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**THE ETHICS OF RISK MANAGEMENT
IN THE INFORMATION AGE**

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For decades, banking was seen as a stuffy profession that operated by the 3-6-3 rule: bankers provided 3 percent on deposits, made loans at 6 percent, and were on the golf course by 3:00 p.m. The ethics associated with banking seemed equally staid and somnolent. The business world, however, changed dramatically in recent decades, led largely by advances in information technologies. Markets became

global, the volume of currency exchanges grew astronomically, and with the availability of hitherto unimaginable computational capacities, a host of financial products emerged. Now the financial industry resembles the 3-6-3 world of banking like a Ferrari resembles a Model T.

Because of this dramatic transformation, ethical norms that once guided the industry often appear quaintly inadequate. Ethical principles, however, are not outdated: justice is timeless. The trick is knowing how to apply ethics to current conditions. This is where applied ethics steps in — it requires fluency both with ethical principles and the practical domain to which the ethical judgments apply.

Enterprise risk management (ERM) is a case in point. It was a new field that grew with astonishing speed and flew under the ethics radars. To the uninitiated it was work for “quants,” not for ethicists. This changed, however, when the world financial system recently collapsed. Suddenly, everyone asked, “What happened?” Judgments flew fast and furiously. Before long, the mainstream media was full of previously arcane vernacular, like “CDOs,” “predatory lending,” and “enterprise risk management,” and this helped to shed some light on the complexity of the problem.

John Boatright is one of the few thinkers who can move smoothly between the worlds of advanced finance and ethical theory. With that fluency, he cuts through complexity to get to the core ethical issues. John’s lecture not only sheds insight on the ethics of ERM, an important subtext of his talk is that for business ethics to live up to its promise, ethical judgment must follow from impartial analysis based on the best knowledge available. Professor Boatright’s lecture was not for the fainthearted, but certainly the attentive reader will be richly rewarded.

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(From left) David Raney, Office of Ethics and Business Conduct, Verizon Communications (retired); Gregory K. Miles, Director, Ethics and Business Conduct, Verizon Communications; John R. Boatright, the Raymond C. Baumhart, S.J., Professor of Business Ethics in the Graduate Business School at Loyola University Chicago, and director of the Graduate Certificate Program in Business Ethics; and W. Michael Hoffman, founding Executive Director, Center for Business Ethics, and Hieken Professor of Business and Professional Ethics, Bentley University



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The Ethics of Risk Management in the Information Age

Monday, February 8, 2010

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Thank you, Dr. Hoffman, for that very kind introduction. Let me say how pleased I am to be at Bentley University. I have been on this campus a number of times to attend activities of the Center for Business Ethics. I trust that everyone in the audience appreciates the role that the center has been playing in the development of the field of business ethics and especially the great work that Mike Hoffman has done in developing the center. I am also very honored to be here as the Verizon Visiting Professor, and I thank Verizon Communications for their generous sponsorship of this lecture.

Today, I want to bring to your attention a change in business thinking and practice that is a mere 15 years old and yet has become a very significant feature of American business. This development goes by the name of “enterprise risk management” (ERM) and can be dated fairly precisely from 1995. Whether it is a fad or an enduring change remains to be seen.

Since this Verizon lecture is about business ethics and information technology, I am concerned not merely to explain enterprise risk management but to explore with you some of the ethical issues that this development raises and the crucial role that information technology plays in enabling ERM. Indeed, ERM and much of risk management generally would not be possible without the immense databases and computing power that are now available for business decision-making and financial engineering.

Much has been written about risk management, and a quick search of library holdings and websites reveals an immense volume of books, articles, manuals, and other works on the subject, especially on the more technical aspects of calculating risk. Risk management is now a course of study in business schools that leads to advanced degrees; practitioners of risk management are organized in numerous professional societies; and the responsibility for managing risk has now been assumed by top-level executives.

Aside from the prominence of risk management generally, the current financial crisis is due, in part, to a failure of risk management by major financial institutions, rating agencies, and government regulators. Many financial firms, including Countrywide, Washington Mutual, Bear Stearns, Merrill Lynch, Lehman Brothers, Citigroup, and AIG, have ceased to exist or are seriously ailing. Although these firms have been criticized for taking great risks — which were magnified by leveraging, in some cases more than 30-to-one — they all employed very sophisticated risk-management tools. Their collapse was due not to a lack of attention to risk management but to a failure to accurately measure and evaluate the risks, and also to an excessive confidence in the numbers their risk-management systems generated. The attitude at many firms appears to have been: “We can leverage 30-to-one safely because our risk management systems are so good.” However, as Niall Ferguson has quipped, “Those whom the gods want to destroy they first teach math.”¹

However, in this abundance of attention to risk management, virtually nothing has been written explicitly about its ethical aspects. Among the reasons for this neglect may be the belief that risk management is a purely technical, value-free matter of identifying, assessing, and responding to risk, or else the belief that all risk management is an unalloyed good. After all, what could be wrong with a company seeking to manage risk in an integrated and comprehensive manner and putting this effort at the heart of corporate decision-making? My aim, though, is to show that enterprise risk management raises ethical issues both in its adoption as a core managerial practice and in its implementation in business organizations. Along the way, I want to offer an account of the role that enterprise risk management played in the current financial crisis. The mere fact that tremendous losses occurred from the use of ERM is not itself an indictment: some risks are worth taking, and losses could result even if risk management were perfectly performed.² Yet, risk management can be blamed for the current crisis if it led to unwise risk taking or if that task was not well done — and both of these conditions appear to have been present in the current crisis.

The management or control of risk has a long history. In his marvelous book, *Against the Gods: The Remarkable Story of Risk*, Peter L. Bernstein locates the dividing line between modern times and the centuries of human existence preceding it in the mastery of risk, which occurred, during the Renaissance, with the discovery of the mathematics of probability.³ This development showed that the suffering and misfortune that occurs in life could be subject to active human control rather than being endured passively as the whims of the gods. For centuries following, managing risk for the benefit of society was the main function of the modern

insurance and banking industries, which employed actuaries and statisticians to calculate the probabilities of such untoward events such as accidents, natural disasters, business failures, medical conditions, and deaths. And governments have long played a role in managing risks for its citizens.⁴ Bernstein points out that the word “statistics” developed from the use of quantitative facts in the administration of state affairs.⁵

The role of the risk manager developed in the 1970s in financial institutions as they took greater risks in making business loans, trading securities for their own account, and creating new financial instruments. Investment banks that traditionally advised clients on new ventures, mergers, and acquisitions not only helped raise capital but also invested in the deals. Theoretical discoveries during this period, such as modern portfolio theory, the capital asset pricing model, and option pricing theory, led to a vast expansion in the use of derivatives of various kinds. This very profitable activity required highly accurate calculations of the downside risk as well as the upside return. Finance theory and specifically modern portfolio theory stressed the idea that risk represented an opportunity as well as a hazard and that the aim of business should not be merely to avoid or reduce risk but to seek the optimal return at an acceptable or desirable level of risk.

Filling this role of calculating risk and balancing the risk-return trade-off was a new corporate actor — the risk manager, typically a “quant,” a well-trained mathematician who possessed the quantitative skills to accurately calculate risk using sophisticated statistical and modeling techniques. The main responsibility of the risk manager during the 1970s and 1980s was to provide information about the probability and magnitude of possible losses and to exercise veto power over unacceptably risky transactions. The risk manager served mainly an advising and policing role.

Enterprise risk management involves a vast expansion of the management of risk and of the risk manager’s role along several dimensions.

First, by 1995, corporate leaders, along with regulators and legislators, became acutely aware of the range of risks that companies faced. Traditional risk management had focused almost exclusively on credit and market risks. However, the unexpected collapse of Barings Bank in 1995 due to the unauthorized trades of a single rogue employee, Nick Leeson, showed a kind of risk that resulted from inadequate management oversight. Suddenly, the concept of operational risk was born. When Shell Oil was seriously damaged the same year in an environmental controversy over the disposal of an oil storage facility, the Brent Spar, in the North Sea and a human rights controversy in Nigeria over the execution of the activist

Ken Saro-Wiwa, the concept of reputational risk gained currency. These kinds of risk were joined by legal risk, regulatory risk, and even strategic risk, which is the risk that a company might fail to achieve the objectives of its strategy. Since achieving the objectives of a strategy is the overarching task of management, categorizing this as a risk made risk management central to business decision-making.

One dimension of ERM, then, is its *comprehensive* nature: virtually all adverse conditions that could affect a company's performance have come to be labeled risks and made into a subject for risk management. Michael Power has described this expansion of scope in the concept of risk as "the risk management of everything."⁶ Virtually everything that top executives have traditionally been concerned with, and many things they had not, have now become conceptualized as risks to be managed.

Second, ERM recognizes that risks do not occur in silos but interact with each other in a complex dynamic process. Therefore, the management of all risk cannot be undertaken in silos or in a piecemeal manner but must be considered together in an *integrated* fashion.

Third, ERM is no longer a specialized function of low-level risk managers but a task for the C-level officers and the directors of a firm. Indeed, many companies have created the office of chief risk officer to aid the CEO, CFO, and the board in placing risk management at the center of corporate decision-making.

So, ERM is different from traditional risk management in that it treats risk in a comprehensive and integrated manner at the highest level of decision-making. In the past 15 years, since 1995, ERM has spread from financial firms, where it originated, to large corporations in virtually every industry.

Enterprise risk management should not be regarded as a single phenomenon that is conceived and practiced in the same way in all organizations. However, the definition offered by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) nicely captures the essence. A 2004 COSO report, *Enterprise Risk Management — Integrated Framework*, defines ERM as follows:

Enterprise risk management is a process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.

This report further identifies eight interrelated components of ERM, which are:

- **Internal Environment** — The internal environment encompasses the tone of an organization, and sets the basis for how risk is viewed and addressed by an entity’s people, including risk management philosophy and risk appetite, integrity and ethical values, and the environment in which they operate.
- **Objective Setting** — Objectives must exist before management can identify potential events affecting their achievement. Enterprise risk management ensures that management has in place a process to set objectives and that the chosen objectives support and align with the entity’s mission and are consistent with its risk appetite.
- **Event Identification** — Internal and external events affecting achievement of an entity’s objectives must be identified, and risks and opportunities must be distinguished. Opportunities are channeled back to management’s strategy or objective-setting processes.
- **Risk Assessment** — Risks are analyzed, considering likelihood and impact, as a basis for determining how they should be managed.
- **Risk Response** — Management selects risk responses — avoiding, accepting, reducing, or sharing risk — developing a set of actions to align risks with the entity’s risk tolerances and risk appetite.
- **Control Activities** — Policies and procedures are established and implemented to help ensure the risk responses are effectively carried out.
- **Information and Communication** — Relevant information is identified, captured, and communicated in a form and timeframe that enable people to carry out their responsibilities.
- **Monitoring** — The entirety of enterprise risk management is monitored and modifications made as necessary.

These eight components should be carried out across the four functions of strategy development and implementation, operations, reporting, and compliance, and across all levels of the organization—at the entity, division, unit, and subsidiary levels.

Now that we have dealt with the “what” question — what is enterprise risk management? — we can turn to the “why” question — why has ERM become so prominent in business?

One answer is the straightforward economic argument that the hazards facing corporations today — and indeed the whole of society — are significantly more likely and more serious than in the past and that ERM is simply a rational organizational response to this more threatening environment. As the experiences of Barings and Shell illustrate, companies can be destroyed or severely damaged by unexpected events that lie outside normal business concerns.

Financial journalist Benjamin Hunt remarks:

What was very odd about the 1990s was that, rather suddenly, managers became much more anxious about the worst thing that might happen to their company. They felt more exposed to risk. They became more preoccupied with risks such as total loss of reputation. Executives began to worry about the “risks that kept them awake at night.”⁷

According to Hunt, business leaders were internalizing the increased, possibly irrational, fears of the public and also responding to a societal demand to be more responsible and accountable. Hunt continues:

Managers now share a society-wide perception that life is more risky, uncertain and unpredictable. Like society, they feel more exposed to risk. But at the same time, they feel they must show responsibility for managing risk because they are on the defensive about appearing to be reckless and irresponsible.⁸

In addition, advances in technology have enabled experts to control risks more effectively, which lead people, in turn, to expect more safety measures. Ironically, greater safety leads people to demand even more of it.

This economic argument — that ERM is a rational response to real risks — has been expanded by sociologists. In his 1997 book *Culture of Fear*, Frank Furedi argued that we live in a culture of fear that is due not so much to an increase in actual dangers but to a greater awareness of hazards and to societal demands for greater safety. Furedi was popularizing the more theoretical work of the sociologists Ulrich Beck and Anthony Giddens, who developed, in the 1990s, the concept of the “risk society” in which people are obsessively concerned about safety and the future.⁹ This development, they contend, is a response to the insecurities created by modern industrial civilization which not only produces some new, man-made hazards but also removes many protections against adversity provided by traditional society.

This economic and sociological argument is not very persuasive. For starters, the world did not suddenly become a more dangerous place in the 1990s; arguably, people in developed countries face less risk today than at any time in history. Because of credit and market risk, business has always been a perilous endeavor, with the possibility of bankruptcy ever-present in capitalism, as reflected in Joseph Schumpeter's concept of creative destruction. And even if people perceived greater hazards and demanded greater efforts at control, it is unclear how these forces could have moved business organizations to act so decisively and quickly in the mid-1990s. ERM was not accepted grudgingly in response to societal pressures or to managers' own fears; there had to have been more powerful forces at work.

My account has two strands. One strand involves a recent transformation in how financial institutions — chiefly banks but also corporations in other industries — are regulated. And the other strand involves the creation of means for managing risk in ways that create profit-making opportunities for banks within this new regulatory system. These new means for managing risk represent financial innovations that have been made possible by technological advances in information technology. The reason why the rise of ERM can be dated fairly precisely to 1995 is that at this point in time three forces converged: technology, regulatory change, and financial innovation. The transformation in the regulatory system, which was facilitated by technology and the possibilities of technology-facilitated financial innovation, converged to create enterprise risk management.

The transformation in regulation in the 1990s can be described as a shift from a rule-based system to a risk-based system. Under a rule-based regulatory system, there is, first, a sharp distinction between the regulator and the regulatee. The regulator is typically a government agency and the regulatee is a business entity that poses some risk to the public. Second, the government regulator typically operates by formulating and enforcing detailed rules for the conduct of the business regulatee.

Banks have traditionally been in the business of pooling the funds of savers, making loans to borrowers, and deriving income from loan fees and the spread between the interest paid to savers and the interest received from borrowers. (This business model has been described as the 3-6-3 rule: Take money from savers at 3 percent; loan it to borrowers at 6 percent; and be on the golf course by three o'clock.) The risks in this process are mainly the credit risk that borrowers may default and the market risks that may result from a change of interest rates or a decline in the value of loan collateral. There is also the risk that a bank may collapse with a loss of the savers' deposits. Since the bank is in the position of borrowing short and

lending long, they also incur the risk that too many savers might demand their deposits back at the same time in a classic run on the bank.

For the most part, the risks in traditional banking have been borne by banks, with their earnings on the process being a reward for the risks assumed. And the aim of government regulation has been to ensure, by means of detailed rules, that banks are able to bear this risk by observing sound investment and loan practices and maintaining adequate capital. In assuming much of the risk inherent in banking, the banks serve an intermediary function that benefits society.

There are obvious drawbacks to rule-based regulation, especially in the finance industry. Detailed rules are difficult to formulate and enforce for such a complex activity as finance, and it is a challenge for regulators to keep pace with innovation and to obtain information about a bank's conduct for enforcement purposes. By setting up an adversarial relationship of regulator-regulatee, banks have little incentive to cooperate in their own regulation; indeed, they have an incentive to obstruct and obfuscate. Moreover, rule-based regulation addresses mainly traditional credit and market risk and is not well suited for the emerging category of operational risk, which is not easily controlled by externally imposed rules.

In response to these drawbacks, risk-based regulation has now become the norm in banking. In risk-based regulation, organizations actively participate in their own regulation through systems of internal control, thus erasing the sharp distinction between regulator and regulatee and easing the adversarial relationship. Second, instead of following detailed rules set by others, organizations assess their sources of risk and develop control systems that enable managers to identify, measure, monitor, and respond to the risks taken. Risk-based regulation thus becomes integral to a firm's management decision-making processes and strategy formulation and implementation rather than an externally imposed, non-management constraint. The role of the regulator is mainly to oversee the development and operation of firms' systems of internal control and ensure their effectiveness and adequacy.

Aside from these obvious advantages of risk-based regulation, it has two additional benefits. First, it provides flexibility in allowing firms to select their own level of risk as long as greater risks are offset by more stringent controls or other safeguards. For example, a bank may be allowed to have a more risky portfolio if it has good control systems. Alternatively, a bank might be permitted a lower level of capital if it can demonstrate that its risks are well controlled. Second, risk-based regulation "normalizes" adverse events by recognizing that they cannot be prevented entirely

and may occur even with the best efforts at control. When they do occur, adverse events are more acceptable if regulators and the public are confident that good control systems were in place.

The shift from rule-based to risk-based regulation has been promoted by a number of prominent organizations in influential reports, often issued after major scandals or crises. In the United States, COSO was formed in 1985 to support the National Commission on Fraudulent Financial Reporting (commonly known as the Treadway Commission), which was charged with investigating a spate of accounting scandals. The 1987 Treadway Commission report recommended that greater attention be given to the development and assessment of internal controls, which include the culture of the organization — specifically, its “ethical tone” — and to the responsibility of executives and boards of directors in systems of internal controls. Subsequently, stress on internal controls has been central to the 1991 Federal Sentencing Guidelines for Organizations and the 2002 Sarbanes-Oxley Act, which requires in the controversial Section 404 that public companies verify the adequacy of their internal control systems. In Britain, the 1992 Cadbury report, titled *Financial Aspects of Corporate Governance*, and the Turnbull report on internal governance, first issued in 1999, provided strong support for risk-based regulation. And similar support was provided in Canada by the Dey Committee report of 1994.

The strongest force in support of risk-based regulation in banking worldwide comes from the Basel II Accord, first issued by the Basel Committee on Banking Supervision in 2004, which seeks to provide uniform guidance for banking regulators in every country in determining the minimum amount of capital needed by banks. Basel II requires that banks develop sophisticated risk models that are followed within the bank and overseen by regulators. The guiding idea of Basel II is that the required level of capital should be proportional to the riskiness of a bank’s portfolio. The accord also places particular stress on operational risk, which it defines as “The risk of loss resulting from inadequate or failed internal processes, people and systems or from external events.”

With the shift from rule-based to risk-based regulation, enterprise risk management developed as the managerial response by categorizing virtually all management concerns as risks to be managed and by assigning responsibility for risk management to the highest levels of decision-making. Internal controls, which were once the domain of separate specialists in different low-level functional areas suddenly became a comprehensive, integrated function for C-level executives, which, as mentioned, may include a chief risk officer.

Michael Power, in his book *Organized Uncertainty*, notes that “in a relatively short period of time, the private world of organizational control systems has been turned inside out, made public, codified, standardized, and re-categorized as risk management.”¹⁰ Power further notes that risk management has become a complete system of regulation that no longer requires the active involvement of government agencies except in an oversight role; the organization becomes both the regulator and regulatee. He writes: “The rise of internal control and its re-designation as ‘risk management’ represents a ‘grand narrative’ of control. As a source of self-evident, self-supporting authority, the concept of internal control now substitutes for the state.”¹¹

We now have half of the account for why enterprise risk management was suddenly adopted by financial firms and by companies in other industries: it is a management response to a new risk-based system of regulation. The other half of the account addresses the profit-making opportunities in ERM.

Traditional banking, in which banks act as intermediaries between savers and borrowers, has a reputation as a rather stuffy, dull enterprise that is mildly, but not wildly, profitable. Its main task is to manage the risks of the banking process. As J. P. Morgan once said, “The fact is that bankers are in the business of managing risk. Pure and simple, that is the business of banking.”¹² The trouble with managing risk is that it’s risky. If the risk can be reduced while collecting the same fees and interest payments on a loan portfolio, then a bank can lend more and consequently earn more on its capital. If it can employ its capital in making loans and trading while not carrying the risk of loans on its books, then a bank can earn even more. This, in a nutshell, is what has happened in the current financial crisis.

The ability of banks to earn more on their capital was facilitated, starting around 1995, by two related developments, both involving ERM. One development was more precise and accurate methods for measuring risks, and the other was new financial instruments for managing them. Although a number of more precise and accurate methods of measuring risk have been developed, the greatest attention has been focused on value at risk (VaR), and I will confine my discussion to this one method.

Value at risk is an amount expressed in monetary units of the maximum amount that can be lost in a portfolio on a given day over a period of time within a certain degree of probability, usually one percent or less. For example, VaR may provide information that with a probability of 99.5 percent, the most a bank can lose on any given day in a 30-day period on a \$1 billion loan portfolio is, say, \$50 million. This information may be used, then, to determine whether this amount at this degree of probability represents an acceptable level of risk for the firm. The usefulness of VaR lies in the feature that it is a single quantitative figure that can be applied across the whole spectrum of an organization's risk exposure to provide a sharp "bright line" test. Any single transaction or a firm's whole portfolio may be approved or not depending on whether the VaR is above or below a certain number. Although simple in concept, the mathematics behind VaR is quite complex, and the initial development of the measurement and the necessary computer programs were once closely guarded as proprietary information. The use of VaR did not become widespread until 1993 when J. P. Morgan published a lengthy document titled RiskMetrics that disclosed the methodology in detail to the world.

VaR is widely criticized for contributing to the current financial crisis, first by giving a false sense of security that may have encouraged excessive risk taking, although, used with care, VaR can also help managers to spot potentially hazardous trends.¹³ Second, VaR may have contributed to the crisis by leading decision-makers to ignore low-probability, high-impact events that should be the focus of risk management. Nassim Taleb popularized this criticism in his book *The Black Swan*, where he also noted the difficulty — if not impossibility — of calculating precise probabilities of events far from the center of a normal distribution curve, especially without using historical data over very long periods of time.¹⁴

Third, VaR does not typically measure liquidity risk, which was encountered in the current financial crisis. A firm such as Bear Stearns that requires daily turnover of its debt may easily calculate the risk that interest rates might rise but not the risk, which actually occurred, that it could not obtain loans at any price due to a lack of confidence in the borrower. Fourth, VaR takes no account of correlations when events, such as housing foreclosures, are related, or of mass actions, as when a great many people respond to events in the same way. This occurred in the 1987 stock market crash when large numbers of traders, using computer programs for portfolio insurance, attempted to sell at the same time. Fifth, VaR can be gamed by traders who load up on securities that have small but positive returns most of the time but could incur large losses in extreme cases — beyond the cut-off point.

A sixth and perhaps the most significant point of criticism is that VaR calculates only the specific risk of a firm's own portfolios and not the systemic risk for the whole economy. As Richard Posner observes in his recent book *A Failure of Capitalism*:

The essential point is the difference between a 1 percent probability that a firm will go broke, because of risky lending, and a 1 percent chance of a depression because the lending financial firms have a correlated 1 percent risk of going broke. The toleration of the risk is rational for each firm, irrational for society.¹⁵

Posner's observation cites not only the risk of correlation — for example, the failure of one broker-dealer such as Bear Stearns or Lehman Brothers would have posed little risk to the economy if every other financial firm had not also been in perilous condition and thus unable to absorb the loss — but also the fact that VaR is calculated only by firms with regard to their own specific risk, not to the systemic risk for the whole economy.

In sum, more precise and accurate measures of risk such as VaR encouraged the adoption of ERM by enabling financial firms to utilize their capital more fully and seek a high level of returns with greater confidence that they were doing so at acceptable levels of risk. In addition, risk was being controlled in ways that could be demonstrated to regulators and the public, so that these firms could simultaneously be more profitable and also meet demands for greater responsibility, accountability, and transparency. Banks could say, "Yes, we are making more money, but we are doing so safely!"

The second factor that facilitated the adoption of ERM was the development of new financial instruments that were possible only with better risk management. The "remarkable story of risk" as told by Peter Bernstein consists not only of the discovery of quantitative measures of risk (that is, statistics) but of financial instruments, such as insurance, that utilize these measures. For many decades, financial firms and corporations in many industries have used not only traditional insurance and hedging investments but also such instruments as futures, options, swaps, and other derivatives to manage risk. But in the 1990s, financial innovation yielded a number of highly ingenious and complex — some would say opaque and convoluted — financial instruments. Chief among these new instruments, which are commonly blamed for the current financial crisis, are collateralized debt obligations (CDOs) and credit default swaps (CDSs). Both of these instruments were used in efforts to realize gains by transferring risk to parties that could handle it more efficiently.

To understand the link between these new instruments and enterprise risk management, consider the situation of a bank which holds a portfolio of loans. As I have already noted, in traditional banking, the bank bears the risks associated with loans in return for the interest payments and the fees these loans generate. Now, suppose a bank wants to make even more money. How can this be done? Two ways readily suggest themselves. First, the bank can sell the loans to another party and use the proceeds to make more loans or else engage in trading. Second, the bank can insure the loans, thus making them less risky so that the bank needs less capital held in reserve and, again, can make more loans or else use its capital for trading.

The first option, of selling the loans, leads to CDOs, in which a large number of loans are combined into a single security, which may then be divided into strips and tranches. When these CDOs are sold, the risks of the loans are transferred to other investors. In theory, the higher tranches of a CDO are of higher quality than the individual loans. So even if they are retained by the bank, they are less risky than the underlying loan portfolio, so that the bank can take on more debt for its level of capital. The second option, of insuring a bank's loan portfolio, is done by buying credit default swaps, which are essentially insurance policies that compensate the lender in the event of default by the borrower. Since the bank is compensated in the event of default, the risk has, again, been transferred, in this case to the firm selling the swap.

In theory, a bank should not be able to make any money in issuing CDOs or in buying CDSs except under two conditions: In selling its loan portfolio to other investors, a bank is also selling the revenue the loans generate, and other investors would not ordinarily be willing to pay more for the loan portfolio than its value to the bank adjusted for risk. Similarly, a firm selling a credit default swap will charge a premium that should exactly equal the compensation that a bank would otherwise receive for assuming the risk of a loan portfolio. In both cases, risk is being transferred, but if it is being transferred at cost, there is no money to be made; the transaction is a wash.

The first of the two conditions under which money can be made from CDOs and CDSs is that the party to whom the risk is being transferred can bear that risk more efficiently and thus would demand less compensation for bearing the risk. This is the theory behind these two financial instruments: with CDOs the risk of a loan portfolio is transferred from relatively undiversified, risk-averse banks to well-diversified, risk-tolerant investors worldwide, who collectively constitute the whole financial market. Because the strips and tranches of CDOs represent finely

tuned combinations of risk and reward, investors can match them precisely to their risk and reward profiles. Consequently, investors worldwide can assume the risk of a loan portfolio more efficiently and thus will demand less of a risk premium. This is the virtuous condition under which money can be made.

The other condition under which CDOs and CDSs can make money for banks is also, unfortunately, the condition which obtained in the current financial crisis. This condition is that the parties to whom the risk is transferred underprice the risk — that is, miscalculate the degree of risk and consequently demand less than they should to assume it.

But is it ethical to transfer risk under this condition? The goal of any trader in a market is to find the buyer who values an asset more than anyone else or who has a lower assessment of the risk or both. And even if that buyer is mistaken, the buyer's loss is still the trader's gain, and the buyer has no one to blame but himself. That's how markets work, and the result is generally accepted as just so long as there is no fraud. If there is "irrational exuberance" in the market, as Alan Greenspan famously opined, is it unfair for a less optimistic trader to take advantage of it? In a normally functioning market, mistakes in valuation will be punished harshly, but the losses will accrue to those who made the mistakes, which seems only fair.

This argument assumes that the market will still clear; that every party will meet its obligations, and that the gains and losses will be allocated accordingly. This is not what happened; the markets, instead, froze up, creating a systemic risk. The relevant ethical point is that the parties to these transactions were not merely putting themselves at risk (which is morally acceptable and, indeed, what trading is all about) but creating systemic risk that affected everyone, including themselves but also investors around the world with no direct exposure to the U.S. market.

This creation of systemic risk raises two ethical questions. One is whether the creation of systemic risk could have been reasonably foreseen, which is a necessary condition for blame. And the second question is whose responsibility it is to avoid systemic risk. Thus, even if a bank is aware that it is creating systemic risk, is it morally permissible to do so in the belief that it is the responsibility of government regulators to worry about systemic risk and that financial firms are morally free to engage in transactions within the rules set by regulators? This question of whether the only obligation of business is to play within the rules of the game set by others, as famously argued by Milton Friedman, is central to the whole debate in business ethics about corporate social responsibility.¹⁶

In general, managing risk is a good thing to do. We don't want businesses — or government or any other organization, for that matter — ignoring or, worse, taking excessive risks. The main ethical questions about enterprise risk management are, first, whether it can deliver on its promises and, second, whether risk management ought to be elevated to comprise virtually the whole of decision-making in an organization. That is, what are the consequences — the gains and losses — of this recent development? On balance, are we as a society and a business system better or worse off for the rise of enterprise risk management?

The question of whether ERM works and delivers on its promises can be examined from the two perspectives of organizational decision-making and regulation. That is, is ERM an effective decision-making framework for organizations, and can it be an effective basis for the kind of risk-based regulation that has been adopted in Basel II and other regulatory schemes? This is obviously a very complex question about which a great deal could be said. I will make only two brief points.

First, insofar as risk management is applied to very low-probability events — the once-in-a decade or once-in-a-century disaster that can literally destroy an organization — the very sophisticated models that are employed may not give adequate guidance to decision makers. Models must employ historical data, which yield reliable probabilities about frequently occurring events, but the kind of extraordinary events that ERM is intended to manage not only lie at the extremes of normal distribution curves but may not be on any curve at all because the events are so rare. Indeed, they may never have occurred before and may even be scarcely imaginable. Peter Bernstein asks, “How can we instruct a computer to model events that have never occurred, that exist beyond the realm of human imagination?” These events are the black swans that Nassim Taleb describes in his book by that title, or the “fat tails” that are noted by others.

In particular, extremely rare events cannot be usefully quantified by value-at-risk calculations, which stop at the 99 percent or at the 99.5 or 99.9 percent level. A firm may be confident that the maximum amount it can lose with, say, a 99 percent degree of certainty is acceptable, but the falloff from that amount to the maximum amount that can be lost in the remaining 1 percent range can be enormous. And VaR does not even attempt to measure the most extreme loss possible beyond a 1,000 days, so shouldn't an executive be concerned about what might happen in 1,001 or 2,000 days?

In his book *Plight of the Fortune Tellers*, Riccardo Rebonato argues that it is not merely difficult to assign a precise probability to extremely rare events but actually meaningless, and that many managers who use the probabilities generated by

“quants” do not have sufficient understanding of statistics to appreciate this point.¹⁷ In Rebonato’s analysis, the misunderstanding results from the existence of two different conceptions of probability. Much of the statistics used in risk management are based on an understanding of probability as an objective frequency of the kind that occurs with repeated coin tosses. However, the interpretation of probability that is relevant to extremely rare events is the more subjective Bayesian view, in which probability is the degree of confidence that we attach to beliefs based on evidence. Whether the relevant sense of probability in risk management is objective or subjective, frequentist or Bayesian, is important in appreciating the degree of precision in statistical calculations and in exercising a proper degree of caution in using these calculations in decision-making. His point is that although objective frequentist probabilities can be calculated with great precision and accuracy, subjective, Bayesian probabilities cannot and confusion can arise from treating Bayesian probabilities with the same confidence as frequency ones. Rebonato also reminds us that all calculations of probability are merely tools that should guide but not determine the decisions made.

Another way of putting this first point is in terms of Frank Knight’s famous distinction between risk and uncertainty in which risk involves an unknown outcome in a known distribution, while Knightian uncertainty occurs when even the possible outcomes are unknown and not merely their distributions. Only events that occur with some frequency can constitute risk in Knight’s sense; very rare events that cannot be part of a known distribution pattern are examples of Knightian uncertainty. As a number of writers observe, calculations of known unknowns may be mistaken, though they are reliable for the most part; but unknown unknowns are not calculable at all.¹⁸

Second, statistics, which underlies risk management, is based on two assumptions. One assumption is that calculations of probabilities are reliable because events are the result of an underlying causal system that may be imperfectly understood but is still orderly and determinative. The other assumption is that human action based on a knowledge of probabilities does not affect the causal system or its outcomes. Thus, the risk manager is like the meteorologist who forecasts the weather: predictions are fallible but still possible because of a certain orderliness, and when people carry an umbrella after a forecast of rain, their behavior can have no impact on whether it actually rains.

Some aspects of finance are like the weather. Thus, certain events involving stock prices, interest rates, and defaults may be very rare, but their occurrences still fall along a distribution curve; and this distribution is due to the working of the laws of economics. Consequently, risk management is possible for many credit and market risks. However, when risk management is expanded to include operational risk and reputational risk, the events in these categories are not always distributed along any distribution curve for the reason that the events are *sui generis*, one of a kind, and do not result in repeated forms from some underlying causal order. They are essentially historical rather than physical events. Predicting such events in finance is like making predictions about weather conditions that are due to a catastrophic meteor crash or to the effects of unchecked carbon emissions. Such forecasts are not commonly included in the evening news.

In addition, in finance, unlike in meteorology, people acting on the basis of a knowledge of probabilities can affect the outcomes. Stable markets are like the weather in that there are so many actors with different aims and motives that one person's actions cancel out the acts of another so that fluctuations in prices are essentially random, like Brownian motion in physics. In times of crisis, however, large numbers of market actors may respond to events in the same way, thus creating extreme movements that could not have been predicted using standard statistical analysis. As Jon Danielsson observes:

In normal times people act individually, some are selling while others buy. In contrast, during crisis people's actions become more similar, there is a general flight from risky assets to safer properties. Herding instincts cause people to behave in a similar way. . . . Hence, a model created in normal times may not be of much guidance in times of crisis.²⁰

If low-probability, high-impact events are difficult to predict — or even if such predictions are meaningless, as Rebonato claims — then ERM might still be of considerable use for the more common, frequently occurring risks. The danger here is that ERM, which is designed to help managers protect against the “risks that kept them awake at night,” becomes focused instead on less serious matters for which data is easier to obtain. Michael Power describes this shift as a kind of “displacement,” in which the scope of risk management is limited by what risk managers can report to their superiors rather than by what really threatens the organization.²¹ This displacement is similar the joke about the drunk who lost his keys in the bushes but is looking under the street lamp because the light is better there.

Further, any failure of ERM to provide much help in managing low-probability, high-impact events undermines the legitimacy of the enterprise and fuels the suspicion that it serves the ideological purpose of maintaining the illusion of control and security. One explanation for the development of ERM, previous noted, is that the public demands that risks be managed, and so the key institutions in society must at least give the impression that this task is being addressed competently, whether it is or not. If some risk simply cannot be managed, then publicly stating this fact is a more honest but politically hazardous course of action.

I turn, finally, to the question of whether ERM is, on the whole, a beneficial development, which is obviously another large question that can be addressed only briefly.

First, some critics charge that ERM creates a false sense of security that itself can be a source of risk. Peter Bernstein, the author of *Against the Gods: The Remarkable Story of Risk*, wrote an article in the *Harvard Business Review* titled “The New Religion of Risk Management.” In it he wrote, “We must consider the possibility that the whole process of breaking free from the Fates has turned us into slaves of a new kind of religion, a creed that is just as implacable, confining, and arbitrary as the old.”²² Part of Bernstein’s complaint is an uncritical reliance on sophisticated computer models. He continued:

Those who live by the numbers may find that the mathematically inspired techniques of modernism have sown the seeds of a destructive technology in which computers have become mere replacements for the snake dances, the bloodlettings, the genuflections, and the visits to the oracles and witches that characterized risk management and decision-making in days of yore.²³

With a false sense of security, traders and executives may be willing to take great risks with the mistaken confidence that transactions are near but not past the limits of acceptability. The seeming precision and accuracy of tests such as VaR provide credible evidence to investors and the public that a financial firm is aggressive yet responsible, and they also serve as a plausible defense for managers when a firm gets into serious difficulty. A contrary position is taken by Benjamin Hunt in *The Timid Corporation* and Daniel Ben-Ami in the book *Cowardly Capitalism*.²⁴ As these titles suggest, both authors argue that the focus on risk management has made managers unreasonably risk-averse and created an economic system in which innovation and growth are hampered by excessive caution and self-restraint.

Second, ERM systems must be well designed and implemented to achieve the desired result. One condition for success, in particular, is that risk be managed properly. There are basically eight ways of managing risk: it may be borne, avoided, reduced, shared, shifted, pooled, hedged, or diversified away. So a risk manager must first choose one or more of these eight means and ensure that the risk is effectively avoided, reduced, shared, etc. In the current financial crisis, many mistakes of this kind were made in the management of risk.

The theory behind collateralized debt obligations is that in the securitization process, the risk of a loan portfolio is diversified away by being transferred to the whole market. The mistakes of the mortgage originators, the broker-dealers, and the major commercial and investment banks were, first, keeping some of the higher AAA-rated tranches that they thought were exceedingly safe; and second, selling the CDOs to investors who mispriced the risk and took losses. They no doubt thought that once the CDOs were sold they were safe because the risk was largely off their books. However, the once-unimaginable possibility that the higher AAA-rated tranches could decline in value became a reality. Furthermore, the losses to other investors prevented them from fulfilling their own obligations and from providing the liquidity that the mortgage originators, broker-dealers, and banks depended on for short-term financing. Thus, Countrywide, Bear Stearns, Lehman Brothers and the like, which had to roll over their debt daily, found that either no one in the financial markets was willing to lend to them due to uncertainty about these firms' assets or no one was able to lend to them due to the lack of capital among lenders. In short, the firms producing CDOs thought they had transferred all their risk, but they had transferred it imperfectly so that it came back to them in unexpected ways.

Similarly, credit default swaps are instruments for transferring risk to a party willing to bear it. Like CDOs, CDSs can create wealth through more efficient ways of bearing risk. Absent that, the gain to the insured party depends on mispricing in which the insuring party underestimates the proper risk premium and suffers a loss. Again, this is of little consequence as long as the insuring party can bear the losses and still fulfill all obligations. In the current financial crisis, most of the credit default swaps were sold by one company, AIG. This had the effect of concentrating rather than diversifying the risks of banks' loan portfolios, and when AIG was unable to meet its obligations in settling claims on the swaps, the effects washed back on the banks that had bought the swaps to insure their loan portfolios. (Other firms without a direct insurable interest also purchased CDSs to hedge their exposures to the banks in question, as well as to make pure gambles; they were

affected as well.) Thus, banks that sought to transfer risk found that it had returned to them in an unexpected way. What they had failed to anticipate was that an AAA-rated insurance company would ever become insolvent.

Third, to the extent that risk management comes to comprise corporate decision-making, ERM involves an assignment of responsibility and accountability for making risk decisions, as well as an allocation of the risk of corporate activity, all of which are normative matters. Overall, it is probably a beneficial development that the C-level executives and the board assume responsibility for risk since they hold the greatest power and have the greatest visibility in otherwise faceless corporations. For example, the provisions of the Sarbanes-Oxley Act that require CEOs and CFOs to sign off on certain corporate reports are intended to assign responsibility for preventing fraud to these officers and to provide a basis for holding them accountable. Similarly, the creation of the position of C-level chief risk officer focuses responsibility and accountability for risk management and emphasizes its importance. The possible downside of the CRO position is that it may remove responsibility and accountability from other members of the organization and create a scapegoat in the event of failure in the risk management system.

When risk management is achieved by voluntary transactions — as when a company shares or shifts or hedges or, in any other manner, transfers risk with the consent of other parties — then there are few ethical problems about the allocation of risk. However, it is possible to manage risk in ways that other parties are forced to assume greater risk involuntarily and sometimes unknowingly.

For example, when banks originated loans that they planned to sell off in CDOs, they lost an important incentive to protect borrowers from assuming unsuitable loans. The protection that banks had previously provided was part of the intermediary function that banks had traditionally served. In the transition from traditional to modern banking, a phenomenon called “disintermediation” occurred, in which the responsibility for managing borrowers’ risk was transferred to borrowers themselves and to the investors in debt-backed securities. Borrowers and investors were not commonly aware of this transfer and did not voluntarily consent to it, and some losses no doubt occurred as a result.

Jacob S. Hacker in his book *The Great Risk Shift* argues that in the past few decades, government and corporations have abandoned the risk-bearing functions that they have long served and shifted a wide variety of risks to individuals, thus creating greater insecurity in society.²⁵ The subtitle of his book is revealing: *The Assault on American Jobs, Families, Health Care, and Retirement — And How You Can Fight Back*.

Fourth, to conclude on a more positive note, ERM is a possible vehicle for corporations to satisfy the pressures on them to be more ethical and socially responsible. The categories of operational and reputational risk, in particular, provide a framework within which ethical and social issues can be registered in the core decision-making processes of a company and be considered at the highest levels of authority. Thus, in ERM, the misconduct of a Nick Leeson, the rogue trader who destroyed Barings Bank, and the environmental and human rights issues that confronted Shell Oil Company are conceived through the lens of ERM not as peripheral matters for management attention but as central tests of managerial competence. Stakeholders and their interests, which were also once peripheral to management concerns, assume a more central role in corporate decision-making when they are viewed as important to risk management. Michael Power writes that “risk and the organizational imperative to manage it appear . . . to be able to internalize external interests and align them with corporate imperatives in a way that was previously impossible. Risk is the basis for corporations to process morality.”²⁶

Much can be said about the ethics of risk management. I feel that I have barely scratched the surface. However, given the little attention that the ethical aspects of this otherwise well-covered subject have received, I hope that I have made a fair start. The students in this audience will be entering a business world that is different in many ways from that of 15 years ago, and one difference is the development of enterprise risk management. Whether ERM is a fad or an enduring change remains to be seen, but I hope that my comments have increased your awareness and understanding of this development and prepared you to deal with it in your career.

Thank you for the opportunity to serve as the Verizon Visiting Professor at Bentley and to speak with you today and in the week to come on this important and timely topic.

Below are highlights of John Boatright's question-and-answer session with Bentley University students, faculty, staff, and guests.

The need to manage risk confronts not only banks but also manufacturers in ensuring that their products are safe. How would you compare the challenges of risk management of the banks in the current financial crisis to those encountered by, say, Ford in the case of the Pinto automobile?

JOHN BOATRIGHT: I think the Ford Pinto situation is simpler in comparison to the ethics of enterprise risk management because clearly there was a responsibility on the part of Ford to produce safe cars. The problem for Ford was: how do you know whether a car has a defect? The same question has arisen more recently in the case of Toyota and the problem with their cars' accelerators. Auto accidents occur due to a variety of causes. While some accidents might indicate a design defect, others do not. So we need to look at the data and determine whether indeed there is a problem. My understanding is that the officer at Ford who was responsible for determining the design maintains to this day that if objective observers looked at the data Ford had, they would make the same decisions. The same point can be made about value at risk or VaR: an article on VaR by Joe Nocera in the *New York Times* pointed out that on Wall Street, Goldman Sachs is credited with having seen the problem in the real-estate market, in part because they did use VaR, but they didn't just go by the numbers. What they looked at was the trend, and even though the numbers looked fairly good, they were trending downwards. So they asked, "What's the cause of this?" After a lot of brainstorming and research it was determined that the housing market was likely to fall considerably. The point is that it's not only the models that you use, but how you interpret them. Some looked to VaR and thought the market was just great, that their risk was relatively minor. Others, like Goldman Sachs, saw a problem from the same VaR data.

In the case of Ford, their responsibility for safety is very clear. I think one of the problems in the current financial crisis is that the responsibility has shifted. So, when banks began investing in collateralized debt obligations (CDOs) instead of originating mortgages that they would hold on to until maturity, they had little incentive to look at the creditworthiness of borrowers. Their attitude was, "That's not our responsibility because now the ultimate investors who buy these, and the rating agencies, are the ones who are supposed to assess the quality. We simply make the loans." There's nothing wrong with subprime loans under ordinary conditions. Most of the borrowers are not going to default. As long as we know

what the default rate is, we can then price and sell the securities accordingly. This will permit many people to get loans who otherwise would not be able to obtain homes. So I think there's a great benefit in securitization. But to transfer responsibility from the bank to the rating agencies and ultimately to the investors is problematic. Banks serve a role of intermediation whereby they assume the risk and also monitor that risk. That has now been essentially transferred to fund managers — the people who manage pension funds and mutual funds, and so on. The trouble is these fund managers failed, partly because of the failure by the rating agencies, but also I think because they didn't quite realize that they now had that responsibility. The problem we're dealing with may be a temporary one in that as responsibility is transferred, the responsible parties come to better recognize the change and then are able to effectively bear their responsibility.

There were examples in the press of banks loaning people money to buy an \$800,000 home when they were only earning about \$20,000 per year. I know the press sometimes finds the most radical examples, but should ERM have caught that sort of thing?

JOHN BOATRIGT: Let's back up. Certainly there was a great deal of predatory lending and also predatory borrowing, so I don't want to defend the most extreme cases. However, let's not be too quick to criticize the activities of the banks. Let's look at it from the point of view of the borrower. If one has a certain income and a house costs a certain amount — the ratio of house price to income used to be about 3 to 1. Then it moved up to 4 to 1, 5 to 1, and peaked, in some cases at 6 or 7 to 1. Who's to say whether I can really afford that house? As the homebuyer, I'm looking at this house as a kind of investment. I want to make some money off of it, so what's the worst that could happen? Probably the worst that could happen is that if this is a balloon loan, the payments will increase later on. However, if I'm doing well in my job, I'm going to be earning more in the future, so that isn't necessarily a problem. Furthermore, normally we expect that the house is going to increase in value over time. Therefore, if need be, I can refinance, to pay down the loan. Or the worst-case scenario is I can sell the house, because typically we expect the house to gain in value over time. From the point of view of the individual buyer, this was a reasonable gamble on the direction of housing prices. It was also expected that some home loans would fail. The percentage might even be as high as 20 percent or 25 percent. It doesn't really matter. If we knew that these loans will fail, we should never have made them in the first place. But if out of 100 loans, we know that 25 will fail, but we don't know which 25, let's give a loan to all 100

people. Typically, the worst that could happen to those 25 is they would eventually have to sell their houses. If their equity increased, it would still have been a reasonable investment for them to make. And yet, the assumptions turned out to be faulty. Still, I would maintain that securitization provides a great benefit as it provides a basis for many people to get loans they couldn't get otherwise, either because of credit standards or because of the way credit is rationed by the bank. On the positive side, once we securitize mortgages, we have instruments that can draw from the whole world market. For example, we can get money from the Chinese to provide for home mortgages in the United States. So securitization can afford many advantages, but it turned out to be built on some mistaken assumptions. The models turned out to be faulty because so many people tried to sell houses at the same time. This led to a lack of liquidity and made it very hard for people to get loans. The source of the problem, then, was not so much loans that never should have been made but the fact that many assumptions on which the loans were made turned out to be mistaken.

You observe that one way of managing risk is to transfer it, thereby reducing one's own risk and increasing the risk to other parties. In the process of securitization, much of the risk of home mortgages was shifted from banks to homeowners and to people's pension and mutual funds. Is this kind of risk transfer or risk shifting ethical?

JOHN BOATRRIGHT: It is true that much of risk management involves risk shifting. Whether this is ethical depends mainly on whether the transfer is voluntary and advances the interests of the two parties. An individual who purchases a share of stock assumes a risk inasmuch as he or she becomes the residual risk bearer of a corporation. But the stock purchase is voluntary, and the individual assumes the risk in anticipation of obtaining a return. A common method of shifting risk is buying insurance, from which both the insurance company and the policy holder expect to benefit. Such win-win mutual benefit is possible because some parties can assume risk at lower cost than others. And one assumption behind securitization — whereby mortgages or other debt obligations are bundled together and sold to the market — is that the market can handle this risk more efficiently than the banks that held the loans initially.

Where securitization failed was in understanding the amount of risk being assumed by investors in the market and pricing this risk accordingly. Arguably, the banks which packaged loans and sold them as collateralized debt obligations were taking

advantage of the ignorance of the market, assuming that these CDOs would be mispriced. A defender of the banks might respond, who's to judge what is a correct price? This is a task for the market. Moreover, investors have responsibility for their own decisions and gain or lose depending on the quality of their judgments. When Lloyd Blankfein, the CEO of Goldman Sachs, was asked in a commission hearing to justify the fact that Goldman was shorting the very securities it was selling to investors, he responded that they were being sold to professional investors who could make up their own mind about the value. However, Phil Angelides, the chairman of the committee, responded that many of these "investors" were teachers and firefighters. Although their funds were being managed by professional investors, the losers were ordinary people who could not easily understand the risks that were being taken on their behalf.

Under normal circumstances, we can leave to the market judgments about what risks to assume and at what price. However, in the case of CDOs, there were good reasons to believe that the risks were being mispriced and that there would be great losses. In addition, the risks were not only great losses but also the collapse of the whole banking system. Although the full dimensions of the impact on the banking system could not have been easily foreseen, there was an awareness at the time that the banks were creating significant systemic risk that then would be borne, in the event of a collapse, by the taxpayers. Under these unusual circumstances, I would say, yes, that there is an ethical issue in securitization in that the banks were transferring risk to parties who could not easily understand the risk and who could be greatly harmed if the risk could not be adequately handled.

Thank you.

Endnotes

- ¹ Niall Ferguson, "Wall Street Lays Another Egg," *Vanity Fair*, December 2008.
- ² This point is well made in René M. Stulz, "Risk Management Failures: What Are They and When Do They Happen?" *Journal of Applied Corporate Finance*, 20(4) (2008), 58-67.
- ³ Peter L. Bernstein, *Against the Gods: The Remarkable Story of Risk* (New York: Wiley, 1996).
- ⁴ For the role of government in managing risk, see David A. Moss, *When All Else Fails: Government as the Ultimate Risk Manager* (Cambridge, MA: Harvard University Press, 2002).
- ⁵ Bernstein, *Against the Gods*, 77.
- ⁶ Michael Power, *The Risk Management of Everything: Rethinking the Politics of Uncertainty* (London: Demos, 2004).
- ⁷ Benjamin Hunt, *The Timid Corporation: Why Business Is Terrified of Taking Risk* (New York: Wiley, 2003), 83.
- ⁸ Hunt, *The Timid Corporation*, 84
- ⁹ Ulrich Beck, *Risk Society: Toward a New Modernity* (London: Sage Publications, 1992); Anthony Giddens, *The Consequences of Modernity* (Stanford, CA: Stanford University Press, 1990).
- ¹⁰ Michael Power, *Organized Uncertainty* (Oxford: Oxford University Press, 2007), 52.
- ¹¹ Power, *Organized Uncertainty*, 61.
- ¹² Stanley Buder, *Capitalizing on Change: A Social History of American Business* (Chapel Hill, NC: University of North Carolina Press, 2009), 143.
- ¹³ See, for example, Joe Nocera, "Risk Management: What Led to the Financial Meltdown," *New York Times*, January 4, 2009.
- ¹⁴ Nassim Nicholas Taleb, *The Black Swan: The Impact of the Highly Improbable* (New York: Random House, 2007).
- ¹⁵ Richard A. Posner, *A Failure of Capitalism: The Crisis of '08 and the Descent into Depression* (Cambridge, MA: Harvard University Press, 2009).
- ¹⁶ Milton Friedman, *Capitalism and Freedom* (Chicago: University of Chicago Press, 1962).
- ¹⁷ Ricardo Rebonato, *The Plight of the Fortune Tellers: Why We Need to Manage Finance Risk Differently* (Princeton, NJ: Princeton University Press, 2007).
- ¹⁸ See René Stulz, "Risk Management Failures: What Are They and When Do They Happen?" *Journal of Applied Corporate Finance*, 20(4) (2008), 58-67; and Philippe Jorion, "Risk Management Lessons from the Credit Crisis," *European Financial Management*, 15(5) (2009), 923-933.
- ¹⁹ This point is not in conflict with the "random walk" view, which holds that fluctuations in stock prices are essentially random because these are short-term movements caused by "noise" in the market around prices that are still determined by fundamentals.
- ²⁰ Jon Danielsson, "The Emperor Has No Clothes: Limits to Risk Modeling," *Journal of Banking and Finance*, 26 (2002), 1275.

- ²¹ Power, *The Risk Management of Everything*, 30.
- ²² Peter L. Bernstein, "The New Religion of Risk Management," *Harvard Business Review*, March-April, 1996, 47-51.
- ²³ Bernstein, "The New Religion of Risk Management," 51.
- ²⁴ Hunt, *The Timid Corporation*; and Daniel Ben-Ami, *Cowardly Capitalism: The Myth of the Global Financial Casino* (New York: Wiley, 2001).
- ²⁵ Jacob S. Hacker, *The Great Risk Shift: The Assault on American Jobs, Families, Health Care, and Retirement — And How You Can Fight Back* (New York: Oxford University Press, 2006).
- ²⁶ Michael Power, "Risk Management and the Responsible Organization," in *Risk and Morality*, ed. Richard V. Ericson and Aaron Doyle (Toronto: University of Toronto Press, 2003), 150.



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