion and implement an optimal solution. In these cases, ad hoc approaches do not strongly facilitate the goal of stability, and therefore are second-best.

From an efficiency standpoint, ad hoc approaches can help to minimize the difficulties in measuring, and balancing, costs and benefits. It may be hard to quantify in advance, for example, the likelihood that the failure of a given firm or other triggering event would cause a systemic meltdown.<sup>236</sup> Because ad hoc approaches are ex post in nature—by definition, not initiated until the time of the potential failure—they can make quantification easier.<sup>237</sup> Furthermore, ad hoc approaches reduce moral-hazard cost to the extent an institution cannot know in advance whether, if it faces financial failure, it will be bailed out or fail. For these reasons, central banks often pursue a policy of “constructive ambiguity” in setting criteria for whether to bail out failing banks, effectively making the decision ex post on an ad hoc basis.<sup>238</sup> Some institutions, though, may be “too big to fail,”<sup>239</sup> and therefore incur moral hazard by anticipating a bailout.<sup>240</sup> Some have argued this occurred in the case of the Fed-arranged purchase by J.P. Morgan of Bear Stearns, notwithstanding the fire-sale price of Bear Stearns shares, because the Federal Reserve “agreed to protect [J.P. Morgan] from a certain amount of [Bear Stearns] liability” that J.P. Morgan “is assuming.”<sup>241</sup>

*g. Market Discipline.* As the discussion of ad hoc approaches has shown, regulatory approaches to systemic risk do not have to be prescriptive ex ante. In a market context, moreover, they may not have to be prescriptive at all. Some amount of bank “regulation,” for example, is believed to be imposed by the market itself.<sup>242</sup> Market-imposed regulation is efficient insofar as it minimizes regulatory costs.<sup>243</sup>

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236. See *supra* note 140 and accompanying text.

237. Cf. BOOKSTABER, *supra* note 139, at 157 (arguing that in non-linear systems, improvised solutions may work better than set rules).

238. See Marcelo Dabós, *Too Big To Fail in the Banking Industry: A Survey*, in *TOO BIG TO FAIL: POLICIES AND PRACTICE IN GOVERNMENT BAILOUTS* 141 (Benton E. Gup ed., 2004).

239. Under the “too big to fail” (TBTF) doctrine, governments act to protect large institutions—primarily banks—“to prevent adverse effects on the financial system.” *Id.*

240. See *id.*

241. Sorkin, *supra* note 3; see also Paul Krugman, Op-Ed., *The B Word*, N.Y. TIMES, Mar. 17, 2008, at A19 (describing the purchase of Bear Stearns as a “bailout”).

242. See, e.g., Bernanke, *supra* note 181 (discussing both the mechanisms of market discipline in banking and certain forces, such as market-participant confidence in bailouts, that undermine market discipline).

243. See Albert J. Boro, Jr., Comment, *Banking Disclosure Regimes for Regulating Speculative Behavior*, 74 CAL. L. REV. 431, 488 (1986) (observing that market discipline can be more efficient than

Although, in theory, perfect markets would never need external regulation,<sup>244</sup> actual markets—including financial markets—are not perfect. Under a market-discipline approach, the regulator’s job is to ensure that market participants exercise the type of diligence that enables the market to work efficiently.<sup>245</sup> This is often achieved by ensuring that market participants have access to adequate information about risks and by arranging incentives so those who influence an institution’s behavior will suffer if that behavior generates losses.<sup>246</sup> This is the type of approach taken by the United States government under the second Bush Administration to minimize hedge-fund failure and the resulting possibility of systemic risk.<sup>247</sup>

Market discipline is, superficially, a low-cost prophylactic regulatory approach. For two reasons, however, a market-discipline approach only weakly facilitates the goal of stability. As discussed above, preventing systemic risk through market discipline is inherently suspect because no firm has sufficient incentive to limit its risk-taking in order to reduce the danger of systemic contagion for other firms.<sup>248</sup> Perhaps this helps explain why, even though the banking and securities-brokerage industries have in large part been subject to a market-discipline regulatory approach,<sup>249</sup> significant potential for systemic risk from an LTCM default was attributed to the overly “generous terms from the banks and broker-dealers that provided credit [to LTCM] and served as counterparties.”<sup>250</sup>

Furthermore, even outside of the systemic-risk context, regulators have a mixed track record, absent prescriptive rules, of ensuring that participants

top-down regulation). For a discussion of the direct and indirect costs of regulation, see *supra* notes 79–84 and accompanying text.

244. See, e.g., Alfred C. Yen, *Western Frontier or Feudal Society?: Metaphors and Perceptions of Cyberspace*, 17 BERKELEY TECH. L.J. 1207, 1228 n.73 (2002) (characterizing regulation of markets as a necessary response to market imperfections).

245. Cf. Bernanke, *supra* note 6, at 6 (observing that, to the extent hedge funds are regulated solely through market discipline, government’s “primary task is to guard against a return of the weak market discipline that left major market participants overly vulnerable to market shocks”). A market-discipline approach is sometimes used to help solve tragedies of the commons. See *supra* note 16.

246. Cf. Bernanke, *supra* note 181 (observing that “[r]eceivership rules that make clear that investors will take losses when a bank becomes insolvent should increase the perceived risk of loss and thus also increase market discipline” and that, in “the United States, the banking authorities have ensured that, in virtually all cases, shareholders bear losses when a bank fails”).

247. See Bernanke, *supra* note 6; Ryan, *supra* note 6, at 2.

248. See *supra* note 63 and accompanying text.

249. See, e.g., Boro, *supra* note 243, at 471; Helen A. Garten, *Banking on the Market: Relying on Depositors To Control Bank Risks*, 4 YALE J. ON REG. 129, 129–30 & n.1 (1986).

250. Bernanke, *supra* note 6. Professor Romano suggests that the breakdown of market discipline is due simply to human greed. See Romano, *supra* note 147, at 79 (discussing greed as a central factor that, in the hedge-fund context, “transform[s] a successful hedging or moderately risky investment strategy into one of high-risk speculation”). Bernanke suggests, however, a possible alternative psychological explanation: that “[i]nvestors, perhaps awed by the reputations of LTCM’s principals, did not ask sufficiently tough questions about the risks that were being taken to generate the high returns.” Bernanke, *supra* note 6.



exercise market discipline.<sup>251</sup> Until the recent subprime mortgage debacle, for example, competing banks were making more and more loans without financial covenants.<sup>252</sup> It is questionable, though, whether lending without financial covenants constitutes “safe and sound” banking practice.<sup>253</sup> The marked decline in the risk premium that has been charged by investors may well represent yet another example of weak market discipline.<sup>254</sup>

This mixed track record is partly explained by behavioral psychology. Investors cannot accurately price risks that rarely occur and are unpredictable.<sup>255</sup> In the context of political risk, for example, investors “often alternate between assessments [of that risk] that, in hindsight, were either much too high or much too low,” creating a “*pattern . . . of alternating optimism and skittishness.*”<sup>256</sup> This pattern partly reflects “availability bias,” or the tendency of a recent crisis to be the most available concept in an investor’s mind.<sup>257</sup> In part, it also reflects the documented human tendency to underestimate the likelihood of very rare but potentially devastating risks.<sup>258</sup> A similar alternating pattern would be expected in the systemic-risk context, which, like political risk, is both rare and unpredictable.<sup>259</sup>

Regulators’ occasional failures to maintain market discipline may also reflect the near-endemic shortage of funding for regulatory monitoring as well as a potential political bias against market interference.<sup>260</sup> According to the U.S. General Accounting Office (GAO), for example, the SEC has had an increasingly inadequate labor force since 1995.<sup>261</sup>

Thus, although market discipline is attractive as a supplement to other regulatory approaches, there is some doubt whether it should serve as the

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251. See Partnoy, *supra* note 102, at 774.

252. See *supra* note 42.

253. See *supra* note 42. Regulators are supposed to ensure that banks follow safe and sound banking practice. See 12 U.S.C. § 93(b)(2)(A)(ii) (2000) (fining banks for recklessly engaging in “unsafe” or “unsound” practices).

254. See *supra* notes 132–40 and accompanying text. For further examples of regulatory failures of market discipline, see Schwarcz, *Protecting Financial Markets*, *supra* note 1.

255. See Claire A. Hill, *How Investors React to Political Risk*, 8 DUKE J. COMP. & INT’L L. 283, 287–89 (1998) (describing how risk-assessment is especially difficult when it requires extrapolation from dissimilar, heterogeneous events). Scholars sometimes distinguish rare and unpredictable risks from other risks by calling the former “uncertainty.” *Id.* at 287 (citing FRANK H. KNIGHT, *RISK, UNCERTAINTY, AND PROFIT* (1921)).

256. *Id.* at 286.

257. *Id.* at 308; *cf. supra* note 135.

258. Hill, *supra* note 255, at 308.

259. *Cf. DAVIS*, *supra* note 18, at 277 (arguing that this pattern may reflect “disaster myopia,” in which “memories of financial instability can rapidly fade, a process intensified by rapid turnover of staff and/or intense competition”).

260. Greenspan, for example, had a serious bias against regulation and assumed market discipline was far better than it actually was. See LOWENSTEIN, *supra* note 36, at 231.

261. U.S. GOV’T ACCOUNTABILITY OFFICE, PUBL’N No. GAO-02-302, *SEC OPERATIONS: INCREASED WORKLOAD CREATES CHALLENGES* 5 (2002), available at <http://www.gao.gov/new.items/d02302.pdf> (describing workload exceeding available workers since 1995 and also the SEC’s small salaries compared to other federal agencies, which contribute to very high turnover).

exclusive, or even primary, regulatory mechanism.

### C. ASSESSING REGULATORY APPROACHES

The discussion above has identified several potential regulatory approaches. This Article next assesses these approaches individually. First, it examines cost-benefit balancing as a means of assessment; second, it considers whether that balancing should be influenced by possible application of a precautionary principle; finally, it assigns possible values to that balancing.

#### 1. Cost-Benefit Balancing and the Precautionary Principle

Cost-benefit balancing, as has been discussed, is a means of measuring the efficiency of regulation.<sup>262</sup> It is also a well-recognized test for regulatory political viability. For example, before any major rule may take effect, U.S. regulatory agencies must submit a cost-benefit analysis to Congress.<sup>263</sup> To this end, regulatory agencies use a variety of methodologies to evaluate regulations,<sup>264</sup> including applying different values when monetizing the costs and benefits of regulations.<sup>265</sup> Regulatory evaluations also can take into account non-quantifiable benefits and costs that may have been key factors in an agency's decision to promulgate a rule.<sup>266</sup>

To the extent regulation deals with health and safety issues (as could arise in the case of systemic risk),<sup>267</sup> agencies go even further beyond strictly econometric cost-benefit modeling. Perhaps the most relevant example for systemic risk

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262. See *supra* note 87 and accompanying text.

263. Congressional Review of Agency Rulemaking Act, 5 U.S.C. §§ 801–808 (2000). “Major rules,” that is, rules whose implementation entail substantial costs, cannot take effect during the sixty days afforded Congress to perform its review. See 5 U.S.C. § 801(a)(3); cf. EATWELL & TAYLOR, *supra* note 78, at 19 (arguing that a balance needs to be struck when examining the benefits and costs of regulation).

264. OFFICE OF MGMT. & BUDGET, EXECUTIVE OFFICE OF THE PRESIDENT, DRAFT 2007 REPORT TO CONGRESS ON THE COSTS AND BENEFITS OF FEDERAL REGULATION 8 (2007) [hereinafter OMB REPORT].

265. *Id.* The analysis regarding health and safety regulations is often context-specific. Compare ENVTL. PROTECTION AGENCY, EPA-452/R-05-003: REGULATORY IMPACT ANALYSIS OF THE FINAL CLEAN AIR MERCURY RULE § 1 at 1, § 12 at 1 (2005) (balancing the cost to a state of implementing the cap-and-trade system against the ultimate health effects in humans—that is, morbidity, infant mortality, and such welfare effects as visibility improvements—of lowering the level of mercury that is consumed) with OMB REPORT, *supra* note 264, at 62 (citing Occupational Exposure to Hexavalent Chromium, 71 Fed. Reg. 10100 (Feb. 28, 2006) (codified at 29 C.F.R. pts. 1910, 1915, 1917–18, & 1926)) (balancing the benefits of preventing 40 to 145 fatal and 5 to 20 non-fatal lung cancers per year against OSHA's estimated annual compliance costs of installing engineering controls and the purchase and use of supplemental respirators at the new Permissible Exposure Limit (\$36–896 billion/year versus \$244–253 million/year as monetized by the OMB)).

266. OMB REPORT, *supra* note 264, at 8–9. In either event, in assessing costs and benefits, regulators often view an industry in isolation and ask what would have happened absent the regulation. Robert W. Hahn & John A. Hird, *The Costs and Benefits of Regulation: Review and Synthesis*, 8 YALE J. ON REG. 233, 239–40 (1991) (referring to this as the “partial equilibrium model”). To the extent regulation deals exclusively with economics, agencies will create econometric models based on the supply and demand characteristics of the industry before and after a regulatory change. *Id.*

267. See *supra* notes 70–71 and accompanying text.

is regulation designed to address the risk of catastrophic events or large, irreversible effects where the actual level of risk is indeterminate.<sup>268</sup> In these cases, regulators often apply a precautionary principle that presumes benefits will outweigh costs.<sup>269</sup> In the principle's most utilized form, regulators may decide to regulate an activity notwithstanding lack of decisive evidence of the activity's harm, such as controlling low-level exposure to carcinogens notwithstanding lack of proof of a causal connection between such exposure and adverse effects to human health.<sup>270</sup> Regulation should not be blindly precautionary<sup>271</sup> but should be proportional to the chosen level of protection based upon an examination of potential benefits and costs, which include such non-economic considerations as public acceptability and the preeminence of health over economic considerations.<sup>272</sup>

## 2. Assigning Possible Values to the Cost-Benefit Balancing

This cost-benefit analysis applies to systemic risk as follows. The costs would be those of implementing the regulatory approach to reduce systemic risk, and the benefits would be measured by the *costs saved* by avoiding the risk. These saved costs would likely be high because they include not only direct economic costs but also indirect social costs.<sup>273</sup> Because the benefits (that is, the saved costs) would be realized only if systemic risk that otherwise would occur is avoided, they should be discounted by the less-than-100% probability that

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268. This type of regulation is discussed in Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841, 848 (2006). A precautionary principle is most often used when assessing the impact of human actions on complex systems, such as the environment and human health, where the consequences of actions may be unpredictable. JAMES SALZMAN & BARTON H. THOMPSON, JR., ENVIRONMENTAL LAW AND POLICY 16 (2d ed. 2007); Robert G. Chambers & Tigran A. Melkonyan, *Pareto Optimal Trade in an Uncertain World: GMOs and the Precautionary Principle*, 89 AM. J. AGRIC. ECON. 520, 528 (2007).

269. Although this principle is often explicitly mentioned in international environmental regulations, it also is implicit in such domestic regulation as efforts to prevent terrorist attacks or regulation of the nuclear power industry, where high costs are justified even in the face of uncertain risk. See Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1005–07 (2003).

270. *Id.* at 1017–18. Governments have incorporated this principle into regulatory policies, and the European Commission has urged that the precautionary principle be considered within a structured approach to the analysis of risk. *Id.*

271. Under a stronger version of the precautionary principle, when an activity is shown to present a significant health or safety risk, regulatory decisions should be made so as to prevent the activity from being conducted notwithstanding scientific uncertainty as to the nature of the damage or the likelihood of its occurrence. Sunstein, *supra* note 268, at 849. This stronger version, however, offers little practical guidance to regulators. Sunstein, *supra* note 269, at 1017–18; see also JOHN D. GRAHAM & JONATHAN B. WIENER, RISK VS. RISK (1995) (demonstrating that interventions to reduce one risk may induce new countervailing risks); Jonathan B. Wiener, *Precaution in a Multi-Risk World*, in HUMAN AND ECOLOGICAL RISK ASSESSMENT: THEORY AND PRACTICE 1509 (Dennis D. Paustenbach ed., 2002) (arguing that although “precaution” can be a desirable strategy in some cases, strong versions of the precautionary principle can induce unintended countervailing risks, that the goal should be optimal rather than maximal precaution, and that actual regulation often moderates the degree of precaution in order to avoid these unintended risks).

272. Sunstein, *supra* note 269, at 1017–18.

273. See *supra* note 70 and accompanying text.

systemic risk will occur,<sup>274</sup> taking into account the also-less-than-100% probability that regulation will avoid it. Regulation would be efficient whenever the expected value of those costs with regulation were less than that without regulation.<sup>275</sup>

Formulaically, the expected value computations can be described as follows:

Expected Value (without regulation) = [likelihood of systemic meltdown without regulation]%  $\times$  \$[cost of systemic meltdown] + [likelihood of avoiding systemic meltdown without regulation]%  $\times$  \$[cost of having avoided systemic meltdown]

Expected Value (with regulation) = [likelihood of systemic meltdown with regulation]%  $\times$  \$[cost of systemic meltdown] + [likelihood of avoiding systemic meltdown with regulation]%  $\times$  \$[cost of having avoided systemic meltdown] + \$[cost of regulation]

To portray these equations more elegantly, let these amounts be represented by symbols, where

$EV_1$  is the Expected Value, without regulation

$EV_2$  is the Expected Value, with regulation

$\gamma$  is the likelihood of systemic meltdown without regulation, expressed as a percentage

$M$  is the cost of systemic meltdown, expressed in dollars

$A$  is the cost of having avoided systemic meltdown, expressed in dollars

$\lambda$  is the likelihood of systemic meltdown with regulation, expressed as a percentage

$R$  is the cost of regulation, expressed in dollars

Using these symbols,

$$EV_1 = \gamma \times M + (1 - \gamma) \times A$$

$$EV_2 = \lambda \times M + (1 - \lambda) \times A + R$$

One can simplify these equations by recognizing that  $A$ , the cost (aside from the cost of regulation,  $R$ ) of having avoided systemic meltdown, equals zero. Therefore,

$$EV_1 = \gamma \times M$$

$$EV_2 = \lambda \times M + R$$

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274. Discounting the consequences of a risk by the probability of its occurring is sometimes referred to mathematically as  $R = p(X)$ , where  $R$  = risk,  $p$  = probability, and  $X$  = severity.

275. For examples of expected-value analysis, see POSNER, *supra* note 34, § 15.1, at 445 & n.1.

Systemic risk thus should be regulated if  $EV_2$  is less than  $EV_1$  (that is, if  $\lambda \times M + R$  is less than  $\gamma \times M$ ).

The interesting question, therefore, is how to estimate the values to be used in these equations. Before examining what these values might be for the regulatory approaches identified, a generic balancing can provide a useful perspective. For this purpose, initially estimate  $\gamma$ —the likelihood of systemic meltdown without regulation—at the two-year “25% probability” prediction discussed at the Sixth Annual Conference of the International Insolvency Institute.<sup>276</sup> Even with regulation, there must be some chance of systemic risk occurring, so initially—without yet examining any particular regulatory approach—the Article will estimate that risk,  $\lambda$ , at 10% in two years<sup>277</sup> on the theory that even the best regulatory approach cannot eliminate the chance of systemic risk. Although the cost of a systemic meltdown,  $M$ , is extremely difficult to pin down, analysts at J.P. Morgan have estimated that LTCM’s failure would have cost its larger bank-creditors \$500–700 million *each*, not to mention the costs to others.<sup>278</sup> This Article, therefore, will initially assume that  $M$  is likely to be at least \$1 billion, and perhaps far greater.<sup>279</sup> Finally, although the cost of regulation,  $R$ , is dependent on the type of regulatory approach, initially assume it will not exceed \$100 million biannually.<sup>280</sup>

Applying these values,  $(10\% \times \$1,000,000,000 + \$100,000,000) = \$200,000,000$ , which is less than  $(25\% \times \$1,000,000,000) = \$250,000,000$ . If these values are realistic, regulation appears to be justified.

A quantitative analysis is no better than its assumptions, of course, and this Article’s assumptions rely on no hard empirical data. Furthermore, a truly realistic balancing of costs and benefits could depend on the particular mechanisms by which systemic failures can arise.<sup>281</sup> The foregoing results should therefore be interpreted cautiously. All that can truly be said with confidence is that so long as  $M$ , the cost of a systemic meltdown, is much greater than  $R$ , the cost of regulation, then regulation should be justified.

276. Memorandum from E. Bruce Leonard, President, Int’l Insolvency Inst., to All Institute Members 2 (June 16, 2006) (on file with author) (discussing the prediction of a “25% probability within two years of a significant disruption in the international financial markets, probably attributable to the collapse or serious difficulties of a major hedge fund,” as one of the “highlights from the Conference”).

277. Because the 25% probability of systemic risk absent regulation is a two-year estimate, the other values used in these equations will be based on two-year estimates. The applicable time period chosen is irrelevant so long as it is common for all values, because these equations are being used solely for comparative purposes.

278. LOWENSTEIN, *supra* note 36, at 190.

279. Cf. David Henry & Matthew Goldstein, *The Bear Flu: How It Spread*, BUS. WK., Jan. 7, 2008, at 30, 32 (suggesting that, globally, the “tab from the [subprime] mortgage mess could run up to \$500 billion”); *Postcards from the Ledge*, ECONOMIST, Dec. 19, 2007 (estimating that, in the United States, “[s]ubprime borrowers will probably default on \$200 billion–300 billion of mortgages”); *Tightening the Safety Belt*, ECONOMIST, Nov. 22, 2007 (graph showing Goldman Sachs prediction of \$148 billion of losses on subprime CDOs).

280. The term “biannually” is used here to mean every two years. See *supra* note 277.

281. BOOKSTABER, *supra* note 139, at 257 (arguing that regulation will not help if there is a failure to understand the mechanisms by which crises develop).

This provides, however, a useful way of thinking about the balancing, especially because  $M$  is likely to be much greater than  $R$ .<sup>282</sup> Moreover, because a systemic meltdown can be catastrophic though the actual level of risk is indeterminate,<sup>283</sup> a precautionary principle might appropriately apply to the balancing, allowing regulation based on a presumption that benefits will outweigh costs.

Critics of regulation, on the other hand, might argue that actual regulatory costs are likely to be much higher than \$100 million biannually because any regulation would slow down economic growth, which itself would be a cost.<sup>284</sup> Because the equations above do not discount  $R$ , any such slowdown in economic growth would significantly increase  $EV_2$ , making it less likely that regulation would be justified. Presumably, though, even if regulation could potentially slow down economic growth—and recall that any regulation should be crafted as not to have that effect<sup>285</sup>—a slowdown would not be inevitable, so the cost of any slowdown should be discounted.

Next, consider how these equations might apply to the specific regulatory approaches previously identified.<sup>286</sup> Of these approaches, several do not seem worthy of further consideration. Regulation aimed at averting panics would likely fail to anticipate all the causes of these panics, would not necessarily deter even identified panics, and could impede market growth; mandating increased disclosure would do relatively little to deter systemic risk and may even be counterproductive; and placing limits on inter-institution financial exposure or micromanaging institutions to diversify risk through hedging might retard investment, whereas institutions are market-driven anyway to diversify risk.<sup>287</sup> That leaves four potentially viable approaches: market discipline, ad hoc approaches, reducing leverage, and ensuring liquidity.

Because market discipline has minimal regulatory costs, it is necessarily efficient under the equations.<sup>288</sup> It is nonetheless suspect as a regulatory approach for two reasons: first, firms lack sufficient incentive to limit risk-taking in order to reduce the danger of systemic contagion for other firms, and second, regulators have a mixed track record of ensuring that participants exercise market discipline, absent prescriptive rules.<sup>289</sup> Market discipline therefore should

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282. Indeed,  $R$  might even represent a profit, not a cost, if liquidity is provided to markets by purchasing securities at a deep discount.

283. See *supra* note 268 and accompanying text.

284. Cf. Bernanke, *supra* note 6 (observing that if hedge funds were forced to reduce exposures in terms of liquidity risk, “liquidity in a particular market segment could decline sharply and unexpectedly”).

285. See *supra* note 78 and accompanying text; *infra* note 314 and accompanying text.

286. See *supra* section II.B.

287. See *supra* section II.B.

288. This is because  $R$  (the cost of regulation) being one or more orders of magnitude less than  $M$ , the cost of a systemic meltdown is vanishingly small in comparison and thus, for equation purposes, can be effectively treated as zero. Hence  $EV_2$  is necessarily always less than  $EV_1$ .

289. See *supra* notes 248–61 and accompanying text.

be used as a supplement to other regulatory approaches.

Ad hoc approaches do not quite fit, at least *ex ante*, into the equations because they are, by definition, crafted after a crisis occurs or is imminent. At that time, however, they are likely to be efficient in that it is then easier to measure and balance costs and benefits.<sup>290</sup> Ad hoc approaches also can reduce the moral-hazard cost.<sup>291</sup> Nonetheless, these approaches are inherently second-best: after a crisis occurs or is imminent, there may well be insufficient time to implement optimal solutions, and the harm already may have been done or can no longer be prevented.<sup>292</sup> Ad hoc approaches therefore should be considered to the extent a systemic meltdown threatens notwithstanding other protections.

The remaining two regulatory approaches—reducing leverage and ensuring liquidity—are more appropriately suited for testing under the equations as potential solutions to the problem of systemic risk. Reducing leverage reduces the risk that a financial entity will fail in the first place, and it also reduces the likelihood of a chain of institutional failures.<sup>293</sup> The trick, however, will be trying to find a simple way of determining the appropriate maximum amount of leverage for different types of companies—in each case a maximum that neither impairs the companies’ ability to operate efficiently nor impedes economic growth. To reduce monitoring and other regulatory costs, such a limitation on leverage might be imposed only on companies exceeding a certain size. Still, monitoring and enforcement could be at issue to the extent structured finance is used to mask leverage—though at least in the United States, that use is increasingly discouraged.<sup>294</sup>

Ensuring liquidity would help prevent financial entities from defaulting and also would help prevent defaulting financial entities from failing. Additionally, liquidity could be provided to capital markets as necessary to keep them functioning. Of the two suggested ways to ensure liquidity,<sup>295</sup> creating a liquidity-provider of last resort appears to be simpler and easier to implement. Although establishing a liquidity-provider of last resort could be expensive, especially to the extent it creates moral hazard or shifts costs to taxpayers, these expenses could be controlled by following a policy of “constructive ambiguity” in deciding whether to provide liquidity<sup>296</sup> and also, when providing liquidity to

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290. *See supra* notes 236–41 and accompanying text.

291. *See supra* notes 236–41 and accompanying text.

292. *See supra* notes 236–41 and accompanying text.

293. *See supra* notes 186–88 and accompanying text.

294. *See* SEC, REPORT AND RECOMMENDATIONS PURSUANT TO SECTION 401(C) OF THE SARBANES-OXLEY ACT OF 2002 ON ARRANGEMENTS WITH OFF-BALANCE SHEET IMPLICATIONS, SPECIAL PURPOSE ENTITIES, AND TRANSPARENCY OF FILINGS BY ISSUERS 3 (2005) (recommending that “transactions and transaction structures primarily motivated by accounting and reporting concerns, rather than economics[,]” be discouraged in the future through a combination of changes to accounting standards by the Financial Accounting Standards Board (FASB) and greater awareness by participants in the financial reporting process).

295. The other way is to impose entity-level liquidity requirements. *See supra* note 235 and accompanying text.

296. *See supra* notes 203, 227 and accompanying text.

markets, by buying securities at a discount.<sup>297</sup> Other costs of a liquidity-provider of last resort would appear to be modest.<sup>298</sup>

Subject to the caveats noted,<sup>299</sup> how might these two approaches fare under a cost-benefit analysis? Although the expected value without regulation,  $EV_1$ , would not change, the expected value with regulation,  $EV_2$ , would change because both  $\lambda$ , the likelihood of systemic meltdown with regulation, and  $R$ , the cost of regulation, are functions of the particular regulatory approach. Consider first the reducing-leverage approach. This approach would probably strongly reduce the risk of a systemic meltdown. Therefore, assume that  $\lambda = 5\%$  for this approach. But because the approach would be very expensive, assume, for illustrative purposes, that  $R = \$1$  billion. Inserting these values into the equations,

$$\begin{aligned} EV_1 &= \gamma \times M \\ &= \$250,000,000 \end{aligned}$$

$$\begin{aligned} EV_2 &= \lambda \times M + R \\ &= 5\% \times \$1,000,000,000 + \$1,000,000,000 \\ &= \$1,050,000,000 \end{aligned}$$

Therefore, under these values, this regulatory approach, reducing leverage, would not appear to be justified.

As mentioned, however, the cost of a systemic meltdown,  $M$ , is likely to be far in excess of \$1 billion.<sup>300</sup> Consider how the answer might change if  $M$  were varied. Assume, for example, first that  $M = \$2$  billion and then that  $M = \$5$  billion. If  $M = \$2$  billion,  $EV_2$  still would remain greater than  $EV_1$ ,<sup>301</sup> so reducing leverage again would not be justified as a regulatory approach. And, even if  $M = \$5$  billion, the equations would only reach a parity.<sup>302</sup> Reducing leverage, therefore, might not be justified as a regulatory approach unless ways can be found to significantly reduce its costs.<sup>303</sup>

Next, consider the approach of ensuring liquidity. This approach would

297. See *supra* notes 225–29 and accompanying text.

298. See *supra* notes 202–30 and accompanying text.

299. See *supra* notes 281–83 and accompanying text.

300. See *supra* note 279 and accompanying text.

301.  $EV_1 = \gamma \times M = 0.25 \times \$2,000,000,000 = \$500,000,000$ .  $EV_2 = \lambda \times M + R = 0.05 \times \$2,000,000,000 + \$1,000,000,000 = \$1,100,000,000$ . Therefore  $EV_2$  is greater than  $EV_1$ .

302.  $EV_1 = \gamma \times M = 0.25 \times \$5,000,000,000 = \$1,250,000,000$ .  $EV_2 = \lambda \times M + R = 0.05 \times \$5,000,000,000 + \$1,000,000,000 = \$1,250,000,000$ .

303. Some estimates of  $M$  could nonetheless reach sufficiently high levels to justify regulatory approaches such as reducing leverage. Consider, for example, a systemic-risk doomsday scenario along the lines of the Great Depression. From its peak in 1929, to its cyclical nadir in 1933, the U.S. gross domestic product (GDP) shrank 45.6% as a result of that Depression. *GDP and Other Major NIPA Series, 1929–2006: II*, SURV. CURRENT BUS., Aug. 2006, at 169, 169, available at [http://www.bea.gov/scb/pdf/2006/08August/0806\\_GDP\\_NIPAs.pdf](http://www.bea.gov/scb/pdf/2006/08August/0806_GDP_NIPAs.pdf). If a systemic meltdown of equal consequence hit the United States today, the GDP would shrink (using a GDP of \$13.19 trillion, the most recent figure



probably moderately reduce the risk of a systemic meltdown. Assume that  $\lambda = 10\%$  for this approach. Although this approach could be very expensive insofar as it fosters moral hazard, the Article will assume that moral hazard is controlled through a policy of constructive ambiguity.<sup>304</sup> Therefore, assume for illustrative purposes that  $R = \$100$  million.<sup>305</sup> Inserting these values into the equations,

$$\begin{aligned} EV_1 &= \gamma \times M \\ &= \$250,000,000 \end{aligned}$$

$$\begin{aligned} EV_2 &= \lambda \times M + R \\ &= 0.10 \times \$1,000,000,000 + \$100,000,000 \\ &= \$200,000,000 \end{aligned}$$

It therefore appears that ensuring liquidity may well be a viable regulatory approach, because  $EV_2$  is \$50,000,000 less than  $EV_1$ . And the attractiveness of this regulatory approach would be dramatically enhanced if the variations of  $M$  (discussed above) were applicable. For example, if  $M = \$2$  billion,  $EV_2$  would be \$200,000,000 less than  $EV_1$ .<sup>306</sup> And, if  $M = \$5$  billion,  $EV_2$  would be \$650,000,000 less than  $EV_1$ .<sup>307</sup> This result, that  $EV_2$  is less than  $EV_1$ , is largely supported even if  $\gamma$ , the likelihood of systemic meltdown without regulation, is stressed downward.<sup>308</sup>

Therefore, even without the support provided by the precautionary principle, it appears that ensuring liquidity should be justified as a regulatory approach to the extent—as this Article argues should be possible<sup>309</sup>—moral hazard can be minimized.

#### D. RECOMMENDATIONS

A regulation establishing a liquidity-provider of last resort, then, is the approach to minimizing systemic risk that would have the best chance of

available) by—and thus  $M$  would equal—\$6.06 trillion. *See id.* at 173. This Article does not suggest that  $M$  is likely to be anywhere near that order of magnitude.

304. *See supra* notes 203, 296 and accompanying text.

305. This biannual value for  $R$  appears reasonable given that the much more complex effort of implementing the Basel II regulatory measures is estimated by the U.S. Office of Management and Budget to cost, in total over four years, only \$545.9 million (present value). OMB Report, *supra* note 264, at 56.

306.  $EV_1 = \$500,000,000$ .  $EV_2 = 0.10 \times \$2,000,000,000 + \$100,000,000 = \$300,000,000$ .

307.  $EV_1 = \$1,250,000,000$ .  $EV_2 = 0.10 \times \$5,000,000,000 + \$100,000,000 = \$600,000,000$ .

308. Consider, for example, stressing  $\gamma$ , the likelihood of systemic meltdown without regulation, downward from 25% to as low as 10%. Then  $\lambda$ , the likelihood of systemic meltdown with regulation, necessarily would reduce, say from 10% to 3%. Applying the \$1 billion, \$2 billion, and \$5 billion variations of  $M$  yields the following results: if  $M = \$1$  billion, then  $EV_1 = \$100,000,000$  and  $EV_2 = \$130,000,000$ , making regulation slightly inefficient; but if  $M = \$2$  billion, then  $EV_1 = \$200,000,000$  and  $EV_2 = \$160,000,000$ , making regulation efficient; and if  $M = \$5$  billion, then  $EV_1 = \$500,000,000$  and  $EV_2 = \$250,000,000$ , making regulation highly efficient.

309. *See supra* notes 203–06 and accompanying text.

success under any number of circumstances. The liquidity-provider of last resort would provide liquidity to help prevent critical financial intermediaries from defaulting and to help prevent defaulting critical financial intermediaries from failing. It also would provide liquidity to capital markets as necessary to keep them functioning.<sup>310</sup> The liquidity-provider of last resort could minimize moral hazard by adopting a policy of constructive ambiguity and refusing to commit itself in advance to bailing out defaulting intermediaries or stabilizing markets.<sup>311</sup> The liquidity-provider of last resort also could minimize moral hazard by buying securities at a discount so that market prices stabilize at a level well below the levels paid by speculating investors.<sup>312</sup> It is important that the liquidity-provider of last resort be operational and “in place” because market collapses can occur rapidly and without warning.<sup>313</sup>

The liquidity-provider of last resort should not, or should only minimally, shift costs to taxpayers. This can be accomplished, for example, by charging premiums to market participants or by privatizing the liquidity-provider-of-last-resort function, or, where that function is taxpayer-financed, by investing any pre-funded money to maintain its value until used.<sup>314</sup> Loans should be advanced at market interest rates, and securities should be purchased at discounts.<sup>315</sup> In either case, the liquidity-provider is more likely to recover its investment if it receives priority of repayment on such loan advances and purchased securities.

The foregoing should be supplemented by a market-discipline approach, under which regulators would attempt to ensure that market participants exercise the type of diligence<sup>316</sup> that enables the market to work efficiently.

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310. See *supra* notes 222–35 and accompanying text.

311. See Frederic S. Mishkin, *Financial Consolidation: Dangers and Opportunities*, 23 J. BANKING & FIN. 675, 683 (1999). For this policy to be credible, however, the liquidity-provider of last resort might sometimes have to let a critical financial intermediary fail. Marvin Goodfriend & Jeffrey M. Lacker, *Limited Commitment and Central Bank Lending*, ECON. Q., Fall 1999, at 19–20.

312. See *supra* notes 224–30 and accompanying text.

313. See *supra* note 120 and accompanying text.

314. See *supra* notes 205–09, 222–25 and accompanying text.

315. Calculating these discounts, however, admittedly might sometimes be difficult. See *supra* note 226 and accompanying text.

316. See *supra* notes 245–48 and accompanying text. “Effective market discipline can be achieved when market participants including investors, financial intermediaries, and policymakers receive timely, reliable, and relevant information.” ZABIHOLLAH REZAEI, FINANCIAL INSTITUTIONS, VALUATIONS, MERGERS, AND ACQUISITIONS: THE FAIR VALUE APPROACH 118 (2001). At least one observer has argued that current market discipline standards have been “undermined by the provision of . . . publicly supplied credit guarantees, which relieve debtors from risk, thereby creating both debtor and creditor moral hazards.” Hal S. Scott, *Market Discipline for Financial Institutions and Sovereigns*, in MARKET DISCIPLINE ACROSS COUNTRIES AND INDUSTRIES 69 (Claudio Borio et al. eds., 2004). It has been urged that “the effectiveness of market discipline as a line of defense against . . . systemic risk needs to be enhanced . . . [in] areas where it is obvious that transparency and disclosure are insufficient for the exercise of effective market discipline.” Garry Schinasi, *Remarks on Causes and Conditions of Financial Instability Panel*, in INTERNATIONAL FINANCIAL INSTABILITY: GLOBAL BANKING AND NATIONAL REGULATION 177 (Douglas D. Evanoff et al. eds., 2007). Observers posit that these areas include “large complex financial institutions; global over-the-counter derivatives markets; and hedge funds and other financial institutions or hybrids that fall outside the scope of existing radar screens.” *Id.*

To the extent these approaches fail to deter a systemic meltdown, government should seek to prevent the meltdown or mitigate its impact by implementing whatever ad hoc approaches appear, at the time, to be appropriate.

Although some of these recommended approaches are prophylactic—aimed at anticipating and preventing systemic collapses—and some are reactive—focused on mitigating the spread and consequences of such collapses—the reactive elements dominate.<sup>317</sup> In part, this reflects the aforesaid tragedy of the commons, making traditional prophylactic protections, including disclosure and other market-discipline measures, insufficient to internalize costs. Also in part, it may reflect that cost-effective prophylactic measures are simply difficult to craft. There are many ways that systemic crises can occur, and trying to regulate all would dampen the economy. For example, one could deter another subprime mortgage crisis by regulating a collateral-value restriction on mortgage loans, but that would impede home ownership and impose other costs.<sup>318</sup> Even without regulation, however, such a crisis might not be repeated, whereas other, unforeseen crises may arise.

The foregoing analysis has examined systemic risk without necessarily identifying or distinguishing the country or countries in which such risk arises. Because financial markets and institutions increasingly cross sovereign borders, a systemic collapse in one country inevitably will affect markets and institutions in other countries.<sup>319</sup> These cross-border effects need to be addressed through international regulation.

### III. REGULATION IN AN INTERNATIONAL CONTEXT

International regulation of financial systems has been subject to a roller coaster of a ride. In the latter years of World War II, the Bretton Woods system was established to rebuild the international financial framework and set transnational rules for monetary policy.<sup>320</sup> Central to this system was the fixing of

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317. Market discipline is a prophylactic regulatory approach, and a liquidity-provider of last resort acts prophylactically to prevent a collapse. But the primary goal of a liquidity-provider of last resort is reactive—to mitigate the spread and consequences of systemic collapse—and ad hoc approaches are, by definition, purely reactive.

318. See *supra* notes 140–42 and accompanying text.

319. See, e.g., Michele Fratianni & John Pattison, *International Financial Architecture and International Financial Standards*, 579 ANNALS AM. ACAD. POL. & SOC. SCI. 183, 184 (2002) (observing increasing concern over transmission internationally of local financial failures); Michael Ehrmann & Marcel Fratzscher, *Global Financial Transmission of Monetary Policy Shocks* 26–27 (Eur. Cen. Bank, Working Paper No. 616, 2006) (showing that U.S. monetary shocks have a significant effect on foreign stock markets, and that the more financially integrated countries are, the greater the effect of a monetary shock in one country on such other countries).

320. RAHUL DHUMALE ET AL., GLOBAL GOVERNANCE OF FINANCIAL SYSTEMS: THE INTERNATIONAL REGULATION OF SYSTEMIC RISK 20, 82 (2006) (noting that the Bretton Woods system received its name from its founding conference in Bretton Woods, New Hampshire, in 1944 and comprised several agreements among economic planners to “rebuild the global economic order”). These agreements also established the IMF and the International Bank for Reconstruction and Development (“World Bank”). *Id.*

exchange rates of all major currencies to the U.S. dollar, with the value of the dollar linked to gold at a guaranteed price of thirty-five dollars per ounce.<sup>321</sup> As a result, exchange rates were remarkably stable for the next twenty-five years.<sup>322</sup> By the 1960s, however, in the face of rapidly expanding world trade, it became increasingly clear that the gold supply was “incapable of supporting the strong demand for global liquidity.”<sup>323</sup> Faced with persistent payment deficits, the United States turned in part to its gold reserves and even more substantially to U.S. dollars to finance its debts, making the volume of dollars held by foreigners soar and the U.S. gold reserves dwindle.<sup>324</sup> In 1971, President Richard Nixon instructed the U.S. Treasury Secretary to suspend all sales and purchases of gold, marking the beginning of the end of the Bretton Woods system and of fixed exchange rates.<sup>325</sup>

The resulting deregulation and liberalization of financial markets brought a substantial increase in cross-border capital flows and trade in financial services.<sup>326</sup> Initially acclaimed,<sup>327</sup> deregulation is now seen as a double-edged sword because unregulated financial institutions and markets have become increasingly interdependent.<sup>328</sup> That, in turn, has increased the global market’s

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321. EATWELL & TAYLOR, *supra* note 78, at 1. Nations entrusted gold as an international medium of exchange because of its earlier use under the gold standard, and they accepted the dollar as an international currency because the United States had accumulated significant quantities of gold. CAMPBELL R. MCCONNELL & STANLEY L. BRUE, *ECONOMICS: PRINCIPLES, PROBLEMS, AND POLICIES* 724 (16th ed. 2005). They therefore came to accept gold and the dollar as international reserves, with the dollar convertible into gold on demand. *Id.*

322. EATWELL & TAYLOR, *supra* note 78, at 1.

323. Robert Guttman, *The International Monetary System*, in *REFORMING MONEY AND FINANCE: TOWARD A NEW MONETARY REGIME* 14–15 (Robert Guttman ed., 2d ed. 1997).

324. MCCONNELL & BRUE, *supra* note 321, at 724. This in turn made it increasingly doubtful that the United States would be able to continue to convert dollars into gold at \$35 dollars per ounce, or that dollars would continue to function as instruments of international monetary reserves. *Id.*

325. EATWELL & TAYLOR, *supra* note 78, at 1.

326. *Id.* at 1–3; DHUMALE ET AL., *supra* note 320, at 14.

327. See, e.g., Timothy A. Canova, *The Transformation of U.S. Banking and Finance: From Regulated Competition to Free-Market Receivership*, 60 *BROOK. L. REV.* 1295, 1354 n.76 (1995) (noting that in the early 1990s, the U.S. Treasury Department unequivocally endorsed financial liberalization by “regularly pressuring other nations to free their domestic interest rates and divorce central bank policy from democratic and parliamentary political control”); Alan Friedman, *But Nations Appear Reluctant: IMF Pushing To Open East Asian Markets*, *INT’L HERALD TRIB. (FR.)*, Sept. 20, 1997, at 13 (quoting a top IMF official as claiming “the benefits of liberalizing . . . outweigh the potential costs” and a former WTO chief as asserting that financial-services liberalization was “the cure, not the cause” of the East-Asian economic crisis of 1997).

328. GERARD CAPRIO ET AL., *FINANCIAL LIBERALIZATION: HOW FAR, HOW FAST?* 15–17 (2001) (observing that the liberalized financial markets “laid bare the previous inefficiencies and failures in credit allocation” and undermined efforts to value the true value of bank capital and the true risk of bank portfolios); Jayati Ghosh, *The Economic and Social Effects of Financial Liberalization: A Primer for Developing Countries* 9 (U.N. Dep’t of Econ. & Soc. Affairs, Working Paper No. 4, 2005), available at [http://www.un.org/esa/desa/papers/2005/wp4\\_2005.pdf](http://www.un.org/esa/desa/papers/2005/wp4_2005.pdf) (“[F]inancial liberalization creates exposure to the following kinds of risk: a propensity to financial crises, both external and internal; a deflationary impact on real economic activity and reduced access to funds for small-scale producers, both urban and rural. This in turn has major social effects in terms of loss of employment and more volatile material conditions for most citizens.”); see also EATWELL & TAYLOR, *supra* note 78, at ix (“The presumption,

exposure to systemic risk.<sup>329</sup> Can international regulation mitigate this risk?

Because this Article's analysis of limiting systemic risk is not necessarily tied to the United States or to a domestic financial system, the Article's recommendations—to establish a liquidity-provider of last resort, supplemented by a market-discipline approach and, as needed, by ad hoc remedies—should theoretically have equal application to limiting cross-border systemic risk. In an international context, however, two issues emerge: is a single regulatory approach feasible, and, if it is, who should act as the international liquidity-provider of last resort (“international LPOLR”)?

Whether or not it is feasible, a single regulatory approach certainly appears desirable, being easier to adopt and administer in a global economy than country-specific regulation and also lessening the potential for a regulatory race to the bottom.<sup>330</sup> Nonetheless, given the diversity of approaches to financial regulation and supervision among various nations of the world, some commentators believe that any single regulatory model would be impractical.<sup>331</sup> They argue that the optimal regulatory model must be customized for each country in accord with the structure and size of the country's financial system, its specific regulatory and supervisory objectives, and its unique historical evolution and political traditions.<sup>332</sup> At the very least, some of these observers contend, the Anglo-American concept of fiduciary duty, which supports a broad range of institutions and regulatory structures, is impossible to replicate in the traditionally less stringently regulated Roman law systems throughout Europe, Africa, Latin America, and many parts of Asia.<sup>333</sup>

These differences do not, however, appear to undermine the concept of a single regulatory approach to systemic risk. Political scientists and economists have observed that international cooperation is the natural and most effective response of states that share an interest in averting a common crisis that affects

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widely held before 1997, that financial liberalization is invariably beneficial, has now been abandoned by almost all serious commentators.”).

329. DHUMALE ET AL., *supra* note 320, at 14.

330. See Elene Spanakos, Note, *Harmonization of International Adequacy Rules for Securities Firms: An Argument To Implement the Value at Risk Approach by Adopting Basel's Internal Model Methodology*, 26 BROOK. J. INT'L L. 221, 241–42, 244 (2000) (arguing that without international standards there will be a “race to the bottom” in regulatory schemes).

331. See, e.g., JAMES A. HANSON ET AL., *GLOBALIZATION AND NATIONAL FINANCIAL SYSTEMS* 273–74 (2003); David T. Llewellyn, *Institutional Structure of Financial Regulation and Supervision: The Basic Issues* 7, Paper Presented at a World Bank Seminar (June 6–7, 2006), available at <http://info.worldbank.org/etools/library/latestversion.asp?232743> (“It is an illusion to believe that there is a single, superior model of institutional structure that is applicable to all countries.”).

332. Llewellyn, *supra* note 331, at 7, 10–11.

333. HANSON ET AL., *supra* note 331 (arguing that the pervasive looting of newly privatized entities in Central and Eastern Europe and the subsequent collapse of small country capital markets in places like Slovakia evidence the challenges inherent in broad and sudden changes to a financial system's regulatory structure); accord DAVID F. GOOD, *ECONOMIC TRANSFORMATIONS IN EAST AND CENTRAL EUROPE: LEGACIES FROM THE PAST AND POLITICS FOR THE FUTURE* 3–4 (1994) (evaluating the concerns and future of European-wide economic integration and claiming that Central and Eastern European economies have long been characterized by their “economic backwardness”).

them individually—despite the many historical, cultural, and legal differences that distinguish nations.<sup>334</sup> An otherwise effective regulatory approach to systemic risk therefore ought to have the potential for international applicability.<sup>335</sup> Basel II effectively illustrates that a single regulatory scheme for financial risk can be applied, at least in the banking context, across diverse national financial systems.<sup>336</sup> Approximately one hundred countries have signaled that they will implement Basel II by 2010.<sup>337</sup>

A single regulatory approach thus appears feasible for mitigating systemic risk. Who should act, however, as the international LPOLR? There are at least two obvious choices. One is the IMF, which sometimes already takes on this

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334. See, e.g., RICHARD J. HERRING & ROBERT E. LITAN, *FINANCIAL REGULATION IN THE GLOBAL ECONOMY* 120–23 (1994) (suggesting systemic risk is analogous to epidemiological risk, in that both can be effectively resolved by international collaboration when “countries agree[] on how to act . . . [and their] cooperation advance[s] to the point of establishing an international agency and jointly financing international action to control and attempt to eradicate” the contagion); James D. Fearon, *Bargaining, Enforcement, and International Cooperation*, 52 INT’L ORG. 269, 271 (1998) (“Whether the goal is to control arms racing, reduce the risk of preemptive war, limit global environmental damage, stabilize exchange rates, or reduce protectionism in trade, state leaders . . . coordinate state policies and the actions of the relevant state bureaucracies . . . to gain various benefits of cooperating.”); Edward J. Kane, *Government Officials as a Source of Systemic Risk in International Financial Markets*, in *REGULATING INTERNATIONAL FINANCIAL MARKETS: ISSUES AND POLICIES* 257–58 (Franklin R. Edwards & Hugh T. Patrick eds., 1992) (analogizing the global financial system to the interconnected subsystems of the human body and implying that just as the central immune system is the most efficient way to regulate the health of the body’s many subsystems, so is a universal regulatory approach the most efficient means of regulating systemic financial risk).

335. See DAVIS, *supra* note 18, at 269 (arguing against possible “excessive readiness to assume that the current domestic situation is unique”); DHUMALE ET AL., *supra* note 320, at 270 (proposing the establishment of a Global Financial Governance Council to coordinate “effective international financial regulation . . . [using] a multilateral treaty regime that combines legally binding principles of efficient regulation (i.e., capital adequacy and consolidated supervision) and a mechanism for developing nonbinding soft law codes (capital adequacy formulas and coordination of enforcement)”); Benn Steil, *Regulatory Foundations for Global Capital Markets*, in *FINANCE AND THE INTERNATIONAL ECONOMY* 66 (Richard O’Brien ed., 1992) (“Since any systemic effects of inadequate or misguided regulation in one jurisdiction cannot be contained within that single jurisdiction, the imposition of universal standards or modes of operation is likely to be the only effective response.”).

336. See IOANNIS S. AKKIZIDIS & VIVIANNE BOUCHEREAU, *GUIDE TO OPTIMAL OPERATIONAL RISK AND BASEL II*, 99–105 (2006); Press Release, Bank for Int’l Settlements, *Basel II and Financial Institution Resiliency* (June 27, 2007), available at <http://www.bis.org/press/p070627.htm>.

337. Karen Krebsbach, *International-Rule Adoption May Harm Emerging Economies*, U.S. BANKER, Apr. 2007, at 22 (“Already more than 100 countries have stated intentions to implement the Basel Capital Accord, known as Basel II.”); Memorandum from the Cent. Bank of Bahr., *Basel II Update* (First Quarter, 2007), available at [http://www.cbb.gov.bh/cmsrule/media/pdf/policydevelopment/Consultations/Basel\\_II\\_Update\\_Q1\\_2007.pdf](http://www.cbb.gov.bh/cmsrule/media/pdf/policydevelopment/Consultations/Basel_II_Update_Q1_2007.pdf) (“Over 100 countries are committed to the implementation of Basel II, with implementation dates ranging from 2005 to 2010.”). The chairman of Basel II concedes, however, that implementing the accord will be extremely difficult. Peter Norman, *Basel II Chairman Says Rules Will Be Hard To Implement*, FIN. TIMES (London), Apr. 11, 2005, at 23. Some also argue that Basel II may actually prove counterproductive. See, e.g., DHUMALE ET AL., *supra* note 320, at 263 (arguing that because the majority of developed nations will adopt some variation of Basel II, the G10 countries are likely to exert at least moderate pressure on developing nations to permit foreign banks to operate in their markets under Basel II, which in turn could have a disproportionate impact on the composition of credit risk in those jurisdictions and place foreign banks at a distinct advantage over local banks).

role, albeit with controversy, in extending liquidity to troubled sovereign states.<sup>338</sup> Another choice would be one or more national central banks, such as the U.S. Federal Reserve Bank or the European Central Bank.

Compare how the IMF and the Federal Reserve might function in an international LPOLR capacity. At least one commentator argues that the Federal Reserve would be a better international LPOLR than the IMF.<sup>339</sup> An international LPOLR should ideally be able to advance funds in a widely used international currency, and the Federal Reserve is a source of U.S. dollars.<sup>340</sup> The IMF, in contrast, has no power to create currency. The Federal Reserve also may have an advantage in that it is arguably less bureaucratic than the IMF and thus capable of making quicker decisions.<sup>341</sup> Thus, the Federal Reserve—and, by analogy, the European Central Bank—appears to have a better institutional capacity than the IMF to act as an international LPOLR.

On the other hand, any national central bank (including the Federal Reserve or European Central Bank) acting as an international LPOLR would face possible conflicts of interest between its national and international responsibilities. The IMF, in contrast, is a truly international organization. Furthermore, through its access to member-state capital, the IMF can theoretically spread the burden of responding to international systemic risk.<sup>342</sup> The IMF cannot, however, create currency. It would not need that power if it has access to a potentially unlimited amount of currency,<sup>343</sup> but such access would require reform of the IMF's relationship with its member-states.<sup>344</sup>

There is, therefore, no clear choice among existing institutions as to who should act as the international LPOLR.

#### CONCLUSION

This Article, which is the first major work of legal scholarship on systemic risk, has examined what systemic risk really means, cutting through the confu-

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338. See *supra* notes 206–08 and accompanying text.

339. ROBERT KELEHER, JOINT ECON. COMM., AN INTERNATIONAL LENDER OF LAST RESORT, THE IMF, AND THE FEDERAL RESERVE 178 (1999). Although the European Central Bank was not in contention when the above comparison was made, the European Central Bank is closely analogous to the Federal Reserve for purposes of such comparison because both are central banks and able to print money as needed.

340. *Id.* (arguing that the Federal Reserve Bank “has international reserve or money-creating powers and, accordingly, can act to satisfy increased demands for liquidity [and also] can act to create liquidity quickly via open market operations rather than through the slower, more cumbersome discount window mechanism,” but tying this argument in part to the U.S. dollar being the dominant reserve currency).

341. *Id.* at 7 (“[The IMF] cannot create reserves or international money, cannot act quickly enough to serve as an international LOLR, and does not operate in a transparent manner. Further, IMF lending currently (indirectly) serves to bail out insolvent institutions, something wholly inappropriate for an international LOLR.”).

342. Knedlik, *supra* note 204, at 26 (describing the IMF's substantial access to capital from more than 20 member states).

343. *Id.* at 8 (“In the case of a global crisis . . . almost unlimited reserves would be necessary.”).

344. *Id.* at 26 (discussing how the IMF could obtain “quantitatively unlimited” access to member-state funds).

sion and ambiguity to establish basic parameters. Economists and other scholars historically have tended to think of systemic risk in terms of financial institutions such as banks, and only infrequently in terms of financial markets. However, with the growth of disintermediation, in which companies can access capital-market funding without going through banks or other intermediary institutions, greater focus should be devoted to financial markets and the relationship between markets and institutions.

This same focus reveals that the monetary-policy actions taken by the Federal Reserve in the recent subprime mortgage crisis, although helpful, are insufficient to stop a full-fledged systemic collapse. This is because monetary policy primarily impacts banks, not financial markets, and it is markets, not banks, that are increasingly at risk. Likewise, ad hoc actions taken in that crisis by the Federal Reserve to protect financial institutions, such as Bear Stearns, might be helpful but are still insufficient because they fail to address the underlying problem: financial-market collapse due to loss of investor confidence.<sup>345</sup> This is not to say that monetary policy or ad hoc approaches should be discarded, only that they must be augmented by measures that more directly address the financial markets.

This Article attempts to identify and assess these measures. A threshold question is whether regulatory measures are appropriate. The Article argues they are because, like a tragedy of the commons, market participants have insufficient incentives, absent regulation, to limit risk-taking in order to reduce the systemic danger to others.

The Article demonstrates the optimality of a multi-tiered regulatory approach. A liquidity-provider of last resort should be created to provide liquidity to failing financial institutions and markets as appropriate to prevent systemic collapse. Liquidity ensures maximum flexibility because “[i]t could solve any problem, irrespective of its cause. Trying to address . . . the cause [] is almost like fighting the last war because the next problem will be different.”<sup>346</sup> Liquidity’s broad-spectrum capability is important in a world where financial intermediation evolves at a speed faster than one can anticipate.<sup>347</sup>

In the subprime mortgage crisis, for example, providing liquidity to the failing mortgage-backed securities markets would help to raise the prices of these securities to levels that more closely reflect their real value, bringing back

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345. Bear Stearns, for example, did not collapse because of problems with economic fundamentals but because of falling prices of mortgage-backed securities that required it to mark-down the value of those securities, which in turn created fear among its contractual counterparties who then refused to have further dealings. See *Caveat Counterparty: When Banks Cannot Trust Each Other*, *ECONOMIST*, Mar. 19, 2008, at 86; Andrew Tanzer, *Bear Stearns: Tip of the Iceberg*, *KIPLINGER’S*, Mar. 14, 2008, <http://www.kiplinger.com/columns/picks/archive/2008/pick0314.htm>.

346. *Systemic Risk Hearing*, *supra* note 1, at 27.

347. See, e.g., BOOKSTABER, *supra* note 139, at 255–57; see also Yamaguchi, *supra* note 7, at 3 (observing that even the best preventative measures may not succeed in removing the sources of systemic risk in an environment where financial intermediation evolves at a speed faster than one can anticipate).



investor confidence.<sup>348</sup> With confidence, credit markets would reopen, mortgage money would once again become available, and home prices would begin rising. This is a sensible market solution to the otherwise intractable problem of home foreclosures resulting from the collapsing housing market.<sup>349</sup>

Although a liquidity-provider of last resort can foster moral hazard, that can be minimized if the liquidity-provider lends under a policy of constructive ambiguity and invests in market securities at a deep discount. Investing at a deep discount would also minimize the burden on taxpayers. Alternatively, the liquidity-provider-of-last-resort function could even be privatized by granting the liquidity-provider a repayment priority on its loans and investments.

The liquidity-provider-of-last-resort function should be supplemented by market discipline, in which regulators attempt to ensure that market participants exercise the type of diligence that enables the market to work efficiently. To the extent these approaches fail to deter a systemic meltdown, government should seek to prevent the meltdown or mitigate its impact by implementing whatever ad hoc approaches appear, at the time, to be appropriate.

Because finance and markets are globally interconnected, systemic collapse in one country inevitably will affect markets and institutions in other countries. The Article therefore also examines the feasibility of internationally regulating systemic risk, the extent to which regulatory solutions are universal or should be different for different countries, and the potential for a regulatory race to the bottom if regulation is done only on a national level.

While this Article was being edited, it was reported that the Bank of England and other “central banks on both sides of the Atlantic” have become “actively engaged” in discussing—apparently consistent with this Article’s recommendations—“the feasibility of mass purchases of mortgage-backed securities as a possible solution to the credit crisis.”<sup>350</sup> A political consensus on these purchases has not yet emerged.<sup>351</sup> It will be interesting to see whether, in response to the subprime mortgage crisis, this Article’s call for an international liquidity-provider of last resort will become a reality.

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348. This type of ex post market-collapse injection of liquidity does not appear to be as desirable as the earlier application recommended by this Article. Once a market has collapsed, not only will the consequences of that collapse be felt, but the liquidity-provider of last resort will also have to raise market prices rather than merely stabilize them, potentially requiring a greater outlay of funds. See *supra* note 197 and accompanying text.

349. *Cf. supra* note 55.

350. Giles & Guha, *supra* note 225.

351. See Giles, *supra* note 226.