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# SYSTEMIC RISK <sup>1</sup>

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*Abstract: 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.*

## I. INTRODUCTION..... 2

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<sup>1</sup> Copyright © 2008 by Steven L. Schwarcz. The author testified before the U.S. House of Representatives Committee on Financial Services on October 2, 2007 regarding this article’s research and recommendations.

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II. DEFINING SYSTEMIC RISK .....	7
III. REGULATING SYSTEMIC RISK .....	16
A. The Appropriateness of Regulation .....	16
B. Identifying Regulatory Approaches .....	24
C. Assessing Regulatory Approaches .....	56
D. Recommendations .....	68
IV. REGULATION IN AN INTERNATIONAL CONTEXT .....	70
V. CONCLUSIONS.....	76

## I. 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>3</sup> The U.S. Federal Reserve, the European Central Bank, and other monetary agencies worldwide have likewise expressed concern about this crisis and its potential systemic effects,<sup>4</sup> dramatically

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<sup>3</sup> See, e.g., *Systemic Risk: Examining Regulators' Ability to Respond to Threats to the Financial System: Hearing Before the H. Committee on Financial Services*, 110<sup>th</sup> Cong. (Oct. 2, 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) (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 Financial Markets: Lessons from the Subprime Mortgage Meltdown*, 93 MINN. L. REV., issue no. 2 (2008).

<sup>4</sup> See, e.g., 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); Sumeet Desai & Gernot Heller, *G-7 to Weigh Global Response to Credit Crisis*, GUARDIAN UNLIM. (London), Feb. 8, 2008 (“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.”); 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.”); 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

illustrated by the collapse of investment bank Bear Stearns.<sup>5</sup> Governments also have been concerned about the potential for systemic failure stemming from hedge fund collapses,<sup>6</sup> originally raised by the near-failure of Long-Term Capital Management<sup>7</sup> and more recently prompted by the unregulated spread of hedge funds as a favored investment

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from the U.S. subprime mortgage crisis, [Bank board member Christian Noyer] said optimism among consumers and executives was already deteriorating.”); Randal Smith, Carrick Mollenkamp, Joellen Perry, & Greg Ip, *Loosening Up: How a Panicky Day Led the Fed to Act*, WALL ST. J., Aug. 20, 2007, at A1; 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 (Apr. 2006) (Federal Reserve of Atlanta working paper 2006-2) (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?*, THE 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*, 12 BALANCE SHEET, No. 5, at 30 (2004) (discussing that post-911, 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).

<sup>5</sup> See, e.g., Andrew Ross Sorkin, *JP Morgan Pays \$2 a Share for Bear Stearns*, N.Y. TIMES, Mar. 17, 2008, at A1; Edmund L. Andrews, *Fed Acts to Rescue Financial Markets*, 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 \_\_\_ (quoting Treasury Secretary Henry Paulson as being less concerned at the moment about moral hazard than about the stability of the financial system).

<sup>6</sup> 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. pt. 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. 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 (2006).

<sup>7</sup> See *infra* notes 37-42 and accompanying text.

tool.<sup>8</sup> Financial leaders also are calling for increased focus on systemic risk that extends past the traditional, bank-oriented, approach.<sup>9</sup>

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<sup>8</sup> See, e.g., REPORT OF THE PRESIDENT’S WORKING GROUP ON FINANCIAL MARKETS, HEDGE FUNDS, LEVERAGE, AND THE LESSONS OF LONG TERM CAPITAL MANAGEMENT 31-32 (April 1999) (hereinafter, “PRESIDENT’S WORKING GROUP”) (recommending measures to restrain excessive leverage of hedge funds); U.S. GENERAL ACCOUNTING OFFICE (GAO), LONG TERM CAPITAL MANAGEMENT: REGULATORS NEED TO FOCUS GREATER ATTENTION ON SYSTEMIC RISK 14-15 (Oct. 1998) (discussing the concern of regulators for the potential risks posed by hedge funds during period of declining credit standards); STAFF REPORT TO THE UNITED STATES SECURITIES AND EXCHANGE COMMISSION, IMPLICATION TO THE GROWTH OF HEDGE FUNDS, 89 (Sept. 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); Anthony W. Ryan, Assistant Secretary for Financial Markets, U.S. Department of the Treasury, Remarks before the Managed Funds Association Conference (June 11, 2007) (transcript on file with author). See also Ben S. Bernanke, Chairman, Board of Governors, U.S. Federal Reserve System, Remarks at the Federal Reserve Bank of Atlanta’s 2006 Financial Markets Conference, Sea Island, Georgia (May 16, 2006) (transcript 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, Attorney General of Connecticut, The Diane Rehm Show, National Public Radio, May 9, 2007 (arguing that hedge funds should be regulated to avoid systemic risk).

<sup>9</sup> See John Gieve (Deputy Governor, Bank of England), 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 for the 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, *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) (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, Oct. 2006, at 1,2 (Eng.), 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). [Are there any financial leaders in the U.S. calling for this? Cite-Sullivan]

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>10</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>11</sup> As a result, the “very definition [of systemic risk] is still somewhat unsettled.”<sup>12</sup>

Some commentators, for example, define systemic risk as “the probability 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>13</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>14</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

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<sup>10</sup> OXFORD ENGLISH DICTIONARY, general definition (2) (2d ed. 1989).

<sup>11</sup> George G. Kaufman, Bank Failures, Systemic Risk, and Bank Regulation, *THE CATO JOURNAL*, Vol. 16 No. 1, at 4 n. 5 (quoting Alan Greenspan, Remarks at a Conference on Risk Measurement and Systemic Risk, Board of Governors of the Federal Reserve System, Washington, D.C. (1995)), available at <http://www.cato.org/pubs/journal/cj16n1-2.html>.

<sup>12</sup> *Id.*

<sup>13</sup> *Id.* at 4. 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.* 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.*

<sup>14</sup> Paul Kupiec & David Nickerson, *Assessing Systemic Risk Exposure from Banks and GSEs Under Alternative Approaches to Capital Regulation*, 48 *J. REAL ESTATE FIN. & ECON.* 123, 123 (2004) (observing further that 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”).

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>15</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>16</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 II, to define systemic risk and then by examining, in Part III.A, what it is about this risk that is most problematic. Building on that foundation, Parts III.B and III.C of the article offer a conceptual framework for solving the problem of systemic risk, focusing on regulatory solutions. In that context, 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. Part III.D of the article provides specific recommendations. Finally, Part IV of the article focuses on systemic risk in an international context since, finance and markets being global, systemic collapse in one

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<sup>15</sup> This is the definition favored by the Commodity Futures Trading Commission. See [http://www.cftc.gov/opa/glossary/opaglossary\\_s.htm](http://www.cftc.gov/opa/glossary/opaglossary_s.htm). Cf. Nicholas Chan et al., *Systemic Risk and Hedge Funds*, EFA Moscow Meeting Paper, at 1 (Feb. 22, 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”).

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>17</sup> no individual market participant has sufficient incentive, absent regulation,<sup>18</sup> to limit its risk taking in order to reduce the systemic danger to other participants and third parties.<sup>19</sup>

## II. 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 are to financial institutions, markets, or both.

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<sup>16</sup> The third definition focuses solely on repercussions to market participants.

<sup>17</sup> 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* (Courier Dover, trans. by Benjamin Jowett) 57 (2000) (observing that “that 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.”).

<sup>18</sup> Tragedies of the commons sometimes can be addressed by regulators informally pressuring parties to work collectively. See Armin Falk, Ernst Fehr, & Urs Fischbacher *Appropriating the Commons: A Theoretical Explanation*, in *THE DRAMA OF THE COMMONS* 158 (Elinor Ostrom et al. eds., 2002). This approach is discussed *infra* notes 242-258 and accompanying text (discussing market discipline as an approach, and showing why it is insufficient).

<sup>19</sup> See *infra* notes 68-71 and accompanying text.

*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 systemic failure.<sup>20</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>21</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>22</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>23</sup> Because of this interconnectedness, one bank’s

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<sup>20</sup> Statement by William J. McDonough, President of the Federal Reserve Bank of New York, before the Committee on Banking and Financial Services, U.S. House of Representatives, Oct. 1, 1998 (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 ultimately worst consequences of systemic risk as “disrupt[ing] the payments mechanism and the capacity of the financial system to allocate capital”).

<sup>21</sup> Mundy, *supra* note 4, at 29.

<sup>22</sup> R. W. HAFER, THE FEDERAL RESERVE SYSTEM: AN ENCYCLOPEDIA 25, 145 (2005) (observing that a bank’s cash reserves are often less than 5% of its deposits).

<sup>23</sup> Kaufman, *supra* note 11, at 4. *See also* Juergen Eichberger & Martin Summer, *Bank Capital, Liquidity and Systemic Risk*, Working Paper series of the Oesterreichische Nationalbank (Working Paper 87), 3 (2004), *available at* [http://www.oenb.at/de/img/wp87\\_1\\_\\_tcm14-9846.pdf](http://www.oenb.at/de/img/wp87_1__tcm14-9846.pdf).

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>24</sup>

This scenario is most graphically illustrated by the Great Depression.<sup>25</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>26</sup> Many banks were unable to satisfy all of these demands, causing them to fail and contracting the money supply.<sup>27</sup> These failures, in turn, caused many otherwise solvent banks to default,<sup>28</sup> and many companies, deprived of liquidity, were forced into bankruptcy.<sup>29</sup> During the height of the Great Depression, from 1930 to 1933, there were approximately 2000 bank failures yearly.<sup>30</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>31</sup>—is making these failures less critical than in the past.<sup>32</sup>

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<sup>24</sup> Kaufman, *supra* note 11, at 4. *See also* Icard, *supra* note 9 (discussing how disturbances could arise and spread within the banking sector).

<sup>25</sup> Michael D. Bordo, Bruce Mizrach, & Anna Schwartz, NBER Working Paper Series (No. 5371), *Real Versus Pseudo-International Systemic Risk: Some Lessons From History* 3, 21 (1995).

<sup>26</sup> *Id.* at 21. To some extent this was in order to obtain funds to satisfy margin calls, and to some extent this was simply in panic.

<sup>27</sup> *Id.*

<sup>28</sup> 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 20% and 50% of bank failures were due to contagion/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) (arguing that most banks failed during the Great Depression for endogenous reasons and not because of financial intertwining).

<sup>29</sup> Bordo, Mizrach, & Schwartz, *supra* note 25, at 21.

<sup>30</sup> FREDERIC S. MISHKIN, *THE ECONOMICS OF MONEY, BANKING, AND FINANCIAL MARKETS* 261 (7th ed. update 2006).

<sup>31</sup> 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.*,

Companies today are able to obtain most of their financing through the capital markets without the use of intermediaries.<sup>33</sup> As a result, capital markets themselves are increasingly central to any examination of systemic risk.<sup>34</sup> Systemic disturbances can erupt outside the international banking system and spread through capital-market linkages, rather than merely through banking relationships.<sup>35</sup>

*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>36</sup> To the extent systemic risk affects markets, however, it is positively correlated with the markets and cannot be diversified away.<sup>37</sup>

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McKinsey Global Institute, Mapping the Global Capital Markets Third Annual Report (Jan. 2007), 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, available at

[http://www.mckinsey.com/mgi/publications/third\\_annual\\_report/index.asp](http://www.mckinsey.com/mgi/publications/third_annual_report/index.asp).

<sup>32</sup> Cf. Bordo et al., *supra* note 25 (observing that “recent literature is less concerned than it was in earlier times with contagious banking panics as the key source of systemic risk”).

<sup>33</sup> 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.

<sup>34</sup> Yamaguchi, *supra* note 9. Yamaguchi, the former Deputy Governor of the Bank of Japan, warns that financial markets now play a role as sources of systemic disturbances. *Id.* at 1.

<sup>35</sup> Icard, *supra* note 9, at 5. Bank deposits are merely a form of lending, from depositors to the bank. *See Citizens Bank v. Strumpf*, 116 S. Ct. 286, 290 (1996).

<sup>36</sup> Cf. RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* 446 (6<sup>th</sup> ed. 2003).

<sup>37</sup> Cf. POSNER, *supra* note 36, at 446 (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 Russian government default on its bonds, caused LTCM to lose hundreds of millions of dollars and approach a default.<sup>38</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.<sup>39</sup>

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>40</sup>

To avoid this scenario from playing out and raising the cost of capital,<sup>41</sup> the Federal Reserve proactively stepped in to broker a workout of LTCM’s debts.<sup>42</sup>

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<sup>38</sup> ROGER LOWENSTEIN, *WHEN GENIUS FAILED: THE RISE AND FALL OF LONG-TERM CAPITAL MANAGEMENT* 86, 144–46, 164, 169–70 (2000).

<sup>39</sup> Statement by McDonough, *supra* note 20 (describing ways that the problems of LTCM could have caused more widespread financial troubles).

<sup>40</sup> *Id.*

<sup>41</sup> *See supra* note 20 (the President of the Federal Reserve Bank of New York concluding that the most important consequence of systemic risk brought on by a failure of LTCM would have been increasing the cost of capital).

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>43</sup> in LTCM the linkages arose from its derivatives-based hedging strategy with other institutions<sup>44</sup> which, in turn, had linkages with yet other institutions and markets.

*An Integrated Perspective:*

Institutional systemic risk and market systemic risk should therefore 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 critical financial intermediaries, like banks, that are pivotal to the funding of companies, and other times 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>45</sup> In contrast, a chain of failures of institutions that are not critical financial

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<sup>42</sup> Under the terms of this workout, existing lenders converted some of their debt to 90% of equity in LTCM and invested \$3.65 billion of additional capital. LOWENSTEIN, *supra* note 38, at 209–10.

<sup>43</sup> See *supra* note 23 and accompanying text.

<sup>44</sup> 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, OTC DERIVATIVES DOCUMENTATION 1 (2005).

<sup>45</sup> Cf. PRESIDENT’S WORKING GROUP, *supra* note 8, 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 [that] can heighten uncertainty about credit risk and disrupt the intermediation of credit,” which in

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>46</sup> Other than their lack of transparency—making it 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>47</sup> Equity

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turn “could cause a contraction of credit and liquidity, and ultimately[] heighten the risk of a contraction in real economic activity”). *See also supra* note 40 and accompanying text.

<sup>46</sup> 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, in order to compete, to make loans without financial covenants. Interview with Douglas Rosefsky, Managing Director, Alvarez & Marsal (Durham, 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.* Grover R. Castle, *Term Lending—A Guide to Negotiating Term Loan Covenants and Other Financial Restrictions*, J. COM. BANK LENDING 30-33 (Nov. 1980) (tables showing that most bank loans contain financial covenants); 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.”); Jyrki Niskanen & Mervi Niskanen, *Covenants and Small Business Lending: The Finnish Case*, 23 SMALL BUS. ECON. 137, 137 (2004) (observes that the norm in bank loan agreements in the U.S. is to include covenants).

<sup>47</sup> *But cf. infra* notes 51-55 and accompanying text (explaining why hedge funds, as operated in today's market environment, may pose greater risk potential than other types of business organizations).

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>48</sup> and, if they are prudent, the hedge-fund investment will be only part of a diversified investment portfolio.<sup>49</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>50</sup> Size matters.<sup>51</sup>

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<sup>48</sup> 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, *Developments in Banking and Financial Law: 2004: IX. Securities: C. The Securities and Exchange Commission's Registration Requirement for Hedge Fund Advisers* 24 ANN. REV. BANKING & FIN. L. 189, 191, 194–95 (2005).

<sup>49</sup> 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).

<sup>50</sup> *See supra* notes 38-40 and accompanying text (describing LTCM’s billions of dollars of exposure). *See also* PRESIDENT’S WORKING GROUP, *supra* note 8, 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., issue no. 10 (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”).

<sup>51</sup> This “size matters” observation would apply not only to a single large hedge fund but also to multiple hedge funds adopting a similar investment strategy (“convergence”) that, collectively, are large. *Cf.* Anthony Murphy, Managing Director, Citi Markets and Banking, Remarks at the International Insolvency Institute seventh annual conference’s panel, “Understanding Derivatives: Dissecting Complex Financial Instruments,” June 12, 2007 (on file with author).

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>52</sup> and employ investing strategies that may converge.<sup>53</sup> But these characteristics are not intrinsic to the nature of a hedge fund as a private and unregistered investment vehicle,<sup>54</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>55</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>56</sup> As clarified below, this definition of systemic risk will underlie the analysis in the remainder of this article, including the example used in Parts III.B and III.C to help identify and assess regulatory approaches.<sup>57</sup>

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

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<sup>52</sup> Sometimes, also, poor management controls can make hedge funds more “fragile” than other institutions. *Cf.* PRESIDENT’S WORKING GROUP, *supra* note 8, at 5 (observing that hedge funds sometimes take on “structured or illiquid positions whose full value cannot be realized in a quick sale,” potentially making 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, “those organizations and their parent firms often have both liquidity sources and independent streams of income from other activities that can offset the riskiness of their positions.” *Id.*

<sup>53</sup> *See supra* note 51.

<sup>54</sup> *See supra* note 6.

<sup>55</sup> [cite-Stewart]

<sup>56</sup> *Cf.* note 20 and accompanying text.

<sup>57</sup> *See infra* notes 118-121 and accompanying text.

labeled *systematic* risk, meaning simply risk that cannot be diversified away and therefore affects most if not all market participants.<sup>58</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>59</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>60</sup>

### III. 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.

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<sup>58</sup> Campbell R. Harvey's Hypertextual Finance Glossary, at [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 25, 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 flows to service liabilities. Distressed selling may then occur. These inevitable market fluctuations appear to be systematic, not systemic, although they sometimes might trigger systemic problems. *Id* at 10.

<sup>59</sup> *But cf.* Bordo et al., *supra* note 25, at 9 (discussing how normal market expansions and contractions can turn into market crises in situations of “speculative mania”).

<sup>60</sup> 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 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. [cite some examples-Sullivan] In contrast, this article's recommendation, to create a “liquidity provider of last resort” to fund illiquid financial markets (*see infra* Part III.D), is more of a “top-down” approach, not focusing directly on individual homeowners and thus not as clearly 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.

This article attempts to answer that general question and then examines how the answer should change by reason of the financial risk being systemic.

*Regulating Financial Risk:*

Scholars argue that the primary if not sole justification for regulating financial risk<sup>61</sup> is maximizing economic efficiency.<sup>62</sup> Efficiency is thus the central goal of the U.S. securities laws,<sup>63</sup> and it likewise appears to be the central goal of securities laws worldwide.<sup>64</sup> It includes maintaining competition, protecting investors against fraud and

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<sup>61</sup> Although scholars also view regulation through public choice theory, that is not a normative goal but, rather, merely 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 (1995).

<sup>62</sup> 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 Hadfield, *Privatizing Commercial Law: Lessons from the Middle and the Digital Ages* 58 (Mar. 2000) (unpublished manuscript, available at <http://papers.ssrn.com/sol3/delivery.cfm/000329600.pdf?abstractid=220252>) (arguing that the “public value at stake in relationships between commercial entities . . . is economic efficiency”).

<sup>63</sup> THOMAS LEE HAZEN, *THE LAW OF SECURITIES REGULATION* 9 (3d ed. 1996). *See also* John C. Coffee, Jr., *Market Failure and the Economic Case for a Mandatory Disclosure System*, 70 VA. L. REV. 717, 751-52 (1984) (arguing that the strongest arguments for the mandatory disclosure system under securities law are based on efficiency); GEORGE J. STIGLER, *THE CITIZEN AND THE STATE* 88 (1975) (arguing that economic efficiency *should be* the central goal of the U.S. securities laws because “efficient capital markets *are* the major protection of investors”) (emphasis in original). 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 Before the Subcomm. on Finance and Hazardous Materials of the House Comm. on Commerce*, 106<sup>th</sup> Cong. 9 (1999) (statement of Hon. Arthur Levitt, Chairman, Securities and Exchange Commission) (testifying that “[i]nformed 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”).

<sup>64</sup> HAL S. SCOTT & PHILIP A WELLONS, *INTERNATIONAL FINANCE* 46 (7<sup>th</sup> ed. 2000) (arguing that the goal of securities law is to “develop a global regulatory framework that preserves the efficiencies associated with international capital mobility”).

other similar abuses, preventing externalities (or requiring those causing externalities to internalize their costs), and correcting other market failures.<sup>65</sup>

Because systemic risk is a form of financial risk, efficiency should be a central goal in its regulation. 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>66</sup> This observation holds true even for banks, which (absent regulation) will protect themselves but not the stability of the banking system.<sup>67</sup> Moreover, even if market participants were able to collectively act 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>68</sup> Market participants thus will not want to internalize those costs and will take an insufficient amount of care in preventing 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>69</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

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<sup>65</sup> HENDRIK S. HOUTHAKKER & PETER J. WILLIAMSON, *THE ECONOMICS OF FINANCIAL MARKETS* 285 (1996). *See also* DAVID GOWLAND, *THE REGULATION OF FINANCIAL MARKETS IN THE 1990S* 21 (1990); HERRING & LITAN, *supra* note 61, at 79. Regulating markets to correct market failure is sometimes referred to as the “public interest theory.” GOWLAND, *supra* at 21.

<sup>66</sup> *See* PRESIDENT’S WORKING GROUP, *supra* note 8, at 31.

<sup>67</sup> *See* Rodrigo Cifuentes, Gianluigi Ferrucci, & Hyun Song Shin, *Liquidity Risk and Contagion* 17-18 (working paper, Jan. 19, 2004, on file with author) (observing that “when 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 sub-optimal.”).

<sup>68</sup> *See infra* notes 72-73 and accompanying text (discussing the social impact of a systemic collapse of the financial system).

<sup>69</sup> Hardin, *supra* note 17.

impact because it is so rare relative to other market risks.<sup>70</sup> For these reasons, regulation of systemic risk appears not only appropriate but necessary.<sup>71</sup>

*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 then efficiency should plainly be the central goal. Conversely, systemic risk focuses on risks *to* the financial system.<sup>72</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>73</sup> Although

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<sup>70</sup> 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. LOWENSTEIN, *supra* note 38, at 71–75, 173. Ignoring a possible greater risk for the sake of personal gain is not unique to the world of finance. Before the *Challenger* disaster, engineers knew of the risk that the rubber O-rings might fail at cold temperature and argued that the launch should be delayed until warmer weather. Engineers also identified the potential for wing damage before the *Columbia* disaster. In both cases, however, NASA administrators appeared to have been less concerned about the possible safety risks than about the impact on their personal reputations of canceling flights. RICHARD BOOKSTABER, *A DEMON OF OUR OWN DESIGN: MARKETS, HEDGE FUNDS, AND THE PERILS OF FINANCIAL INNOVATION* 159–61 (2007).

<sup>71</sup> *Cf.* Cifuentes et al., *supra* note 67, at 18 (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 is more cost effective when implemented on an ex ante preventative or ex post reactive basis, is discussed *infra* Parts III.C and III.D.

<sup>72</sup> I thank my colleague, Ralf Michaels, for this insight into differentiating risks within, and to, the financial system.

<sup>73</sup> 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 (Winter 2002) (discussing an explosion of executions as probably resulting from increased crime due to the Great Depression). *Cf.* Erin Ryan,

efficiency in a broad sense includes health and safety, these are sometimes viewed from a regulatory standpoint as going beyond efficiency.<sup>74</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 Department of Homeland Security (DHS) in connection with an anticipated bird-flu pandemic.<sup>75</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>76</sup> In each case, DHS's primary goal is to preserve the stability of these industry sectors in the face of a pandemic.<sup>77</sup>

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*Federalism and the Tug of War Within: Seeking Checks and Balance in the Interjurisdictional Gray Area*, 66 MD. L. REV. 503, 636-37 (2007) (“pragmatism . . . seems well-suited to the circumstances of the time: massive unemployment, farmer uprisings and hunger marches, public rioting, and widespread fear of revolt.”).

<sup>74</sup> VISCUSI ET AL., *supra* note 62, at 9.

<sup>75</sup> See Department of Homeland Security, Pandemic Influenza: Preparedness, Response, and Recovery, Guide for Critical Infrastructure and Key Resources, *available at* <http://www.pandemicflu.gov/plan/pdf/CIKRpandemicInfluenzaGuide.pdf>.

<sup>76</sup> Critical industry sectors are broken down into critical infrastructure and key resources. Critical infrastructure is defined as systems and assets so vital to the U.S. that their incapacity or destruction would have a debilitating impact on security, national economic security, national public health, safety, or any combination of those. *Id.* at 20. Critical infrastructure is identified as 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 are identified as commercial facilities, government facilities, dams, and nuclear power plants. *Id.*

<sup>77</sup> *Id.* at 20. DHS is concerned that a pandemic, by disturbing these industry sectors, might cause “economic disruption” and “social disturbance.” *Id.* at 32.

For analysis purposes, the remainder of this article will assume that preservation of the financial system is socially desirable<sup>78</sup> and thus stability should be an important regulatory goal.<sup>79</sup> The goals of regulating systemic risk thus should include both efficiency and stability.<sup>80</sup>

*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>81</sup> Indeed, its direct and indirect costs can be high.<sup>82</sup> The

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<sup>78</sup> This is not to say that preserving the financial system will always be socially optimal. An iconoclast might contend that 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 cf.* 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”).

<sup>79</sup> 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 (*cf.* 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 (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 9 (also considering consequences). These consequences can be prevented, however, by preventing the collapse of the financial system.

<sup>80</sup> Although I recognize that efficiency, in a broad sense, includes not only health and safety (*see supra* note 74 and accompanying text) but also stability, it will be analytically useful to view stability as separate from efficiency per se.

<sup>81</sup> *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,

former include the cost of hiring government (or government-delegated) employees to enforce the regulation as well as associated monitoring and compliance costs.<sup>83</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>84</sup>), loss of economic welfare caused by firms performing fewer transactions, and the dynamic costs of regulations acting as a barrier to innovation.<sup>85</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

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A PRIMER FOR POLICY ANALYSIS 309-10 (1978) (warning that “the 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, 476 n. 225 (1997) (discussing the ability of market participants, in this case lenders, to find alternative markets; in the case of systemic risk, however, 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 36, at 456 (observing that securities market regulation is “founded on the premise that without such regulation [such markets] would not function satisfactorily,” but then arguing, *id.* at 457, 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 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).

<sup>82</sup> Even where there is market failure, “government intervention may not [always] yield a superior outcome.” VISCUSI ET AL., *supra* note 62, at 10. See also *id.* at 13 (observing that “‘government failure’ may be of the same order of importance as market failure”).

<sup>83</sup> See, e.g., D. T. Llewellyn, *Competition and the Regulatory Mix*, NAT’L WESTMINSTER BANK Q. REV., Aug. 1987, at 4-5. See also EATWELL & TAYLOR, *supra* note 81, at 19 (observing that overly fastidious regulation may result in risks being overpriced).

<sup>84</sup> 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).

<sup>85</sup> GOWLAND, *supra* note 65, at 21.

or cautiously.<sup>86</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>87</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>88</sup> Because systemic risk can cause market failures and associated externalities,<sup>89</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

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<sup>86</sup> 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. Robert McLeman & Barry Smit, *Vulnerability to Climate Change Hazards and Risks: Crop and Flood Insurance*, 50 CAN. GEOGRAPHER 217 *passim* (2006).

<sup>87</sup> Milton Friedman, *Have Monetary Policies Failed?*, 62 AM. ECON. REV. 11, 12 (May 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, *An Examination of the Current Status of Rating Agencies and Proposals for Limited Oversight of Such Agencies*, 30 SAN DIEGO L. REV. 579, 610-11 (1993) (observing that “[t]oo much regulation inhibits economic growth by increasing costs and making capital harder to raise”).

<sup>88</sup> See *supra* notes 65-66 and accompanying text.

<sup>89</sup> 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. See *supra* notes 79-81 and accompanying text (discussing whether collapse of the financial system sometimes could, in the long run, be beneficial for society).

regulation do not exceed its benefits.<sup>90</sup> This second notion of efficiency thus becomes more transparent by separately recognizing those costs.<sup>91</sup>

### B. Identifying Regulatory Approaches

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

#### *Historical Approaches:*

Historically, regulation of systemic risk has focused largely on preventing bank failure.<sup>92</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>93</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>94</sup> In an international context,<sup>95</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>96</sup> Basel II outlines credit risk, operational risk, and market risk as the three issues that should influence capital holding requirements.<sup>97</sup> The benefits of Basel II are said to include greater transparency and a

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<sup>90</sup> 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).

<sup>91</sup> See *infra* notes 272-275 and accompanying text (computing the cost-benefit efficiency of regulating systemic risk by separately recognizing *R*, the cost of regulation).

<sup>92</sup> Yamaguchi, *supra* note 9, at 2.

<sup>93</sup> Steven A. Ramirez, *The Law and Macroeconomics of the New Deal*, 62 MD. L. REV. 515, 543-44 (2003). [briefly describe FDIC insurance scheme. Cite-Stewart]

<sup>94</sup> EICHBERGER & SUMMER, *supra* note 23, at 1; DAVIS, *supra* note 20, at 124-26.

<sup>95</sup> For an analysis of the international dimensions of regulating systemic risk, see *infra* Part IV.

<sup>96</sup> BASEL COMMITTEE ON BANKING SUPERVISION, *INTERNATIONAL CONVERGENCE OF CAPITAL MEASUREMENT AND CAPITAL STANDARDS: A REVISED FRAMEWORK* 26-217 (June 2006), available at <http://www.bis.org/publ/bcbs128.pdf>.

<sup>97</sup> *Id.*

“state of the art” approach to risk management that “make banking safer and more profitable.”<sup>98</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>99</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>100</sup> Deposit insurance also can permit insolvent banks to remain in operation and continue to generate losses,<sup>101</sup> such as the \$150 billion of losses generated by the ongoing operation of insolvent savings and loan associations.<sup>102</sup>

Capital requirements are similarly imperfect. Constraining lending activities of banks can redirect funds to lenders whose constraints are not binding.<sup>103</sup> Capital requirements also are said to undercut the ability of banks to build equity value.<sup>104</sup> These

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<sup>98</sup> MARC B. LAMBRECHT, *THE BASEL II RATING: ENSURING ACCESS TO FINANCE YOUR BUSINESS* 9 (2005). *See also* Jaime Caruana in C.E.V. BORIO, *MARKET DISCIPLINE ACROSS COUNTRIES AND INDUSTRIES* 25 (2004).

<sup>99</sup> Kaufman, *supra* note 11, at 5. *See also id.* at 18 (quoting Anna Schwartz). *Cf.* POSNER, *supra* note 36, 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).

<sup>100</sup> Kaufman, *supra* note 11, at 6.

<sup>101</sup> *Id.*

<sup>102</sup> *Id.*

<sup>103</sup> *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).

<sup>104</sup> EICHBERGER & SUMMER, *supra* note 23, at 22 (arguing that “[b]anks 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.”).

requirements also can be imprecise, since the standards by which they are imposed are imprecise.<sup>105</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. 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 increased off-shore hedge fund compliance with international standards.<sup>106</sup> Even the Chairman of the U.S. Federal Reserve Board acknowledges the ongoing challenge.<sup>107</sup>

Finally, although certain governmental bodies such as the U.S. General Accounting Office and the Securities and Exchange Commission (SEC) have

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<sup>105</sup> Frank Partnoy, *Why Markets Crash and What Law Can Do About It*, 61 U. PITT L. REV. 741, 781-82 (Spring 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”).

<sup>106</sup> See PRESIDENT’S WORKING GROUP, *supra* note 8, at 29-43.

<sup>107</sup> Bernanke, *supra* note 8, at 2-4 (observing that although, “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 noting the possibility of non-transparent leverage), “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”). 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.

recommended specific oversight practices and reporting requirements for hedge funds,<sup>108</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>109</sup> These problems are real,<sup>110</sup> but their significance pales in comparison to the problem of systemic risk.<sup>111</sup> Furthermore, the SEC appears to lack the jurisdiction to attack even these peripheral problems:

[M]anaging systemic risk is a decision for the [U.S.] Treasury Department or the Federal Reserve, not the SEC. The SEC's charge is not to remedy concerns rooted in excessive leverage or complex derivatives transactions or otherwise to manage risk in financial markets. The fact that the SEC might worry about systemic risk does not give it jurisdiction over the matter . . . .<sup>112</sup>

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,

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<sup>108</sup> U.S. GENERAL ACCOUNTING OFFICE, *supra* note 8. [Is that a report instead by the U.S. General Accountability Office? Check the original source. Cite-Sullivan. Also, is there a direct citation to the SEC's recommendation? Cite-Sullivan]

<sup>109</sup> Mara der Hovanesian, *The SEC Isn't Finished with Hedge Funds*, BUS. WK. 34 (July 17, 2006).

<sup>110</sup> For additional non-systemic problems that might be the province of SEC regulation, see Paredes, *supra* note 6, at 6-7.

<sup>111</sup> See, e.g., Chan et al., *supra* note 15; Timothy F. Geithner, *Hedge Funds and Their Implications for the Financial System*, Federal Reserve Bank of New York (Nov. 17, 2004); PRESIDENT'S WORKING GROUP, *supra* note 8; *Toward Greater Financial Stability: A Private Sector Perspective*, Counterparty Risk Management Group II (2005) (all of these articles, from the economic and financial literature, recognizing systemic risk as *the* central issue of hedge fund failure).

<sup>112</sup> Paredes, *supra* note 6, at 21. *Accord*, Goldstein v. SEC, 451 F.3d 873 (D.C. Cir. 2006).

which is the interest rate the Federal Reserve charges a bank to borrow funds when the bank is temporarily short of funds.<sup>113</sup> The European Central Bank and other central banks similarly cut the interest rate they charge to borrowing banks.<sup>114</sup> These steps, however, directly impacted banks, not financial markets.<sup>115</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>116</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>117</sup>

*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>118</sup> and consistent with supposition by the President’s Working Group on Financial Markets, Hedge Funds, Leverage, and the Lessons of Long Term Capital Management<sup>119</sup> as well as testimony before the U.S. House of Representatives’

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<sup>113</sup> See Greg Ip, Robin Sidel & Randall Smith, *Stronger Steps: Fed Offers Banks Loans to Ease Credit Crisis*, WALL ST. J., Aug. 18-19, 2007, Weekend Ed., at A1; <http://www.duke.edu/%7Echarvey/Classes/wpg/bfglosd.htm> (visited Aug. 20, 2007).

<sup>114</sup> Smith, Mollenkamp, Perry, & Ip, *supra* note 4, at A8.

<sup>115</sup> Ip, Sidel, & Smith, *supra* note 113, at A8 (observing that “the [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”).

<sup>116</sup> See *infra* note 122 (observing that because financial markets are tightly coupled, spiraling events may well occur rapidly, within days). 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, 918-919 (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, Greg Ip, & Shefali Anand, *Fed Fails So Far In Bid to Reassure Anxious Investors*, WALL ST. J., Aug. 21, 2007, at A1.

<sup>117</sup> 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, *Protecting Financial Markets*, *supra* note 3.

<sup>118</sup> See *supra* notes 50-57 and accompanying text.

<sup>119</sup> Cf. *supra* note 45 and references therein.

Committee on Banking and Financial Services<sup>120</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 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>121</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 further price-drops.<sup>122</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.

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<sup>120</sup> *Cf. supra* notes 39-40 and accompanying text.

<sup>121</sup> *See, e.g.,* DAVIS, *supra* note 20, at 127-28 (describing how markets are depressed when failing institutions are forced by creditors to liquidate their assets in distress sales). *See also infra* note 127 and accompanying text (discussing how forced sales of assets to meet margin calls can depress asset prices, creating a downward pricing spiral); Cifuentes et al., *supra* note 67, at 5-6 (noting the “recent theoretical findings on banking and financial crises that has emphasised the limited capacity of the financial markets to absorb sales of assets”).

<sup>122</sup> These spiraling events may well occur rapidly, within days. *See, e.g.,* Testimony of Richard Bookstaber before the U.S. House of Representatives Committee on Financial Services, Oct. 2, 2007, at 1 (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”), available at [http://www.house.gov/apps/list/hearing/financialsvcs\\_dem/ht1002072.shtml](http://www.house.gov/apps/list/hearing/financialsvcs_dem/ht1002072.shtml). *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”).

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>123</sup> This approach appears to be a key feature of existing bank regulation, which endeavors to prevent bank runs through governmental deposit insurance.<sup>124</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 inadvertently destroying the market’s liquidity<sup>125</sup>; or, as in the generic example of a systemic market meltdown,<sup>126</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>127</sup>

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<sup>123</sup> MILTON FRIEDMAN & ANNA SCHWARTZ, A MONETARY HISTORY OF THE UNITED STATES 1867-1960, at 311 (1963). Such a panic can occur, for example, when depositors “fear that means of payment will be unobtainable at any price.” Bordo et al, *supra* note 25, at 7.

<sup>124</sup> *Deposit Insurance*, Hearing Before the U.S. Senate Committee on Banking, Housing, and Urban Affairs, Feb. 26, 2003 (statement of Alan Greenspan, Chairman of the U.S. Federal Reserve System), *available at* <http://www.federalreserve.gov/boarddocs/testimony/2003/20030226/default.htm>.

<sup>125</sup> See DAVIS, *supra* note 20, at 121.

<sup>126</sup> See *supra* notes 118-120 and accompanying text.

<sup>127</sup> 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, 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*

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>128</sup> Incongruously, sometimes stability can be achieved by closing down capital markets to halt price-drops,<sup>129</sup> though this can backfire by actually increasing investor panic.<sup>130</sup>

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*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 systemic stability” 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 67, at 2. 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, 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 (also explaining, *id.* at 37, that leverage decreases the amount of capital relative to potential cash obligations, and 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).

<sup>128</sup> Cf. Andrew Elek & Dominic Wilson, *The East Asian Crisis and International Capital Markets*, ASIAN-PACIFIC ECON. LITERATURE 1, 7 (May 1999) (describing investor withdrawal of capital and resulting large-scale insolvency due to market illiquidity).

<sup>129</sup> See, e.g., Partnoy, *supra* note 105, 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 911 attacks. Margo McCall, *Uncertainty Follows Tragedy*, WIRELESS WEEK, Sep. 17, 2001, at 1.

<sup>130</sup> Partnoy, *supra* note 105, at 783 (arguing that closing down markets “may actually fuel panic,” and explaining that “there is no empirical evidence supporting this point, but it seems equally plausible that investor cognitive error would increase more during the

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>131</sup> Furthermore, even when identified, panics cannot always be averted easily. Consider, for example, price shocks that cause panics.<sup>132</sup> These shocks should not result from known risks because rational investors will price in the cost of those risks.<sup>133</sup> But investors are not always rational. Earlier this decade, “high-yield corporate bonds (formerly known as junk bonds) were able to attract investors only by offering interest rates eight to 10 percentage points higher than U.S. government bonds.”<sup>134</sup> By early 2007, however, high-yield bonds could attract investors by offering interest rates merely “little more than two percentage points” higher than government bonds.<sup>135</sup> Although the reason for this marked decline in the risk premium is unclear,<sup>136</sup> it

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period in which the circuit breaker [closing down the market] is in effect than it would have increased during a period of panic selling”).

<sup>131</sup> See 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. Federal Reserve System).

<sup>132</sup> Cf. DAVIS, *supra* note 20, at 12 (observing that mispricing can lead to increased market vulnerability); Bordo et al., *supra* note 25, at 9 (discussing how “speculative mania” can turn into market crisis).

<sup>133</sup> Cf. POSNER, *supra* note 36, at 446 (observing that investors, who are risk averse, will want to be compensated for risk that cannot be eliminated).

<sup>134</sup> Paul Krugman, Editorial, *The Big Meltdown*, N.Y. TIMES, Mar. 2, 2007, at A17.

<sup>135</sup> *Id.* Internationally, the decline in the risk premium has been even more pronounced, with high-yield European bonds commanding nearly 16% interest in 2002 but recently less than 3%. 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, IMF Working Paper No. 07/160, July 2007).

<sup>136</sup> Balakrishnan argues that the decline in the risk premium is due to a liquidity glut. *See id.* A participant in a faculty workshop suggested, anecdotally, that the decline might result from hedging, whereby risk gets spread out (*cf. infra* notes 163-171 and accompanying text, discussing hedging), risk-spreading 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 (*see* Steven L. Schwarcz, *Intermediary Risk in a Global Economy*, 50 DUKE L. J. 1541, 1557-61 (2001), discussing loan participations),

may be attributable in part to the availability heuristic<sup>137</sup>: investors became complacent after observing that “the bursting of the technology bubble of the 1990s failed to produce a global disaster.”<sup>138</sup> It may also be attributable to herd behavior, which economists call the “bandwagon effect,”<sup>139</sup> under which investors follow the trends in markets and potentially overvalue or undervalue assets,<sup>140</sup> thereby making irrational investment decisions.<sup>141</sup>

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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. 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 171 and accompanying text), but it should not reduce risk *within* the financial system.

<sup>137</sup> 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 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).

<sup>138</sup> Krugman, *supra* note 134.

<sup>139</sup> *See, e.g.*, THOMAS CARGILL, ET AL., THE POLITICAL ECONOMY OF JAPANESE MONETARY POLICY 108 (date) (discussing this 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).

<sup>140</sup> *Cf.* Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 2004 U. ILL. L. REV. 1, 14 (discussing this phenomenon).

<sup>141</sup> A famous example of irrational investment arose out of the tulip trade in 17<sup>th</sup> 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 (Michael Roding & Hans Theunissen eds., 1993). Irrational investment trends can start quite easily. If, for example, a particular stock unexpectedly gains in value, the losers (e.g., 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. *Id.* at 181. In these ways, price movements can become somewhat self-sustaining. BOOKSTABER, *supra* note 70, at 169–70.

Furthermore, because the same trigger can foreshadow small consequences some times 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>142</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-related crisis was that mortgage loans turned out to be undercollateralized, due to the drop in home prices.<sup>143</sup> One 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>144</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.

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<sup>142</sup> In a 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 (May 2005). 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 70, 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.

<sup>143</sup> [cite-Sullivan]

<sup>144</sup> This collateral-value restriction on margin loans is imposed under Regulations G, U, T, and X [cite-Stewart], which require a two-to-one collateral-value-to-loan ratio on loans to purchase margin (i.e., publicly-traded) stock, secured by such stock.

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>145</sup> It works by reducing, if not eliminating, asymmetric information among market players, making the risks transparent to all.<sup>146</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>147</sup> Indeed, the government report issued after LTCM's near-failure recommended increased public disclosure by hedge funds.<sup>148</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>149</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, since investors or counterparties of those entities are unlikely to care about that disclosure to the extent it pertains to systemic risk.<sup>150</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>151</sup>

Imposing additional disclosure requirements may even prove counterproductive, causing market participants to change their behavior. Thus, traders may become more

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<sup>145</sup> Greg Lumelsky, *Does Russia Need a Securities Law?*, 18 NW. J. INT'L L. & BUS. 111, 122-23 (Fall 1997) (observing that “[s]ince 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”).

<sup>146</sup> *Id.*

<sup>147</sup> *Cf. supra* note 133 (indicating that investors will want to be compensated for risk that cannot be eliminated).

<sup>148</sup> *See supra* note 106 and accompanying text.

<sup>149</sup> *See supra* notes 66-70 and accompanying text (likening systemic risk to a tragedy of the commons).

<sup>150</sup> *Cf. Roberta Romano, A Thumbnail Sketch of Derivative Securities and Their Regulation*, 55 MD. L. REV. 1, 80-81 (1998) (arguing that improved disclosure would not have prevented hedge-fund problems).

<sup>151</sup> [cite-Anderson]

cautious, demanding that prices move farther before making trades, thereby ultimately reducing market liquidity.<sup>152</sup>

The efficacy of disclosure is further limited by the increasing complexity of transactions and markets.<sup>153</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>154</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>155</sup> This risk can be significant since derivatives can allow leverage up to 1,000 times the amount of capital put down.<sup>156</sup>

This article does not purport to resolve the ongoing broader debate of whether to regulate derivatives, absent effective disclosure.<sup>157</sup> In the context of systemic risk, however, the issue of derivatives regulation is best viewed as bifurcated: regulation of

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<sup>152</sup> BOOKSTABER, *supra* note 70, at 221. *Cf.* Romano, *supra* note 150 (arguing that if government imposes too much regulation, less experienced investors might be lulled into engaging in derivatives trading).

<sup>153</sup> See Schwarcz, *supra* note 140 (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).

<sup>154</sup> *Credit & 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) (observing that “[i]nvestors 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*, \_\_\_ UTAH. L. REV. (2008) (symposium issue on the subprime mortgage meltdown).

<sup>155</sup> See, e.g., LOWENSTEIN, *supra* note 38, at xix & 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).

<sup>156</sup> 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).

<sup>157</sup> For an analysis of that larger debate, see Romano, *supra* note 150.

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>158</sup> Recently-enacted derivatives netting provisions in the U.S. Bankruptcy Code,<sup>159</sup> however, are aimed at mitigating this risk.<sup>160</sup> The extent to which these netting provisions will be effective to reduce systemic risk is ultimately an empirical question.<sup>161</sup>

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<sup>158</sup> See, e.g., 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); Michael R. Darby, *Over-The-Counter Derivatives and Systemic Risk to the Global Financial System* 6–18 (Nat'l Bureau of Econ. Res., Working Paper No. 4801, 1994); Ludger Hentschel & Clifford W. Smith, Jr., *Risks in Derivatives Markets: Implications for the Insurance Industry*, 64 J. RISK & INS. 323, 342 (1997); Frank Partnoy & David A. Skeel, Jr., *The Promise and Peril of Credit Derivatives*, 75 U. CIN. L. REV. 1019, 1040 (2007) (all arguing that derivatives can increase risk if they are used for speculation rather than hedging). *But cf.* Ludger Hentschel & Clifford W. Smith, Jr., *Derivatives Regulation: Implications for Central Banks*, 40 J. MON. ECON. 305, 320–23 (1997) & Myron S. Scholes, *Global Financial Markets, Derivatives Securities, and Systemic Risks*, 12 J. RISK & UNCERTAINTY 271, 277–85 (1996) (arguing that derivatives reduce systemic risk).

<sup>159</sup> See, e.g., 11 U.S.C. § 546. These derivatives netting provisions apply to all derivatives, whether used for speculation or for hedging.

<sup>160</sup> See, e.g., 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); *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); Christopher J. Redd, *Treatment of Securities and Derivatives Transactions in Bankruptcy, Part I*, 24-6 ABIJ 36, 37 (2005). [Explain in text how these netting provisions mitigate systemic risk. Cite-Anderson]

<sup>161</sup> 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 and invalidate ipso facto clauses. [cite-Anderson] 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, Q.C., at the International Insolvency Institute's seventh annual conference's panel, "Understanding Derivatives: Dissecting Complex Financial Instruments," June 12, 2007 (observing that, outside the U.S., there are "huge" re-characterization and fraud risks in credit derivatives").

Derivatives used for hedging, in contrast, may—although it is not free from doubt<sup>162</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>163</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 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>164</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”). The SPV raises funds to support that assumption of risk by issuing securities to investors in the capital markets. 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). 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

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<sup>162</sup> See, e.g., Cifuentes et al., *supra* note 67, at 24-26 (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, *Wall St. Frets Over a Market Big and Murky*, N.Y. TIMES, Feb. 17, 2008, at 1 (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 BU 1 (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).

<sup>163</sup> See Yamaguchi, *supra* note 9, at 2 (discussing the rise of credit derivatives). See also Partnoy & Skeel, *supra* note 158.

the portfolio. 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>165</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>166</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>167</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>168</sup> If an institution fails, it potentially would impact many more other institutions. Furthermore, hedging strategies sometimes fail,<sup>169</sup> and diversification increases the chance that some market participants may not fully understand the risks they are taking on.<sup>170</sup> The net effect of hedging strategies, however, appears to be a positive reduction of risk.<sup>171</sup>

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<sup>164</sup> STEVEN L. SCHWARCZ, *STRUCTURED FINANCE, A GUIDE TO THE PRINCIPLES OF ASSET SECURITIZATION* 12-14 n. 37 (3d ed., supplemented through March 2007).

<sup>165</sup> See SCHWARCZ, *supra* note 164, Chap. 12.

<sup>166</sup> See *infra* note 209.

<sup>167</sup> See *infra* notes 172-175 and accompanying text.

<sup>168</sup> Cf. *supra* note 162.

<sup>169</sup> For example, convergent hedging strategies could concentrate rather than diversify risk. Cf. *supra* note 51 (noting the danger of convergent investment strategies). Hedging strategies are sometimes also unrealistic and, as illustrated by LTCM, can fail spectacularly when market liquidity dries up. Waldman, *supra* note 51.

<sup>170</sup> Cf. *supra* note 162.

<sup>171</sup> Alan Greenspan, Chairman, Board of Governors, U.S. Federal Reserve System, Remarks at the Federal Reserve Bank of Chicago's Forty-first Annual Conference on Bank Structure: Risk Transfer and Financial Stability (May 5, 2005) (transcript available at <http://www.federalreserve.gov/Boarddocs/Speeches/2005/20050505/default.htm>) (arguing that hedging can create net protection); DAVIS, *supra* note 20, 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 and prevent systemic risk”).

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.

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 de-stabilize other highly-leveraged investors,<sup>172</sup> increasing the likelihood of a systemic market meltdown (as illustrated by the generic example<sup>173</sup>). This suggests another possible approach to regulation: placing limits on inter-institution financial exposure.<sup>174</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>175</sup>

This approach already applies to banks through lending limits, which restrict the amount of bank exposure to any given customer's risk.<sup>176</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>177</sup> and the

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<sup>172</sup> See *supra* note 50 and accompanying text.

<sup>173</sup> See *supra* notes 118-120 and accompanying text.

<sup>174</sup> 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 106 and accompanying text.

<sup>175</sup> Cf. *supra* notes 120-121 and accompanying text (discussing, in the context of the 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).

<sup>176</sup> 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, 12 U.S.C. § 371 B-2 (1991).

<sup>177</sup> JOE REIF, SERVICES: THE EXPORT OF THE 21ST CENTURY, 58 (1997). See also Timothy F. Geithner, Speech before the Conference on Systemic Financial Crises at the Federal Reserve Bank of Chicago (Oct. 1, 2004), <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."); Stijn Claessens, *Benefits and Costs of Integrated Financial Services*

high volumes of financial assets circulating among non-bank financial entities.<sup>178</sup> Evidence even suggests that non-bank 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>179</sup>

However, Federal Reserve Chairman Ben Bernanke, in championing a market-based, invisible hand approach to regulation,<sup>180</sup> has rejected the suggestion that government should enforce financial exposure limits on financial institutions, specifically hedge funds.<sup>181</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>182</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

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*Provision in Developing Countries*, Brookings-Wharton Papers on Financial Services 85, 106 n.50 (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).

<sup>178</sup> 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 173.

<sup>179</sup> See John Lipsky, *Through the Looking Glass: The Links Between Financial Globalization and Systemic Risk*, available at: <http://www.imf.org/external/np/speeches/2007/092707.htm>.

<sup>180</sup> See Ben S. Bernanke, *Financial Regulation and the Invisible Hand*, Speech at the New York University Law School, Apr. 11, 2007, <http://www.federalreserve.gov/newsevents/speech/bernanke20070411a.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”).

<sup>181</sup> *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”).

<sup>182</sup> *Id.*

major financial market participants.”<sup>183</sup> Empirical research supports focusing on the risk exposure of hedge fund counterparties rather than imposing financial exposure limits on hedge funds themselves.<sup>184</sup>

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>185</sup> Absent leverage, institutions can absorb losses linearly, dollar for dollar. Institutions may shrink, but they would not 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>186</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>187</sup> as well as trigger a potential chain of defaults as other institutions are not paid amounts owed them (and in turn, if highly leveraged, such other institutions might then be unable to pay amounts owed to yet other institutions).

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<sup>183</sup> *Id.*

<sup>184</sup> See Federal Reserve Bank of New York Research Update: Research and Statistics Group, “Contemporary Credit Risk Management is Best Defense Against Systemic Risk Linked to Hedge Funds” (Oct. 2007), [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 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”).

<sup>185</sup> Cover letter included at beginning of PRESIDENT’S WORKING GROUP, *supra* note 8 (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).

<sup>186</sup> DAVIS, *supra* note 20, at 40 (concluding that “increased corporate debt in relation to equity, assets or cash flow is likely to lead to a greater probability of bankruptcy”).

Reducing leverage is therefore primarily prophylactic, reducing the risk and mitigating the spread and consequences of systemic collapse.<sup>188</sup> Reducing leverage would also strongly facilitate the goal of stability. It nonetheless could create significant costs. Some leverage is good,<sup>189</sup> though there is no optimal across-the-board amount of leverage that is right for every company.<sup>190</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>191</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>192</sup> Imposing unnuanced limitations on leverage, however, could impair a firm’s ability to operate efficiently and impede economic growth.<sup>193</sup>

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<sup>187</sup> Cf. 11 U.S.C. § 303 (discussing failure to pay debts as the basis for involuntary bankruptcy).

<sup>188</sup> 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 of mitigating, 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 253-256 and accompanying text, so that lessons about leverage learned from a collapse are eventually disregarded.

<sup>189</sup> For example, at least in the U.S., 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 20, at 40.

<sup>190</sup> 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).

<sup>191</sup> See *supra* notes 94-96 & 103-105 and accompanying text.

<sup>192</sup> Governor Susan Schmidt Bies, Fed. Reserve Bd., Remarks Before the Institute of International Bankers (Sept. 26, 2005).

<sup>193</sup> Cf. *supra* note 189. [Consider possibly reducing leverage permitted by derivatives. Cf. *supra* note 156. Small institutional failures are unlikely to result in failures to pay amounts large enough to trigger other institutional defaults, so any limitations on leverage should probably be applied only to large firms (but might that violate equal

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>194</sup>), and by providing liquidity to capital markets as necessary to keep them functioning.<sup>195</sup> This would strengthen these two key links in the systemic meltdown chain,<sup>196</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>197</sup> In the former

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protection under the U.S. Constitution?). Consider also the efficacy of a reducing-leverage approach in that structured finance can be used to mask leverage, comparing 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 (June 15, 2005), *available at* <http://www.sec.gov/news/studies/soxoffbalancrpt.pdf>. This SEC staff report focused, among other things, on whether financial statements of issuers of securities transparently reflect the economics of off-balance-sheet arrangements, recommending that “transactions and transaction structures primarily motivated by accounting and reporting concerns, rather than economics” be discouraged through a combination of changes to accounting standards and greater awareness by participants in the financial reporting process. *Id.* at 3.]

<sup>194</sup> *Cf.* Schwarcz, *supra* note 81, at 444-45 (discussing lack of liquidity as the primary cause of bankruptcy).

<sup>195</sup> *See infra* notes 220-232 and accompanying text. This also responds directly to the crux of a systemic collapse since 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.

<sup>196</sup> *Cf. supra* notes 118-120 and accompanying text (describing these links in the generic example).

<sup>197</sup> 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 Basics: The Banks Roll Up Their Sleeves*, N.Y. TIMES, Aug. 19, 2007, Wk. in Rev., at 2 (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

context, economists argue that monetary contractions can occur when market crashes engender fears that lenders will lack resources to extend loans.<sup>198</sup> However, panic will not usually become contagious (and thus systemic), they contend, when a lender of last resort provides adequate liquidity.<sup>199</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>200</sup>

Establishing a liquidity provider of last resort could be an expensive proposition, potentially creating moral hazard and shifting cost to taxpayers.<sup>201</sup> Nonetheless, these costs may be controllable. The discussion below considers 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, and the rules by which it decides which to do would be uncertain to third parties.<sup>202</sup> Additional ways to control

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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 115 and accompanying text.

<sup>198</sup> Bordo et al, *supra* note 25, at 19.

<sup>199</sup> *Id.*

<sup>200</sup> *See id.* at 21.

<sup>201</sup> Cf. 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); Jonathan R. Macey & Maureen O’Hara, *Solving the Corporate Governance Problems of Banks: a Proposal*, 120 BANKING L.J. 326, 328-29 (Apr. 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 105, at 757-84 (discussing moral hazard in the context of market crashes and lenders of last resort).

<sup>202</sup> *See* Partnoy, *supra* note 105, at 784 (suggesting this approach); DAVIS, *supra* note 20, at 123 (“An essential feature [of a liquidity provider of last resort] is that its operation

moral hazard might include setting qualification criteria for borrowing and repayment incentives for borrowers,<sup>203</sup> and requiring coinsurance.<sup>204</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>205</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 International Monetary Fund (“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>206</sup> That failure, however, is political and not inherent in the concept of a lender of last resort.<sup>207</sup>

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should be uncertain for any particular institution in difficulties . . . .”). A policy of constructive ambiguity nonetheless is imperfect, requiring difficult political choices of whom to exclude. *See Systemic Risk Hearing, supra* note 3, at [cite discussion of this between Congressperson and the author-Sullivan].

<sup>203</sup> 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.

<sup>204</sup> 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 since society wants the borrowing to occur to avoid systemic risk.

<sup>205</sup> 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.”).

<sup>206</sup> *See, e.g.,* Adam Lerrick, *Funding the IMF: How Much Does it Really Cost?*, QUARTERLY INTERNATIONAL ECONOMICS REPORT, Nov. 2003, at 1, *available at* <http://www.house.gov/jec/imf/11-18-03.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 201, at 963-64 (discussing how the IMF raises money from taxpayers of member-nations) & at 965-66 (observing that the return to IMF

Yet another way to avoid shifting costs to taxpayers is to privatize the role of 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>208</sup> Shifting the source of funding to capital markets would eliminate the need for taxpayers to pay for the funding since the size of these markets should be large enough to accommodate the legitimate financing needs of troubled institutions.<sup>209</sup> Such a shift also would 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>210</sup> The risk of potential default will make institutions more cautious. Furthermore, as explained below,<sup>211</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

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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”).

<sup>207</sup> Cf. Schwarcz, *supra* note 201, at 965 n. 45 (observing that “[o]nly a foolish investor would seek a rate of return that is equal to or less than its cost of funds”).

<sup>208</sup> Privatization might even occur indirectly. Cf. Smith, Mollenkamp, Perry, & Ip, *supra* note 4, at A8 (observing that, in response to the subprime mortgage crisis, several large banks in the United States “discussed with the Federal Reserve Bank the possibility of borrowing a total of \$75 billion to be used to buy” mortgage-backed securities, to support their value).

<sup>209</sup> The global capital markets had approximately \$65 trillion debt securities outstanding as of September 30, 2006. Bank for International Settlements, BIS QUARTERLY REV. A85-A100 (Dec. 2006). See also Moisés Naím, *Mexico’s Larger Story*, 99 FOREIGN POL’Y 112, 122-23 (1995) (“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.”).

<sup>210</sup> Schwarcz, *supra* note 201, at 987 & 993.

<sup>211</sup> See *infra* note 220 and accompanying text.

would not want to be “taxed” by the claims of existing creditors.<sup>212</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>213</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>214</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 attract new-money credit “tends to create value for unsecured creditors,” even where those creditors’ claims are subordinated to the new money,<sup>215</sup> because credit increases a borrower’s liquidity, thereby reducing its risk of failure and increasing the expected value of unsecured claims.<sup>216</sup>

New-money credit nonetheless could decrease value to unsecured creditors if overinvestment occurs.<sup>217</sup> Monitoring, though, can limit the risk of overinvestment.<sup>218</sup> Any law authorizing a priority therefore should enable existing creditors to scrutinize and

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<sup>212</sup> Cf. Schwarcz, *supra* note 201, at 986 (discussing similar reasons why a priority would be needed in a sovereign-debt restructuring context to attract financing).

<sup>213</sup> See 11 U.S.C. § 364 (authorizing priorities for so-called “DIP,” or debtor-in-possession, loans).

<sup>214</sup> 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 201, at 988.

<sup>215</sup> 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.

<sup>216</sup> See *id.* at 430.

<sup>217</sup> 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.

<sup>218</sup> Schwarcz, *supra* note 201, at 989-90.

object to excessive amounts of new-money priority financing and to monitor its use as appropriate.

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 is likely, absent liquidity, 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 decision-making role.<sup>219</sup> It might then be possible to combine the best of both worlds by enabling the decision-making 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>220</sup>

The foregoing examination focused on a liquidity provider of last resort providing liquidity to institutions by making loans. Consider next providing liquidity to markets by purchasing securities.<sup>221</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>222</sup>

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<sup>219</sup> See *infra* note 230 and accompanying text (suggesting that the Federal Reserve Bank appears to be best situated to act in this capacity).

<sup>220</sup> Cf. Schwarcz, *supra* note 201, 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 & 990 n. 199.

<sup>221</sup> Cf. DAVIS, *supra* note 20, at 268 (suggesting there may be a need for a “market maker of last resort” to protect financial markets).

<sup>222</sup> Cf. Allaudeen Hameed, Wenjin Kang & S. Viswanathan, Stock Market Declines and Liquidity 34 (March 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”).

The first difference is not problematic since a government agency could 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>223</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>224</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>225</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 won’t 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

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<sup>223</sup> 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, *Central Banks Float Rescue Ideas*, FINANCIAL TIMES, Mar. 21, 2008, at \_ (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”).

<sup>224</sup> Chris Giles, *Mortgage Assets “Are Likely Target,”* FINANCIAL TIMES, Mar. 24, 2008, at 6 (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*, FINANCIAL TIMES, Mar. 24, 2008, at 13 (observing that “trading [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”).

market.<sup>226</sup> Empirical evidence confirms that individuals engage in this type of herd behavior.<sup>227</sup> A liquidity provider of last resort is needed to correct these market failures.

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>228</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>229</sup>

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<sup>225</sup> Cf. *supra* note 202 and accompanying text.

<sup>226</sup> See, e.g., Tyler Cowen, *It's Hard to Thaw a Frozen Market*, N.Y. TIMES, Mar. 23, 2008, at BU 5 (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?”).

<sup>227</sup> Cf. Paul M. Healy & Krishna Palepu, *Governance and Intermediation Problems in Capital Markets: Evidence from the Fall of Enron 26* (Aug. 15, 2002 draft, available at [www.ssrn.com](http://www.ssrn.com)) ([update cite-Stewart to published version in] J. ECON. PERSP.) (fund manager who estimates a stock is overvalued but does not act on this analysis “and simply follows the crowd” will not be rewarded for foreseeing the problems, “but neither will he be blamed for a poor investment decision when the stock ultimately crashes, since his peers made the same mistake”); 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”).

<sup>228</sup> To the extent these moneys are invested in market-rate securities, there should not be losses to taxpayers.

<sup>229</sup> Cf. Yamaguchi, *supra* note 9, 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 1 (reporting on August 10, 2007 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).

The Federal Reserve Bank appears to be best situated to act in that capacity in the U.S. domestic context, though its power to so act is ambiguous under existing law.<sup>230</sup> This article later examines who might act as an international liquidity-provider of last resort.<sup>231</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>232</sup> and they would be even harder to apply and manage in a broader context since the entities would be less uniform. Nor would entity-level liquidity requirements be applicable to ensuring market liquidity.<sup>233</sup>

Ad Hoc Approaches. The extent to which ad hoc (that is, purely reactive) regulatory responses to systemic risk facilitate stability and efficiency is, of 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 are too late and the harm has been done or no longer can be prevented, and sometimes there is 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

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<sup>230</sup> To the extent the Federal Reserve Bank has this power, its source would be § 13(3) of the Federal Reserve Act (12 U.S.C. § 343), 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.” Although this may well enable the Federal Reserve to fund failing institutions, it is dubious it enables the Fed to purchase securities in falling markets.

<sup>231</sup> See *infra* notes 335-342 and accompanying text.

<sup>232</sup> [cite-Anderson]

<sup>233</sup> [cite-Anderson]

event would cause a systemic meltdown.<sup>234</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>235</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 whether to bail out failing banks, effectively making the decision ex post on an ad hoc basis.<sup>236</sup> Some institutions, though, may be “too big to fail,” and therefore incur moral hazard by anticipating a bailout.<sup>237</sup> Some have argued that 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] for a certain amount of [Bear Stearns] liability” that J.P. Morgan “is assuming.”<sup>238</sup>

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>239</sup> Market-imposed regulation is efficient insofar as it minimizes regulatory costs.<sup>240</sup>

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<sup>234</sup> See *supra* note 142 and accompanying text (observing that the same trigger can foreshadow small consequences some times and large consequences other times, and that a sorting mechanism may not always be discernible ex ante).

<sup>235</sup> Cf. BOOKSTABER, *supra* note 70, at 157 (arguing that in non-linear systems, improvised solutions may work better than set rules).

<sup>236</sup> Marcel Dabos, *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).

<sup>237</sup> See *supra* note 236.

<sup>238</sup> Sorkin, *supra* note 5. See also Paul Krugman, *The B Word*, N.Y. TIMES, Mar. 17, 2008, at \_\_\_ (describing Bear Stearns’ purchase as a “bailout”).

<sup>239</sup> See, e.g., Ben S. Bernanke, Chairman, Board of Governors, U.S. Federal Reserve System, Remarks at the New York University Law School, New York, New York (Apr. 11, 2007) (transcript available at

<http://www.federalreserve.gov/boardDocs/speeches/2007/20070411/default.htm>)

(discussing both the mechanisms of market discipline in banking and certain forces, such as market participant confidence in bailouts, that undermine market discipline).

<sup>240</sup> 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

Although in theory perfect markets would never need external regulation,<sup>241</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>242</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>243</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>244</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>245</sup> Perhaps this helps explain why, even though the banking and securities-brokerage industries have in large part been

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efficient than top-down regulation). *See also supra* notes 82-87 (discussing direct and indirect costs of regulation).

<sup>241</sup> *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).

<sup>242</sup> *Cf.* Bernanke, *supra* note 8, 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 18.

<sup>243</sup> *Cf.* Bernanke, *supra* note 239 (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").

<sup>244</sup> Bernanke, *supra* note 8; Ryan, *supra* note 8, at 2.

<sup>245</sup> *See supra* note 66 and accompanying text.

subject to a market-discipline regulatory approach,<sup>246</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>247</sup>

Furthermore, even outside of the systemic-risk context, regulators have a mixed track record, absent prescriptive rules, of ensuring that participants exercise market discipline.<sup>248</sup> Until the recent subprime mortgage debacle, for example, competing banks were making more and more loans without financial covenants.<sup>249</sup> It is questionable, though, whether lending without financial covenants constitutes “safe and sound” banking practice.<sup>250</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>251</sup>

This mixed track record is partly explained by behavioral psychology. Investors cannot accurately price risks that rarely occur and are unpredictable.<sup>252</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*

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<sup>246</sup> See, e.g., Boro, *supra* note 240, at 471; Helen A. Garten, *Banking on the Market: Relying on Depositors to Control Bank Risks*, 4 YALE J. ON REG. 129, 129–30, 129 n.1 (1986).

<sup>247</sup> Bernanke, *supra* note 8, at 1. Professor Romano suggests that the breakdown of market discipline is due simply to human greed. Cf. Romano, *supra* note 150, at 79 (discussing greed as a central factor that, in the hedge-fund context, transforms 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 8, at 1.

<sup>248</sup> Partnoy, *supra* note 105, at 774.

<sup>249</sup> See *supra* note 46.

<sup>250</sup> Cf. *supra* note 46. Regulators are supposed to ensure that banks follow safe and sound banking practice. See 11 U.S.C. § 93(b)(2)(A)(ii) (2007) (fining banks for recklessly engaging in “unsafe” or “unsound” practices).

<sup>251</sup> See *supra* notes 134-141 and accompanying text. For further examples of regulatory failures of market discipline, see Schwarcz, *Protecting Financial Markets*, *supra* note 3.

<sup>252</sup> Claire A. Hill, *How Investors React to Political Risk*, 8 DUKE J. COMP. & INT’L L 283, 287-89 (1998). Scholars sometimes distinguish rare and unpredictable risks from

alternating optimism and skittishness.”<sup>253</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>254</sup> In part, also, it reflects the documented human tendency to underestimate the likelihood of very rare but potentially devastating risks.<sup>255</sup> A similar alternating pattern would be expected in the systemic-risk context, which (like political risk) is both rare and unpredictable.<sup>256</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>257</sup> According to the U.S. General Accounting Office (GAO), for example, the SEC has had an increasingly inadequate labor force since 1995.<sup>258</sup>

Thus, although market discipline is attractive as a supplement to other regulatory approaches, there is some doubt whether it should serve as the exclusive, or even primary, regulatory mechanism.

### C. Assessing Regulatory Approaches

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other risks by calling the former “uncertainty.” *Id.* at 287 (citing Frank H. Knight, *RISK, UNCERTAINTY, AND PROFIT* (1921)).

<sup>253</sup> Hill, *supra* note 252, at 286 (emphasis in original).

<sup>254</sup> *Id.* at 308. *Cf.* note 137, *supra* (discussing the availability heuristic).

<sup>255</sup> Hill, *supra* note 252, at 308.

<sup>256</sup> *Cf.* DAVIS, *supra* note 20, 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”).

<sup>257</sup> Greenspan, for example, had a serious bias against regulation and assumed market discipline was far better than it actually was. LOWENSTEIN, *supra* note 38, at 231.

<sup>258</sup> GAO Report GAO-02-302, *SEC Operations: Increased Workload Creates Challenges* (March 5, 2002) (describing workload exceeding available workers since 1995 and also the SEC’s small salaries compared to other federal agencies which contributes to very high turnover), *available at* <http://www.gao.gov/new.items/d02302.pdf>. [But would that shortage be any less with express regulation? Perhaps, because there would be a clearer regulatory enforcement mandate to justify hiring, and most people comply with regulations anyway. Cite-Sullivan]

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.

*Cost-Benefit Balancing and the Precautionary Principle:*

Cost-benefit balancing, as has been discussed, is a means of measuring the efficiency of regulation.<sup>259</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>260</sup> To this end, regulatory agencies use a variety of methodologies to evaluate regulations,<sup>261</sup> including applying different values when monetizing the costs and benefits of regulations.<sup>262</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>263</sup>

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<sup>259</sup> See *supra* note 90 and accompanying text.

<sup>260</sup> Congressional Review of Agency Rulemaking Act, Chap 8, USCA && 801-08. "Major rules," i.e., 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 81, at 19 (arguing that a balance needs to be struck when examining the benefits and costs of regulation).

<sup>261</sup> Draft 2007 Report to Congress on the Costs and Benefits of Federal Regulation, Office of Management and Budget, at 8 (hereinafter, "OMB Report").

<sup>262</sup> *Id.* The analysis regarding health and safety regulations is often context specific. Compare the EPA's Clean Air Mercury Rule where the cost to a state of implementing the cap-and-trade system was compared to the ultimate health effects in humans of lowering the level of mercury that is consumed (i.e. morbidity, infant mortality and such welfare effects as visibility improvements) with DOL-OSHA's Regulation on Occupational Exposure to Hexavalent Chromium (71 FR 10100) where the benefits of preventing 40-145 fatal and 5-20 non-fatal lung cancers per year were weighed 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 million/yr versus \$244-253 million/yr as monetized by the OMB). Regulatory Impact Analysis of the Clean Air Mercury Rule – Final Report at 1-1 and 12-1; and OMB Report, *supra* note 261, at 60.

<sup>263</sup> *Id.* 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 and John A. Hird, *The Costs and Benefits of Regulation: Review and Synthesis*, 8

To the extent regulation deals with health and safety issues (as could arise in the case of systemic risk<sup>264</sup>), agencies go even further beyond strictly econometric cost-benefit modeling. Perhaps the most relevant example for systemic risk is regulation designed to address the risk of catastrophic events or large, irreversible effects where the actual level of risk is indeterminate.<sup>265</sup> In these cases, regulators often apply a precautionary principle that presumes benefits will outweigh costs.<sup>266</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>267</sup> Regulation should not be blindly precautionary<sup>268</sup>

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YALE J. ON REG. 233, 239-40 (Winter 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.*

<sup>264</sup> See *supra* notes 72-73 and accompanying text.

<sup>265</sup> This type of regulation is discussed in Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841, 848 (May 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 (2nd 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).

<sup>266</sup> 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).

<sup>267</sup> Sunstein, *supra* note 266, 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.*

<sup>268</sup> 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 265, at 849. This stronger version, however, offers little practical guidance to regulators. Sunstein *supra* note 266, 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

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>269</sup>

*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>270</sup> Because the benefits (i.e., 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 systemic risk will occur,<sup>271</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>272</sup>

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

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

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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).

<sup>269</sup> Sunstein *supra* note 266, at 1017-18.

<sup>270</sup> See *supra* note 73 and accompanying text (discussing poverty, unemployment, and crime as potential social costs).

<sup>271</sup> 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.

<sup>272</sup> For examples of expected value analysis, see RICHARD A. POSNER, *ECONOMIC ANALYSIS OF LAW* § 15.1, at 445 & n.1 (6<sup>th</sup> ed. 2003).

Expected Value (with regulation) = [likelihood of systemic meltdown with regulation]% × \$[cost of systemic meltdown] + [likelihood of avoiding systemic meltdown with regulation]% × \$[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,

$$EV_1 = \gamma \times M$$

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

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>273</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>274</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>275</sup> The article therefore will initially assume that  $M$  is likely to be at least \$1 billion, and perhaps far greater.<sup>276</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>277</sup>

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<sup>273</sup> Memorandum from E. Bruce Leonard, President, International Insolvency Institute, 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”).

<sup>274</sup> 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 since these equations are being used solely for comparative purposes.

<sup>275</sup> LOWENSTEIN, *supra* note 38, at 190.

<sup>276</sup> *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”); *Tightening the Safety Belt*, ECONOMIST, Nov. 22, 2007 (graph showing Goldman Sachs prediction of \$148 billion of losses on subprime CDOs); *Postcards from the Ledge*, ECONOMIST, Dec. 19, 2007 (estimating that, in the U.S., “[s]ubprime borrowers will probably default on \$200 billion-300 billion of mortgages”).

<sup>277</sup> The term “biannually” being used here to mean every two years. *See supra* note 274.

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>278</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.

This provides, however, a useful way of thinking about the balancing, especially since  $M$  is likely to be much greater than  $R$ .<sup>279</sup> Moreover, because a systemic meltdown can be catastrophic though the actual level of risk is indeterminate,<sup>280</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>281</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

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<sup>278</sup> BOOKSTABER, *supra* note 70, at 257 (arguing that regulation will not help if there is a failure to understand the mechanisms by which crises develop).

<sup>279</sup> Indeed,  $R$  might even represent a profit, not a cost, if liquidity is provided to markets by purchasing securities at a deep discount.

<sup>280</sup> See *supra* note 265 and accompanying text.

<sup>281</sup> Cf. Bernanke, *supra* note 8 (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”).

regulation should be crafted as not to have that effect<sup>282</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>283</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>284</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>285</sup> It is nonetheless suspect as a regulatory approach for two reasons: firms lack sufficient incentive to limit risk taking in order to reduce the danger of systemic contagion for other firms, and regulators have a mixed track record of ensuring that participants exercise market discipline, absent prescriptive rules.<sup>286</sup> Market discipline therefore should 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

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<sup>282</sup> See *supra* note 81 and accompanying text and *infra* note 311 and accompanying text.

<sup>283</sup> See Part III.B.

<sup>284</sup> See *supra* Part III.B.

<sup>285</sup> 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  $EV_1$ .

<sup>286</sup> See *supra* notes 244-258 and accompanying text.

benefits.<sup>287</sup> Ad hoc approaches also can reduce the moral-hazard cost.<sup>288</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>289</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 also reduces the likelihood of a chain of institutional failures.<sup>290</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>291</sup>

Ensuring liquidity would help to prevent financial entities from defaulting, and also would help to prevent defaulting financial entities from failing. Liquidity

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<sup>287</sup> See *supra* notes 234-237 and accompanying text.

<sup>288</sup> See *supra* notes 235-238 and accompanying text (discussing how ad hoc approaches can reduce, but also sometimes can increase, moral hazard).

<sup>289</sup> See *supra* notes 234-237 and accompanying text.

<sup>290</sup> See *supra* notes 185-186 and accompanying text.

<sup>291</sup> See *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* (June 15, 2005), in which the SEC staff recommended, *id.* at 3, 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

additionally could be provided to capital markets as necessary to keep them functioning. Of the two suggested ways to ensure liquidity,<sup>292</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>293</sup> and also, when providing liquidity to markets, by buying securities at a discount.<sup>294</sup> Other costs of a liquidity provider of last resort would appear to be modest.<sup>295</sup>

Subject to the caveats noted,<sup>296</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,

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

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

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Accounting Standards Board (FASB) and greater awareness by participants in the financial reporting process.

<sup>292</sup> The other way is to impose entity-level liquidity requirements. *See supra* note 233 and accompanying text.

<sup>293</sup> *See supra* notes 202 & 225 and accompanying text.

<sup>294</sup> *See supra* notes 222-227 and accompanying text.

<sup>295</sup> *See supra* notes 201-228 and accompanying text.

<sup>296</sup> *See supra* notes 277-279 and accompanying text (cautioning that a quantitative analysis is no better than its assumptions, and this article’s assumptions rely on no hard empirical data; and that a truly realistic balancing of costs and benefits could depend on the particular mechanisms by which systemic failures can arise).

$$= 5\% \times \$1,000,000,000 + \$1,000,000,000$$

$$= \$1,050,000,000$$

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>297</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>298</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>299</sup> Reducing leverage therefore might not be justified as a regulatory approach unless ways can be found to significantly reduce its costs.<sup>300</sup>

Next consider the approach of ensuring liquidity. This approach would probably moderately reduce the risk of a systemic meltdown. Therefore 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

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<sup>297</sup> See *supra* note 276 and accompanying text.

<sup>298</sup>  $EV_1 = \gamma \times M = 25\% \times \$2,000,000,000 = \$500,000,000$ .  $EV_2 = \lambda \times M + R = 5\% \times \$2,000,000,000 + \$1,000,000,000 = \$1,100,000,000$ . Therefore  $EV_2$  is greater than  $EV_1$ .

<sup>299</sup>  $EV_1 = \gamma \times M = 25\% \times \$5,000,000,000 = \$1,250,000,000$ .  $EV_2 = \lambda \times M + R = 5\% \times \$5,000,000,000 + \$1,000,000,000 = \$1,250,000,000$ .

<sup>300</sup> 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, 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 \$13.29 trillion, the most recent figure 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.

constructive ambiguity.<sup>301</sup> Therefore assume, for illustrative purposes, that  $R = \$100$  million.<sup>302</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 since  $EV_2$  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>303</sup> And, if  $M = \$5$  billion,  $EV_2$  would be \$650,000,000 less than  $EV_1$ .<sup>304</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>305</sup>

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<sup>301</sup> See *supra* notes 202 & 293 and accompanying text.

<sup>302</sup> 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 261, at 56.

<sup>303</sup>  $EV_1 = \$500,000,000$ .  $EV_2 = 0.10 \times \$2,000,000,000 + \$100,000,000 = \$300,000,000$ .

<sup>304</sup>  $EV_1 = \$1,250,000,000$ .  $EV_2 = 0.10 \times \$5,000,000,000 + \$100,000,000 = \$600,000,000$ .

<sup>305</sup> 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.

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>306</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 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>307</sup> The liquidity provider of last resort could minimize moral hazard by adopting a policy of constructive ambiguity, refusing to commit itself in advance to bailing out defaulting intermediaries or stabilizing markets.<sup>308</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>309</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>310</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,

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<sup>306</sup> See *supra* notes 202-204 and accompanying text.

<sup>307</sup> See *supra* notes 220-232 and accompanying text.

<sup>308</sup> 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* 19 (Fed. Res. Bank of Richmond, Working Paper No. 99-2, 1999).

<sup>309</sup> See *supra* notes 222-227 and accompanying text.

<sup>310</sup> See *supra* note 122 and accompanying text.

where that function is taxpayer-financed, by investing any pre-funded money to maintain its value until used.<sup>311</sup> Loans should be advanced at market interest rates, and securities should be purchased at discounts.<sup>312</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 that enables the market to work efficiently.<sup>313</sup>

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>314</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. In part, also, 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

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<sup>311</sup> See *supra* notes 204-207 & 220-222 and accompanying text.

<sup>312</sup> Calculating these discounts, however, admittedly might sometimes be difficult. See *supra* note 224 and accompanying text (observing that it might be difficult to determine the discount when information needed to value the securities being purchased is unavailable or imperfect, but that the liquidity provider of last resort could then choose to err on the side of taking an extra large discount).

<sup>313</sup> See *supra* notes 242-244 and accompanying text. [Expand textual discussion of how the market discipline approach presently works. Cite-Anderson]

<sup>314</sup> 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.

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>315</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>316</sup> These cross-border effects need to be addressed through international regulation.

#### IV. 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>317</sup> Central to this system was the fixing of 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

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<sup>315</sup> See *supra* notes 142-144 and accompanying text.

<sup>316</sup> See, e.g., 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); 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).

<sup>317</sup> RAHUL DHUMALE, JOHN EATWELL, & KERN ALEXANDER, 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

thirty-five dollars per ounce.<sup>318</sup> As a result, exchange rates were remarkably stable for the next twenty-five years.<sup>319</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>320</sup> Faced with persistent payment deficits, the U.S. 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>321</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>322</sup>

The resulting deregulation and liberalization of financial markets brought a substantial increase in cross-border capital flows and trade in financial services.<sup>323</sup> Initially acclaimed,<sup>324</sup> deregulation is now seen as a double-edged sword because

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established the IMF and the International Bank for Reconstruction and Development (“World Bank”). *Id.*

<sup>318</sup> EATWELL & TAYLOR, *supra* note 81, 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 U.S. had accumulated significant quantities of gold. CAMPBELL R. MCCONNELL & STANLEY L. BRUE, *ECONOMICS: PRINCIPLES, PROBLEMS, AND POLICIES* 724 (2004). They therefore came to accept gold and the dollar as international reserves, with the dollar convertible into gold on demand. *Id.*

<sup>319</sup> EATWELL & TAYLOR, *supra* note 81, at 1.

<sup>320</sup> ROBERT GUTTMAN, *MONEY AND FINANCE: TOWARD A NEW MONETARY REGIME* 15 (1997).

<sup>321</sup> MCCONNELL & BRUE, *supra* note 318, at 724. This in turn made it increasingly doubtful that the U.S. 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.*

<sup>322</sup> EATWELL & TAYLOR, *supra* note 81, at 1.

<sup>323</sup> EATWELL & TAYLOR, *supra* note 81, at 1–3. DHUMALE, EATWELL, & ALEXANDER, *supra* note 317, at 14.

<sup>324</sup> *See, e.g.,* Alan Friedman, *But Nations Appear Reluctant: IMF Pushing to Open East Asian Markets*, INT’L HERALD TRIB., Sept. 20, 1997 (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 East Asian economic crisis of 1997); 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 (noting that in the early 1990’s, the U.S. Treasury

unregulated financial institutions and markets have become increasingly interdependent.<sup>325</sup> That, in turn, has increased the global market's exposure to systemic risk.<sup>326</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 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>327</sup> Nonetheless, given

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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 control”).

<sup>325</sup> Jayati Ghosh, *The Economic and Social Effects of Financial Liberalization: A Primer for Developing countries* 9 (United Nations Department of Economic and Social 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.”); GERARD CAPRIO, PATRICK HONOHAN, & JOSEPH E. STIGLITZ, 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). See also EATWELL & TAYLOR, *supra* note 81, at ix (“The presumption, widely held before 1997, that financial liberalization is invariably beneficial has now been abandoned by almost all serious commentators.”).

<sup>326</sup> DHUMALE, EATWELL, & ALEXANDER, *supra* note 317, at 14.

<sup>327</sup> Cf. Elene Spanakos, *Note: Harmonization of International Adequacy Rules for Securities Firms: An Argument to Implement the Value At Risk Approach by Adopting Basle's Internal Model Methodology*, 26 BROOK. J. INT'L L. 221, 241–42, 244 (2000)

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>328</sup> The optimal regulatory model, they argue, 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>329</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>330</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 them individually—despite the many historical, cultural, and legal differences that distinguish nations.<sup>331</sup> An otherwise

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(arguing that without international standards there will be a “race to the bottom” in regulatory schemes).

<sup>328</sup> See, e.g., David T. Llewellyn, *Institutional Structure of Financial Regulation and Supervision: The Basic Rules*, p. 7, Paper presented at a World Bank Seminar June 6th and 7th, 2006 available at: [info.worldbank.org/etools/library/latestversion.asp?232743](http://info.worldbank.org/etools/library/latestversion.asp?232743) (arguing that “[i]t is an illusion to believe there is a single, superior model of institutional structure that is applicable to all countries”); JAMES A. HANSON, PATRICK HONOHAN, & GIOVANNI MAJNONI, *GLOBALIZATION AND NATIONAL FINANCIAL SYSTEMS* 273-74 (2003).

<sup>329</sup> Llewellyn, *supra* note 328.

<sup>330</sup> HANSON, HONOHAN & MAJNONI, *supra* note 328 (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).

<sup>331</sup> See, e.g., James D. Fearon, *Bargaining, Enforcement, and International Cooperation*, 52 *INTERNATIONAL ORGANIZATION*, Spring 1998, at 271 (“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.”); RICHARD J. HERRING & ROBERT E. LITAN, *FINANCIAL REGULATION IN THE GLOBAL ECONOMY* 120–123 (1994) (suggesting systemic risk is

effective regulatory approach to systemic risk therefore ought to have the potential for international applicability.<sup>332</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>333</sup> Approximately 100 countries have signaled they will implement Basel II by 2010.<sup>334</sup>

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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); 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).

<sup>332</sup> See DAVIS, *supra* note 20, at 269 (arguing against possible “excessive readiness to assume that the current domestic situation is unique”); Benn Steil, “Regulatory Foundations for Global Capital Markets,” in *FINANCE AND THE INTERNATIONAL ECONOMY*, (RICHARD O’BRIEN, ed.) 66 (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.” DHUMALE, EATWELL, & ALEXANDER, *supra* note 317, 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)”

<sup>333</sup> See Bank for International Settlements, *Basel II and Financial Institution Resiliency*, June 27, 2007, available at: <http://www.bis.org/press/p070627.htm%5D.>; IOANNIS S. AKKIZIDIS & VIVIANNE BOUCHEREAU, *GUIDE TO OPTIMAL OPERATIONAL RISK AND BASEL II*, 99–105 (2006).

<sup>334</sup> [cite-Stewart] 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. Some also argue that Basel II may actually prove counterproductive. See, e.g., DHUMALE, EATWELL, & ALEXANDER, *supra* note 317, 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).

A single regulatory approach thus appears feasible for mitigating systemic risk. Who should act, however, as the international LPOLR?<sup>335</sup> There are at least two obvious choices. One is the IMF, which sometimes already takes on this role, albeit with controversy, in extending liquidity to troubled sovereign states.<sup>336</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, for example, 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>337</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>338</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>339</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

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<sup>335</sup> See *supra* note 231 and accompanying text (calling for creation of an international liquidity provider of last resort).

<sup>336</sup> See *supra* notes 206-207 and accompanying text.

<sup>337</sup> 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.

<sup>338</sup> ROBERT KELEHER, JOINT ECONOMIC COMMITTEE, AN INTERNATIONAL LENDER OF LAST RESORT, THE IMF, AND THE FEDERAL RESERVE 178 (Comm. Print 1999) (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,” though tying this argument in part to the U.S. dollar being the dominant reserve currency).

<sup>339</sup> *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.”).

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>340</sup> The IMF cannot, however, create currency. It would not need that power if it has access to a potentially unlimited amounts of currency,<sup>341</sup> but such access would require reform of the IMF's relationship with its member-states.<sup>342</sup>

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

## V. CONCLUSIONS

This article, which is the first major work of legal scholarship on systemic risk, has examined what systemic risk really means, cutting through the confusion 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.

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<sup>340</sup> Knedlik, *supra* note 203, at 26 (describing the IMF's substantial access to capital from more than 20 member states).

<sup>341</sup> *Id.* at 8 (“In the case of a global crisis . . . almost unlimited reserves would be necessary”).

<sup>342</sup> *Id.* at 26 (discussing how the IMF could obtain “quantitatively unlimited” access to member-state funds).

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>343</sup> This is not to say that monetary policy or ad hoc approaches should be discarded, merely 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, as appropriate to prevent systemic collapse, to failing financial institutions and markets. 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>344</sup> Liquidity’s broad-spectrum capability is important in a world where financial intermediation evolves at a speed faster than one can always anticipate.<sup>345</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

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<sup>343</sup> Bear Stearns, for example, did not collapse because of problems with economic fundamentals but because of falling prices of mortgage-backed securities, requiring 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. [cite-Sullivan]

<sup>344</sup> *Systemic Risk Hearing*, *supra* note 3 (statement of the author [at p. 68 of the Hearing’s transcript-cite-Sullivan]).

<sup>345</sup> *See, e.g.*, BOOKSTABER, *supra* note 70, at 255. *See also* Yamaguchi, *supra* note 9, 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).

levels that more closely reflect their real value, bringing back investor confidence.<sup>346</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>347</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.

Finance and markets being 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

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<sup>346</sup> This type of ex post market-collapse injection of liquidity is not as desirable as the earlier application recommended by this article. *See supra* note 196 and accompanying text (proposing that the liquidity provider of last resort act at the beginning of a collapse, to stabilize market prices). Once a market has collapsed, not only will the consequences of that collapse be felt but also the liquidity provider of last resort will have to raise market prices rather than merely to stabilize them, potentially requiring a greater outlay of funds.

<sup>347</sup> *Cf. supra* note 60 (arguing that politics should not impede attempts to reach realistic market solutions to the problem of systemic risk).

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>348</sup> A political consensus on these purchases has not yet emerged.<sup>349</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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<sup>348</sup> Giles & Guha, *supra* note 224.

<sup>349</sup> Giles, *supra* note 224.