

## Essay

# The Known, the Unknown, and the Unknowable in Financial Policy: An Application to the Subprime Crisis

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*This Essay examines the subprime crisis through the lenses of the known, the unknown, and the unknowable in financial policymaking. The first two Parts focus on information and incentive problems faced by monetary policymakers and prudential supervisors in trying to prevent crises. The third Part emphasizes challenges that arise when preventative measures fail and financial policymakers must manage financial crises. These include pressures to oversupply public subsidies in the short-run at the risk of providing incentives for institutions to take greater risks and cause larger crises in the long run, and conflicts and gaps between micro- and macro-prudential supervision. Some micro-prudential regulation may make individual institutions safer, while increasing the vulnerability of the financial system to systemic risk.*

### Introduction

This Essay draws upon a project conducted by the Wharton Financial Institutions Center about the known, the unknown, and the unknowable in financial risk management.<sup>1</sup> The “known” (*K*) refers to a situation where we know the probability of a future event with sufficient certainty that we can specify all the parameters of the probability distribution with a high degree of confidence. This may occur because we have extremely powerful a priori knowledge—for example, a theory of what determines the event about which nearly all experts agree—or because we have data collected over a sufficient range of conditions that we can estimate the distribution with a high degree of confidence.

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The “unknown” ( $u$ ) refers to a situation in which we can specify an event but there is considerable uncertainty about when or whether it may occur because we have a variety of alternative theories without consensus among experts about which is correct, or because we lack adequate data or sufficiently powerful statistical techniques to estimate a distribution with even negligible levels of confidence. The “unknowable” ( $U$ ) refers to events that we have not even identified because they have not happened or because we have no widely accepted theory that leads us to expect that they might happen.

Much of the history of the development of risk management has been converting  $U$  to  $u$  to  $K$ —although it would be a mistake to infer that we have enjoyed continuous progress to  $K$ . The boundaries are not fixed and behavior is dynamic. We may find that  $K$  has become  $u$  and that an entirely new  $U$  has become important. Indeed, Benoit Mandelbrot and Nassim Taleb warn that there is much more  $u$  in  $K$  than is commonly acknowledged.<sup>2</sup> The past is never a perfect predictor of the future. New factors may become important, and relationships estimated in times of normal market functioning tend to break down at times of market stress. What we thought was mild randomness often proves to be wild randomness—or at least more often than it should if it were governed by a Gaussian distribution. In Will Roger’s phrase, one of the key risks may be what we think we know “that just ain’t so.”

Undue reliance on ratings by a wide variety of financial markets participants is a good example of this problem in the subprime crisis. Indeed, much of the current financial crisis has shown us that many things that we regarded as in the domain of  $K$  are in fact in the domain of  $u$ . What follows is an overview of the challenge policymakers face in dealing with a crisis as seen through the lenses of  $K$ ,  $u$ , and  $U$ . I will begin in the next two Parts by examining the information and incentive problems faced by monetary policymakers and prudential supervisors in trying to prevent crises. The concluding Part emphasizes challenges that arise when preventative measures fail and financial policy makers must manage financial crises.

## I. Information Challenges for Financial Policymakers

Financial policy becomes most relevant when a shock that was unknown or unknowable shifts the financial system from the domain of  $K$  into the domain of  $u$ . Financial policymakers are charged with limiting the vulnerability of the financial system to such shocks and mitigating the consequences of such shocks once they occur. Financial policymakers aim to promote monetary and financial stability, but virtually every aspect of financial policymaking is subject to substantial uncertainty. For example, how precisely should these objectives be defined? With regard to monetary policy, what amount of

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2 Benoit Mandelbrot & Nassim Taleb, *Mild and Wild Randomness: Focusing on the Risks that Really Matter*, in *THE KNOWN, THE UNKNOWN AND THE UNKNOWABLE IN FINANCIAL RISK MANAGEMENT*, *supra* note 1.

inflation is consistent with achieving stable, sustainable growth? What measure of inflation is appropriate? Is it feasible, both technically and politically, for the monetary authorities to prevent asset bubbles during periods of low and stable inflation?<sup>3</sup> Moreover, the monetary authorities must operate with incomplete knowledge about the current state of the economy and how their actions (or inaction) may affect economic activity. Monetary policy operates with long and variable lags and it is difficult to anticipate market responses to shocks. Yet the monetary authorities must immediately determine whether there is adequate liquidity in the financial system and whether monetary policy needs to be adjusted to counter the effects on the economy of a crisis-induced tightening of credit.<sup>4</sup>

Prudential supervision generally focuses on safety and soundness issues. Micro-prudential supervision focuses on the safety and soundness of individual institutions. By contrast, macro-prudential supervision focuses on the safety and soundness of the financial system. Although most supervisory resources are allocated to micro-prudential supervision, the allocation does not ensure that macro-stability goals will be achieved. Indeed, sometimes the appropriate action to make an individual institution safer can undermine macro-financial stability. Demanding that individual institutions hold more capital and reserves can appear to make those institutions safer, but it may come at the cost of restricting credit and refusing to roll over loans to other institutions.

With regard to prudential policy, the primary goal of financial stability must be to protect the functioning of the financial system in providing payments services and facilitating the efficient allocation of resources over time and across space. This may be threatened by a loss of confidence in key financial markets or institutions, as we have seen in the current subprime crisis. But how safe should financial institutions be? Should all failures be prevented? Would the consequent, necessary restrictions on risk-taking by financial institutions reduce the efficiency of financial intermediation and reduce investment? Would this deprive the economy of the dynamic benefits of creative destruction? Or would it shift risk-taking and innovation to unregulated entities where it could not be monitored, much less controlled? What tools should be used to achieve these objectives?

And what governance structure is most likely to motivate policymakers to act in the public interest? Public-sector compensation contracts are much more highly constrained than compensation contracts for senior executives in financial-services firms. And even where there has been complete freedom of

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3 Jacob Frenkel, the former Governor of the Bank of Israel, has expressed doubt about whether the monetary authorities know enough to deflate bubbles before they become dangerous. John Thornhill & Adrian Michaels, *Bear Stearns Rescue a 'Turning Point,'* FIN. TIMES, Apr. 7, 2008, at 4. Frenkel asserts that the real choice is "Which system do you want: one in which the [monetary authority] pricks three bubbles out of five or five out of three bubbles? Because we know for sure that it will not be able to solve four out of four." *Id.*

4 Donald Kohn, *The Role of the Known, the Unknown and the Unknowable in Managing and Preventing a Crisis: A Central Banker's Perspective*, in THE KNOWN, THE UNKNOWN AND THE UNKNOWABLE IN FINANCIAL RISK MANAGEMENT, *supra* note 1.

contracting in private institutions, we have learned that the outcome may be dysfunctional, leading risk-takers to accept much more risk than shareholder principals—or certainly the taxpayers, who have to pay for the consequences of reckless risk-taking—would want. More fundamentally, when objectives are not crisply defined, it is difficult to establish and enforce accountability. Blame avoidance is, by default, the primary objective of most bureaucrats.<sup>5</sup>

Although the prudential supervisory authorities have enormous, if ill-defined, responsibility, they have relatively little power to constrain risk-taking by profitable institutions that they believe bear excessive exposure to uncertain shocks. In order to guard against the arbitrary use of regulatory and supervisory power, most countries subject disciplinary decisions by officials to some sort of judicial or administrative review. In order to discipline a bank, a supervisor must not only know that a bank is taking excessive risk, but also be able to prove it to the satisfaction of the reviewing body—perhaps beyond a reasonable doubt. This leads to a natural tendency to delay disciplinary measures until much of the damage from excessive risk-taking has already been done. The United States has tried to limit the scope for forbearance through prompt corrective action measures contained in the Federal Deposit Insurance Corporation Improvement Act of 1991<sup>6</sup> by removing a substantial degree of supervisory discretion. Yet experience during the crisis with IndyMac, an institution that was permitted to lose nearly nine billion dollars before it was closed, indicates that even explicit rules may be insufficient to limit forbearance in times of crisis.<sup>7</sup>

Review of supervisory actions also leads officials to react mainly to what has already happened (and is, therefore, objectively verifiable) rather than to act on the basis of expectations about what may happen (which are inherently disputable). Moreover, supervisors are seldom, if ever, held accountable for the misallocation of resources that occurs when an insolvent institution is permitted to continue operating.

In Charles Goodhart's refinement of the *KuU* framework, in which *K* is partitioned into actual past data and expected values, supervisors generally react to past actual losses rather than mean expected losses, much less the unexpected losses (or standard deviation around the normal distribution) that are more relevant for setting capital requirements. This pattern persists even

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5 For additional discussion of blame avoidance and the challenge of holding bureaucrats accountable, see Edward Kane, *Politics and Fed Policymaking: The More Things Change, the More They Remain the Same*, 6 J. OF MONETARY ECON. 199 (1980). In more recent work, Kane has written: "These blame-avoidance norms come together in what we might call the First Commandment of Turmoil Management: *Be merciful unto important Home-Country Institutions and lead their problems not into contagion with other firms or markets.*" Edward Kane, Incentive Conflict in Central-Bank Responses to Sectoral Turmoil in Financial Hub Countries (Nat'l Bureau of Econ. Research, Working Paper No. W13593, 2007), available at [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1029934](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1029934).

6 Federal Deposit Insurance Corporation Improvement Act of 1991, Pub. L. No. 102-242, 105 Stat. 2236 (codified in scattered sections of 12 U.S.C.).

7 See Joe Adler, *FDIC To Sell IndyMac; But Cost Estimate Grows*, AM. BANKER, Jan. 5, 2009, at 4.

when the mean and standard deviations of the distribution are believed to be known.<sup>8</sup> Alan Greenspan, former Chairman of the Board of Governors of the Federal Reserve System, has also expressed doubt about whether regulators know enough to act preemptively.<sup>9</sup>

Information issues present a fundamental challenge to supervisory authorities who must oversee the solvency of regulated financial institutions. Neither actual past data nor expected values can be relied upon in times of crisis when markets become illiquid and difficult supervisory decisions must be made. Traditionally, bank accounting has been a mix of historical cost accounting, accrual accounting, and mark-to-market accounting that can obscure the true financial condition of a bank. This mix of accounting conventions has sometimes undermined incentives for hedging risks by valuing a risky position and the offsetting hedge differently, thereby increasing the volatility of earnings, even though risk has been reduced. Many external observers doubt this mix of standards conveys a true and fair account of the current position of a financial institution.<sup>10</sup>

In an effort to improve and harmonize financial accounting standards more or less simultaneously during the fall of 2008, the International Accounting Standards Board and the Financial Accounting Standards Board implemented new rules that require firms to fair value their financial assets. The rules classify these assets in three different categories: (1) assets that can be marked to market based on prices in active markets for identical instruments; (2) assets that are marked to matrix, based on observable market data for similar assets; and (3) assets that are marked to model, based on judgment regarding how the market would price such assets if they were traded in active markets.<sup>11</sup>

This third category presents significant difficulties for regulators, who face a severe asymmetric information problem vis-à-vis the regulated institution. How can the regulatory authorities comfortably rely on the estimated values of “level three” assets?<sup>12</sup> Yet the question of the correct price

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8 C.A.E. Goodhart, *Domestic Banking Problems*, in THE KNOWN, THE UNKNOWN AND THE UNKNOWABLE IN FINANCIAL RISK MANAGEMENT, *supra* note 1.

9 Alan Greenspan, *The Fed Is Blameless on the Property Bubble*, FIN. TIMES, Apr. 7, 2008, at 9 (“Regulators, to be effective, have to be forward-looking to anticipate the next financial malfunction. This has not proved feasible. Regulators confronting real time uncertainty have rarely, if ever, been able to achieve the level of future clarity required to act preemptively.”).

10 Ray Ball, Don’t Blame the Messenger . . . or Ignore the Message, Booth School of Business Initiative on Global Markets (Oct. 12, 2008) (unpublished manuscript), available at <http://www.igmchicago.org/2008/10/23/dont-blame-the-messenger-ignore-the-message/>.

11 For additional discussion of fair value standards and the three-tiered classification of assets, see INT’L MONETARY FUND, GLOBAL FINANCIAL STABILITY REPORT: CONTAINING SYSTEMIC RISKS AND RESTORING FINANCIAL SOUNDNESS 54-85 (2008), available at <http://www.imf.org/External/Pubs/FT/GFSR/2008/01/pdf/text.pdf>, and Ball, *supra* note 10.

12 For example, S&P studied one bond, formerly rated AAA, backed by 9000 second mortgages. Nearly one-quarter are delinquent and losses on those that have defaulted are 40%. One financial institution carries the bond on its books at 97 cents on the dollar. S&P ran a favorable scenario and concluded the bond was worth 87 cents on the dollar, but under a less favorable scenario it was

for such assets is critical for policies like the Troubled Asset Relief Program (TARP) in the United States, as well as for “bad bank” proposals under consideration in many countries. If the price is set too low, banks will not willingly participate. If the price is set too high, it can be the source of enormous concealed taxpayer subsidies. Elizabeth Warren, an independent monitor appointed by Congress to scrutinize the bank recapitalization program, has recently stated that the Treasury has overpaid \$78 billion in the \$254 billion it has spent in TARP transactions so far.<sup>13</sup>

Efforts by central banks to add liquidity to the system to revive these markets have had little effect in the face of persisting concern regarding the solvency of key counterparties. Indeed, many U.S. banks have chosen to hold excess reserves at the central bank rather than participate in interbank markets. The flight to quality has been so extreme on occasion that Treasury bill yields have turned negative.<sup>14</sup>

## II. Crisis Prevention

Most policymakers would agree with Don Kohn, Vice Chairman of the Federal Reserve Board, that it is better to prevent such crises than to try to manage and mitigate them once they have occurred.<sup>15</sup> Crisis prevention is an enormous burden, however, which falls mainly on the shoulders of the prudential authorities. Prudential regulation attempts to establish rules for the sound operation of financial institutions and for critical elements of the financial infrastructure such as clearing and settlement arrangements. Ideally, prudential policymakers should be looking beyond the known to anticipate emerging sources of systemic vulnerability in order to calibrate appropriate prudential policies. In the dynamic world of modern finance, anticipating new sources of vulnerability requires trying to understand how changing institutions, products, markets, and trading strategies create vulnerabilities to new kinds of shocks and new channels of contagion, such as the margin/hairstock spiral and the loss spiral just described. But the known cannot be neglected. Institutions still fail in familiar ways by taking excessive concentrations of credit risk or by imprudently borrowing short and lending long, as recent experience with Northern Rock and dozens of Structured Investment Vehicles has shown.<sup>16</sup>

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worth only 53 cents on the dollar. It currently trades in the secondary market at 38 cents on the dollar. See Vikas Bajaj & Stephen Labaton, *Big Risks for U.S. in Trying To Value Bad Bank Assets*, N.Y. TIMES, Feb. 2, 2009, at A1.

13 Krishna Guha, Francesco Guerrero & Julie MacIntosh, *U.S. Looks at Turning Bank Stakes to Equity*, FIN. TIMES, Feb. 6, 2009, at 1.

14 See Michael Mackenzie, *Interest Rate on U.S. Treasury Bills Turns Negative*, FT.COM, Dec. 8, 2008, available at <http://www.ft.com/cms/s/0/c0c68a98-c646-11dd-a741-000077b07658.html>.

15 *Id.*

16 See INT’L MONETARY FUND, *supra* note 11, at 54-85 (discussing structured investment vehicles); see also NORTHERN ROCK PLC, INTERIM RESULTS 6 MONTHS ENDED 30 JUNE 2007 (July

Prudential supervisory authorities confront a number of trade-offs that must be made on uncertain terms. How safe should banks be? Goodhart notes that it is relatively easy to establish a set of penalties that would make the banking system perfectly safe, but largely irrelevant in intermediating between savers and investors.<sup>17</sup> Ken Scott argues that a central feature of corporate governance is aligning the risk-neutral preferences of well-diversified shareholders with those of risk-averse managers.<sup>18</sup> This calculus is unlikely to take account of the systemic costs of an institution's failure, and the prudential authorities will presumably prefer a higher degree of safety. But how much higher?

By far the most ambitious effort at prudential regulation has been the development and implementation of the Basel II standards for capital adequacy.<sup>19</sup> These standards try to emulate "economic capital,"<sup>20</sup> which is used by the most sophisticated institutions to measure and aggregate risks. But the concept is firmly rooted in the world of *K*. Reliance on economic capital depends on risk managers (and those who supervise them) being able to estimate downside tail risks at a high level of confidence so that the financial institution can establish the amount of capital it needs to protect earnings volatility at a prescribed level of confidence, to achieve a probability of default associated with the financial institution's target debt rating.

Banking supervisors from the thirteen countries that comprise the Basel Committee on Banking Supervision began to take note of the evolving concept of economic capital when they expanded the original Basel Accord on Capital Adequacy, which set minimum standards of capital adequacy for the member countries to take account of market risk. The 1996 Market Risk Amendment<sup>21</sup> provided an entirely new approach to setting capital requirements that relied on the way that leading banks were measuring and managing this risk. The original Accord set capital requirements roughly in line with expected losses. The concept of economic capital made clear that the role of capital should be to absorb unexpected losses, with reserves established to absorb expected losses. And so instead of requiring banks to allocate their positions to crude risk buckets or applying mechanical asset price haircuts to positions in an attempt to approximate risks, the regulatory authorities provided the opportunity for

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2007), available at <http://companyinfo.northernrock.co.uk/downloads/stockEx070725.pdf> (showing Northern Rock's vulnerability to a liquidity crisis).

17 Goodhart, *supra* note 8.

18 Ken Scott, *KUu and the Place of Corporate Governance*, in THE KNOWN, THE UNKNOWN AND THE UNKNOWABLE IN FINANCIAL RISK MANAGEMENT, *supra* note 1.

19 For background on the efforts of the Basel Committee, see Bank for International Settlements, Basel II: Revised International Capital Framework, <http://www.bis.org/publ/bcbsca.htm> (last visited Apr. 14, 2009).

20 Economic capital is the amount of capital that a firm needs to ensure that it remains solvent over a specified period of time with a specified degree of confidence.

21 For additional details, see BASEL COMMITTEE ON BANKING SUPERVISION, BANK FOR INT'L SETTLEMENTS, OVERVIEW OF THE AMENDMENT TO THE CAPITAL ACCORD TO INCORPORATE MARKET RISKS (1996), available at <http://www.bis.org/publ/bcbs23.htm>.

qualifying banks to rely on the supervised use of their internal models to determine their capital charges for exposure to market risk.

The “internal models” approach was expected to deliver several benefits. First, it would reduce or eliminate incentives for regulatory capital arbitrage because the capital charge would reflect the bank’s own estimate of risk. Second, it would reward diversification to the extent that a bank’s internal models captured correlations across risk positions. Third, it would deal more flexibly with financial innovations, incorporating them in the regulatory framework as soon as they were incorporated in the bank’s own risk management models. Fourth, it would provide banks with an incentive to improve their risk management processes and procedures in order to qualify for the internal models approach. And fifth, compliance costs would be reduced to the extent that the business was regulated in the same way that it was managed. By and large, the “internal models” approach for market risk had proven to be highly successful, even when it was severely tested by the extreme market disruptions in 1997, 1998, and 2001.<sup>22</sup> But it failed spectacularly during the subprime crisis because of its inability to capture the default risk and associated liquidity risk in subprime-related instruments.

Nonetheless, this early success, in combination with the progress made in modeling credit risk, led to calls from industry to revise the original Basel Accord to incorporate an internal-models approach to capital regulation of credit risk.<sup>23</sup> Basel II attempts to extend this new approach to setting capital requirements to credit risk and operational risk.<sup>24</sup>

The architecture of Basel II is built on three pillars. Pillar 1 specifies capital charges for exposure to credit, market, and operational risk. Pillar 2 describes the Supervisory Review Process. And Pillar 3 sets out standards for Market Discipline. Although the supervisory authorities were convinced that credit scoring models had significantly expanded the amount of credit risk that could be regarded as falling in the domain of the known, they were skeptical that internal models of credit risk were as reliable and verifiable as models of market risk. While some kinds of credit risk—like retail lending—have rich and granular data sets comparable to market risk, other kinds of credit risk are less amenable to empirical analysis because data are sparse relative to past credit cycles and distinctly non-granular. In the end, the regulators rejected the supervised use of internal models, but permitted qualifying banks to use their internal model inputs—estimates of probability of default, loss given default, exposure at default, and duration of exposure—as inputs in the regulatory model that would determine capital requirements. These Pillar 1 capital requirements recognized the analytical and empirical advances banks had made

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22 For an analysis of the Basel process, see Richard J. Herring, *Implementing Basel II: Is the Game Worth the Candle?*, in 14 FIN. MARKETS, INSTITUTIONS & INSTRUMENTS 267 (2005).

23 *Id.*

24 See BANK FOR INTERNATIONAL SETTLEMENTS, *BASEL II: INTERNATIONAL CONVERGENCE OF CAPITAL MEASUREMENT AND CAPITAL STANDARDS: A REVISED FRAMEWORK* (2006), available at <http://www.bis.org/publ/bcbs128.htm>.



in expanding the extent to which credit risk can be regarded as known. Unfortunately, the losses experienced by the institutions most heavily engaged in packaging and selling subprime-related debt have cast considerable doubt on the reliability of such models. The standardized version of Basel II, which relies on ratings issued by Nationally Recognized Statistical Ratings Organizations, has not fared much better. In many cases, more than half the tranches of subprime-related securities were subjected to triple-notch downgrades, which are extraordinarily rare in corporate issues.

Because Basel II is an agreement negotiated among the members of the Basel Committee on Banking Supervision, it reflects a number of political compromises that undermine its aspirations for technical precision. This is most evident in the definition of regulatory capital, which is based on accounting values and includes a number of items that do not reflect an institution's capacity to bear unexpected losses. This undercuts the link to economic capital and the logic of the approach.

Pillar 1 capital charges are intended to deal with known risks. Pillar 2, the Supervisory Review Process, is intended to deal with unknown risks that can be identified, but are not sufficiently well quantified to establish Pillar 1 capital charges. Presumably, as theoretical and empirical advances succeed in moving some of these risks into the domain of *K*, Pillar 1 capital charges will be established for them as well.

The principal tools of supervisory analysis in the domain of the unknown are stress testing and scenario analysis. Stress testing requires economic judgment to formulate and calibrate scenarios that expose potential vulnerabilities. It requires a careful consideration of which relationships will continue to hold and which relationships will break down in time of stress. Benoit Mandelbrot and Nassim Taleb caution that traditional stress testing, which relies on selecting a number of worst-case scenarios from past data, may be seriously misleading because it implicitly assumes that fluctuations of this magnitude would be the worst that should be expected.<sup>25</sup> They note that crashes happen without antecedents. Before the crash of 1987, for example, stress testing would not have included a twenty-two percent drop in share prices within a single day. In their view, risk managers and prudential supervisors should evaluate the robustness of a portfolio over an entire spectrum of extreme risks.

Goodhart emphasizes a different concern regarding stress testing and scenario analysis.<sup>26</sup> What may matter most in a crisis are interactive effects that occur when many institutions attempt to adjust their portfolios in the same way at the same time. These are critical to understanding an institution's vulnerability in a crisis and the impact on the financial system, but are omitted from most scenarios.

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25 Mandelbrot & Taleb, *supra* note 2.

26 Goodhart, *supra* note 8.

Stress testing and the simulation of crises may be of value even if such crises never occur. The data necessary to simulate a crisis may prove useful in monitoring vulnerability, and a careful consideration of the consequences of such a crisis may lead to changes in strategy and/or risk management. Crises seldom unfold according to the anticipated scenario, but strategies for responding to one kind of shock may prove useful when a different kind of shock occurs. For example, evacuation procedures that Morgan Stanley established after the bombing of the World Trade Center in 1993 enabled the firm to safeguard all of their employees in the much more severe terrorist attack on September 11, 2001.<sup>27</sup>

The key element of regulatory discipline under Pillar 2, however, is the ability of the prudential supervisor to impose an additional capital charge on an institution if the supervisors are uncomfortable with the results of the institution's stress tests. This move places supervisors in the role of imposing discipline on an institution thought to be vulnerable to a shock of unknown probability. The stance will inevitably prove challenging for supervisors who are usually much less well-paid and well-informed than bank managers. The history of bank supervision does not provide much basis for optimism that they will succeed. In fact, Northern Rock provides a recent example of a notable failure to do so. In June 2007, just before the near collapse of the bank, the British Financial Services Authority (FSA) authorized Northern Rock to apply the Pillar 1 internal-ratings-based risk weights, which reduced its required regulatory capital by nearly thirty percent. Northern Rock, in turn, planned to increase its dividends to shareholders by thirty percent.<sup>28</sup> The FSA made no attempt to offset the reduction in Pillar 1 capital charges with a Pillar 2 capital charge, nor did it require Northern Rock to conduct a stress scenario that would have shown that it was fatally exposed to a liquidity shock.

In some cases, it is simply not possible to even imagine the shock that may occur. How should prudential supervisors deal with this *U*? As Scott notes, firms can limit their leverage and maintain enough capital and liquidity to absorb unknowable losses, should they occur.<sup>29</sup> But how much slack is sufficient? By assumption this quantity is unknowable, and almost all of the things that banks could do to cope with the unknowable are very costly. Moreover, competitive pressures may make it very difficult to sustain such precautions. Should regulators therefore require that banks hold capital substantially in excess of the regulatory minimum as a safeguard against unknown and unknowable shocks? Increasing capital charges for risks that cannot be identified becomes a deadweight cost and may lead to the

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27 Seth Schiesel & Riva D. Atlas, *By-the-Numbers Operation at Morgan Stanley Finds Its Human Side*, N.Y. TIMES, Sept. 16, 2001, at B8.

28 See NORTHERN ROCK PLC, *supra* note 16; see also Press Release, Financial Services Authority, FSA Moves to Enhance Supervision in Wake of Northern Rock (Mar. 26, 2008), available at <http://www.fsa.gov.uk/pages/Library/Communication/PR/2008/028.shtml> (discussing FSA's assessment of its failings with regard to the supervision of Northern Rock).

29 Scott, *supra* note 18.

circumvention of regulation and riskier outcomes. As Sir Andrew Crockett observed during a panel discussion at the Wharton School of the University of Pennsylvania, it is inherently difficult for policymakers to strike the proper balance between the efficiency losses associated with excessively onerous preventative policies and the cost effectiveness of responding *ex post* to adverse events.<sup>30</sup> For regulators as well as firms, the appropriate amount of financial slack is an unknown.

Pillar 3 of the Basel II approach is intended to enhance market discipline by improving disclosure. The authorities may collect and publish data that helps market participants understand the current state of the economy and financial markets and the condition of regulated financial institutions. But growing reliance on dynamic trading strategies to manage risk has made it increasingly difficult to provide a meaningful picture of risk exposures. Positions may change so rapidly that information is out-of-date before it can be published. Moreover, the chief motive for market discipline—the fear of loss—is often undermined by the reluctance of the authorities to permit creditors, counterparties, and sometimes even shareholders of systemically important financial institutions to suffer loss. The extraordinary bailouts of Bear Stearns, Citigroup, and Bank of America are recent cases in point. The exception, the bankruptcy of Lehman Brothers, proved so disruptive that members of the Group of Seven vowed that such an event should never happen again.<sup>31</sup>

The ambitious new Basel II approach attempts to incorporate into capital regulation what is known about risk management, but it may generate several unintended consequences that could shift the financial system into the domain of the unknown. The attempt to force all major firms to adopt one version of “best practice” and especially the imposition of a regulatory model of credit risk may increase the likelihood of herding. Banks may be much more likely to attempt to move in the same direction at the same time, which could undermine the liquidity of markets and increase volatility.

To the extent that Basel II succeeds in making capital requirements more risk sensitive, it will make bank lending more pro-cyclical. This tendency is reinforced by the fact that banks increasingly hold marketable assets that must be fairly valued. In a boom, measured risks are likely to decline and prices are likely to rise. Measured capital will rise just as required capital falls, thus facilitating additional lending and accentuating the boom. In a recession, internal ratings will migrate downward, thus increasing required capital. As institutions attempt to meet rising capital ratios, they may sell assets. If asset prices fall, this will add to the erosion of the bank’s capital position caused by the downward migration of credit ratings, thus exacerbating the constriction of the supply of loans. More risk-sensitive capital requirements interacting with a

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30 Sir Andrew Duncan Crockett, President, JPMorgan Chase Int’l, Statement at the Wharton School of the University of Pennsylvania, Panel on Financial Risk Management in Practice: The Known, the Unknown and the Unknowable (Feb. 23, 2005).

31 Krishna Guha, *G7 Pledge ‘No More Lehmans,’* FT.COM, Oct. 12, 2008, [http://us.ft.com/ftgateway/superpage.ft?news\\_id=fto101220081506055760](http://us.ft.com/ftgateway/superpage.ft?news_id=fto101220081506055760).

higher proportion of fair valued assets may inadvertently accentuate booms and busts. This is a clear case where micro-prudential and macro-prudential objectives may conflict. Basel II may make individual banks safer, but weaken the banking system. More fundamentally, Basel II fails to deal with systemic risk.

### III. Crisis Management

Because it is so difficult for prudential supervisors to fulfill their responsibilities *ex ante*, policymakers must often shift into crisis management mode to mitigate, *ex post*, the consequences of a shock. Kohn observes that in a financial crisis, the ratio of  $u$  and  $U$  will be especially large relative to  $K$ .<sup>32</sup> Policymakers must deal with such unknowns as the size of the future disruption. How large will it be? How many firms will be involved? How long will it last? How likely is it to have serious spillover consequences for real economic activity?

Part of the problem is in anticipating the channels of contagion. Which firms have direct exposure to the shock? Which firms have indirect exposure because they are counterparties or creditors of the firms that sustain a direct impact or because they have similar exposures and could lose access to external financing? Which other firms might be placed in jeopardy because of the forced liquidation of assets in illiquid markets as risk-averse lenders and counterparties demand larger haircuts and/or more collateral for loans? Risk preferences and perceptions of risk are dynamic, and so a flight to quality often occurs. Market participants may sell assets whose prices are already declining and avoid any counterparty that might be impaired. During the subprime crisis, policymakers have learned that their ability to substitute central bank liquidity for endogenous liquidity created by the financial system is less effective than was once believed.

In a crisis, policymakers must try to convert  $u$  into  $K$  as quickly as possible. This conversion requires close cooperation across regulatory authorities within a country and, increasingly, across borders. Inevitably, the primary source of information is major market participants. But conflicts of interest may corrupt flows of information. Information may be selectively communicated to serve the self-interests of market participants who might be the beneficiaries of crisis management policies. Does this potential distortion of information argue for a direct role of the crisis manager in supervising systemically important institutions? The Fed insists that the central bank must be actively involved in supervising systemically important institutions, but central banks lack such authority in many other countries,<sup>33</sup> and the 2008 Treasury proposal for reforming the U.S. financial system removes supervisory

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32 Kohn, *supra* note 4.

33 Richard J. Herring & Jacopo Carmassi, *The Structure of Cross-Sector Financial Supervision*, 17 FIN. MARKETS, INSTITUTIONS AND INSTRUMENTS 51 (2008).

authority from the Fed while increasing its responsibility for crisis management.<sup>34</sup> How best to organize prudential supervision and crisis management remains a significant unknown.

Policymakers must also convey information in a crisis. They may urge firms to do what the policymakers believe they should do in their own self-interest, as happened in the Long-Term Capital Management crisis in 1998.<sup>35</sup> But when is it appropriate to be reassuring and when might reassurances prove counterproductive?

Crisis management may inadvertently lead to larger future crises. If risk-takers are protected from the full negative consequences of their decisions, they may be likely to take greater risks in the future. This presents a difficult dilemma for crisis management. The costs of inaction are immediate and obvious. It is easy to imagine damaging outcomes, and self-interested market participants will press for official support and can easily muster political support. Inaction in a crisis is likely to be subject to blame even when blame is not appropriate. Officials' fear of being blamed for inaction may contribute to an inherent tendency to oversupply public subsidies. Once subsidies have been provided, entrenched interests will lobby to keep them and new additional activity may depend on them. Moreover, moral hazard manifests itself slowly and may be difficult to relate to any one particular policy choice. The history of crises teaches us that it is very difficult for the authorities to exit from guarantees issued in a crisis once normal conditions are restored.

Ultimately, efficient resolution policy may be the best safeguard against moral hazard. But in most countries policymakers lack the appropriate tools to resolve a large, complex financial institution without jeopardizing the rest of the financial system.<sup>36</sup> And large complex financial institutions have adopted corporate structures that defy efficient resolution. The sixteen large complex financial institutions identified by the International Monetary Fund have two-and-a-half times as many majority-owned subsidiaries as the sixteen largest non-financial corporations.<sup>37</sup> Moreover, most of these firms are managed in an integrated fashion along lines of business with minimal regard for either national boundaries or the individual entities which must be taken through some sort of bankruptcy process in the event of failure. Thus, to prevent the tendency to oversupply bailouts during crises from leading to greater systemic risk, the regulatory authorities should devise ways of resolving institutions

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34 See DEP'T OF THE TREASURY, BLUEPRINT FOR A MODERNIZED FINANCIAL REGULATORY STRUCTURE (2008), available at <http://www.treas.gov/press/releases/reports/Blueprint.pdf>.

35 See Shadow Financial Regulatory Committee, Statement on the Issues Posed by the Near-Collapse of Long-Term Capital Management (Sept. 28, 1998), available at [http://fic.wharton.upenn.edu/fic/Policy%20page/20051114\\_ShadowStatement151%5B1%5D.pdf](http://fic.wharton.upenn.edu/fic/Policy%20page/20051114_ShadowStatement151%5B1%5D.pdf)

36 Richard J. Herring, *International Financial Conglomerates: Implications for Bank Insolvency Regimes*, in MARKET DISCIPLINE IN BANKING: THEORY AND EVIDENCE 99 (George G. Kaufman ed., 2003).

37 Richard J. Herring & Jacopo Carmassi, *The Structure of International Financial Conglomerates: Complexity and Its Implications for Systemic Risk*, in OXFORD HANDBOOK OF BANKING (Allen N. Berger et al. eds., forthcoming 2009).

without creating intolerable spillovers. The financial authorities can accomplish more by doing less, if they can credibly restore a role for market discipline in the system by devising a credible resolution plan for every systemically important institution.

Devising these plans requires an honest assessment of what we actually know about the risks assumed by systemically important institutions and, indeed, what the managers themselves know. Since many of these risks are unknown and some are unknowable, supervisors need to place much greater emphasis on increasing the resilience of the system by ensuring that no institution is too big, too complex, or too interconnected to fail. As a practical first step, systemically important institutions should be required to file and update a winding-down plan just as they now file business continuation plans. If supervisors are not persuaded that the winding down plan is realistic, they should be empowered to require changes in the size or structure of the firm so that if an uncertain or unknown shock should occur, the firm could be resolved without imposing intolerable costs on the rest of the financial system. This is a much more urgent task for the Basel Committee than adding still more complexity to Basel II.