

AFTER THE BAILOUT: REGULATING SYSTEMIC MORAL HAZARD*

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How do we prevent excessive risk taking in the financial markets? This Essay offers a strategy for regulating financial markets to better prevent the kind of disaster we saw during the Financial Crisis of 2008. By developing a model of risk-manager decisionmaking, this Essay illustrates how even “good people” acting in utterly rational and expected ways brought us into economic turmoil.

The assertion of this Essay is that the root cause of the Financial Crisis was systemic moral hazard. Systemic moral hazard poses a unique challenge in crafting a regulatory response. The challenge lies in that the best response to systemic moral hazard is “predictive prevention.” It is inherently difficult to reward individuals for producing predictive prevention. Unsurprisingly, markets fail to produce it at optimal levels and thus cannot prevent systemic moral hazard and the kind of crises that ensue. The difficulty in valuing predictive prevention is seen when we model how risk managers make decisions regarding the prevention of excessive risk. The model reveals how the balance can be tipped in favor of risk taking that leads to systemic failure and broad social harm. The model also reveals how regulation might work to reset the balance to one that is superior for society. We can achieve optimal risk-taking decisionmaking in two ways: (1) by requiring all asset managers in the market to put their own money at risk in their trading decisions; and (2) by requiring all asset managers to use “best practices” in managing risk, or else be subject to legal liability.

These prescriptions arise out of a regulatory strategy that accepts the need to balance the benefits of risk taking in financial markets (and the consequent inevitability of some financial failure) with the desire to avoid excessive risk taking and the costs of systemic collapse. The focus of this strategy is on those instances in which we cannot trust ourselves to be prudent.

* Copyright © 2009 by Karl S. Okamoto. Robert Richards, Esq. provided essential research support for this Essay. I am indebted to Tecla Borick, Roger Dennis, Alex Geisinger, Robert Lawless, Steven Schwarcz, David Zaring, and the participants at the Third Annual Law & Entrepreneurship Retreat for their comments and suggestions on this Essay. The usual disclaimers apply.

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INTRODUCTION

What many now call the Financial Crisis of 2008 (Financial Crisis) in fact began in 2007.¹ The bankruptcy of New Century Financial, a leading subprime mortgage lender,² in April 2007 began a chain reaction of financial collapse that brought the world's economy to its knees. While the financial markets had begun to fear in 2007 that the bubble in residential housing, fueled by the easy credit provided by institutions like New Century Financial, was unwinding, it took another year and the failure of Bear Stearns (Bear) for the world to realize how pervasive the credit bubble and the effect of its collapse would be.³ While the precise causes of the Financial Crisis continue to be debated, there is broad agreement on one lesson—various players in our financial markets were allowed to take excessive risk.

Individual instances of excessive risk taking do not usually cause broad financial collapse. In the years leading up to the Financial Crisis, however, excessive risk taking became systemic as a series of interrelated parties took risks that compounded the exposure of the others. One party's failure led to the failure of another, which led in turn to more failures. Some have highlighted this cascade effect as a cause of the Financial Crisis,⁴ and indeed, it was an important element. But, in each of the stories of failure that collectively make up the Financial Crisis, we find a common theme—an asset manager had strong incentives to take greater and greater risk and to understate the risk he was taking, while the incentive to act with prudence only became disproportionately weaker. This imbalance of incentives posed a moral hazard for the decisionmaker in that his potential reward for imprudence greatly outweighed his cost. This imbalance was pervasive, leading to multiple instances of excess. It was in this sense that moral hazard was systemic.

1. For a detailed account of the events of the Financial Crisis of 2008 and the U.S. government's responses, see Steven M. Davidoff & David Zaring, *Big Deal: The Government's Response to the Financial Crisis*, ADMIN. L. REV. (forthcoming 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1306342.

2. See Julie Creswell & Vikas Bajaj, *Home Lender Is Seeking Bankruptcy*, N.Y. TIMES, Apr. 3, 2007, at C5.

3. For a discussion of the causes of the credit bubble, see Austin Murphy, *An Analysis of the Financial Crisis of 2008: Causes and Solutions*, (Nov. 4, 2008) (unpublished manuscript, on file with author), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1295344&rec=1&srcabs=1306342.

4. *Hedge Funds, Systemic Risk, and the Financial Crisis of 2007–2008: Written Testimony for the H. Oversight Comm. Hearing on Hedge Funds*, 110th Cong. (2008) (written testimony of Andrew W. Lo, MIT Laboratory for Financial Engineering), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1301217.

As the U.S. government responds to the immediate crisis,⁵ attention has turned to the question of a broader regulatory response.⁶ Each time we go through this kind of market upheaval,⁷ we ask ourselves how better regulation could have prevented the harm. Yet at the same time, we run the risk of doing even more harm by overreacting.⁸

This Essay offers a strategy for how to regulate financial markets to better prevent the kind of debacles that led to the Financial Crisis. This strategy stems from an understanding of how market incentives converged to increase systemic risk to the point of collapse. Its goal is to correct the imbalance of incentives that led to excessive risk taking. There will be a strong desire to respond to the Financial Crisis with broad regulatory reform. There will also be a strong desire to hold individuals accountable for the harm. This Essay uses a model of risk-manager decisionmaking to illustrate how even “good people”⁹ acting in utterly rational and expected ways could have and indeed were likely to have brought us into economic turmoil. Understanding this dynamic allows us to be targeted¹⁰ in our regulatory response.

To develop our response, a good account of the cause of our current woes is necessary. We will see that the sad tales of Lehman Brothers (Lehman),¹¹ American International Group (AIG),¹² and Washington Mutual (WaMu)¹³ all share a common narrative. Like Long-Term Capital Management LP (LTCM)¹⁴

5. See David M. Herszenhorn, *Bush Signs Bill*, N.Y. TIMES, Oct. 4, 2008, at A1 (reporting on the passage of the Emergency Economic Stabilization Act of 2008, Pub. L. No. 110-343, 122 Stat. 3765 (codified at 12 U.S.C. §§ 5201–5201, 5211–5241, 5251–5253, 5261 (2008))).

6. See *id.* (noting that in passing the bailout legislation, members of Congress “said that it was only a first step and pledged to carry out a sweeping overhaul of the nation’s financial regulatory system”). For an overview of the various proposals for regulation, see generally Lawrence A. Cunningham & David T. Zaring, *The Three or Four Approaches to Financial Regulation: A Cautionary Analysis Against Exuberance in Crisis Response*, 78 GEO. WASH. L. REV. (forthcoming Oct. 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1399204.

7. See A.C. Pritchard, *The SEC at 70: Time for Retirement?*, 80 NOTRE DAME L. REV. 1073, 1081–82 (2005) (“Scandal driven reform followed by political neglect has been a recurring pattern in the securities markets. . . . [D]emands for financial market regulation will arise in times of crisis. . . . Crisis, however, does not create the ideal environment for developing balanced, cost-effective policy interventions. Politicians will want to ‘do something,’ even if the proposed something may prove to be costly, ineffective or counterproductive.”).

8. See *id.*

9. I am not suggesting that there are no individuals whose actions deserve approbation. My point is that the problem is bigger than a few bad apples.

10. Or “modest[.]” as Justice Breyer urges. STEPHEN BREYER, REGULATION AND ITS REFORM 184 (1982).

11. See *infra* notes 60–63 and accompanying text.

12. See *infra* notes 68–73 and accompanying text.

13. See *infra* notes 88–89 and accompanying text.

14. See *infra* notes 52–55 and accompanying text.

and Bear¹⁵ before them, each of these entities failed when their gambles in the so-called “carry trade” turned sharply against them.

Carry trade refers generally to the strategy of taking low-cost borrowings and investing them in higher-yielding assets in order to capture the “spread,” or “carry,” created.¹⁶ It is exactly what banks traditionally do for a living.¹⁷ It is the logic behind Collateralized Debt Obligations (CDOs),¹⁸ Special Investment Vehicles (SIVs),¹⁹ and even the economics of the current government bailout. It is a great way to make money, assuming you can manage the risk.

The risk of the carry trade lies in two places. According to the old saying, there is no such thing as a free lunch. Well, this is only partially true in the case of the carry trade. Generally, the use of lower-cost borrowed money to finance higher-yielding investments comes with the risk that the cash flows will not coincide.²⁰ In other words, there is always the risk that when you need the money to service the low-cost debt, the higher-yielding asset could be illiquid. In a perfect world, the cost of insuring against this risk

15. See *infra* notes 56–59 and accompanying text.

16. An excellent definition of the carry trade in connection with mortgage-related securities is given by Judge Spatt of the Eastern District of New York:

The carry trade involves financing or “carrying” the purchase of mortgage-backed securities with funds borrowed through repurchase agreements from the money market. This strategy attempts to take advantage of the differences between the rates of repurchase agreements, which have lower short-term interest rates, and the mortgage-backed securities, which have higher long-term interest rates. A comparison of the differences between the rates is called the “yield curve.” Relying on this mismatch of interest rates can produce significant gains when the yield curve is steep, that is, when the spread between long-term and short-term interest rates is wide.

In re N.Y. Cmty. Bancorp, Inc. Sec. Litig., 448 F. Supp. 2d 466, 470 (E.D.N.Y. 2006).

17. LLOYD B. THOMAS, MONEY, BANKING AND FINANCIAL MARKETS 204 (2006) (“Banks earn profits principally by obtaining funds at relatively low interest rates and then lending the funds or investing in securities at higher interest rates.”).

18. For a description of Collateralized Debt Obligations, see *infra* notes 70–71 and accompanying text.

19. For a description of Special Investment Vehicles, see *infra* notes 70–71 and accompanying text.

20. As Judge Spatt described it:

However, the carry trade has its risks. If the yield curve flattens because short-term interest rates increase and long-term rates do not increase at a similar pace, the investment is exposed in two ways. First, the spread between the interest rates is reduced such that net income from the spread decreases, an event known as a “margin squeeze.” Second, under applicable accounting rules, mortgage-backed securities are classified as “available—for sale,” instead of “held to maturity,” and thus the investor must immediately realize any loss on the decline in value of the securities.

N.Y. Cmty. Bancorp., 448 F. Supp. 2d at 470; see also Roberta Romano, *A Thumbnail Sketch of Derivative Securities and Their Regulation*, 55 MD. L. REV. 1, 65 (1996) (“Financial institutions, such as savings and loans, frequently have mismatched asset and liability durations. They lend at fixed rates for the long term (mortgages), but they borrow at floating rates over the short term (deposits). With this balance sheet structure, if short-term rates rise the institution will lose money.”).

ought to equal the spread you were planning to earn in the first place.²¹ However, here is where the finance economists' famous one free lunch²² comes into play. By using portfolio theory and the power of diversification, it is possible to manage the risk of mismatched cash flows through the use of pooled assets. It's what banks do. It's what CDOs, SIVs, and all other types of securitizations do. It is the structure that drove the recent boom in consumer lending.

The second-place risk lies in the incentives faced by the decisionmaker. The very nature of the carry trade strategy creates a particular kind of moral hazard.²³ In every failed institution, we find an asset manager of some kind who was using other people's money to make a bet that he could earn more with it than he had promised to pay back. In every case, while there were certainly consequences for failing to pay the promised return, the potential reward for betting harder and harder was a siren's song to take more risk, certainly more than one would have taken if they were betting their own money. Elsewhere, I have called this the "no skin in the game" problem.²⁴

The potential for disloyalty or shirking responsibility is endemic to all agency relationships.²⁵ But the moral hazard faced by an asset manager poses

21. Hedging strategies are a type of risk-management device used to address the risk of mismatched cash flows. In an efficient market, we would expect the cost of the hedge to equal the profit of the trade, implying therefore that the real source of reward from any carry trade is the risk being taken. See Kenneth A. Froot, David S. Scharfstein & Jeremy C. Stein, *Risk Management: Coordinating Corporate Investment and Financing Policies*, 48 J. FIN. 1629, 1633–38 (1993).

22. The "free lunch" refers to the observation that by holding a diversified portfolio of assets, an investor can earn the same return as available from an undiversified one while taking less risk. This observation is one of the cornerstones of modern portfolio theory and earned its author, Harry Markowitz, the Nobel Prize. See Harry Markowitz, *Portfolio Selection*, 7 J. FIN. 77 (1952).

23. There has been an enormous discussion of the moral hazard implications of the government's actions to bail out troubled financial institutions. See, e.g., Daniel Henninger, *Wonder Land: Welcome to 'Moral Hazard'*, WALL ST. J., Oct. 2, 2008, at A17 ("[E]very corner bar and hair salon is filled with experts on the perils of moral hazard. Everyone gets it: Cut risk down to next to nothing and some people do crazy things."). These discussions are usually focused on the moral hazard being created by bailing out various entities and individuals from their excessive risk taking. My focus is on the moral hazard that predated any government rescue. The moral hazard I see as underlying our current troubles lies in the inherent incentives asset managers have to take excessive risk when playing with other people's money. This dynamic of moral hazard is by no means unique to the current situation. See, e.g., John C. Coffee, Jr., *What Caused Enron? A Capsule Social and Economic History of the 1990s*, 89 CORNELL L. REV. 269, 278 (2004) ("After the S&L crisis, investigators quickly identified a classic 'moral hazard' problem. Because the government guaranteed banks' financial obligations to depositors, these depositors had little reason to monitor management, and accordingly bank promoters were able to leverage their firms excessively."). For a more wide-ranging discussion of moral hazard, including some historical perspective on the concept, see Tom Baker, *On the Genealogy of Moral Hazard*, 75 TEX. L. REV. 237 (1996).

24. See Karl S. Okamoto, *Skin in the Game*, LEGAL TIMES, Sept. 29, 2008, at 52.

25. For the seminal work on this dynamic, see Michael C. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 J. FIN. ECON. 305 (1976).

a particular systemic threat. As I will describe, an asset manager can maximize his personal opportunity in two ways: (1) by taking more and more risk; and (2) by undervaluing (or even outright concealing) the degree of risk being taken. Indeed, he frequently has the incentive to do both, consciously or otherwise. Furthermore, asset managers operate in a market of highly interrelated transactions. Normally, because each transaction involves a potential winner and loser, we expect the market to discipline both excessive risk taking and any misvaluation of risk. Sometimes, however, especially in new and frothy markets, market discipline fails. Unchecked, the incentive to take risk and also to understate it becomes systemic as it propagates across a market of highly interrelated assets—like the market for mortgage-related securities.²⁶

This Essay contends that the root cause of the Financial Crisis is systemic moral hazard.²⁷ While generally we would expect markets to constrain individuals' moral hazard by punishing excessive risk taking, we have before us a perfect storm of market failure. Because so many participants in the market for mortgage-related assets suffered from a moral hazard that favored risk taking over prudence, the market's normal discipline failed. Each player was being paid to either take greater risk or to understate the risks being taken, and many were paid to do both. No one had the incentive to stand up and say that the emperor had no clothes, even though many in the market knew months, if not years, in advance that things were headed for a crash.²⁸

26. See, e.g., Uday Rajan, Amit Seru & Vikrant Vig, *The Failure of Models That Predict Failure: Distance, Incentives and Defaults*, (Stephen M. Ross Sch. of Bus. at the Univ. of Mich., Research Paper No. 1122; Chicago Graduate Sch. of Bus., Research Paper No. 08-19, 2008), available at <http://ssrn.com/abstract=1296982> (describing the tendency of loan originators to ignore "soft" information regarding creditworthiness as volume of lending grows).

27. For a similar conclusion based on an earlier run of financial scandals, see James Dow, *What Is Systemic Risk? Moral Hazard, Initial Shocks, and Propagation*, MONETARY & ECON. STUD., Dec. 2000, at 1, 2 ("[M]oral hazard . . . is an important element of financial crises.").

28. Indeed, there were Congressional hearings to discuss this precise scenario a year before. See, e.g., *Systemic Risk: Examining Regulators' Ability to Respond to Threats to the Financial System: Hearing Before the H. Comm. on Financial Serv.*, 110th Cong. (2007). The experts' prediction of a collapse came even earlier. See, e.g., Editorial, *The US Economy and the 'R' Word*, BUS. TIMES (Singapore), Aug. 9, 2006 ("Many economists suggest that a housing bust is potentially more dangerous for the US economy than even the technology bust of 2001. For instance, Nouriel Roubini of New York University's Stern School of Business has pointed out that whereas the victims of the tech-bust were mainly investors with high exposures to technology stocks, the victims of a housing bust will be every home-owning American household. Moreover a housing bust will be a triple-whammy for the US economy: it will lead to declines in residential investment, a slowdown in household spending on durable goods, as well as a fall in employment—all of which will feed into further reductions in house prices and increase the chances of a recession.").

This looks, therefore, like the perfect situation for regulation as the solution. As Justice Breyer,²⁹ among others, has told us, the sweet spot for regulation is where markets fail. In fact, the call for greater regulation began even before the market turmoil.³⁰ Even steadfast free marketers like former Treasury Secretary Henry Paulson have understood, if only to preempt more intrusive legislation, that new regulation is inevitable.³¹

By laying out this story of systemic moral hazard, my goal is to offer a general strategy for the inevitable governmental response to the wide-ranging calls for greater oversight of our financial markets. This strategy attempts to take into account the various lessons we have learned from past regulatory attempts to prevent broad social harm from financial market failure. These lessons can be summed up in Justice Breyer's warning that "*modesty is desirable in one's approach to regulation.*"³²

Those who say that there is no such thing as a free lunch will also say that without risk, there can be no reward. There is no world where the risk of financial crisis can be reduced to zero. Therefore, the regulatory response to a financial crisis must balance the benefits of risk taking in our economy with the costs of systemic collapse. In particular, it must weigh the benefits of greater governmental oversight with the costs to optimal economic balance. And it must do all this in a world of uncertainty, constant change, and great complexity. Broadly speaking, the strategy advocated here is to address a very specific instance of market failure with a limited regulatory response, but one that will create a dynamic for ongoing improvements in the way we measure and control financial risk taking in an uncertain, changing, and complicated world.

If systemic moral hazard is the culprit to focus on, how can regulation help? Systemic moral hazard poses a unique challenge in crafting a regulatory

29. See BREYER, *supra* note 10, at 15 ("The justification for intervention arises out of an alleged inability of the marketplace to deal with the particular structural problems."). Justice Breyer identifies moral hazard as one kind of market failure that may justify a regulatory response. See *id.* at 32–33.

30. See, e.g., Edmund L. Andrews, *Treasury's Plan Would Give Fed Wide New Power*, N.Y. TIMES, Mar. 29, 2008, at A1 ("The Treasury Department will propose on Monday that Congress give the Federal Reserve broad new authority to oversee financial market stability, in effect allowing it to send SWAT teams into any corner of the industry or any institution that might pose a risk to the overall system."); *Treasury Secretary Requests Greater Powers for the Federal Reserve*, N.Y. TIMES, June 20, 2008, at C3 ("The Bush administration said Thursday that the Federal Reserve should be given sweeping new powers to protect the integrity of the financial system, contending that this year's market turmoil had exposed a badly outdated regulatory system.").

31. Press Release, U.S. Dep't of the Treasury, *Treasury Releases Blueprint for Stronger Regulatory Structure* (Mar. 31, 2008), available at <http://www.ustreas.gov/press/releases/hp896.htm> ("The U.S. regulatory structure does not serve American (sic) as well as it could, and modernization is inevitable.").

32. BREYER, *supra* note 10, at 184 (discussing pitfalls of overzealous regulation).

response. The problem is that the best answer to systemic moral hazard is something I describe as “predictive prevention.” It is inherently difficult to reward individuals for the production of predictive prevention because the more successful it is, the less valuable it seems. Therefore it is no surprise that markets routinely fail to produce predictive prevention, and thus fail to prevent systemic moral hazard.

The consequence of this difficulty in valuing predictive prevention is seen when we model how risk managers make decisions regarding the prevention of excessive risk. The model reveals that the balance is easily tipped in favor of risk taking that leads to systemic failure and broad social harm. The model also reveals how regulation might work to reset the balance to one that is superior for society. We achieve this optimal balance in two ways: (1) by requiring all asset managers in the market to put their own money at risk in their trading decisions; and (2) by requiring all asset managers to use “best practices” in managing risk or be subjected to legal liability.

In Part I, I provide a short history of the Financial Crisis, using various examples to describe in greater detail the carry trade strategy and how that common narrative pervades the debacle. In Part II, I describe the collapses of LTCM, Bear, Lehman, AIG, and WaMu, emphasizing how each is an example of a failed carry trade strategy that contributed to the larger Financial Crisis. In Part III, I discuss the role of systemic moral hazard as a root cause of this crisis. In Part IV, I lay out the case for predictive prevention as a solution while highlighting the inherent challenges of producing optimal predictive prevention. Here, I introduce the model of risk-manager decisionmaking. In Part V, I examine the model’s implications for designing a modest regulatory response.

I. THE CARRY TRADE AND ITS RISKS

A. A Basic Example of the Carry Trade

An example of the carry trade strategy is an interest rate arbitrage trade often used by hedge funds.³³ Under most market conditions, the relationship between interest rates and maturities is an upward sloping line.³⁴ Bonds with longer maturities generally have higher interest rates than shorter-term bonds. So if a trader can raise money by selling bonds into the short-term market

33. See FILIPPO STEFANINI, *INVESTMENT STRATEGIES OF HEDGE FUNDS* 148 (Laura Simontacchi trans., John Wiley & Sons Ltd. 2006) (2005) (“A carry trade consists in buying bonds with yields higher than the cost of money borrowed to purchase them.”).

34. See RICHARD A. BREALEY & STEWART C. MYERS, *PRINCIPLES OF CORPORATE FINANCE* 678 (7th ed. 2003).

and then invest the proceeds in longer-term bonds bearing a higher interest rate, he will earn a positive spread or carry on the trade.

Take a simple example. A trader borrows \$1,000 by issuing a 3-month bond at 3.2 percent. He then takes the \$1,000 and invests in a 1-year bond earning 4 percent. While he has to pay \$8 (3.2 percent of \$1,000, divided by 3 months/12 months, or 4) at the end of the three months on the money he borrowed, he will earn \$10 after one year, or a positive carry of \$2. Sounds like a “no lose” strategy until you realize that our trader has taken some risk.

Come three months time, he will need to raise the capital required to repay the 3-month loan but will not yet have gotten back the money he invested in the 1-year bond. Therein lies the challenge. If, in the meantime, interest rates have gone up, two things will happen: the cost of maintaining the trade will go up, and the value of the trader’s assets will go down. To see this, consider what happens if the prevailing 3-month interest rate at the 3-month point is now 4.8 percent. Now the trader will need to borrow \$1,000 at a cost of \$12 per quarter. This means his investment in the 1-year bond is now costing him \$2, creating a negative spread or carry. In addition, because bond prices vary inversely with prevailing interest rates,³⁵ the market value of the 1-year bond he holds will fall.

B. Banks and the Carry Trade

The traditional business model³⁶ for a bank is a variation on this carry trade strategy.³⁷ Banks take in deposits from their customers. These deposits, in the form of checking accounts, certificates of deposit, or savings accounts, are liabilities of the bank in the sense that they must be returned to the customer at some point. They come with a carrying cost. That cost can include interest paid on deposit accounts. But even if no interest is paid, the bank incurs costs in providing the services (such as checking, ATM access, and internet banking) associated with the accounts. To profit, the bank must use its deposits to earn revenue that exceeds the carrying cost of the deposits (and its other operating expenses). The bank earns this revenue by investing its capital (which includes its customers’ deposits plus an amount of leverage that it

35. See *id.* at 675.

36. Recent years have seen a shift from this traditional model of matching low-cost deposits with higher-yielding assets such as loans to a noninterest, fee model. This model relies on fees for services like investment banking or origination and servicing fees for various securitization transactions. See Robert DeYoung & Tara Rice, *How Do Banks Make Money? The Fallacies of Fee Income*, ECON. PERSP., 4th Q. 2004, at 34. As noted below, securitizations are themselves another variation on the carry trade strategy.

37. See THOMAS, *supra* note 17, at 204–29.

obtains by borrowing funds from other banks, the markets, or the Federal Reserve) in revenue-producing assets, primarily loans. A positive carry is earned if the cash flows from the loans exceed those paid with respect to the capital (deposits and any leverage).

C. The “Run on the Bank” as Systemic Risk

The risk a bank faces can be seen from the extreme case of a so-called “run on the bank.” Since depositors are generally free to demand the return of their funds at any time, if they all ask for their deposits back at the same time, the bank may not be able to meet their demand if it cannot liquidate the various investments it has made quickly enough to raise the cash needed to satisfy depositors (and pay down leverage).

Generally, even though any one deposit-account balance may fluctuate day to day, the aggregate or portfolio of accounts will remain level. Therefore, banks can make assumptions regarding their longer-term capital levels in setting the average maturities of their investments. While any one deposit account may have an average duration of only days or months, the overall average maturity of its deposits will be much longer, allowing the bank to invest in longer-term assets and enjoy the positive carry that comes from the typical upward slope of the yield curve. But if that average maturity suddenly shortens due to a run on the bank, the bank faces significant losses and ultimately failure if it cannot liquidate its investments at values that exceed its commitments.

The tragedy is that a mass demand for a return of deposits is usually preceded by declines in asset values and a squeeze in alternative sources of liquidity. This creates the potential for a vicious cycle of decline and panic. As asset values decline, customers become concerned about the stability of their banks and begin to withdraw deposits. As customers withdraw their deposits, banks are forced to liquidate more assets, further depressing values and withdrawing liquidity from other banks or institutions that need leverage to support their investments. These other institutions in turn now also must liquidate their positions, again depressing values, and so on. This spiral is the recipe for financial collapse. It is essentially the story of WaMu, the largest bank to fail in U.S. history.³⁸ It is also an illustration of the notion of systemic risk.³⁹

38. Robin Sidel, David Enrich & Dan Fitzpatrick, *WaMu Is Seized, Sold Off to J.P. Morgan*, in *Largest Failure in U.S. Banking History*, WALL ST. J., Sept. 26, 2008, at A1 (“The collapse of the Seattle thrift . . . was triggered by a wave of deposit withdrawals . . .”).

39. See Steven L. Schwarcz, *Systemic Risk*, 97 GEO. L.J. 193 (2008).

In a recent article, Professor Steven Schwarcz defines systemic risk as 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.⁴⁰

Professor Schwarcz lists a run on the bank as a “classic example of systemic risk.”⁴¹ He then compares the demise of LTCM to a banking crisis⁴² and develops a model for evaluating financial market regulation that takes into account the broader social costs of a wide-reaching market meltdown.⁴³ As the analysis in this Essay does as well, Professor Schwarcz insists that any regulatory response must overcome a cost-benefit analysis.⁴⁴ Applying a model of such an analysis, he concludes that “a regulation establishing a liquidity provider of last resort . . . is the approach to minimizing systemic risk that would have the best chance of success.”⁴⁵

The same common narrative exists in bank failures like WaMu, to LTCM, and on to the subsequent fiascos of the Financial Crisis. But unlike Professor Schwarcz, my suggestion here is to change our regulatory scheme to *prevent*, rather than simply be in a position to respond⁴⁶ to, a financial crisis. I acknowledge his warning that “cost-effective prophylactic measures are simply difficult to craft.”⁴⁷ But by examining the common narrative again, this Essay has a proposal for just that—cost-effective prevention through regulation. So it is important to see how the simple story of a bank and the potential for systemic risk from a run on that bank repeats itself when we turn to the more esoteric cases of LTCM, Bear, Lehman, and AIG.

II. THE CARRY TRADE MELTS DOWN

A common business model and a common incentive structure permeate the financial markets. Because this incentive structure favors risk taking over prudence, and indeed disables effective risk management, we find excessive

40. *Id.* at 204.

41. *Id.* at 199.

42. *Id.* at 201.

43. *Id.* at 208 (“[P]reservation of the financial system is socially desirable and thus stability should be an important regulatory goal.”).

44. *Id.* at 234–35.

45. *Id.* at 241–42.

46. *Id.* at 243 (noting that “the reactive elements [of the proposed regulatory solutions] dominate”).

47. *Id.*

risk taking across the entire market, which ultimately led to broad financial collapse. To see this, one needs to recognize the commonalities among the various types of players involved in the Financial Crisis. Firms like LTCM, a hedge fund, Bear and Lehman, investment banks, and AIG, an insurance company, are all essentially banks, the main difference being that they are not regulated like banks.⁴⁸ They are all engaged in the carry trade. They all suffered a run on the bank.

A. Long-Term Capital Management: An Early Casualty of the Carry Trade

A hedge fund is a private investment fund.⁴⁹ It gathers investments from institutional investors (such as pension plans, university endowments, and funds of funds) and wealthy individuals. It then attempts to invest those funds profitably under an arrangement that pays the hedge fund manager both a fixed management fee and a performance fee based on a share of the profits he earns for his investors.⁵⁰ At the peak, top hedge fund managers could earn performance fees exceeding a billion dollars per year.⁵¹ LTCM was a hedge fund. Its investment strategy was to make highly leveraged bets on a basket of global debt securities using low-cost borrowings to enhance returns.⁵²

Based on quantitative models developed by two Nobel laureates, LTCM's strategy was once described as a "money machine."⁵³ The machine relied primarily on capturing a relatively small spread that existed between highly liquid U.S. Treasury bonds and relatively less liquid bonds issued by other governments. In order to capture these spreads, the fund needed to hold very large long and short positions in various kinds of government bonds. To

48. See Andrew Ross Sorkin & Vakas Bajaj, *Shift for Goldman and Morgan Mark the End of an Era*, N.Y. TIMES, Sept. 22, 2008, at A1 (noting how the Financial Crisis had led to the conversion of investment banks into bank holding companies, subjecting these firms to greater regulatory oversight). The Bank Holding Company Act of 1956, 12 U.S.C. §§ 1841–1850 (2006), governs the conversion of a bank into a bank holding company.

49. For a leading text on the economics of hedge funds, see ANDREW W. LO, *HEDGE FUNDS: AN ANALYTIC PERSPECTIVE* (2008). For an excellent discussion of the legal structures, see TIMOTHY SPANGLER, *THE LAW OF PRIVATE INVESTMENT FUNDS* (2008).

50. See Keith H. Black, *Designing a Long-Term Wealth Maximization Strategy for Hedge Fund Managers*, in *HEDGE FUNDS: INSIGHTS IN PERFORMANCE MEASUREMENT, RISK ANALYSIS, AND PORTFOLIO ALLOCATION* 181, 181 (Greg N. Gregoriou et al. eds., 2005).

51. See Jenny Anderson & Julie Creswell, *Make Less Than \$240 Million? You're off Top Hedge Fund List*, N.Y. TIMES, Apr. 24, 2007, at A1.

52. For fuller accounts of the LTCM story, see NICHOLAS DUNBAR, *INVENTING MONEY: THE STORY OF LONG-TERM CAPITAL MANAGEMENT AND THE LEGENDS BEHIND IT* (2000), and ROGER LOWENSTEIN, *WHEN GENIUS FAILED: THE RISE AND FALL OF LONG-TERM CAPITAL MANAGEMENT* (2000).

53. *Id.* at 169, 179.

do so, they were able to borrow enormous sums (as much as 100 times their own capital) from a variety of Wall Street and other large financial institutions.

The strategy was very successful until there was a shock in the market for sovereign debt. This shock caused the predicted spread to reverse sharply, forcing the fund to recognize losses in its asset base. This in turn resulted in a call for new collateral from its various lenders. When the fund could not deliver the additional collateral, it was threatened with bankruptcy. If allowed to go into bankruptcy, the fund would have faced a fire sale of its portfolio of bonds.⁵⁴ Because of the enormous size of this portfolio, there was widespread concern that a liquidation of the portfolio would exacerbate the worldwide collapse in the government bond market. To avoid this, the U.S. government intervened and orchestrated a bailout by a consortium of financial institutions.⁵⁵

Beyond the obvious similarities with the current crisis, the purpose of retelling what is for many a familiar story is to highlight the carry trade embedded in LTCM's failed strategy. Like a bank, the fund used a high proportion of low-cost borrowed money to make investments in higher-yielding assets. As became obvious, this strategy involved the risk that the fund would not be able to "roll over" or replace its borrowed funds at a time when its assets could not be liquidated at values that would repay in full its total loans outstanding. When creditors saw this risk, there was a risk of a run on the bank that threatened to further depress asset values as the supply of assets in the market bulged from the liquidation of the fund's positions. We see the same dynamic at play in the stories of Bear and Lehman.

B. Bear, Lehman, and AIG: Casualties of the Credit Default Swap

1. Bear and Lehman as Intermediaries to Credit Default Swap Contracts

Bear Stearns and Lehman Brothers were two prominent Wall Street investment banking firms. Investment banking firms make money by: (1) rendering for a fee services such as mergers and acquisitions advice and strategic consulting; (2) providing asset management services; (3) securities trading, including securities underwriting; and (4) proprietary trading and merchant banking. In the latter two cases, the firm often risks its own capital

54. This risk was heightened because of the unique treatment of derivatives under bankruptcy law. Unlike other assets that are subject to the automatic stay of a bankruptcy proceeding, collateral for derivative positions like swaps are exposed to immediate execution by the creditor. See Franklin R. Edwards & Edward R. Morrison, *Derivatives and the Bankruptcy Code: Why the Special Treatment?*, 22 YALE J. ON REG. 91, 95-99 (2005).

55. Steven Lipin, Matt Murray & Jacob M. Schlesinger, *Bailout Blues: How a Big Hedge Fund Marketed Its Expertise and Shrouded Its Risks*, WALL ST. J., Sept. 25, 1998, at A1.

and therefore can make or lose money depending on changes in asset values. These investments are often leveraged and therefore require access to financing. In all cases, to sustain their businesses, the firms require capital for which they often rely on short-term borrowings. Again, like a bank, these firms seek to profit by matching lower-cost capital with higher-yielding investments.

Bear,⁵⁶ for example, made significant investments, both as a principal through its proprietary trading operations and captive hedge funds and as an agent managing investors' money, in mortgage-related securities. Bear operated a significant prime brokerage⁵⁷ business in which it served as a counterparty intermediary for a large volume of over-the-counter derivative transactions. Bear also served as a custodian for many large institutional investors and hedge funds, and relied on these relationships for significant earnings from trading commissions and similar brokerage services.⁵⁸

When hit by the shock of the subprime mortgage meltdown, Bear was forced to recognize significant losses in its proprietary trading portfolio. These portfolios were part of the assets Bear used as collateral to support their access to borrowed funds. Because of uncertainty over the degree of these writedowns, Bear's lenders began to require more collateral and insisted on more liquid collateral, such as cash. This, in turn, forced Bear to sell more of its mortgage-related securities, thus putting more pressure on their value in the market.

At the same time, many of Bear's customers, some of who in effect were taking Bear's credit risk by dealing with Bear as a counterparty in derivatives transactions and others who were concerned about access to their own assets held in a custodial account in the event of a Bear failure, began to withdraw their business, clipping Bear's earnings and therefore its ability to self-finance. In other words, Bear suffered a run on the bank.⁵⁹

The story behind Lehman's bankruptcy is virtually identical. Perceived as the investment bank with the next largest exposure after Bear to the decline

56. For a synopsis of the demise of Bear Stearns (Bear), see Kate Kelly, Greg Ip & Robin Sidel, *Fed Races to Rescue Bear Stearns in Bid to Steady Financial System*, WALL ST. J., Mar. 15, 2008, at A1.

57. Prime brokerage should not be confused with subprime mortgage brokers. The latter is the business of securing mortgages for higher-risk home buyers. The former is a part of the brokerage business of an investment bank that focuses on the trading activities of large professional traders like hedge funds.

58. For a discussion of the various business activities of Bear and other investment banks, see K. THOMAS LIAW, *THE BUSINESS OF INVESTMENT BANKING: A COMPREHENSIVE OVERVIEW* 1–3, 18–22 (2d ed. 2006).

59. As SEC Chairman Christopher Cox put it, Bear's collapse "was the result of a lack of confidence," and not a result of "inadequate capital." Letter From Christopher Cox, Chairman, SEC, to Nout Wellink, Chairman, Basel Comm. on Banking Supervision (Mar. 20, 2008), available at http://www.sec.gov/news/press/2008/2008-48_letter.pdf.

in mortgage-related assets, Lehman suffered a liquidity squeeze when its sources of short-term capital needed to fund its day-to-day working capital requirements and its pool of willing counterparties for its prime brokerage business both dried up.⁶⁰ Unfortunately for Lehman, its crisis came after the government had already spent billions bailing out Bear, Freddie Mac, and Fannie Mae, and taken the unprecedented move of opening the discount window to nonbanks, leaving no appetite at that moment for funding further bailouts.⁶¹ Without a government rescue, Lehman was forced into bankruptcy and ultimately into liquidation.⁶²

It is useful to focus on one aspect common to both Bear and Lehman's demises. In each case, an important part of the firm's business model was the ability to function as an intermediary for over-the-counter derivatives trading. In particular, both Bear and Lehman had very large "swap" businesses. A swap is a contract between two parties designed to give one party a specified payment under certain circumstances. A common type of swap much in the news lately is the credit default swap, which allows a party to hedge the risk of a borrower's default by obligating the swap counterparty to make the required loan payments if the borrower defaults.⁶³ Swaps can cover an infinite variety of transactions. They are private agreements between two parties under which one party is obligated to make a payment to the other based on the change in the value of a specified asset. They can relate to stocks, commodities, or other agreements like bank loans. What is common to them all is the need for evaluating counterparty risk. The swap holder needs to know the swap provider can live up to the obligation to make the required payment. In other words, a swap is only as good as the credit of the firm standing behind it.

To facilitate the use of swaps, various financial institutions have designated entities to serve as swap or "ISDA"⁶⁴ counterparties. The use of a special entity can serve two purposes. First, by using an entity that is not a registered broker-dealer, the firm avoids regulation by the Securities and Exchange

60. Susanne Craig, *Lehman Struggles to Shore Up Confidence*, WALL ST. J., Sept. 11, 2008, at A1.

61. Deborah Solomon et al., *Ultimatum by Paulson Sparked Frantic End*, WALL ST. J., Sept. 15, 2008, at A1.

62. For a more complete account of the demise of Lehman, see LAWRENCE G. MACDONALD & PATRICK ROBINSON, *A COLOSSAL FAILURE OF COMMON SENSE: THE INSIDE STORY OF THE COLLAPSE OF LEHMAN BROTHERS* (2009).

63. For a general discussion of credit default swaps, see Eric Dickinson, *Credit Default Swaps: So Dear to Us, So Dangerous* (Nov. 20, 2008) (unpublished manuscript, on file with author), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1315535.

64. This is the acronym for the International Swaps and Derivatives Association, Inc., a trade group that, among other functions, has developed the standard form documents for swap agreements. For information, see <http://www.isda.org> (last visited June 7, 2009).

Commission (SEC), including the SEC's capital adequacy requirements for broker-dealers. Second, the firm can select an entity that will attract the highest credit rating from the leading credit rating agencies. For example, both Lehman and Bear often used their publicly traded holding company as the entity to serve as the counterparty for its swap contracts. Given their relative transparency, a readily determined market capitalization, and ownership of the firms' operating subsidiaries, each of these firms had historically attracted top ratings from the credit rating agencies. This top rating allowed customers to feel comfortable about the potential credit risk embedded in the swap contracts they contracted with Lehman and Bear.

While each individual swap contract represented a potential liability for Lehman and Bear—and the total notional value (the dollar value of each contract) of all swap contracts issued by these firms ran into the hundreds of billions—the actual net exposure of the firms was much smaller.⁶⁵ Generally, firms like Lehman and Bear act solely as an intermediary (and not as a principal like AIG did) in entering into swap contracts. As an intermediary, Lehman or Bear would immediately enter into a countertrade that matched and offset the exposure in the first swap contract. Their motivation was not to make a bet on the transaction underlying the swap, but rather to earn a small spread embedded in the swap price. So the critical exposure these firms faced from their swap businesses was not the notional value of the swap contracts themselves but the possibility that they could not maintain the creditworthiness they needed to serve as counterparties in swap transactions.

As part of a swap agreements, each party agrees to maintain certain credit support based on the changing notional value of the particular swap agreement. For example, if the swap is a credit default swap and the likelihood of a payment rises because of the deteriorating credit of the subject borrower, the swap writer must post additional collateral to support its ability to make good on its swap obligations. In addition, in the event that the initial creditworthiness of the swap writer diminishes, the counterparty may also require additional collateral.⁶⁶

This was the challenge posed to Lehman and Bear. Their credit ratings were adversely affected by their losses in their portfolios of mortgage-related

65. See, e.g., *Lehman Debt Swaps Settled for \$5.2 Billion*, N.Y. TIMES, Oct. 22, 2008, available at <http://dealbook.blogs.nytimes.com/2008/10/22/lehman-debt-swaps-settled-for-52-billion/> (noting that an estimated \$400 billion in Lehman credit default swaps was settled for a net \$5.2 billion because so many dealers held offsetting positions).

66. See generally INT'L SWAPS & DERIVATIVES ASS'N, INC., 2005 ISDA COLLATERAL GUIDELINES 8–26 (2005), available at <http://www.isda.org/publications/pdf/2005isdacollateralguidelines.pdf> (discussing the function of collateralization in managing risk).

securities. The rating downgrades led to the need to post additional collateral, which led to the need for new capital. When that became unavailable, the demand for new collateral could not be met. In Bear's case, this led to a forced rescue by JPMorgan Chase, which promptly restored Bear's credit rating by guaranteeing all of its counterparty obligations. In Lehman's case, it led to a bankruptcy. As nervous counterparties attempted to unload their credit default swap positions with Lehman and to replace those swaps with new hedges, the market for credit default swaps froze up as demand for these positions suddenly outstripped supply. Many believe this turmoil led to the credit market freeze and stock market crash that followed.⁶⁷ It certainly precipitated the downfall of AIG. In both cases, what we saw in the end was a run on the bank.

2. The Hazards of Credit Default Swaps and the Downfall of AIG

Unlike Bear and Lehman, AIG, the world's largest insurance company, was holding the risk of its swap contracts and not simply acting as an intermediary.⁶⁸ Through a special purpose subsidiary based in London, it held a notional value of credit default swaps that at one point was roughly \$500 billion.⁶⁹ Credit default swaps are often described as insurance because they provide the holder of the swap with a policy that compensates them if a borrower defaults on a debt. AIG was the insurer, and it had written a half-trillion dollars of coverage.

Much of this coverage was being provided in order to support various securitization structures. While coming under various labels like collateralized debt obligations (CDOs), collateralized mortgage obligations (CMOs), and special investment vehicles (SIVs), all of these securitization structures⁷⁰ share some basic features. A sponsor (often an investment bank) creates an entity (such as an SIV) that acquires a pool of assets, such as a group of

67. For an interesting discussion of the market impact of the Lehman bankruptcy and its implications for governmental response to financial crises, see Kenneth Ayotte & David A. Skeel, Jr., *Bankruptcy or Bailouts?* (Inst. for Law & Econ. Univ. of Pa. Law Sch., Research Paper No. 09-11; Law & Econ. Nw. Univ. Sch. of Law, Research Paper No. 09-05, 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1362639.

68. See Gretchen Morgenson, *Behind Biggest Insurer's Crisis, A Blind Eye to a Web of Risk*, N.Y. TIMES, Sept. 28, 2008, at A1 (describing how AIG's exposure to credit default swap liabilities led to its demise).

69. *Id.* For a fuller account of the AIG story and the governmental response, see William K. Sjostrom, Jr., *The AIG Bailout*, 66 WASH. & LEE L. REV. (forthcoming 2009).

70. For a description of certain common securitization structures and related securities, see Romano, *supra* note 20, at 68-78, and Steven L. Schwarcz, *Protecting Financial Markets: Lessons From the Subprime Mortgage Meltdown*, 93 MINN. L. REV. 373, 376-79 (2008).

mortgages or commercial loans or credit card receivables or other CDOs and CMOs. It then issues tranches of securities that represent a series of layered claims against the cash flows generated by the pool of assets. The layering can consist of any variety of slicing and dicing, but often includes providing different levels of seniority to the different tranches of securities. For example, an SIV may issue AAA bonds, A bonds, BBB bonds, and so on down to a residual equity tranche. AAA, A, and BBB refer to the ratings the bonds attract from the rating agencies at the time of issuance. AAA is the highest rating and is widely viewed to be just shy of a comparable treasury bond in credit quality. This rating is based upon the rating agencies' assessment of the credit risk of the security. AAA means there is little to no risk. These are the kinds of securities held by money market mutual funds and other ultra-conservative investors.

The magic of these securitization structures becomes clear when you realize that a pool of subprime mortgages can be the collateral support for the AAA bond. Indeed, relatively risky assets, like subprime auto loans, various consumer debt, and leveraged buyout financings, are frequently the fodder for securitizations with AAA tranches. The reason this is possible is that by layering the claims of the different securities, you create equity. In other words, since the senior tranche has first dibs on the collateral over the subordinated tranches, there appeared to be little risk that they will not be paid in full.

It was common to either guarantee an AAA tranche or "credit enhance" a lower-rated tranche to AAA by buying an "insurance wrap" for the security from an AAA insurer. In other words, to assure investors in a securitization that the securities they were buying were of the highest credit quality, the sponsor would routinely offer insurance in the form of a credit default swap. The cost of this insurance would simply be one more fee paid out of the transaction.

The reason these securitization transactions make economic sense is that a pool of assets is more valuable than the sum of the values of the individual assets. Diversification and the ability to divide the underlying assets into their various component parts (e.g., principal, interest, current income, zero coupon income, low risk, high risk, etc.) to better match investor preferences can create sufficient value that outweighs the various transaction costs of a securitization, including the sponsor's fees. But the key to making these deals work is finding some means to overcome the asymmetry of information that investors face regarding credit quality. Insurance was a large part of the answer. Thus the importance of credit default swaps to securitizations. They

allowed a liquid market to develop among investors who could trade mortgage-related securities without investing a great deal in determining the underlying credit quality of the asset pool supporting their securities. If each investor had been forced to make that determination on a pool-by-pool basis, the cost would have been prohibitive. But through a combination of credit ratings and insurance, the cost was minimized, allowing a multi-trillion dollar market (and the industry that supported it) to flourish.

Others have explored the credit rating process and its deficiencies.⁷¹ Suffice it to say that recent history has taught us that rating agencies were not up to the task. Their primary function is to determine the risk of default under a debt instrument. In other words, they calculate worst-case scenarios. When presented with a securitization structure, their job is to evaluate the worst-case scenario for each tranche of security such that they can opine that at a given confidence level, the worst-case scenario still allows for payment in full of the particular instrument. In essence, AAA and BBB ratings on a CDO or similar security represent higher or lower confidence levels with respect to the projected downside asset values of a pool of assets. In relying on credit ratings for their credit evaluations, market participants had outsourced their risk management to the rating agency. For the pool sponsors who used these ratings solely to assist in the marketing of their securities, the nonchalance towards the reliability of the ratings comes as no surprise. What is surprising is how readily true investors—those who intended to hold these securities as investments—accepted these “risk assessments for hire” as a substitute for their own risk management. The perfect example is AIG.

AIG's downfall did not stem from a portfolio of toxic securities. Rather, it came when the insurance policies it wrote for the most senior of these securities were called upon. In underwriting the risk of insuring the senior tranches of various pooled assets, AIG was engaged in very much the same downside calculation that a rating agency or any risk manager would make. Realizing that its insurance policy would only be called upon if the value of the pool fell below the entire value of all junior securities, it concluded that the chance it would ever be called to pay on any one of its credit default swaps was low. The chance that on average it would pay more than it took in on a portfolio of such instruments was even smaller still.

71. See Frank Partnoy, *The Siskel and Ebert of Financial Markets?: Two Thumbs Down for the Credit Rating Agencies*, 77 WASH. U. L.Q. 619 (1999); Steven L. Schwarcz, *Private Ordering of Public Markets: The Rating Agency Paradox*, 2002 U. ILL. L. REV. 1 (arguing that reputational costs are adequate to constrain rating agency misbehavior and overcome any conflict of interest arising from client fees).

But what AIG ignored, just as Bear and Lehman did, is that the ultimate ability to pay is not the only issue. What also matters is being able to keep your seat along the way, as in being able to sustain your investment position through a decline in value and then wait for a recovery. That's something that a typical credit rating agency's analysis does not emphasize. It does not focus on the risk of mismatched cash flows.

Companies with enormous positive net worth fall into bankruptcy everyday. Why? Because they made a bad carry trade. What AIG forgot was that its stock-in-trade, just like WaMu, Bear, and Lehman, was its ability to attract creditors on a daily basis. In the case of WaMu, it was depositors and banks; in the cases of Bear and Lehman, it was counterparties; and in the case of AIG, it was buyers of commercial paper. Once their sterling balance sheet positions came into question, that financing dried up. In a normal environment, some vulture investor would have bridged the issue by providing the capital required to maintain the investments and then waited to see the trading value recover. But these were not normal times, and AIG had miscalculated.

So why did the government feel compelled to rescue AIG?⁷² Because if AIG had gone into bankruptcy, all that would have been left to assure a half-trillion dollar market for mortgage-related securities would have been the credit ratings. The reason why a few money market funds broke the all-important one dollar per share value was because some of their AAA-rated bonds were not insured.⁷³ Again, it appears no one used the run on the bank scenario in their risk models.

C. The Rise and Fall of the Carry Trade

So who was buying all of these mortgage-related assets in these various securitizations? Well, we now know that Bear and Lehman were big investors. So were other hedge funds, all of which probably used leverage. But one of the largest classes of investors was comprised of banks, thrifts, and savings and loans. Institutions like WaMu and IndyMac Bank. Why? Because of the carry trade.

72. See Monica Langley, Deborah Solomon & Matthew Karnitschnig, *Bad Bets and Cash Crunch Pushed Ailing AIG to Brink*, WALL ST. J., Sept. 18, 2008, at A1.

73. While money market funds did not historically benefit from government guaranties, in order to provide a sense of their relative stability, they all strove to maintain a per share value of one dollar. When several funds were forced by losses to fall below the one dollar threshold, the U.S. government stepped in and offered a federal guaranty of money market mutual fund deposits in order to prevent mass withdrawals. Press Release, U.S. Dep't of the Treasury, *Treasury Announces Guaranty Program for Money Market Funds* (Sept. 19, 2008), available at <http://www.treasury.gov/press/releases/hp1147.htm>.

Until recently, one of the best ways to make money as a bank was to take low-cost deposits, borrow from the Federal Reserve at a very low cost, and invest those deposits and borrowings in mortgage-related assets issued by various securitization sponsors. Because these securities came with high credit ratings and often credit default insurance, these were “good” assets for bank capital adequacy requirements while earning a strong positive carry. Further, buying tradable securities was a much lower-cost growth strategy than actually originating loans or providing traditional banking services. Indeed, for a while it looked like a money machine, much like LTCM’s government bond strategy. Further, as demand for these mortgage-related assets grew, the sponsors became more and more aggressive in the kinds of assets they used in the pools. Any concern about credit quality was quickly appeased once rating agencies and insurance providers saw that aggressive structures led to aggressive lending which in turn led to higher home prices. Higher home prices justified more aggressive structures, and so on.

Home values and, at least initially, home ownership grew as people who could not previously qualify for financing found lenders willing to provide a mortgage because it was destined for a securitization pool. While the Federal Reserve expressed some concern over irrational home prices, it was slow to raise rates and dampen the party. So, when real estate prices came back to earth, credit tightened, collateral backing credit default swaps was called in, liquidity was squeezed, assets were sold in haste, prices collapsed, credit froze, and so on.⁷⁴ We had a classic run on the bank. I will leave it to the economists to determine who we should blame for the mess that resulted. What I can say is that whoever started the spiral, moral hazard kept it spinning.

III. A PERFECT STORM—SYSTEMIC MORAL HAZARD

A. The First Hazard: The Incentive to Take Excessive Risk

Moral hazard arises when an actor does not bear all of the consequences of his actions. It is particularly acute when he can profit by taking risks that he does not fully bear. Asset managers who profit from the gains earned using other people’s money face a moral hazard. Since they do not bear the full cost of a loss of capital and since higher returns are correlated with higher risk, an asset manager has the incentive to take additional risk in order to earn addi-

74. Professor Schwarcz provides a more detailed account of this cascade of events in the housing and debt markets. See Steven L. Schwarcz, *Understanding the Subprime Financial Crisis*, 60 S.C. L. REV. 549, 550–53 (2009).

tional returns.⁷⁵ This is a form of agency cost inherent in the asset manager relationship. The asset manager relationship is the primary building block of modern financial markets. Both the firms themselves, such as LTCM, Bear, Lehman, AIG, and WaMu, and the individuals who make up these firms are situated within an asset manager relationship. They all face moral hazard.

1. An Illustration of the Asset Manager's Incentive to Take Excessive Risk

To see this, consider a simple example. An investor places a sum of money (say \$1 million) into an account with an asset manager. The arrangement calls for the payment to the asset manager of a performance fee (say 20 percent of the profits) based upon the gains he earns on the account. The logic behind this arrangement is that if the manager's upside is tied to an increase in the value of the account, his incentives will be better aligned with the goals of the client. He makes money if the client makes money. This is often seen as superior to a fixed fee compensation arrangement, usually found at most mutual funds in which the fee is set at a percentage of assets under management. Fixed fees reward managers for gathering assets, while performance fees reward performance, or so many believe.⁷⁶

The trouble with this rosy assessment of performance-based compensation is that it ignores moral hazard. Let's assume our asset manager has two choices for investing the client's \$1 million account. One is a safe, bond-type investment offering a 5 percent return. The other is an aggressive, highly leveraged derivatives trade offering a 25 percent return. Which should he choose?

Well, we cannot answer that question without knowing more about the client and the client's overall investment strategy. But we can say that the asset manager has a strong incentive to pursue the higher risk choice. Why? Because 20 percent of 25 percent is much larger than 20 percent of 5 percent. Of course, you may object that the asset manager will share the client's concern for risk of loss. A sure 1 percent fee may be better than a highly risky 5 percent one. And if a loss might impact the manager's ability to retain the

75. See Dow, *supra* note 27, at 16–17.

76. See, e.g., Richard M. Ennis & Michael D. Sebastian, *Are Performance Fees Right for Your Fund? A Case Study*, J. INVESTING, Summer 2003, at 45, 45 (“In tying manager compensation to superior performance, rather than solely to asset size, PFs [performance fees] better align the interests of asset manager and client. Under an ABF [asset-based fee] the manager has an incentive to increase assets under management through marketing. But larger portfolios are more difficult to trade profitably, so the growth-oriented manager runs the risk of becoming too large to outperform when trading costs are taken into account. PFs, on the other hand, reward the manager for performance, an inducement, in principle at least, to control growth in assets under management.”).

client or attract new ones, he will certainly factor that cost into his risk assessment. But the fact remains that while losses impose some costs on the asset manager, they are less than those borne by the client because none of the asset manager's money is at risk. Therefore, absent some other constraints, the asset manager can be expected to take more risk than the client normally would.⁷⁷

2. The Performance-Based Asset Manager Relationship as a Call Option

The mathematics of moral hazard is readily apparent if we visualize a performance-based asset management relationship as a form of call option.⁷⁸ Under our hypothetical performance fee arrangement (20 percent of profits), our asset manager has been given in effect an option to purchase a 20 percent interest in the portfolio he is managing for a strike or exercise price equal to the starting asset value. Put differently, so long as he has returned the client's initial investment, he gets 20 percent of the upside. Basic finance theory tells us that the primary determinants of the value of a call option like this are duration and volatility (starting asset value and strike price having been exogenously determined).⁷⁹ The longer an option is open, the greater its value. Therefore the manager certainly has some incentive to increase the value of the option by protecting principal if one consequence of a loss of capital is the departure of the client.⁸⁰ However, the option is also more valuable

77. See Dow, *supra* note 27, at 16–17 (describing the moral hazard effect of a trader's "convex payoff function").

78. See Thomas J. Brennan & Karl S. Okamoto, *Measuring the Tax Subsidy in Private Equity and Hedge Fund Compensation*, 60 HASTINGS L.J. 27 (2008) (describing fund manager compensation as different forms of call options).

79. For a discussion of the Option Pricing Model and the so-called "Black-Scholes" Formula, see RICHARD A. BREALEY & STEWART C. MYERS, *PRINCIPLES OF CORPORATE FINANCE* 601–03 (7th ed. 2003). For the seminal statements of the theory, see Fischer Black & Myron Scholes, *The Pricing of Options and Corporate Liabilities*, 81 J. POL. ECON. 637 (1973), and Robert C. Merton, *Theory of Rational Option Pricing*, 4 BELL J. ECON. & MGMT. SCI. 141 (1973).

80. It is important not to understate the countervailing factors within an asset manager's incentives. Risk that threatens a loss of capital not only affects the current year's fees but will also adversely affect the opportunity to earn fees in subsequent years. Therefore, the asset manager's compensation is better seen as a compound option or option on an option to take into account the cost of losing the possibility of rolling the dice year after year. On the nature of compound options, see Robert Geske, *The Valuation of Compound Options*, 7 J. FIN. ECON. 63, 63 (1979) ("Almost any opportunity with a choice whose value depends on an underlying asset can be viewed as an option. A contract specifies the terms of the opportunity, or details what financial economists call the option's boundary conditions. Many opportunities have a sequential nature, where later opportunities are available only if earlier opportunities are undertaken. Such is the nature of the compound option or option on an option."). For an example of the valuation of a hedge fund manager's compensation as a compound option, see Brennan & Okamoto, *supra* note 78, at 47–49.

when the underlying asset is more volatile. In other words, by taking greater risk, the asset manager can increase the value of the call option.⁸¹ All other things being equal, the asset manager relationship is more valuable to the manager the more risk he takes.⁸²

3. The Inadequacy of Current Constraints on Excessive Risk Taking in the Asset Manager Relationship

We recognize this potential tension between the incentives of the asset manager and the interests of his client. Normally, the asset manager relationship has constraints that work to contain moral hazard. For example, fee arrangements often contain both a fixed fee and a performance fee component. This serves to balance the equation by, in effect, increasing the cost of a loss of capital to the manager. So, if a manager earns a fee based on assets under management, part of the value of the asset management relationship can be seen as the annuity that comes from the stream of fixed management fees.⁸³ A loss of capital reduces that stream and therefore reduces the value of the annuity. The threat of this loss can counterbalance the increase in value that comes from taking greater risk. Similarly, investors often insist that managers place a significant amount of personal capital at risk in the same pool as the client's. The notion is that by forcing managers to "eat their own cooking," clients can constrain excessive risk taking. Of course, any efforts like these to balance the incentives depend on the relative size of the weights we add to the equation. If the rewards of increased risk taking greatly outweigh the costs, the inherent moral hazard of the asset manager relationship will prevail.

81. See Thomas S. Coleman & Laurence B. Siegel, *Compensating Fund Managers for Risk-Adjusted Performance*, 2 J. ALTERNATIVE INVESTMENTS, WINTER 1999, at 9, 9 (stating that the performance fee structure "rewards higher returns with no reference to volatility or risk. . . [and] provide[s] an incentive for the manager to add to the risk of the fund. . .").

82. See Black, *supra* note 50, at 184–85 ("By understanding the Black-Scholes options valuation model, we can see that the potential incentive fee increases with the amount of assets under management, the length of time the hedge fund manager controls the assets, and the volatility of the fund's investment strategy. As the manager is able to retain investor assets for longer periods of time, the potential value of their incentive fee increases. . . . While hedge fund investors may be risk averse, they have given hedge fund managers the incentive to be risk seeking.").

83. See William N. Goetzmann, Jonathan E. Ingersoll, Jr. & Stephen A. Ross, *High-Water Marks and Hedge Fund Management Contracts*, 58 J. FIN. 1685, 1686 (2003) ("[W]hen investors are likely to remain for the long term, and when volatility is low, the regular fee portion of the contract provides the greatest value to the manager.").

Extreme examples of this basic observation might illustrate the point. Jerome Kerviel⁸⁴ and Nick Leeson⁸⁵ were both asset managers (each being traders at so-called “proprietary trading desks” at two banks) who worked under similar compensation structures. Under this structure, you take a given starting amount of money (permitted exposure), invest it as you determine (within certain constraints), and you will be paid a percentage of the profits. No profits, no pay (other than a modicum of salary). Repeated no profits, then no pay and no more job. Repeated profits, then you keep your job and get a bigger allocation of capital that allows for bigger profits. In other words, Kerviel and Leeson faced squarely the moral hazard described above. In hindsight, it comes as little surprise when, given the chance, each created for themselves extremely valuable options by taking enormous risk. There was little downside, especially once they had gone down the path of illicit behavior that eliminated the power of the one constraint of keeping their jobs. If the risks had paid off, each stood to make enormous rewards.⁸⁶ If it failed, they were already going to get fired for the mistakes they had made. So why did Société Générale and Barings Bank allow this dynamic to exist? Why didn’t they use a different incentive structure, one that did not incentivize their agents to expose the banks to billions of losses?

They believed they had adequately counterbalanced the inherent incentive to take excessive risk by erecting a “regulated” environment. In other words, they expected a system of external constraints, such as trade monitoring

84. See David Gauthier-Villars, Carrick Mollenkamp & Alistair MacDonald, *French Bank Rocked by Rogue Trader*, WALL ST. J., Jan. 25, 2008, at A1 (“He was a low-level trader in the [Société Générale’s] ‘Delta One’ desk in western Paris, earning about 100,000 euros (\$145,000) a year. His job was to make bets on how large European stock indexes would move . . .”).

85. See Nicholas Bray & Michael R. Sedit, *Barings Was Warned Controls Were Lax but Didn’t Make Reforms in Singapore*, WALL ST. J., Mar. 2, 1995, at A3 (“Up to sometime last year, Mr. Leeson’s responsibility was to execute trades on behalf of clients on the Singapore International Monetary Exchange, or Simex. But ‘he was doing such a good job that it was decided he should begin trading for his own account,’ said a Barings executive. . . . ‘His brief was to exploit differences, not to take risk positions.’ The problem, however, was that he did take positions, huge ones that eventually racked up the massive losses.”).

86. Marcus W. Brauchli, Nicholas Bray & Michael R. Sedit, *Broken Bank: Barings PLC Officials May Have Been Aware of Trader’s Position*, WALL ST. J., Mar. 6, 1995, at A1 (“Barings traditionally has paid out approximately 50% of its gross earnings as bonuses to its employees, and the 1994 bonus pool is estimated to have been around the equivalent of \$163 million. A number of directors would have got bonuses of about \$1.6 million, while Barings insiders say Mr. Leeson was in line for a bonus of more than a half-million dollars—approximately double what he had received the previous year.”); David Gauthier-Villars & Carrick Mollenkamp, *Société Générale Blew Chances to Nab Trader*, WALL ST. J., Jan. 29, 2008, at A1 (“[B]y the end of 2007, [Kerviel] had cashed out positions producing a profit of 55 million euros (\$81 million) for the bank. That was far more than his annual target, so Mr. Kerviel was expecting a bonus of 300,000 euros to be paid out this year . . .”).

and other back-office surveillance, to detect and prevent the rogue traders.⁸⁷ Unfortunately, those systems failed. A similar systemic failure underlies the Financial Crisis.

B. The Second Hazard: The Incentive to Understate Risk

There is also a second pernicious aspect to the moral hazard faced by the asset managers involved in our current meltdown. Not only do they face the incentive to take greater risk, but they also have an incentive to understate the risk. To see this, we must return to the story of how the market for mortgage-related assets works.

1. An Illustration of the Incentive to Understate Risk—WaMu and the Pool Sponsors

Let's begin with the mortgage officers at WaMu. Their compensation was incentive-based, rewarding them for producing volume. The more mortgages that were completed, the better they were paid. Overseeing the quality of the mortgages was the responsibility of an underwriting group that traditionally would have imposed credit quality standards to protect the bank.⁸⁸ But because in the new market WaMu was in the fee-based origination business and not in the principal lending business, underwriting standards were replaced with rating agency criteria. Neither WaMu nor any of its agents had any incentive to concern themselves with the increasing credit risk of its borrowers so long as the mortgage pools remained willing to accept the mortgages WaMu originated. Indeed, the incentive was quite the opposite. It was in WaMu's interest to downplay the credit quality issues of any particular loan so long as it did not jeopardize the ability to resell the loans it was originating.⁸⁹

Next, let's turn to the pool sponsors that purchased mortgages originated by WaMu. Pool sponsors—investment firms whose business it was to structure investment pools, securitize them, and sell the resulting tranches of securities to investors—were focused on closing transactions.⁹⁰ They earned fees at each

87. For an interesting discussion on the choices for regulatory responses to rogue trading, see Kimberly D. Krawiec, *The Return of the Rogue*, 51 ARIZ. L. REV. 127 (2009).

88. For an account of the demise of WaMu, see Christopher Palmeri, *JPMorgan Chase to Buy Washington Mutual*, BUS. WK., Sept. 26, 2008.

89. See Rajan, Seru & Vig, *supra* note 26.

90. Professor Schwarcz has described this as the “originate-to-distribute” model of lending. Steven L. Schwarcz, *Regulating Complexity in Financial Markets*, 87 WASH. U. L. REV. (forthcoming), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1240863 (SSRN manuscript at 9).

closing and often managed, on an incentive basis, pools of capital that invested in subordinated and equity tranches of the securitization. For the pool sponsors, the issue that came to dominate the process was conformity with criteria established through the rating process for securitizations. Through their experience in negotiating ratings with the agencies, securitization sponsors developed knowledge about what mattered to the agencies in rating their pools and geared their lending criteria accordingly. So long as markets were willing to purchase securities based on agency ratings, sponsors were motivated to push as many deals as possible through the pipeline. Again, on balance, it was in the pool sponsor's interest to understate the riskiness of the underlying assets in the pool. The less perceived risk, the easier it was to obtain the required rating.

The dialogue between pool sponsors and the rating agencies regarding the methods and assumptions to be used to model portfolio risk centered on various statistical models of pool performance and the various assumptions that underlay these models. It was an iterative process, with each new pool and securitization structure offering a new opportunity to explore the boundaries of the agencies' tolerance. No match for the vast resources of Wall Street, the agencies were highly reliant on the sponsors for factual and modeling support. The rating agencies' staffs were thinner, less well paid and overworked. They also relied on the fees paid by the industry they policed for their livelihood.⁹¹

C. The Allure of Risk Taking and Understating Risk

Investors understood that rating agencies might not vigorously monitor the industry that was the primary source of their revenue, and were initially cautious. But two mutually reinforcing forces came to stoke demand for mortgage-related assets. First, a low interest rate environment supported growing demand for houses that in turn supported growing real estate prices. An environment of rising prices masked concerns about credit risk. Low rates also renewed interest in the venerable carry trade, thus increasing demand for higher-yielding assets that could be paired with low-cost sources of capital. For many financial institutions, including both traditional savings associations and high-flying hedge funds, the pairing of high-yielding mortgage-related assets with low-cost Federal Reserve funds was an irresistible road to growth. Second, as concern about credit risk waned, the opportunity to earn fees by insuring credit default became tantalizing. Asset managers were earning

91. These concerns over the effectiveness of rating agencies as monitors were well known, having been detailed almost a decade ago by Professor Frank Partnoy. See Partnoy, *supra* note 71.

huge performance fees from the positive carry they could earn from investing in such reliable assets as real estate debt.

In the case of AIG, this spread would appear almost irresistible. For “no cost,” the credit default swap traders were able to earn enormous premiums by issuing insurance for what appeared to be low-risk securities. Of course, the cost was the risk they were taking by putting up their company’s balance sheet as collateral for their trades. But so long as they were able to price that risk based on the default models used by pool sponsors and the credit rating agencies, this low hanging fruit appeared virtually free while generating huge bonuses for the individuals involved.⁹²

Underlying all of this was an enormous faith in the market’s ability to analyze and measure risk. In each case, this faith was held by a person who had much to gain by taking credit risk and by erring on the side of understating the risks taken. In each case, the asset manager, the mortgage pool sponsor (or his delegate at WaMu), the trader at Bear or Lehman, or the credit default swap group at AIG was betting someone else’s money in exchange for a cut of the upside. The size of that bet (and therefore its value to the manager) was allowed to grow as the measure of its riskiness shrank. Across the board, among all of the significant players in the market, there was a common moral hazard. And in this case, that hazard all pointed in one direction—to ignore the mounting credit risk in mortgage-related assets. In this sense, the moral hazard was systemic.

IV. PREDICTIVE PREVENTION

If systemic moral hazard is endemic to the asset manager relationship, and the asset manager relationship is the primary building block of our modern financial system, and the root cause of the Financial Crisis is systemic moral hazard, how do we keep ourselves safe from financial turmoil? In the end, I am not certain we can, and I am almost certain that trying too hard could be worse.⁹³ Nevertheless we will surely try by expanding the regulation of our financial markets. In constructing this regulation, it will be difficult to accept any assertion by the financial industry that self-regulation is an adequate response. As the model of risk-manager decisionmaking described below reveals, there is good reason to conclude it is not. But the model also suggests that part of the

92. See Morgenson, *supra* note 68.

93. As Justice Breyer admonishes, “modesty is desirable in one’s approach to regulation.” BREYER, *supra* note 10, at 184 (discussing pitfalls of overzealous regulation).

answer may lie in taking the increasing efforts by the financial services industry to forestall governmental regulation and co-opting them for the public good.⁹⁴

A. Risk Management and Compliance as Tools for Predictive Prevention

By attempting to elevate the role of risk management and compliance within individual firms, the industry was hoping to avoid the kind of fiasco that led to the Financial Crisis. It was also hoping to preempt greater government regulation of its businesses.⁹⁵ Fiascos cost money and bring regulation, both things private market leaders want to avoid. Predictive prevention is the approach that risk management and compliance seeks to achieve. However, this approach suffers from an inherent disability: The more successful one is at achieving predictive prevention, the less we will value it. Therein lies the challenge in designing effective regulation.

So how does risk management and compliance work? I cannot begin to fully cover the subjects. There is vast literature both on the theoretical and practical levels.⁹⁶ These concepts can be found in areas as far afield as political risks like terrorism,⁹⁷ to pricing hurricane insurance,⁹⁸ to evaluating the risk of running with the bulls in Pamplona.⁹⁹ But two concepts that appear in the finance literature are central to our discussion: value at risk and scenario analysis.

94. See, e.g., INST. OF INT'L FIN., FINAL REPORT OF THE IIF COMMITTEE ON MARKET BEST PRACTICES: PRINCIPLES OF CONDUCT AND BEST PRACTICE RECOMMENDATIONS (2008), available at <http://www.iif.com/regulatory> (scroll down to "Global Finance Leaders Release Comprehensive Proposals to Strengthen the Financial Industry and Financial Markets;" then click "IIF Final Report of the Committee on Market Best Practices" hyperlink under "Related Documents"). The IIF is a trade association of leading financial institutions worldwide.

95. See A. Cain, *Banking Organization Proposes Stronger Risk Focus*, INTERNAL AUDITOR, June 2008, at 16 ("[B]anks focus on self-regulation to avoid tighter government regulation."). For a more formal discussion of self-regulation as a strategy to preempt governmental action, see John W. Maxwell, Thomas P. Lyon & Steven C. Hackett, *Self-Regulation and Social Welfare: The Political Economy of Corporate Environmentalism*, 43 J.L. & ECON. 583 (2000).

96. See, e.g., MICHEL CROUHY, DAN GALAI & ROBERT MARK, THE ESSENTIALS OF RISK MANAGEMENT (2006). The IIF Report, INST. OF INT'L FIN., *supra* note 94, provides a description of what a comprehensive program of risk management looks like.

97. See, e.g., 2 INTERNATIONAL POLITICAL RISK MANAGEMENT: THE BRAVE NEW WORLD (Theodore H. Moran ed., 2004).

98. See, e.g., Fouad Bendimerad & Stephen Hom, *Catastrophe Modeling*, RISK MGMT., May 1999, at 26; Ming Li & Imelda Y. Powers, *The Role of Catastrophe Modeling in Insurance Rating*, RISK MGMT., Oct. 2007, at 40.

99. Fermín Mallor, Carmen García-Olaverri, Sagrario Gómez-Elvira & Pedro Mateo-Collazas, *Expert Judgment-Based Risk Assessment Using Statistical Scenario Analysis: A Case Study—Running the Bulls in Pamplona (Spain)*, 28 RISK ANALYSIS 1003 (2008).

1. Value at Risk

Value at Risk (VAR) is a statistical measure of the downside potential of a given asset or pool of assets.¹⁰⁰ It attempts to answer the question: What is the worst-case scenario? It does this by determining at given confidence levels the lowest possible value of an asset or portfolio at some specified future time. Assume we have a portfolio X with a stating value of \$1 million. We might say that the 1-day VAR of X is \$100,000 at the 95 percent confidence level. This statistic attempts to give us the worst-case scenario for our portfolio over the next day. It says with 95 percent confidence that the worst case is that X will fall to \$900,000 in value.

When we think back to the story of mortgage-related securities, we can see how VAR might be a useful tool. Remember, the basic dynamic that underlies the current turmoil is a failure to anticipate a worst-case scenario for asset values. Through various securitization structures, the market erected a pyramid of highly leveraged investments supported by the equity cushions created through pooling. As noted above, a pool of assets is more valuable than the sum of its parts because of the power of diversification. This value in turn supported higher leverage ratios. As assets were pooled and repooled again, either directly or through derivatives that in turn were pooled as well, leverage became viral. Had someone calculated the VAR taking into account what we now know was a massive assumption of correlated risk by a series of interdependent institutions, it would likely have given us pause. It would have told us that under some scenarios, we collectively would lose as much as a trillion dollars of value, as we have.¹⁰¹ It would have also told the leaders of Bear, Lehman, AIG, and WaMu that they each had a good chance of getting wiped out. So why didn't it?

The calculation of VAR depends on the probability distribution you create for an uncertain future. For relatively simple predictions, like the price of Microsoft stock at the close tomorrow, one can rely on history to define the parameters of a normal distribution and use that picture of potential outcomes as the basis for prediction.¹⁰² So, we can feel fairly confident if we say the 95 percent 1-day VAR is \$3. That's because in only 5 percent of the

100. For a general discussion of value at risk (VAR), see Darrell Duffie & Jun Pan, *An Overview of Value at Risk*, J. DERIVATIVES, Spring 1997, at 7, and CROUHY, GALAI & MARK, *supra* note 96, at 149–79.

101. *Mortgage Losses: Move Over, Subprime*, ECONOMIST, Feb. 5, 2009, available at http://www.economist.com/businessfinance/displaystory.cfm?story_id=13062194.

102. For a discussion of the challenges in constructing a unified measure of VAR for a portfolio of assets across time and for multiple risk factors, see Duffie & Pan, *supra* note 100.

cases we model based on the historical performance of Microsoft stock over the course of one day would the loss be greater than \$3. Given how 95 percent of the cases work out better, we might comfortably take steps today, such as lend \$30 overnight against a share of Microsoft as collateral, if that share traded today at \$33 based on this calculation of VAR.

When we move, however, beyond simple assets (and even more so if we move to entire markets), predictions of the distribution of possible outcomes become less reliable.¹⁰³ Here we need to rely on more sophisticated modeling tools that call on greater judgment to yield useful results. As we move to these more elaborate modeling tools, we must become less confident in our predictions overall. We also have to accept that confidence levels become even less worthy of instilling confidence in the value of VAR as a measure of worst-case scenarios.¹⁰⁴

2. Scenario Analysis

In the meantime, scenario analysis attempts to fill some of the void caused by VAR's unreliability in more sophisticated scenarios.¹⁰⁵ A more qualitative version of the calculation embedded in VAR, scenario analysis attempts to answer the same questions: What are the potential outcomes we face, and what are the probabilities of each occurring? Risk managers are charged with identifying potential downside scenarios, evaluating their probability, analyzing their cause, and establishing programs for their containment. Ranging from testing backup communications systems to highly sophisticated computer modeling of portfolio performance, risk managers are in the business of thinking up worst-case scenarios and then stress-testing their businesses under various disaster conditions to prepare for these scenarios. Risk managers also identify systemic weaknesses, like moral hazard, and design and implement policies (such as personal trading rules to eliminate the incentive to front run client trading, for example) to ameliorate them.¹⁰⁶ They

103. See, e.g., Jón Danielsson, *The Emperor Has No Clothes: Limits to Risk Modeling*, 26 J. BANKING & FIN. 1273 (2002) (arguing that risk modeling assumptions are especially suspect during times of crisis).

104. First, VAR itself was never intended to capture the range of risk that could impact entire firms or markets. See Duffie & Pan, *supra* note 100, at 9 (“[VAR] captures only one aspect of market risk, and is too narrowly defined to be used on its own as a sufficient measure of capital adequacy.”). Second, VAR relies on an underlying assumption regarding the distribution of potential outcomes. These assumptions tend to undervalue the impact of outlier, or “fat tail,” distributions, often leading to optimistic assessments. See NASSIM NICHOLAS TALEB, *THE BLACK SWAN* (2007).

105. For a general discussion of scenario analysis, see CROUHY, GALAI & MARK, *supra* note 96, at 173–79.

106. See *id.* at 325–45 (describing approaches to managing “operational risk”).

then set up systems to ensure compliance with these policies. In other words, they attempt to predict harm and prevent it where possible. This is what I describe as predictive prevention.

B. The Challenge in Obtaining Optimal Predictive Prevention

Predictive prevention is the action of systematically analyzing potential downside scenarios, identifying potential causes, and establishing policies to prevent their occurrence. I distinguish predictive prevention from predictive preparation. The latter is the analysis of potential downside scenarios for which the best one can do is to prepare because no action can prevent them. When a risk manager takes steps to deal with a natural disaster or the sudden death of an executive, he is engaged in predictive preparation. When, on the other hand, he attempts to avoid trading losses by monitoring the trading activity of a rogue trader, he is attempting to prevent the harm he anticipated. As we shall see below, this distinction is important.

Presumably, many people at Bear, Lehman, AIG, and WaMu were doing scenario analysis. All of these entities had risk management functions. So why did they all fail? Is it because, like the difficulty of calculating VAR, they had too little information and inadequate tools to allow them to evaluate the risks they faced? Could we have prevented their demise if we had simply required greater transparency in the market? Would disclosure and better modeling have enabled them to better foresee the degree of correlated risk they were building up amongst themselves until the house of cards came tumbling down?

It is very tempting to say yes. If we do, then our regulatory focus can be on disclosure and can assume that if we gave market participants better market-wide information, they would do a better job policing the risks they take. After all, even if we could design an accurate statistical model for VAR, the people most capable of applying it would be the risk managers who sit across the desk from the traders, as opposed to government bureaucrats. In a world where there is no simple model for analyzing systemic risk, there is all the more reason to doubt the ability of a government bureaucracy to identify and understand market risk in a way that will prevent market failure. These arguments, I'm certain, will be how the industry will seek to deflect the public's calls for greater regulation. Predictive prevention requires the kind of in-depth understanding and close involvement that only in-house risk managers and compliance officers can provide. Their failure in the past stems

primarily from a lack of market information. Yes, government should help fix that, but not more. Or so they will argue.¹⁰⁷

This argument ignores one very important aspect of predictive prevention. What they miss is the fact that without government involvement, the market will always underinvest in predictive prevention. The reason for this is the perverse fact that predictive prevention appears less valuable the more effective it is.

1. An Illustration of the Conundrum of Predictive Prevention

Consider the following scenario. A risk manager has identified a portfolio position worth \$20 million today with a 1-day VAR at an 80 percent confidence level of \$2 million and a 90 percent confidence level of \$10 million. Against this position there is an obligation due in one day of \$18 million. In other words, he sees a trade that in 80 percent of the cases produced by his model is a wash or better. But in 10 percent of the cases, the trade will require \$8 million or more of funding. Let's assume this level of funding would be unacceptable to the firm. Let's also assume that the trader's best estimate is that the position will grow in value to \$25 million. What is the risk manager's choice?

He can flag the position and force its liquidation today at \$20 million or ignore it and see what happens. In nine out of ten cases, nothing adverse will happen. In one out of ten, disaster will occur. If he flags the position and the likely result occurs, the risk manager will in hindsight have cost the firm whatever upside does in fact arise. Only if the unlikely disaster does in fact materialize does his decision have value in hindsight.

But this scenario only partially illustrates the problem. Here at least we can measure part of the value of prevention—the value of a good flag, a correct

107. See, e.g., Josef Ackermann, Op-Ed., *How the Banks Can Win Back Confidence*, FIN. TIMES, July 31, 2008, at 9 (“[M]anaging complex financial institutions requires raising the bar on risk management, underwriting and disclosure if companies are to prosper in the very competitive global marketplace.”) (advocating self-regulation based upon an industry group’s statement of market best practices); L. Gordon Crovitz, *Information Age: Seeking Rational Exuberance*, WALL ST. J., Oct. 6, 2008, at A17 (“The credit crisis is a crisis of information—or rather the lack of information . . . Adequate disclosure would have made clear the payment and investment flows through each level of securities and where the risks lie, including when they are swapped to counterparties.”); Aaron Lucchetti, *Moving the Market: More Data on Mortgage Bonds Sought*, WALL ST. J., July 16, 2008, at C3 (“The American Securitization Forum, a trade group representing banks, investors and others in the loan-securitization business, is expected to propose on Wednesday the collection and disclosure of more than 100 types of data for mortgages that are packaged into securities. . . . In recent weeks, ASF representatives have met with the Securities and Exchange Commission, Treasury Department and other regulators, which are supportive of the trade group’s efforts.”).

call. Whether or not the risk manager's warning is heeded, the hindsight value of a correct call will be measurable. We will see what the loss was. In the case of more complicated systemic risk, like moral hazard prevention, that value will not be calculable unless disaster is imminent. And by then, we may be too late. If risks are well prevented, we'll never know how much value was preserved because we will never experience the loss. All we will have to measure is the cost of prevention.

An example more close to home may help explain. Assume your teenage child asks you for permission to attend a party at a friend's home. Now given past experience, you are concerned that the level of parental supervision at this friend's party may be poor and therefore the risk of disaster is high. So you have a choice. You can refuse and put up with the expected consequences, having only the solace of knowing your child is safe at home. In other words, you can choose to take no risk. Or, you can allow him to go and pace until he is safely back for the night. Only if the worst occurs would you know for sure you would have been making an optimal choice by saying no. If he goes and returns safely, you get little verification you weren't just lucky that one night. If you say no, you'll never know what disaster you actually prevented.¹⁰⁸

Of course, you can never know. Therefore it is very difficult to value these decisions, especially in the face of the very measurable costs of saying no. In parenting, this might lead some of us to simply take no risk and refuse permission every time. But in business, this is not an option. We have to take risk. Given the difficulty of valuing a "no" decision in a world where risks are themselves uncertain and variable, the mental calculus does not favor prevention even when the odds are high that harm will come. This is a problem no matter how good our information might be. It is a problem because while we can identify the value of a "no" decision in theory, in the real world "no" decisions will be evaluated routinely only in hindsight. In hindsight, they tend to not look very good unless we are already facing a disaster.

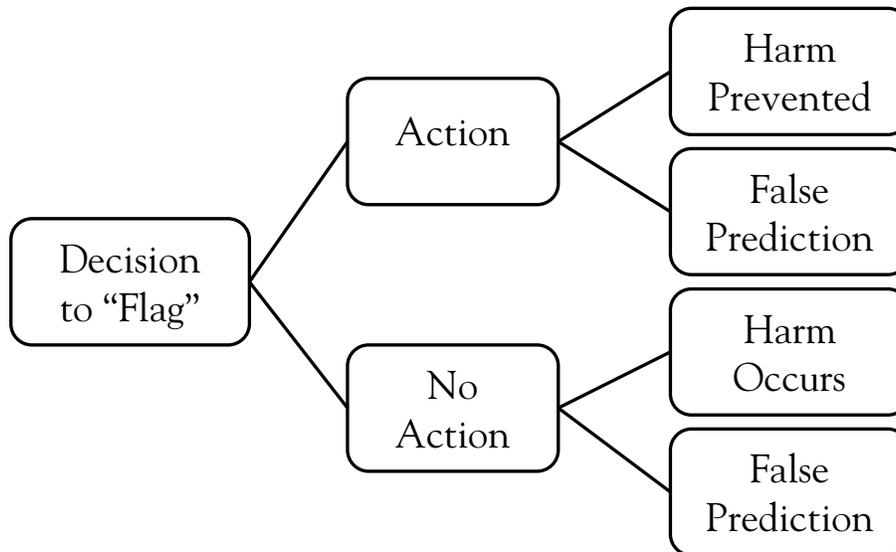
Let's return to our risk manager. Assume he is evaluating a credit default swap to be issued with respect to a debt instrument issued by an SIV that owns a pool of CDOs. The CDOs are in turn secured by a pool of mortgage-related securities, a portion of which have been wrapped with an insurance wrapper issued by an affiliate of his firm. The mortgage-related

108. Of course I'm not talking about the case where your choice saves your child from involvement in some bad event (a drug bust, for example) that occurs anyway. I'm thinking of those cases where but for your child staying home, he would have been the one driving to the liquor store.

securities are all high quality but depend for their value on the prevailing market for the real estate assets they financed. These values are highly correlated with the liquidity of mortgage-related securities that in turn is a function of the vitality of these SIV and CDO structures. Suppose we have given this risk manager the information necessary to realize that if they go forward with the swap, the total exposure of his firm would be significant and even disastrous in the unlikely case that both real estate values suddenly plummet and liquidity for mortgage-related securities dries up overnight. If he stops writing swaps and nothing happens, he will struggle to keep his job, even if his decision proves to be the one that keeps the house of cards from tumbling down. If he doesn't stop and disaster comes, he simply joins the crowd. What would you do?

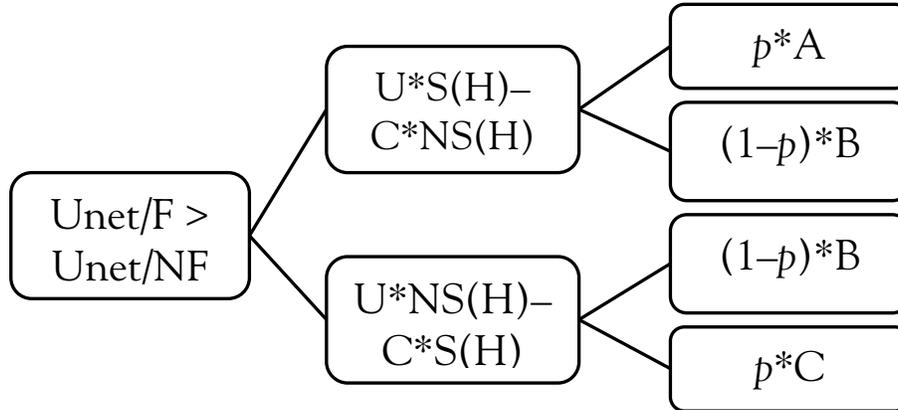
2. A Model of Risk Manager Decisionmaking

If we were to display the risk manager's decision as a decision tree, it might look like this:



We can assign values to the four outcomes as follows, where p is the probability of a preventable harm occurring if no action is taken, A is the value to the decisionmaker of preventing the harm, B is the value of the transaction

affected by the action being evaluated assuming no harm actually occurs, and C is the cost to the decisionmaker of preventable harm occurring:¹⁰⁹



Having defined these terms, we can then express the decision to take action as follows: We would expect a decisionmaker to take action to prevent an expected harm if

$$(p*A) - (1-p)*B > (1-p)*B - (p*C).$$

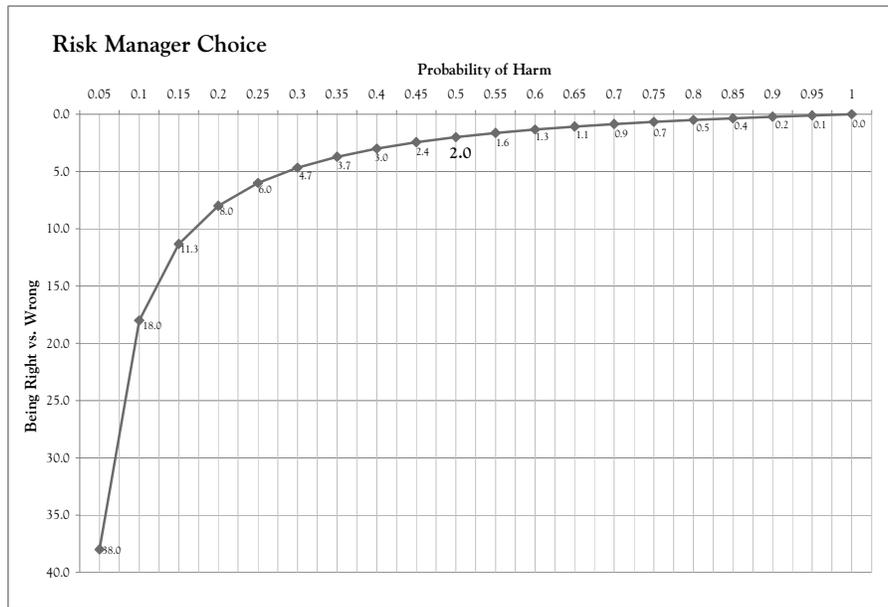
You might object that the B term lumps two different exogenous stakes as one. The impact of the value of the transaction affected will not be the correct measure of the impact on the decisionmaker. For example, only if the decisionmaker participates in the full benefit to the firm of the transaction can we equate the value of the transaction to the value to the decisionmaker. Also, in the case of a typical risk manager, who does not have a direct participation interest, the impact of the value of a lost transaction (for which he is blamed as the deal killer) will exceed any value he might have earned if the deal went through and no harm arose. I agree that it is inappropriate to equate the decisionmaker's stake with the value of the transaction and to equate the two stakes in the two different outcomes, but we shall see below that doing so has little real effect on the analysis. It also allows us to simplify the equation in a useful way.

109. I derive the model and the forms of notation from the model presented in Anthony R. Harris & Gary D. Hill, *Bias in Status Processing Decisions*, in *RATIONALITY AND COLLECTIVE BELIEF* 1, 15-34 (Anthony R. Harris ed., 1986).

The equation can be simplified to:

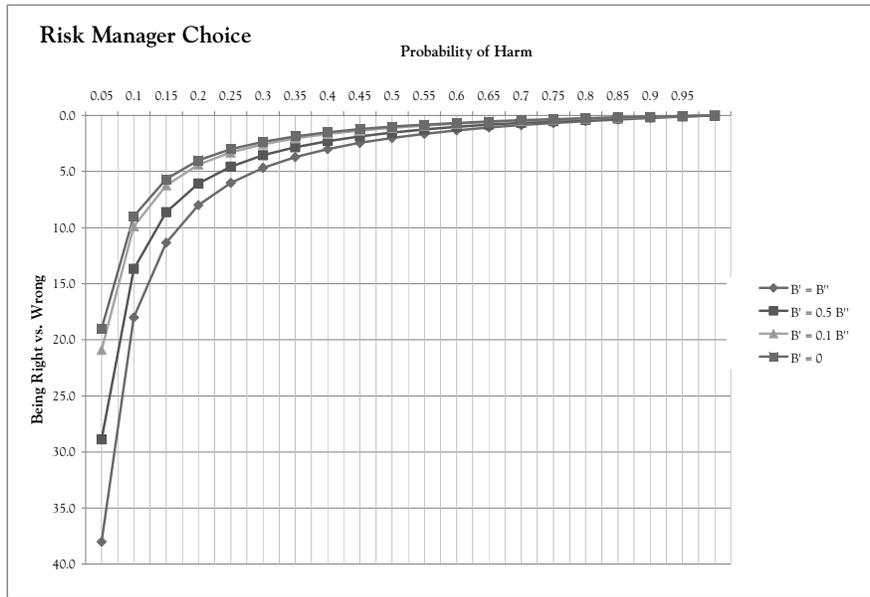
$$p^*(A+C) > 2B^*(1-p).$$

This equation represents the tradeoff a decisionmaker must make in deciding to raise a flag. This equation defines what the relative stakes must be between being right about the preventable harm he predicts and being wrong.



What this chart shows is what the relationship between the term (A + C) and the B term must be for the decisionmaker to decide to raise the flag. We can read the graph to say that at a 50 percent probability of a preventable harm occurring, our decisionmaker will *not* raise the flag unless the value of A (the reward for correctly preventing harm) plus C (the cost he would bear if the harm had occurred) is at least two times B (the cost he would bear for a false prediction). As we might expect, the relationship quickly inverts as the probability of harm grows so that as harm becomes more certain, the tradeoff becomes less demanding.

The ratio of 2.0 (seen most clearly at the 50 percent probability point) is a figment of the earlier choice to equate the two B terms. If we decide to vary them, we see the following:

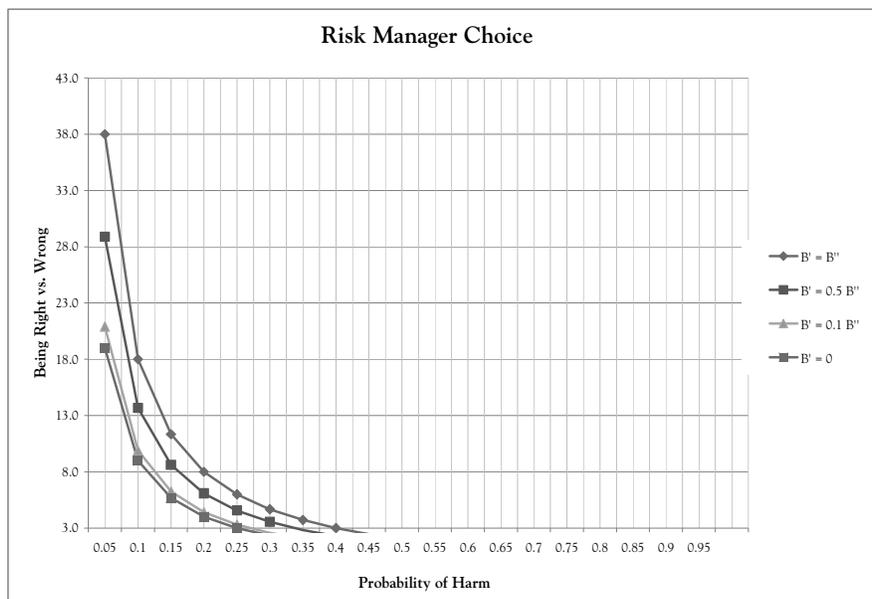


This chart shows how the boundary changes if we assume that the value to the decisionmaker of the affected transaction is separated into two separate types of stakes. B'' is the cost of being blamed for a lost transaction in the event the predicted harm does not occur. B' is the value of the transaction to the decisionmaker assuming he allows it to go forward and no predicted harm occurs. I am assuming these two stakes bear some relationship to each other (having as their common benchmark the absolute value of the transaction). So what we see in the chart is the effect of changing the relative values. So if we assume that the decisionmaker has no upside from allowing the transaction to go forward (such as a compliance officer or risk manager on a fixed salary assuming the transaction itself is not material to his employer), we will use the case where $B' = 0$. As we would expect, in this case the tradeoff between the stakes required before we would expect a flag becomes less demanding as we remove the possibility of a benefit from the transaction under scrutiny. This is precisely why conflict-of-interest rules tend to be particularly strict for risk managers and compliance officers.¹¹⁰ The impact of changing the relationship between the two terms is linear and works both ways. In other words, the more upside we give our decisionmaker,

110. A typical conflict-of-interest rule restricts the ability of a risk manager or compliance officer from having a financial interest in the transactions she is charged with reviewing.

the more demanding the tradeoff calculus would become before we could expect a flag. As the old saying goes, you can't trust the fox to watch the hen house.

As already noted, in all scenarios the tradeoff calculus becomes self-evident as the risk of harm becomes more certain. Even with very skewed incentives, when faced with almost certain harm, a decisionmaker will likely act to prevent it. What is more interesting for our discussion is the other end of the curve, where the probability of harm is low.



What we are asking in this chart is what kind of probability of harm is needed before we can expect our decisionmaker to raise a flag if the stakes of being right are 5 times those of being wrong. As we can see, even if we assume our risk manager has no conflict of interest, or no stake in the transaction, he still needs approximately a 15 percent probability of harm before he will raise a flag. At 3 times, this rises to 25 percent. These are very high levels of risk of harm. Of course, I am using highly oversimplified variables that lump together nuances of all kinds regarding the nature of different risks, the impact of discovery and assessment, the opportunity to ameliorate risk by means other than simply abandoning the transaction, and so on. But the underlying relationships, if not the precise numbers, are descriptive of the risk manager's quandary. So, it is instructive to consider how the stakes of being "right" are likely to relate to those of being "wrong."

This brings us back to the point regarding hindsight valuation of prevented harm. The ratio that defines the level of risk of harm at which we can expect our hypothetical decisionmaker to take preventive action is the ratio of $(A + C)$ to B . We have discussed the B value. What can we predict about A (the reward for correctly preventing harm) and C (the cost the decisionmaker bears if the harm occurs)? And what is their relationship to the cost of a false prediction? I have already said it is my expectation that the value of C is low, A is lower still, and both together are rarely higher than B , let alone 3 or 5 times higher. Consider two examples.

Imagine a simple investment firm that consists of two players. One is the trader and principal. The other is a risk manager and compliance officer. The trader originates each proposed transaction and earns any upside. The risk manager has the ability to prevent a trade if it exceeds certain risk parameters. He does not participate in any upside. Let's assume this is not a "bet the firm" transaction.

Now assume a transaction is proposed and the risk manager predicts a small chance of significant harm, sufficient to merit a flag. What will be the cost to him if he fails to flag the risk and the harm comes to pass, as in, C ? Since the probability of harm was low, it may also be less likely that in hindsight his "miss" will be detected or criticized. The more complicated the scenario analysis involved, the more likely this will be. In order to hold the risk manager accountable for his miss in hindsight, there has to be a well-established analytical framework under which we can judge the failure. In other words, if a simple VAR calculation would have revealed the risk, it is easy to say to the risk manager this was a miss he should not have made. When the predictive tool itself is highly indeterminate and replete with the need for judgment, it becomes difficult to assign blame after the fact. No using 20/20 hindsight. Furthermore, if the nature of the miss reflects a broader, systemic misjudgment (in other words, he simply followed the crowd), it will be even less likely he will bear any cost for the miss.

And if he raises the flag, will he get credit for a good call? Unlikely. First, it is a simple truth that it is hard to get credit for what does not happen. That is not to say that a harm clearly avoided will not be appreciated. But if the outcome had a low probability, it is likely that the causal connection between prediction and prevention will not be clear. This will be all the more true if the scenario analysis is complex. We will not be able to make a direct link between action taken and disaster avoided. Instead we will have to believe that action taken played some role in a complicated chain of events that led to one of many alternative outcomes that prevented the harm anti-

pated. What is certain is that the trader did not get to do the trade he wanted to do and that the harm predicted did not occur. That the two are causally connected will be difficult to establish, and therefore difficult to reward.

How about our trader? Is this disability simply an agency problem arising from the agent's difficulty in establishing the value of his actions? Two factors suggest not. First, the trader himself is an agent of his investors whose money he is managing and suffers from the same agency issues. Second, the trader as the principal has a higher hill to climb since, as discussed above, the stakes of a false prediction are higher for him. If we recognize all firms as simply more complex configurations of our two-player firm, we can see why markets will underinvest in predictive prevention.

V. LESSONS FOR REGULATORY DESIGN

Thus far I have made three assertions. First, the root cause of our current financial crisis is moral hazard. Both firms and the individuals that make them up have an incentive to take excessive risk and to undervalue the risks they are taking. This tendency is endemic to the asset manager relationship that serves as the basic building block of our financial markets. Second, the antidote to this moral hazard is risk management and compliance. In particular, it is the production of predictive prevention that can identify and counter excessive risk taking. Third, predictive prevention suffers from an inherent disability that leads markets to underproduce it. This disability arises from the disparity between the real and measurable costs of opportunities forgone because of risk and the benefit of avoiding possible harms that, once avoided, are never felt and are thus difficult to measure. This leads us to the discussion of regulation. Where markets fail, we ask if government can help.

A. The Inadequacy of Government Oversight

In the *Blueprint for a Modernized Financial Regulatory Structure*,¹¹¹ former Secretary Henry Paulson and his team at the Treasury Department offered what certainly will be an important starting point for any discussion of expanded regulation of the nation's financial markets. The *Blueprint* describes a new and expanded role for the Federal Reserve as the "market stability regulator."¹¹² In that role, the Federal Reserve would be "responsible for overall

111. U.S. DEPT OF THE TREASURY, BLUEPRINT FOR A MODERNIZED FINANCIAL REGULATORY STRUCTURE (2008).

112. *Id.* at 144.

conditions of financial market stability.”¹¹³ It would fulfill this responsibility primarily through the collection of information, allowing it to assess “the risks present in the overall financial system.”¹¹⁴ It would share this information with the market to allow all market participants to “better evaluate their risk profiles.”¹¹⁵ And if necessary, the Federal Reserve would be granted powers to take action to preserve stability.¹¹⁶ The *Blueprint* goes out of its way to say that these new powers will not be used to intrude into the operations of individual firms but rather will focus on systemic risks affecting the market as a whole.¹¹⁷ The upshot is that the *Blueprint* continues to rely largely on the traditional regulatory approach. Once again, we are going to assume that if adequate information is made available to the market, the market will police itself.

The *Blueprint* was published in the spring of 2008,¹¹⁸ before the demise of Lehman, AIG, and WaMu. I’m doubtful that this kind of approach will survive the call for regulatory reform that has followed the recent financial turmoil. There have been and will certainly continue to be calls for a heavier hand on the part of government.¹¹⁹ There will also continue to be calls for imposing blame for this and any future debacles. The desire for these kinds of regulatory responses is understandable. The question, of course, is whether they are wise.

The implications of the model of risk-manager decisionmaking described in Part IV above suggest a few principles any regulation should follow. As is already well understood by industry and government alike, it tells us that we

113. *Id.*

114. *Id.* at 147.

115. *Id.*

116. *Id.*

117. *Id.* (“[T]he Federal Reserve’s financial institution regulation and supervision should not generally focus on the financial health or failure of an individual financial institution, but rather on the overall risk exposure of the entire financial system.”).

118. Press Release, U.S. Dep’t of the Treasury, *supra* note 31.

119. See, e.g., Alistair Darling, *Shocks to the System Show Need for Fresh Answers*, FIN. TIMES, Oct. 10, 2008, at 13 (“Last April finance ministers agreed to implement recommendations on strengthening regulation and we have made good progress on these issues, including disclosure. But the turmoil has underscored the need for further, speedier action, including on reviewing capital requirements, executive compensation structures that encourage irresponsible risk-taking, the finance system’s procyclicality and improving cross-border co-operation.”); Joellen Perry & Alistair MacDonald, *The Financial Crisis: EU Proposes Regulatory Overhaul Amid Bailouts*, WALL ST. J., Sept. 30, 2008, at A7B (“The European Union’s top markets official is preparing an overhaul of banking regulation across the continent, as Europe struggles to deal with its own wave of bank failures.”); Gillian Tett, Paul J. Davies & Aline Van Duyn, *A New Formula? Complex Finance Contemplates a More Fettered Future*, FIN. TIMES, Oct. 1, 2008, at 11 (“Thus Mr. Dinallo is now working with David Paterson, the New York governor, to push for regulation of credit default swaps, contracts that protect against default. The Securities and Exchange Commission has also called for increased regulation of credit derivatives.”).

should be concerned when persons responsible for risk management have personal stakes in the transactions they are reviewing.¹²⁰ We also know that in the case of some of the most important persons we want to address—for example, leaders of financial institutions and hedge fund managers—we also want them to have a stake.¹²¹ As discussed above, the real regulatory challenge is how to solve the quandary of hindsight valuation of a harm prevented.

The *Blueprint's* call for better and coordinated market information is certainly vital. As discussed, one aspect of the quandary is that the difficulty in valuing prevention grows as certainty regarding the causal relationship declines. So, as we noted, if risks were all reducible to a VAR-like statistic, the challenge would be relatively simple. The Federal Reserve would simply make sure the market had the necessary information to run the numbers. If anyone cheated, it would be simple to recreate the miss and assign blame. But because we are dealing with very complicated predictive modeling, two things are likely. First, government is unlikely to be up to the challenge of keeping up with the markets if it was its responsibility to monitor systemic risk on society's behalf.¹²² Second, information alone will not be enough to remove the quandary. We need to change the natural tradeoffs in the decisionmakers' calculus.

In describing the decisionmaking in a two-person firm, I made the simplifying assumption that the trade being evaluated was not a "bet the firm" transaction. In doing so, I tried to avoid the complicated discussion of how the potential for "losing one's seat" may impact the risk manager's calculus. So, one component of the *A* term in our model (the value of preventing harm)

120. See INST. OF INT'L FIN., *supra* note 94, at 49.

121. As I discuss below, see *supra* notes 129–132 and accompanying text, one regulatory change I propose is to increase the stake of key decisionmakers in the transactions that create risk. But my suggestion is to increase *both* their downside and their upside by insisting they put their own money on the table.

122. See, e.g., BREYER, *supra* note 10, at 186 (advocating "less restrictive" regulatory methods when dealing with complex industries: "[t]axes, marketable rights, and similar incentive-based approaches often provide practical methods for reconciling the need for simple regulatory rules with the diversity and complexity of the industrial world"); *id.* at 199 (describing the complex cost structure of the U.S. airline industry that led to a failure of price and entry regulation); *id.* at 266 (describing the complexity and constant change characteristic of costs and technologies subject to environmental regulation, inhibiting the creation of effective environmental standards); Steven M. Davidoff, *Paradigm Shift: Federal Securities Regulation in the New Millennium*, 2 BROOK. J. CORP. FIN. & COM. L. 339, 355 (2008) (describing the regulatory challenges posed by rapid innovation in financial products); Bradley C. Karkkainen, *Information as Environmental Regulation: TRI and Performance Benchmarking, Precursor to a New Paradigm?*, 89 GEO. L.J. 257, 263 (2001) ("Conventional approaches to environmental regulation are nearing a dead end, limited by the capacity of regulators to acquire the information necessary to set regulatory standards and keep pace with rapid changes in knowledge, technology, and environmental conditions."); Steven L. Schwarcz, *Rethinking the Disclosure Paradigm in a World of Complexity*, 2004 U. ILL. L. REV. 1, 6–7 (discussing the inadequacy of U.S. federal securities regulation to cope with the complexity and rapid innovation in derivatives).

should be the value of the compound option that an asset manager holds so long as he “keeps his seat” and is able to restart his ability to earn fees in future time periods. Similarly, the inverse—the cost of losing one’s seat, or the “knockout” risk—needs to be included in the evaluation of the C term (the cost of allowing preventable harm to occur). Put more simply, both the trader and the risk manager will have strong incentives to avoid betting the firm. Normally, we would expect this dynamic to constrain excessive risk taking. It explains why most of the time firms act with prudence and avoid the kind of disaster we have witnessed lately. It also highlights when the danger of excessive risk taking will be greatest—when markets are frothiest and when they are new, and especially when they are both.

The model predicts that firms will underinvest in predictive prevention when the ratio of (A+C) to B (either B’ and/or B”) tilts in favor of the B terms (the value of the transaction that would be halted to avoid harm). Frothy and/or new markets are particularly likely to see this tilting for two reasons. First, in frothy and/or new markets, asset managers experience an abnormal growth in assets under management. The growth is abnormal because it tends to be sudden, large, and unpredictable in its longevity. So, for example, hedge funds grew from total assets under management of \$600–650 billion in 2003¹²³ to a peak of \$1.9 trillion in 2008.¹²⁴ As assets under management grow, under the kind of performance-based compensation structure that permeates the asset manager relationship, the value of B’ (the potential payoff if nothing happens) becomes overwhelming. As described above, the more value you have under an option, the more valuable the option becomes. Second, the value of the option in future periods (reflected in the A and C terms) is diminished because it is difficult to rely on the annuity value of future revenue streams in a new market or to assume that activity will be sustained at what appear to be bubble levels. Therefore, there is less incentive for the asset manager to protect principal underlying the option and more incentive to take risks with the assets. At the same time, the cost (reflected in the B” term) of not participating in any short-term gains is particularly high. It is very tough to be a contrarian in a rising market, especially in a business that pays for short-term performance.

In addition, I have ignored the potential impact of the p term on tilting the balance. To the extent that market players systemically undervalue the

123. IMPLICATIONS OF THE GROWTH OF HEDGE FUNDS: STAFF REPORT TO THE U.S. SECURITIES AND EXCHANGE COMMISSION vii (2003).

124. Walter Hamilton, *Investors Pull \$152 Billion Out of Hedge Funds in Fourth Quarter*, L.A. TIMES, Jan. 22, 2009, at C5 (noting that the industry assets had fallen by \$0.5 trillion since its peak).

probability of risk,¹²⁵ this would also suggest that firms will underinvest in predictive prevention. I suspect that the tendency to misprice risk will be greatest in frothy and/or new market environments.

So, how can regulation address this potential imbalance? We have two choices. We can increase the cost of not preventing a predicted harm (C) or we can increase the reward for preventing it (A). Given what we have said about the difficulty of valuing prevented harms, it might appear that increasing the costs (C) may be a more fruitful avenue. This might lead us to create legal penalties for firms and individuals who take risks that lead to harm. The challenge is the need to balance prevention with a desire to not stifle socially beneficial risk taking. For example, would it have been a good idea to impose legal sanctions on Bear, Lehman, AIG, and WaMu? The firms themselves have suffered the ultimate sanction.¹²⁶ Unless we want to pierce the sacrosanct veil of limited liability, their owners have also paid a hefty price.¹²⁷ So what is left is what we are seeing many advocate: some sanctions against the

125. See, e.g., HERSH SHEFRIN, BEYOND GREED AND FEAR: UNDERSTANDING BEHAVIORAL FINANCE AND THE PSYCHOLOGY OF INVESTING 257 (2000) (describing the tendency toward optimism in evaluating future outcomes).

126. On March 15, 2008, Bear agreed to be acquired by JPMorgan Chase for a deeply discounted price. Robin Sidel, Dennis K. Berman & Kate Kelly, *J.P. Morgan Buys Bear in Fire Sale, as Fed Widens Credit to Avert Crisis*, WALL ST. J., Mar. 17, 2008, at A1. Lehman filed for bankruptcy protection on September 15, 2008, and subsequently sold most of its operations to various financial firms. Michael J. de la Merced, *Lehman Is Selling Its Money Management Business to Two Equity Firms*, N.Y. TIMES, Sept. 30, 2008, at C9; Andrew Ross Sorkin, *Bids to Halt Financial Crisis Reshape Landscape of Wall St.*, N.Y. TIMES, Sept. 15, 2008, at A1. On September 15, 2008, AIG agreed to accept an \$85 billion loan from the U.S. government, in exchange for the right to an ownership stake of more than 70 percent. Monica Langley, Deborah Solomon & Matthew Karnitschnig, *Bad Bets and Cash Crunch Pushed Ailing AIG to Brink*, WALL ST. J., Sept. 18, 2008, at A1. On September 25, 2008, federal bank regulators seized Washington Mutual and sold its bank operations to JPMorgan Chase for \$1.9 billion. Robin Sidel, David Enrich & Dan Fitzpatrick, *WaMu Is Seized, Sold Off to J.P. Morgan, In Largest Failure in U.S. Banking History*, WALL ST. J., Sept. 26, 2008, at A1.

127. Whereas Bear's stock price peaked at \$171.00 per share, JPMorgan Chase ultimately agreed to pay \$10.00 per share for the firm. Landon Thomas Jr., *At Bear, an Apology Is Met With Silence*, N.Y. TIMES, May 30, 2008, at C6; Landon Thomas Jr., *Run on Big Wall St. Bank Spurs U.S.-Backed Rescue*, N.Y. TIMES, Mar. 15, 2008, at A1. Lehman's stock lost 95 percent of its value prior to the firm's bankruptcy filing. Alex Berenson, *A Financial Drama With No Final Act in Sight*, N.Y. TIMES, Sept. 14, 2008, at WK1. From January through September 2008, AIG's share price declined by more than 90 percent, and shareholders faced further losses from dilution due to the partial nationalization of the firm and decline in asset value due to the sale of the firm's assets to repay the federal loan. Mary Williams Walsh, *At A.I.G., Maneuvers to Salvage Some Value*, N.Y. TIMES, Sept. 23, 2008, at C10. From April 2007 through September 19, 2008, Washington Mutual's stock price fell precipitously. Eric Dash, *Bank Is in Line for a \$5 Billion Infusion*, N.Y. TIMES, Apr. 8, 2008, at C2; Ben White, *The Winners, Maybe*, N.Y. TIMES, Sept. 20, 2008, at C1.

management of these firms. The argument against this kind of *ex post* sanctioning is well known.¹²⁸ I will not repeat it.

B. A Proposed Approach to Regulation

Prospectively, I would suggest a different approach. First, increase the cost (C), not by imposing legal sanctions, but rather by imposing minimum investment requirements. Second, stipulate legal sanctions against the primary decisionmakers, but do so while setting out a very clear standard for exculpation. The standard should be the exercise of the “best practices” of predictive prevention. In this way, we will increase the likely incidence of prevented harm by increasing within the firm its likely reward (A).

1. Requiring Asset Managers to Invest Their Own Money

One maxim followed by many investors in entering into an asset manager relationship is to require the manager to “eat his own cooking.” In other words, it is common for investors in hedge funds or private equity partnerships to insist that the managers themselves place a meaningful percentage of their own net worth at risk alongside the investors’ money.¹²⁹ The logic is simple. If the manager suffers the same downside as the investor, he will bring a greater level of care and risk management to his decisionmaking. In terms of our model, we can see why. By putting more “skin in the game,” a manager who places his own money at risk increases the value of C, the cost of incurring preventable harm. This increased cost serves to offset the tendency to take excessive risk by counterbalancing moral hazard.

Investors in private investment partnerships know they should not carry this logic too far. Indeed, in better times, one of the complaints levied against more successful hedge funds has at times been that the manager “loses his edge” because his taste for risk declines as the amount of his own assets at

128. See, e.g., Jennifer Arlen, *The Potentially Perverse Effects of Corporate Criminal Liability*, 23 J. LEGAL STUD. 833, 836–37 (1994) (noting that strict liability may lead firms to avoid internal efforts to detect wrongdoing if the cost of liability exceeds the expected preventive value of increasing the risk of detection through better monitoring); see also Jennifer Arlen & Reinier Kraakman, *Controlling Corporate Misconduct: An Analysis of Corporate Liability Regimes*, 72 N.Y.U. L. REV. 687, 754 (1997) (contending that “the purpose of corporate sanctions is not to punish wrongdoers but rather to induce firms to detect, report, and punish wrongdoers”).

129. A notable example is Warren Buffett’s \$5 billion investment in Goldman Sachs Group, Inc. As part of his investment, Mr. Buffett required the senior managers of Goldman to agree to maintain very sizable personal investments in the firm for several years unless Buffett’s investment was first paid off. Yogita Patel, *Buffett Insists Goldman Executives Are Also Owners*, WALL ST. J., Oct. 8, 2008, at C3.

risk grows with his fund's success.¹³⁰ So it is a balancing act. If by regulation we are going to insist on skin in the game by private actors, we need to think seriously about how and if we can strike that balance between offsetting moral hazard and discouraging optimal risk taking.

Also, I leave for another day the very complicated questions of how to design "skin in the game" for every context. A person with significant net worth will be different from a decisionmaker whose primary source of wealth is his salary. It may in some contexts be more effective to use nonfinancial "skin" (such as social approbation¹³¹). The design of appropriate incentive schemes requires a much more nuanced discussion than I can provide here. Suffice it to say that one aspect of the story of moral hazard is the incentives that come from giving asset managers an "upside only" perspective.

Perhaps the answer here lies in allowing the market to decide and simply facilitating the analysis through government-mandated disclosure. Perhaps it is sufficient to simply provide the means for the market to evaluate the amount of personal investment each decisionmaker has at stake, by requiring designated persons like the key decisionmakers at banks, hedge funds, and other financial institutions to publicly file a financial disclosure statement that reveals their stakes in their risk-taking decisions and how they may profit from them. I am not ready to make a proposal one way or the other. I am intrigued, however, by the notion that one way to correct the imbalance in our financial market's risk-taking decisionmaking is to increase the cost of preventable harm to those who allow it to occur. While legal sanctions may be one answer, they tend to be blunt and haphazard in their effect. The alternative, of asking private actors to "put their money where their mouths are" or at least tell us if they have or have not so we may take that information into account, is appealing.¹³²

I contrast the possibility for disclosure as the regulatory means to achieving my strategy of increasing skin the game with a much more commonly suggested

130. See Black, *supra* note 50, at 185 (noting that managers tend to reduce risk taking to preserve assets under management and fees already earned); Goetzmann, Ingersoll & Ross, *supra* note 83, at 1716 ("returns [to hedge fund managers] are diminishing in scale"). Another dynamic is that as assets grow, the annuity value of the fixed portion of the typical "2 and 20" management fee becomes increasingly valuable, incentivizing the manager to seek to simply grow and preserve assets under management rather than seek outsized returns.

131. I think it is interesting how the "stigma" of bankruptcy has changed in recent times for the managers of the defunct companies. The loss of social approbation associated with bankruptcy may have lessened one of the countervailing costs that previously constrained the incentive to take excessive risk.

132. Any objection that this intrudes into personal affairs, while true, may now seem petty. We have seen that their "private" decisions do indeed have a very public impact. We routinely ask our public servants to disclose their financial interests. Is it absurd to think that we might ask the same of those who might spend \$700 billion of the public purse by their actions?

regulatory response. There has been much talk about capital adequacy requirements as a means for protecting financial markets. The Basel II standards that were implemented around the world before the Financial Crisis were meant to address the kind of systemic risk we've witnessed during the recent debacle.¹³³ By requiring that financial institutions themselves maintain a specified equity cushion in their activities, the standards are similar to the "skin in the game" notion. They require that the firms themselves have assets on the table that in theory operate both as security for any losses and as a stake that countervails the optionality that comes with greater and greater leverage. The difference between Basel II requirements and my notion of "skin" is whose balance sheet is at stake.

A version of the longstanding discussion of the agency problem, I question what effect minimum capital requirements at the firm level will have on the risk-taking decisionmaking of the firm's managers (other than by simply increasing their costs). More importantly, the structure of regulations of this kind suffers from the same challenge that underlies the problem they seek to address. In the end, someone has to calculate VAR or some similar statistical measure of the exposure being evaluated. The same calculations that allowed credit rating agencies and AIG to ignore the risks that came to bear underlie the calculation of capital under Basel II or the like. In the end, we are left with the same problem. Who do we trust to make those calculations and under what conditions are we comfortable that they are being made prudently? And perhaps more importantly, when do we believe that the math chosen was the best available?

2. Requiring Best Practices to Foster Predictive Prevention

A common answer is not to trust but rather to force decisionmakers to be prudent *ex ante* by imposing *ex post* liability. There is a vast literature on the use of legal sanctions to promote socially beneficial actions by corporate actors.¹³⁴ A common and understandable reaction to widespread harm is

133. See BASEL COMM. ON BANKING SUPERVISION, BANK FOR INT'L SETTLEMENTS, INTERNATIONAL CONVERGENCE OF CAPITAL MEASUREMENT AND CAPITAL STANDARDS 2-5 (2006).

134. See, e.g., Jennifer Arlen & Reinier Kraakman, *supra* note 128, at 754 (contending that "the purpose of corporate sanctions is not to punish wrongdoers but rather to induce firms to detect, report, and punish wrongdoers"); Daniel R. Fischel & Alan O. Sykes, *Corporate Crime*, 25 J. LEGAL STUD. 319, 321 (1996); Reinier H. Kraakman, *Corporate Liability Strategies and the Costs of Legal Controls*, 93 YALE L.J. 857, 866-67 (1984) (asserting that imposition of *ex post* liability on individual managers is generally inefficient); Jonathan R. Macey, *Agency Theory and the Criminal Liability of Organizations*, 71 B.U. L. REV. 315, 340 (1991) ("Increased organizational penalties may induce corporate managers to be excessively risk-averse. What ensues is a stifling of innovation and an increase in costly internal control systems-costs borne ultimately by consumers.").

“someone has to pay.” It comes as no surprise that in the aftermath of the recent financial meltdown, which has inflicted pain throughout society, one part of the government’s response is to look for individuals to hold culpable.¹³⁵ A seemingly logical corollary of that effort is a call for stricter legal rules with greater legal sanctions to deter the next round of bad decisions. The logic goes: if the next CEO of the next Lehman faced some legal sanctions such as criminal penalties, he would be less likely to permit the kinds of excessive risk taking that led to our current travails.

Of course, the prevailing response to this logic (beyond any issues of fairness and moral culpability) is the fear of unintended consequences. What becomes of the American economy when the cost of risk taking includes the potential for personal legal liability?¹³⁶ A common regulatory strategy for striking a balance between personal legal liability and excessive risk aversion is to define clear standards for exculpation.¹³⁷ In other words, define a legal

135. See, e.g., Kara Scannell & John R. Emshwiller, *Countrywide Chiefs Charged With Fraud*, WALL ST. J., June 5, 2009, at C1.

136. This debate has played most famously in the development of the business judgment rule and the duty of care imposed on corporate directors. See Stephen M. Bainbridge, *The Business Judgment Rule as Abstention Doctrine*, 57 VAND. L. REV. 83 (2004). It has also been the center of the debate over the certification provisions of Sarbanes-Oxley. These provisions impose personal liability on the members of senior management of a public company for certain errors or omissions in the company’s financial disclosure. Sarbanes-Oxley Act of 2002 § 302, 15 U.S.C. § 7241 (2006) (imposing personal civil liability on an issuer’s chief executive officer and chief financial officer for falsely certifying as to the accuracy of periodic financial statements or the adequacy of internal financial controls); HAROLD S. BLOOMENTHAL, *SARBANES-OXLEY ACT IN PERSPECTIVE* §§ 2:3, 2:6 (2008–2009). For a general discussion and critique of these and other provisions of the Sarbanes-Oxley Act of 2002, see HARRY N. BUTLER & LARRY E. RIBSTEIN, *THE SARBANES-OXLEY DEBACLE: WHAT WE’VE LEARNED; HOW TO FIX IT* 92 (2006) (“These sanctions [i.e., the SOX criminal penalties for officers] make the corporate suite a very dangerous place even for law abiding executives. They may react by avoiding public firms that are subject to SOX, or engaging in conduct that is far more conservative than diversified shareholders would prefer—including excessive attention to internal controls disclosures.”).

137. Cass R. Sunstein, *Problems With Rules*, 83 CAL. L. REV. 953, 976 (1995) (“In modern regulation, a pervasive problem is that members of regulated classes face ambiguous and conflicting guidelines, so that they do not know how to plan. For people who are subject to public force, it becomes especially important to know what the law is before the actual case arises. Indeed, it may be more important to know what the law is than to have a law of any particular kind. Consider, for instance, the *Miranda* rules. A special virtue of those rules is that they tell the police specifically what must be done, eliminating the guessing games that can be so destructive to ex ante planning. So, too, in the environmental area, where prospectively clear rules, even if strict, are often far better than the ‘reasonableness’ inquiry characteristic of the common law.”). This strategy has been used often in regulating the financial markets. See Lawrence A. Cunningham, *A Prescription to Retire the Rhetoric of “Principles-Based Systems” in Corporate Law, Securities Regulation, and Accounting*, 60 VAND. L. REV. 1411, 1447 & n.136 (2007) (“SEC regulations provide safe harbors, all of which contain precisely delineated boundaries . . .” (citing numerous examples)); Donna M. Nagy, *Judicial Reliance on Regulatory Interpretations in SEC No-Action Letters: Current Problems and a Proposed Framework*, 83 CORNELL L. REV. 921, 930 (1998) (“The SEC often uses its general rulemaking

standard for imposing personal liability but at the same time provide a very clear and demonstrable means for avoiding legal sanction. In securities law, the classic example of this strategy is the due diligence defense under section 11 of the Securities Act of 1933.¹³⁸

A similar approach might be used by the new market stability regulator. Rather than rely solely on disclosure and its own monitoring and risk-assessment capabilities, the regulator can use this strategy to co-opt¹³⁹ and empower the legion of risk managers who now sit across the desk (or at least down the hall) from the decisionmakers. The regulator can adopt legal rules that impose significant legal sanctions on firm leaders in the event of certain firm failures (like those of Bear, Lehman, AIG, and WaMu), provided that the firm leader cannot establish that his firm followed “best practices” in predictive prevention.

By adopting such a rule, the regulator will be addressing the quandary of preventable harm. While it will remain difficult to judge in hindsight the value of harms prevented, this new rule will redefine the A term in our model by adding to it the value of avoiding legal sanction through the adoption of preventive best practices. In other words, if it is difficult to see the original value of prevention, we will define its value exogenously by adding a new

powers to define statutory terms or to create ‘safe harbors’ that provide objective criteria upon which market participants may rely to secure exemptions provided for in the statutory text.”); *id.* at 957–58 (“Safe harbor rules are tremendously popular with market participants because the federal securities statutes insulate from liability any person who in good faith conforms with an SEC rule, even if a court subsequently determines that the rule is invalid.”).

138. Securities Act of 1933 § 11(b)(3), 15 U.S.C. § 77k(b)(3) (2006); *see also* 9 LOUIS LOSS & JOEL SELIGMAN, *SECURITIES REGULATION* ch. 11, § (C)(2)(d), at 4259–61, 4269–70 (3d ed. 2004).

139. *See* Robert Eli Rosen, *Resistances to Reforming Corporate Governance: The Diffusion of QLCCs*, 74 *FORDHAM L. REV.* 1251, 1274 (2005) (“In making law a critical contingency, SOX led to the empowerment of compliance officers. As a result of the scandals, ‘compliance officers are being given far more responsibility and resources. “This is a tremendous sea change. . . . Now, the compliance officer will report directly or indirectly to the board of directors.”’ At other times, inside counsel shunned the compliance role, fearing that being the ‘corporate conscience’ would exclude them from important decisions. In the post-SOX environment, compliance has become an essential element in important corporate decisions. Susan Hackett, of the Association of Corporate Counsel (‘ACC’), advised inside counsel to ‘[t]ake advantage of the passage of . . . Sarbanes-Oxley’ and to ‘[u]se this opportunity to position the legal department as a center of . . . institutionalizing . . . compliance initiatives.’” (citations omitted)).

Under SEC rules, registered investment companies, business development companies, and investment advisers must appoint a “chief compliance officer” to ensure that the entity has in place policies and procedures fostering compliance with the securities laws, including Sarbanes-Oxley. 17 C.F.R. § 270.38a-1 (2008); *id.* § 275.206(4)-7. “[T]he compliance officer should have a position of sufficient seniority and authority within the organization to compel others to adhere to the compliance policies and procedures.” Compliance Programs of Investment Companies & Investment Advisers, Investment Advisers Act Release No. 2204, Investment Company Act Release No. 26299, 81 SEC Docket 3448, at 3454 (Dec. 17, 2003).

benefit—the avoidance of liability. Instead of seeing risk managers as deal killers, firm leaders will now have to see them as personal insurance as well. As one scholar of risk management noted, “the secret to [a risk manager’s] success is the degree of ‘clout’ they wield.”¹⁴⁰

The challenge with such a regulatory solution is the race to the bottom that can ensue in defining best practices.¹⁴¹ Those facing potential liability will seek the narrowest and most easily fulfilled criteria for obtaining exculpation. As already discussed, risk management in the area of financial markets is highly complex and indeterminate. It is very much an evolving science and likely will never be free from the need for judgment. While a “tick the box”¹⁴² approach might be easier to administer, it will not provide the optimal prevention we seek.¹⁴³ So how do we strike this balance?

The *Blueprint* announced that it was taking an “objectives-based”¹⁴⁴ approach to regulation. One objective assigned to the market stability regulator is to “focus market discipline to limit systemic risk.”¹⁴⁵ A powerful means for focusing market discipline is to lead in the development of best practices in predictive prevention. The Federal Reserve would be hard pressed to monitor all or even just the largest players in the financial system. It will be particularly hard in an environment where an inherent incentive to take excessive risk continues to prevail. A different, more leveraged regulatory approach is needed. The Federal Reserve certainly has the resources to facilitate and vet the latest thinking on risk management and compliance. While concerns over regulatory capture¹⁴⁶ are inescapable, charging the Federal Reserve with the responsibility for defining best practices as they evolve is certainly more likely to yield public-regarding standards than leaving it to private actors to define adequate prevention. As these standards are defined, the Federal Reserve can require firms to benchmark themselves both through

140. Andrew Hopkins, *Beyond Compliance Monitoring: New Strategies for Safety Regulators*, 29 LAW & POL’Y 210, 215 (2007) (discussing regulatory strategies to increase workplace safety).

141. See David Zaring, *Best Practices*, 81 N.Y.U. L. REV. 294 (2006) (arguing that “best practices” regulation often leads to imposing only “common practices”).

142. “Tick the box” refers to regulatory regimes that require a checklist of objective steps that may be fulfilled through formalistic measures, inviting compliance with the literal requirements rather than the spirit of the regulation.

143. See Hopkins, *supra* note 140, at 214 (arguing that best practices should avoid “tick the box” approach and insist on effectiveness as the goal).

144. U.S. DEP’T OF THE TREASURY, *supra* note 111, at 2.

145. *Id.* at 15.

146. “Regulatory capture” refers to the notion that regulators tend over time to become subject to the influence and control of the industry they regulate. For an interesting discussion of regulatory capture in the context of food and drug safety, see Sidney A. Shapiro & Rena I. Steinzor, *Capture, Accountability, and Regulatory Metrics*, 86 TEX. L. REV. 1785 (2008).

periodic disclosure and ultimately to qualify for exculpation. In this way, the Federal Reserve would have a regulatory structure that relies on market forces to implement those practices that it learns from its research and experience are the best way to reduce systemic risk.

I take much of my inspiration for these specific proposals from Professor Ayres and Professor Braithwaite's notion of "responsive regulation."¹⁴⁷ Without purporting to have developed a comprehensive proposal, I am attempting to provide the locus for erecting what these authors called "enforced self-regulation."¹⁴⁸ My interest in doing so goes back to my original choice of strategy. I accept that regulation cannot eliminate all risk of systemic collapse. I accept the need for risk taking in our financial markets. I want to avoid the potential costs of overregulating individual decisionmaking. I have identified, however, instances where markets can be expected to make choices that are suboptimal, where we know we cannot trust ourselves to be prudent. But when I consider traditional regulatory strategies to address this limited instance of market failure, I am concerned that the very complexity and uncertainty that is part of the problem makes difficult a traditional regulatory solution. What is needed is neither simply better disclosure nor stricter standards. What is needed is a greater effort to measure and control complexity, uncertainty, and change. Since the rewards for that effort are difficult to claim in the private markets, the role for government becomes clearer. It should provide incentives that overcome the market's conflicted incentive to get better at it.

CONCLUSION

Thomas McCraw ends his acclaimed history of regulation in America with the following admonition:

[I]n popular perceptions over the last three decades regulation has been regarded as a synonym for failure. . . . To weigh against [this], we have only one [theory] . . . the theory of "public use of private interest." According to this theory, regulators should always exploit the natural incentives of regulated interests to serve particular goals that the regulators themselves have carefully defined in advance. And, in fact, the historical record suggests that regulation in America has succeeded best when it has respected these incentives instead of ignoring them.¹⁴⁹

147. IAN AYRES & JOHN BRAITHWAITE, *RESPONSIVE REGULATION: TRANSCENDING THE DEREGULATION DEBATE* (1992).

148. *Id.* at 101.

149. THOMAS K. MCCRAW, *PROPHETS OF REGULATION: CHARLES FRANCIS ADAMS, LOUIS D. BRANDEIS, JAMES M. LANDIS, ALFRED E. KAHN* 308 (1984).

We are facing what may well be one of the great moments of American regulatory reform. We should approach such reform with these words in mind.

We have witnessed a great crisis in our financial markets. There will be debate over its causes. There is broad agreement, however, that moral hazard played a prominent role. The premise of this Essay is that it was indeed the root cause of why we find ourselves where we are. So if we are to make the financial world safer, we must deal somehow with the problem of moral hazard.

I have argued that the proper response to the tendency to take excessive risk due to moral hazard has been well understood for some time. It underlies the new importance of the class of investment professional called the risk manager (and his colleague, the compliance officer). By engaging in what I have described as predictive prevention, these professionals are charged with preventing the harm we have witnessed. So what went wrong?

This Essay offers a model of risk-manager decisionmaking that reveals a fundamental flaw in the current risk-management regime. The flaw lies in the imbalance between the stakes for the decisionmaker of being right versus the costs of being wrong.

This Essay then offers a regulatory strategy that, as Professor McCraw admonishes, takes into account the inherent incentives at work among the players in our financial markets. It is a strategy that acknowledges the long-standing tradition of market-based financial regulation and its emphasis on disclosure as the critical public good. However, it also identifies where that reliance on market forces has failed and where with the lightest touch¹⁵⁰ government can bring private incentives back into alignment with the public interest.

150. A "light touch" is preferred because of the difficulty of evaluating the costs and benefits of regulatory change. See, e.g., Robert W. Hahn & John A. Hird, *The Cost and Benefits of Regulation: Review and Synthesis*, 8 YALE J. ON REG. 233 (1991) (providing a re-assessment of the costs of various regulatory programs). The concern that "overregulation" has adversely affected American competitiveness and economic growth should not be forgotten in this milieu of panic. See COMM. ON CAPITAL MARKETS REGULATION, INTERIM REPORT OF THE COMMITTEE ON CAPITAL MARKETS REGULATION (2006), available at http://www.capmktreg.org/pdfs/11.30Committee_Interim_ReportREV2.pdf (arguing that overregulation has caused an erosion in the U.S.'s competitiveness as a source of public equity capital); COMM. ON CAPITAL MARKETS REGULATION, THE COMPETITIVE POSITION OF THE U.S. PUBLIC EQUITY MARKET (2007), available at http://www.capmktreg.org/pdfs/The_Competitive_Position_of_the_US_Public_Equity_Market.pdf (offering evidence of decreasing competitiveness); cf. Darrell Duffie & Henry T. C. Hu, *Competing for a Share of Global Derivatives Markets: Trends and Policy Choices for the United States* (Rock Ctr. for Corporate Governance, Stanford Univ., Working Paper Series No. 50; U. of Tex. Law, Law & Econ. Research Paper No. 145, 2008), available at <http://ssrn.com/abstract=1140869> (concluding that while differing regulation can impact the choice of location for the development of derivatives markets, other factors, such as the concentration of human capital, have a stronger effect).