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MIT Roundtable on Corporate Risk Management

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Photographs by Yvonne Gunner
Robert Merton: Good morning, I’m Bob Merton, and I want to welcome you all to this discussion. Our topic is corporate risk management, with perhaps a look at the implications for the current financial crisis. And I’d like to start by saying a few things that might help set the stage for our four panelists, who are all very interesting and accomplished people.

When we think about risk and risk management, everybody says it’s very important. When a firm or an institution goes down, a lot of people lose their jobs, assets change hands, and a lot of franchise value can be destroyed in the process. So risk management is important in the sense of protecting on the downside. But there’s also a common perception that risk management has very little to do with creating growth and value—that you’ll never get to the Fortune 100 just by having good risk management. And I think that’s a serious misunderstanding of what risk management is really all about.

Since this discussion is part of a conference on finance honoring Stew Myers, I think it’s important to keep in mind that if uncertainty and risk were not a major part of this branch of economics, you could teach the entire finance course in an afternoon. Valuation would come down to nothing more than the time value of money. You wouldn’t need any valuation models or financial instruments, and you wouldn’t have to worry about incentives or information costs or any of the other main concerns that now inform our theory of corporate finance. But, as I think most of us understand—and if you didn’t see this before, recent events have made it painfully clear—risk is a major driver of value in any financial market, whether it be the stock market, credit markets, real estate, private equity, or any of our derivatives markets.

Now, there are some interesting parallels between today’s financial environment and the early 1970s, when Stew and I and some of our colleagues were looking at the effects of risk on security values. And, with hindsight, it now seems clear why the innovations in derivatives and risk management started in the 1970s—and not, say, in the 1960s or the 1950s. It was the need, or demand, for these new instruments that gave rise to them. The demand I’m talking about came from the fact that, in the 1970s, we saw double-digit inflation and interest rates in the U.S. for the first time. We also had a huge oil price shock—and we had the breakdown of Bretton Woods, which meant that all the currencies started to float. The result of all this was unprecedented volatility in virtually all financial markets. And the effect of such volatility and uncertainty on corporate values was pretty dramatic: During the 18 months from the beginning of 1973 until August of ’74, the U.S. stock market lost roughly half its value in inflation-adjusted terms. That’s probably the largest decline for that short a period that we’ve ever experienced, even if you go back to the Great Depression.

The good news, though, is that this period of turmoil in our markets provided the stimulus for important advances in the theory and practice of financial risk management. And there were equally important developments in the field of corporate finance, including Stew Myers’s work on the cost of capital, capital structure, and the valuation of what Stew called “real options.” And one of the main lessons underlying all this pioneering work is not only that uncertainty and risk have important effects on value, but that corporate risk management can be used to increase the values of industrial companies as well as financial institutions. How do they do that? At the risk of front-running our panelists, let me just throw out the idea that, by offering firms and institutions protection against risks they have no comparative advantage in taking, risk management helps them expand their risk-taking in those areas where they do have a competitive advantage. Used in this way, risk management becomes a critical part of corporate strategy.

Now, let me take a moment to introduce each of our panelists—though I don’t think any of them really needs an introduction, certainly not to this audience.

Lakshmi Shyam-Sunder is Director, Corporate Risk at the International Finance Corporation, which is viewed as the “private sector arm” of the World Bank Group. Lakshmi is leading IFC’s new Client Risk Advisory function whose mission is to anticipate and cushion the effects of the current crisis on projects in emerging markets. She also serves as IFC’s representative on the boards of some client institutions. After joining IFC in 1994, Lakshmi worked in a variety of positions in treasury and portfolio before becoming Director of Risk Management and Financial Policy. Before joining IFC she was on the finance faculties of the MIT Sloan School and Dartmouth’s Tuck School—and, during that time, consulted on valuation and risk management for U.S. financial institutions and corporations, as well as institutions in emerging markets. Lakshmi holds a PhD. in finance from the Sloan School, where she was a student of Stew’s.
Judy Lewent recently retired as Executive Vice President and Chief Financial Officer of Merck. Judy became the company’s CFO, as well as a member of its Executive Committee, as far back as 1990. In 2005, after also running Merck’s Asian operations, she assumed responsibility for corporate strategy and development as well as worldwide finance. Judy continues to serve on the boards of Dell, Motorola, and Thermo Fisher Scientific—and is also a trustee of the Rockefeller Family Trust, a life member of the MIT Corporation, and a member of the American Academy of Arts and Sciences.

Don Lessard is the Epoch Foundation Professor of International Management at the Sloan School. Risk has been a central theme in Don’s research, starting with his work on risk management for emerging economies in the early 1970s and alternatives to conventional general obligation debt financing for developing countries in the early 1980s. Later in the ’80s, he became an expert on corporate exchange risk management; and in the ’90s, he began to explore the idea of risk management as a corporate core competence and strategic source of value. The focus of Don’s current research is the management of risk in large projects such as infrastructure and oil and gas exploration.

Andrew Lo is the Harris & Harris Group Professor of Finance at the Sloan School as well as director of MIT’s Laboratory for Financial Engineering. His work covers everything from financial asset and option pricing models to hedge-fund risk and return dynamics and transparency to behavioral models of risk preferences and financial markets. Andrew is currently a research associate of the National Bureau of Economic Research, a member of the NASD’s Economic Advisory Board, and the founder of the AlphaSimplex Group, a quantitative investment management company.

So, we have four people here who have done a lot of thinking about and have a lot of experience in managing corporate risks. Each of them will be showing us different aspects and dimensions of risk management, particularly the interface with corporate finance. And let’s get started with Lakshmi Shyam-Sunder, who, as I mentioned, is director of finance and risk management at the IFC.

Capital Structure as Risk Management Strategy: The Case of IFC
Lakshmi Shyam-Sunder: Thanks, Bob. I’d like to begin by thanking the organizers of this event for the job they’ve done, and for giving me this opportunity to participate. Having been a student of Stew’s, I’ve long expected this kind of event to take place, I just didn’t know when. And I want to say a big thank you to those who made it happen.

I will speak as someone who has been away from academics for a long time. I’d like to begin with some general comments on Stew’s work and then talk about how his insights help explain many of the decisions made by the International Finance Corporation—and let me start with the standard disclaimer that anything I say represents my own views and not necessarily the IFC’s.

When Bob sent me Stew’s resume to help prepare for this conference, I was struck by a number of things as I read it. First is the remarkably long period of time during which Stew has been producing papers on corporate finance. His current list of published articles starts in 1965 and ends with one listed as forthcoming in 2008, while including papers in almost every year during this 44-year period. Even more remarkable is the number of these papers that have turned out to provide new “paradigms,” new ways of thinking about and advancing our knowledge of capital structure and corporate finance generally. Whether it is real options or contingent claims analysis, asymmetric information, agency costs and corporate governance, or, more recently, risk capital allocation, Stew has shown an uncanny knack for thinking about the implications of these new approaches, and how they both explain and can be used to improve the practice of corporate finance. And each time Stew spells out his thoughts in a paper, it seems to spawn a whole new field of inquiry that, in addition to other benefits, provides careers for many academics.

Take Stew’s Presidential address to the American Finance Association in 1984. The subject was an explanation of capital structure and corporate financing that Stew called the “pecking order” hypothesis. The basic idea was that when making financing decisions, most corporate managers do not try to balance the tax benefits of debt against the costs of financial distress, as the then dominant “static tradeoff” theory suggested. Managers’ main concern is instead trying to minimize the “information costs” of new issues—a goal they accomplish by using a financing pecking order in which internal funds are preferred to external finance whenever possible; and if outside capital is required, debt is preferred to equity. I remember working with Stew two decades ago on this question of the relative explanatory power of the two theories. And last week, feeling a bit like Rip Van Winkle,
Many of the ideas Stew has offered were highly relevant to the situations I’ve faced over the years. But before I get into this, I think it’s important to step back and keep firmly in mind one of the “laws,” or first principles, of Brealey and Myers: there is more value to be made by good business or “investment” decisions than by financing decisions. I suspect that failure to heed this lesson is a big reason for the crisis faced by several institutions today. For example, a number of institutions continued to originate or invest in assets of questionable value as long as they could fund them mainly if not entirely with other people’s money.

There is also an important corollary to this law—namely, that a lot of value can be lost by bad financing decisions. And this is entirely in keeping with Stew’s overall thinking on capital structure, which has focused on the interaction between the “real” or asset side of a business and the financing or liability side. As his students will recall, Stew encouraged people to divide corporate assets into two categories, which he called “assets in place” and “growth options.” I’ve found that thinking in these terms, while at the same time taking account of the incentives of managers and information problems faced by investors, provides a powerful way of approaching decisions about capital structure. My sense is that, even without an explicit knowledge of Stew’s framework, much of our assessment of risks at IFC—our attempt to devise a capital structure and financing framework that serves all our stakeholders—is driven by these considerations. Since we view much of our business as essentially a sequence of future growth options, we want to have enough of an equity cushion to be confident of our ability to fund these options or investment opportunities when they materialize. At the same time, we don’t want to have so much equity—or “financial slack,” as I think Stew was the first to call it—that we encourage wasteful behavior.

Another of Stew’s important insights is that option-like or growth assets have a higher cost of capital—that is, a higher required rate of return—than existing operations or assets in place. Stew developed this idea while thinking about the required return on a pharmaceutical company’s R&D program, as compared to the expected return on manufacturing and selling patented drugs. And my own thinking on capital structure at IFC continues to be influenced by work that Stew and I did with Judy Lewent about 20 years ago on the pharma industry—and I imagine Judy will be telling us about this work in a moment.

But, again, the key insight for the purpose of setting capital structure is that growth options like R&D should be funded mainly with equity. On the other hand, as Stew also pointed out in later work, information asymmetries between management and investors can make the raising of equity capital a very expensive proposition. Thus, it is not surprising that equity for IFC has been an extremely scarce resource. When our shareholders—which, again, are the governments of 181 nations—explain their reluctance to give us more capital, they almost always cite their budget constraints. But even in the absence of such constraints, my guess is that this scarcity of equity arises at bottom from concerns about the option-like features of our “business model,” which have the effect of increasing risk, agency costs, and asymmetric information. In other words, our shareholders face uncer-
tainty about the value of the activities they are being asked to fund—and the effect of this uncertainty is compounded by the fact that, having granted us the money, they have less-than-complete control over what we do with it.

So, these agency costs and information costs ensure that we face large costs in raising outside equity. And, as Stew’s pecking order theory of financing would predict, we rely heavily on retained earnings while making moderate use of debt and maintaining enough slack to preserve our ability to invest in growth options. As the IFC has grown, management has generally tried to issue debt to finance growth while structuring the debt to carry a AAA rating. (In fact, for IFC issuing riskier debt would be more like issuing equity.) But at the same time, having generated a fair rate of return on our past investments as well as some excess cash, we also volunteer from time to time to return that cash to our shareholders to reassure them that their capital is being used by us in a way that meets their priorities.

Another important influence on our capital structure is regulatory requirements. For financial institutions generally, regulatory capital requirements in the form of Basle II have of course been a major factor driving capital structure decisions. Though IFC is unregulated—and despite heavy criticism of the Basle II requirements for encouraging securitzations and “pro-cyclical behavior”—we have chosen to adopt some of these capital standards, though in a modified form that reflects differences in our role, our time horizon, and the risks we face. Why do we do it? My sense is that adopting such standards gives us a credible way of communicating our basic capital needs to our shareholders and debtholders, and other important stakeholders such as the rating agencies and our clients and partners. In other words, it helps us manage our information asymmetry problem.

But given our role as a countercyclical investor—as a provider of funds for value-adding projects in emerging markets during periods of crisis or limited capital access—we also felt it was necessary for us to view these standards as minimum requirements. Financial distress for us would be very costly not just in financial terms but, much more important, in terms of our ability to carry out our mission. Also, unlike some of our sister institutions, we do not have sources of “callable” or contingent capital to draw on in case of emergencies. And so we maintain a significant capital buffer over and above these minimums to allow for growth, absorb shocks, and minimize the chance of financial distress. Thus, what appears to have been a “conservative” financial structure in good times has enabled us today to step up to the plate, take risks, and help our clients weather the crisis we’re now facing.

Now, in the current financial crisis, a lot of financial institutions have been learning the hard way about the costs of financial distress. For example, the costs of raising new equity under duress have turned out to be remarkably high. And to the extent that one institution’s problems have spread to others, such systemic effects are likely to affect the real economy as well.

What’s more, as I suggested, the Basle II capital requirements have been recognized as contributing to our current problems by encouraging procyclical behavior and effects—behavior and effects that have been compounded by a fair value accounting system. When all institutions start measuring, managing, and trading risk in the same way, you can expect to see synchronized booms and busts across all markets.

So, we are now seeing perhaps some unintended consequences of capital regulation and other standards. Regulation that is meant to protect the system may actually have contributed to systemic problems. And the question this raises is how to determine the optimal level of slack, and how to create and maintain it or some form of contingent capital—both at the level of individual institutions and for the system as a whole—so that such cyclical effects are dampened? This is a very interesting, and obviously a very important, question.

Another important question—one that bears directly on the first—is how to set capital requirements for, and allocate economic capital among, different business lines within financial institutions. Stew has a very interesting paper on capital allocation for different business lines in insurance companies. Though the issues here are complex, Stew’s paper has once again generated valuable insights. His thinking here, as in most everything else he has done, should help guide us toward the solutions to some difficult problems. At the very least, it will keep us all busy for a long time. Thank you.

Merton: Thanks, Lakshmi. Now let’s turn to Judy Lewent, who until recently was both the CFO and the head of strategic planning at Merck.
What appears to have been a “conservative” financial structure in good times has enabled us today to step up to the plate, take risks, and help our clients weather the crisis we’re now facing….In the current financial crisis, a lot of financial institutions have been learning the hard way about the costs of financial distress. For example, the costs of raising new equity under duress have turned out to be remarkably high.

Lakshmi Shyam-Sunder
R&D projects over this period and then comparing them to the cost of capital using the CAPM.

But, as Stew also showed, the cost of capital does not remain constant throughout the life of a drug. Instead it starts at a high level to reflect the higher risk associated with R&D and, for those products that make it, goes down with each successive phase of testing and commercialization. In fact, Stew concluded that the cost of capital in the early stages of clinical testing can be more than twice the cost of capital for a mature product.

Stew’s analysis also showed that accounting, or operating, returns on assets for pharma R&D are upwardly biased measures of the true profitability of pharma R&D investment. The main reason for this bias is the accounting convention that requires R&D spending to be expensed on the P&L instead of being capitalized—which understates the capital base, or the “denominator,” in the rate of return calculation.

In addition, because of the high failure rates in drug development, the uncertainty about the revenue and profit from R&D investment is very high. But when you look only at the drugs and pharma companies that succeed, which is the conventional way of looking at the industry, the range of possible outcomes is skewed to the right. In other words, since investment projects that don’t work out tend to get dropped from the sample and never show up in the analysis, the extent of the successes is exaggerated by the exclusion of the failures. And the distortion that results from this kind of after-the-fact analysis of successful pharma companies has been an important subject of debate in our ongoing discussions with policy makers around the world about the reasonableness of pharma returns.

This work was done in the heat of the health-care reform debate in the 1990s, and its relevance has come back in full force. By overstating the profits of the pharma companies and understating the cost of capital for R&D investment, we are likely to end up making some major policy blunders—policies that are going to reduce investment in R&D and, along with it, the competitiveness and value of our research-based pharma industry.

Now let’s turn to Stew’s concept of the risk-return staircase and its application to pharma companies. There has been quite a bit written on the concept. But let me give you a very brief overview of the idea, and then talk about its implications for today’s looming health-care debate.

The basic idea of the risk-return staircase is that, from an investor’s standpoint, as one follows a drug through the stages of its life, it is very risky in the beginning and gets progressively safer as you move toward the end. Stew displayed this relationship as a staircase, with risk and the cost of capital stepping down as the product advances through each stage of discovery, development, and commercialization. The R&D expenditure was characterized as an asset with no current cash flows but lots of promise, what Stew referred to as a “growth option.” That option is an asset that, like a house, can be viewed as having a mortgage attached to it. The amount of the mortgage is the R&D expenditure required to get the asset to market, to take it from the discovery to the development and commercialization phases. As the required R&D expenditures go down, the remaining balance and risk associated with a pharma R&D project keep diminishing over time. As you pass through successive phases of the R&D process, your required R&D expenditures shrink; and for those projects that continue to show promise and receive funding, the probability of a successful outcome continues to go up and risk goes down.

In making this point, Stew goes on to construct a balance sheet for an individual R&D project. On the asset side, you have the present value of the expected revenue stream from the project—and that present value of course reflects the risk of the project, with larger risks requiring higher rates for discounting the cash flows. Early in the life of most R&D projects, the probability of success is low. And so the expected revenues are adjusted downward to reflect that lower probability—and hence their present values are also reduced to reflect their greater risk and higher cost of capital.

On the right-hand or liability side of the balance sheet, you have two items: (1) the present value of the cost of development and (2) the equity, or expected NPV, of the project, which is the difference between the present value of the expected revenues and the present value of the expected costs. In doing the calculations for this balance sheet, Stew also argues that you should use different discount rates for the revenues and the costs—higher discount rates for the revenues, reflecting their greater uncertainty and higher cost of capital, and lower rates for the R&D outlays given the greater, mortgage-like certainty of the expenditures.

When you have done that, you can then solve for the project’s overall, or weighted average, discount rate by calculating the ratio of the present value of the R&D costs to the project’s NPV. And the higher the ratio of R&D costs to...
We set up a capital structure framework for the company that is designed both to ensure our ability to fund our R&D budget and to protect us against business risks. And some of these risks have materialized, including attacks on our intellectual property, product liability issues, and late-stage failures of development projects. Thanks to our predominantly equity capital structure, we have been able to tell our major stakeholders, both outside and inside the company, that we will continue to invest in R&D, to do licensing deals and acquisitions, and to otherwise continue to grow this company—all this while continuing to maintain our dividend.

Judy Lewent

total project value—a concept that Stew described as a project’s “R&D leverage”—the higher the overall discount rate and cost of capital. But, as a company’s drugs get closer to market, the probability of success and the NPV increase—and R&D leverage, risk, and the cost of capital and discount rates all go down.

From a public policy perspective, the key insight from this analysis is that the cost of capital, and hence the required returns or hurdle rate, for pharma R&D investment are much higher than you would guess from looking at large, mature pharma companies, where R&D projects are bundled into their portfolios of late-stage, marketed products. To get a better idea of the market’s expectations for the cost of capital for individual R&D investments, you have to look at the smaller biotech companies—or perhaps at the rates of return required by venture capitalists.

From a corporate policy perspective, there is another important insight from following Stew’s procedure of dividing corporate market values between assets in place and real growth options. Although well-diversified investors may not care about the risks associated with each specific drug candidate, they care a lot about the company’s making good on its commitment to maintaining its investment in R&D, to exercising its real options if you will. The risk of a company’s under-investing in R&D cannot be managed by investors through diversification. It’s top management’s responsibility to ensure that the company has the funding or access to capital to carry out its R&D.

How do these concepts apply to more recent developments in the industry? Today,
there’s greater uncertainty not only about the scientific success of R&D programs, but also about the size of the revenue streams that are expected to be generated by even the most successful drugs. The probability of success in drug development does improve as you go through the different stages, but not to the extent that it used to. Whether this is a function of the scientific difficulty or changes in the regulatory environment or other factors, there’s no question that the path from discovery to development and commercialization has become more risky and uncertain. As a result of all these factors, drug development costs are increasing. And this means higher discount rates and cost of capital for the industry. The higher cost of capital, larger R&D costs, and greater uncertainty about revenues have all affected the willingness—and indeed the entire approach—of the pharmaceutical industry to invest in R&D. And from a policy standpoint, the negative trends in each of these three variables are jeopardizing the ability of pharma to earn the cost of capital and thereby attract new capital.

For example, small biotechs have responded to their reduced access to markets by monetizing, or selling off rights to, their royalty streams. Big pharma has not followed suit, mainly because it continues to have better—though by no means great—access to markets. Nevertheless, big pharma has increasingly been “outlicensing” early-stage drug opportunities to biotechs. And I think this is a mistake, a confusion of accounting outcomes with maximizing shareholder value. The companies are thinking to themselves, “I have a finite R&D budget, but some projects that look pretty good. If I structure a deal where I outlicense a drug development program to company A with an option to buy it back if it succeeds, then I get that R&D cost off my P&L and report higher earnings.” This kind of earnings management runs against the grain of everything I learned from Stew at MIT. Don’t let accounting get in the way of good investment decisions. Take all positive net present value projects; if you have things that are worth doing, you should do them. Big pharma’s cost of capital, though higher than in the past, has got to be a lot lower than what a smaller firm is going to charge you to outlicense a development project and then sell it back to you.

Let me finish by making a point about the optimal capital structure for big pharma—and this is one I discussed with Lakshmi about 15 years ago and have never let go of. To make this point, we need to return to this concept of R&D leverage—which, as I said earlier, is the present value of development costs as a percentage of the total NPV of the project or company. Even in the case of relatively mature pharma companies, well over half of their current value comes from “growth options” as opposed to current products, or what Stew calls “assets in place.” For this reason, management’s most important obligation is to ensure that the firm has sufficient equity capital—or at least access to it—to carry out its R&D program. R&D is the engine of value, the source of much of the expected future cash flows—and, perhaps even more important, the source of the benefits for our customers.

And this to me is the main reason why major pharmaceutical companies have low debt levels, and biotechs almost no debt at all. The basic insight is that, for pharma companies, their R&D spending is their primary obligation, equivalent to, say, an industrial company’s commitment to servicing its debt. And this means that if pharma companies were to add lots of financial risk on top of this business risk or obligation, they could end up destroying much of their value. They would be raising, to unacceptable levels in my view, the risk that financial distress would force cutbacks in R&D.

So, working with Stew and others over the years, we set up a capital structure framework for the company that is designed both to ensure our ability to fund our R&D budget and to protect us against business risks. And some of these risks have materialized, including attacks on our intellectual property, product liability issues, and late-stage failures of development projects. Thanks to our predominantly equity capital structure, we have been able to tell our major stakeholders, both inside and outside the company, that we will continue to invest in R&D, to do licensing deals and acquisitions, and to otherwise continue to grow this company—all this while continuing to maintain our dividend.

Thank you.

Merton: Thanks, Judy. Now, let’s hear from Don Lessard, who joined the Sloan School faculty just after I did, and who has been thinking and writing about global corporate risk management ever since then.

The Link Between Risk Management and Corporate Strategy

Don Lessard: Thanks, Bob. My focus will be the ways in which finance and risk management interact with real business decisions, and can be used to improve them. It’s a delight to follow Judy Lewent because she is my model of a senior finance
executive who has succeeded in bringing a finance perspective into strategic corporate decisions. And, as Judy just told us, Stew Myers has provided much of the framework and specific insights that allow that to happen.

Let me start by saying a little about the development and evolution of my own interest in finance and risk management. I started my career in corporate finance by looking at risk in a classic portfolio sense, thinking about how investors should diversify across countries to reduce risk and how governments—particularly emerging market governments—should think about designing their financing to lay off or cushion those risks. Among other things, I tried without much success to persuade oil- and other commodity-producing countries to issue commodity-linked bonds to stabilize their net revenue streams and strengthen their credit standing. Then I spent a good deal of time helping multinational corporations manage the risks associated with international expansion, particularly currency and political risk and uncertainty stemming from other macro fluctuations. And in the past decade, I’ve shifted my focus to the management of large complex projects in infrastructure and oil and gas.

Although I now think of myself as a general international management person, I’ve never forgotten my finance roots and my debt to Stew’s thinking. To go back to the point that Bob Merton made at the outset, most people tend to think of the goal of risk management as the preservation of capital, keeping the firm from losing money. But what we have discovered using finance concepts such as “real options”—a term that, as Bob mentioned, was invented by Stew—is that risk management is a way of expanding upside opportunities as well as limiting downside risk. And approaching strategic or business problems from a finance perspective often ends up providing insights into real business opportunities.

I first learned this in the 1970s when a computer manufacturer asked me to analyze the company’s FX exposure and assess the value added by its active currency risk management program. As it turned out, the trading program was adding a little bit of value and doing little or nothing to reduce risk. At the same time, the company was essentially giving away free currency options by quoting prices in a variety of currencies and allowing important clients to tell them after the fact which currency they were going to pay in. In response to this analysis, the company decided to provide only a dollar price list for large clients—those who could easily take advantage of the ambiguity in the firm’s pricing terms and who did not need currency protection—but to continue pricing in local currency for smaller customers for whom local pricing was valuable.

In this case, getting sales and marketing right was worth much more than any conventional FX risk management approach. And I had a similar experience in studying the responses of automakers and large equipment makers to large currency fluctuations in the 1980s. The most promising solutions for these companies did not involve financial hedging. Instead they called for the creation of real options—different sourcing and marketing options and flexible manufacturing, or what I like to refer to as “a factory on a ship.” But to do this clearly requires greater collaboration between finance and operations.

In the late 1990s, I worked with a multinational firm that was determining its response to the Asian financial crisis. Of course, my first advice was to ensure that local currency balances were “upstreamed” as quickly as possible. But our big realization was that the crisis could throw the firm’s entire distribution chain into stress, with a significant exposure of the firm’s reputation to possible shortcuts by its local distributors in response to this stress. The upshot was the recognition of the need to focus on which of these distributors to “prop up” and which ones to take out.

In every case, then, what started out looking like a financial risk management problem became something quite different. The most cost-effective kinds of risk management often turn out to be real options, sources of operating flexibility that can be built into a company’s operations. And in this sense, I feel like I’ve been on a long journey in which Stew has been looking over my shoulder. He has always insisted that, rather than forcing the problem to fit a particular financial model or instrument, you have to start with a thorough understanding of the firm’s assets and operations, figure out the value-maximizing set of strategic operating decisions, and then design the company’s financing around them.

But let’s go back to some of Stew Myers’s footprints in this area. There are many, but let me just comment briefly on a couple concepts that Stew has either invented or heavily influenced.

The first is what I like to refer to as “risk management components and value additivity.” For many years, the standard view in corporate finance was that most of the financial risk management activities of publicly traded companies—including
diversification into unrelated businesses and the hedging of currency and interest rate risk—represented needless duplication of shareholders’ diversification. Corporate efforts to manage risks that could be easily diversified away by having a broad base of shareholders were thus thought to have no effect on the corporate cost of capital or corporate values. In this standard view, it was only the owners of private or closely held companies that were thought to benefit significantly from managing such “diversifiable” risks. However, shareholders cannot create real options—or can they pool or share volatile demand in a way that decreases average costs.

Stew’s thinking on the corporate underinvestment problem and the value of real options ended up providing a justification for managing such risks—later formally developed by people like Cliff Smith, Dave Mayers, and Rene Stulz—that applied to public as well as private or closely held companies. A classic illustration of such value-adding corporate risk management—and it’s one that has been used as a model in many business schools—was Judy Lewent’s currency hedging program at Merck. The primary function of that program, as Judy just told us, was to ensure Merck’s ability to fund its R&D program—a program that can be viewed as one very large real option as well as the main source of the company’s value even today.

Another kind of value-increasing risk management is the factory-on-a-ship concept I mentioned earlier—say, an arrangement that allows a multinational like Caterpillar to source its components from at least two currency areas by having a “base-load” contract in both places, along with a “swing” contract that allows for shifts between them.

Yet another risk management approach involves the real, as opposed to, financial pooling of risks. Cemex, for example, has acquired or built a group of cement plants around the Caribbean basin that has given it the ability to match capacity and demand more closely with the result of higher average plant loadings than would be possible for a set of independent firms operating these plants. Shareholders owning these plants as a set of separate firms might have been able to obtain similar degree of risk reduction through diversification, but they could not have obtained the benefits of this greater average efficiency.

So, thanks in part to Stew’s thinking, a great deal of real risk management makes sense regardless of how the asset is owned and financed. And to come back to a point I made earlier, companies spend too much time thinking about the right-hand side of the balance sheet, and too little thinking about how risk management can affect operations.

The second of Stew’s footprints is what I like to describe as a “pecking order” of real (operational) and financial risk management. Real decisions involving positive NPV real options and pooling opportunities—which are effectively a set of real options on where to source demand—come first, as do situations where one firm has comparative advantage relative to its competitors in taking the risks that are essential to delivering value. The resulting “retained” risks then become the focus of possible financial risk management—and note my use of the term “retained” here rather than “residual,” which is meant to emphasize that these risk exposures are the result of conscious choices rather than just an inability to offload them.

To summarize, then, corporate risk management really begins with the left-hand side of the balance sheet. It begins with efforts to identify and manage operating and strategic risks. Are our plants and workplaces safe? Are we facing threats from our competitors? Companies also need to take account of regulatory “institutional” and country risks, such as the possibility of price controls, expropriation, environmental regulation, and reduced access to markets. And, at this point, having taken account of all these effects on the left-hand side of the balance sheet, only then should a company consider its options for financial risk management.

As Stew likes to say, companies create far more value in their investment decisions than in their financing decisions. And the purpose of financing—of risk management from the right hand side of the balance sheet—is to ensure that the assets on the left hand side are allowed to realize their full potential.

Now, an important part of this task, as both Lakshmi and Judy told us earlier, is preserving the financial flexibility to take on all positive-NPV projects by limiting the amount of debt. But, at the same time, you want keep operating managers from having too much equity capital—which, as a lot of the dotcoms showed us, is a prescription for overinvestment and value destruction. That’s the so-called agency cost of free cash flow problem. And the challenge here is finding the “sweet spot,” the amount of debt and equity capital that provides enough flexibility, while avoiding the kind of slack that breeds waste and inefficiencies.

But one point of clarification here:
The most cost-effective kinds of risk management often turn out to be real options, sources of operating flexibility that can be built into a company’s operations. And in this sense, I feel like I’ve been on a long journey in which Stew has been looking over my shoulder. He has always insisted that, rather than forcing the problem to fit a particular financial model or instrument, you have to start with a thorough understanding of the firm’s assets and operations, figure out the value-maximizing set of strategic operating decisions, and then design the company’s financing around them.

Don Lessard

When I say that companies should think about managing their financial risks only after taking care of their operating and strategic risks, I don’t want to rule out the possibility of a feedback loop. In other words, there can and will be cases in which a company’s financial risk management solutions make possible a different operating or strategic approach. For example, it’s conceivable that an effective currency hedging operation could dominate multiple sourcing options under one set of circumstances—and that changes in these circumstances could cause the company to shift back to an operating solution like multiple sourcing. The important thing, however, is that management keep in mind its full range of operating and financial responses to risk and uncertainty.

And there’s one last matter I want to touch on—the question of who inside a company is responsible for risk management. Is it just the treasury or the chief risk officer—or do operating managers and line people have a major role to play? Given the primary importance of operating and strategic responses to corporate risk management, much of risk management must take place on the front line. It’s no coincidence that CEMEX’s CFO is also its chief strategist. You must make sure that operating people with “local” information and decision-making authority have strong incentives to add value by making the right decisions in the face of risk while avoiding doing anything that would put the franchise at risk—and you also want to have reporting systems that provide enough oversight and control to ensure that it doesn’t happen.

So, I’ve just given you an account of my personal tour through the discipline of corporate risk management, with an emphasis on what I’ve learned from Stew. And perhaps my most important point is that risk management is not just about preserving value by putting a floor on losses, it’s also about exploiting opportu-
nities. At the same time, companies need to pay more attention to encouraging front-line people to think harder about risk while pursuing opportunities. And I’ll stop there.

Merton: Thanks, Don, that was terrific. Now let’s hear from Andrew Lo, who I believe is going to warn us about some of the problems in corporate risk management.

Corporate Finance and Financial Crises

Andrew Lo: Let me start by thanking the organizing committee for putting together this wonderful tribute to Stew, and for inviting me to participate. It’s an honor to be here. I feel like a bit of an outsider since most of my research is on capital markets and financial econometrics, which can get pretty far afield from corporate finance. But I want to mention that Stew had a big impact on my career at the very start—in fact my Ph.D. thesis was actually in corporate finance. It was on capital structure, and was an attempt, somewhat along the lines of what Don Lessard was just suggesting, to integrate the real side with the financial side of a company’s decisions.

After getting my Ph.D., I became more familiar with the broader literature in both capital markets and corporate finance—and I discovered that the MIT finance tradition was quite different from how financial research was done anywhere else. It was different in the sense that people like Bob Merton and Stew Myers took an extraordinary interest in the practical importance and applications of their theories. And that kind of impact on financial practice is something that I have tried to emulate in my own career and through my own research.

But now let me turn to the topic at hand: corporate risk management and its implications for financial market crises. This is very timely, of course, given that we’re now in the midst of a pretty significant financial crisis. Bear Stearns and Lehman Brothers are gone, Merrill Lynch has been acquired by Bank of America, and Fannie Mae and Freddie Mac have been taken over by the government. This is an extraordinary time for financial economists. And in formulating my comments, I thought I would try to focus on Stew’s major contributions to the literature, and how they might relate to financial crises. At first blush, you might think that finance theory is pretty far removed from what we’re now witnessing. But as you think about it, it becomes clear that there are some very important ties—that I’m not sure we’ve fully appreciated. And I suspect a number of us, including me, will be working in this area during the next several years.

There are three areas, all heavily influenced by Stew’s thinking, that I’d like to focus on today: capital structure, real options, and corporate governance. In my view, each one of these three areas has played a critical role in contributing to the crisis that we’re going through today, and financial research in each area may help us understand how to remedy some of the problems.

With respect to capital structure, finance theory begins of course with M&M, which says that capital structure doesn’t matter, at least in the hypothetical case of perfect markets—and risk management therefore doesn’t matter either. So if you believe that there is a role for capital structure, and a role for risk management, then you have to start by looking at the frictions, the violations of perfect markets, that could make capital structure and risk management important contributors to—or perhaps safeguards of—a company’s value.

My point here is that although the theoretical explanations that give us optimal capital structures could be the same as those that give us optimal risk management policies, they don’t have to be the same. For example, the standard “static tradeoff” theory of capital structure attempts to balance the tax benefits of debt against the costs of financial distress. But while this may yield an optimal capital structure, it might not give you an optimal, or value-maximizing, risk management policy. For example, the fact that risk management policies are often designed and approved by committee—that is, by the Risk Committee—suggests that a corporation’s risk preferences may be inconsistent over time and with respect to different investment opportunities. These inconsistencies or conflicts may not be reflected in the trade-off between tax shields and costs of financial distress. So, risk is actually a somewhat different animal that requires taking account of perhaps a different set of market imperfections, including assumptions about investor behavior.

One of the ideas that Stew proposed years ago—the pecking order hypothesis of corporate financing—can be interpreted as a “behavioral” hypothesis in the sense that a corporate manager’s desire to preserve financial flexibility appears to be premised on his distrust of the rationality of investors and markets. This view has some significant implications for capital structure, and it also has implications for risk management, particularly in the case of financial institutions. As I think we’re now learning, the theories of both capital
As I think we’re now learning, the theories of both capital structure and risk management for financial institutions are even more important in understanding financial crises than many of the asset-pricing models that lie at the heart of such crises...Now, the question for financial economists is whether we can model the tendency of managers to underestimate improbable events—the so-called “fat tails” of the distribution—and the need to compensate for that tendency when setting risk management and even capital structure guidelines.

Andrew Lo
In my view, there's nothing fundamentally wrong with tail risks if properly prepared for and properly disclosed. For example, the catastrophe insurance industry has made a business of pricing and bearing those kinds of risks. But when such risks sneak into corporations in ways that are not fully understood or disclosed, that's when we begin to sow the seeds of future financial crises. And, of course, the risk of housing price depreciation as amplified by mortgage-backed securities has been a great example of this temptation.

The last topic that I want to take up is corporate governance. This is a subject of Stew's recent work, but his abiding interest in it is clear from his textbook and many earlier writings.

Corporate governance is an issue that has been largely ignored on the capital markets side where I've focused much of my research, but for many reasons, I think that's going to change in the next few years. What I'm referring to is the fact that risk management as an activity in financial companies is really a bit of a misnomer. If you think about the most popular risk management software vendors—companies like RiskMetrics, Sungard, and Barra—the output of their analytics does not really lend itself to risk management. The services they provide are really just risk measurement, not risk management. There's nothing prescriptive, nothing that tells you what you ought to do, given a certain set of risk analytics. And frankly, risk analytics in the hedge-fund industry at this point appear to me to be still a matter largely of window dressing, as opposed to corporate governance structures for actively and effectively managing risks.

A case in point—and one that I think is worthy of further study—is the well-known hedge fund Amaranth, which blew up in 2006. This was a $10 billion hedge fund that apparently, at least at one point, had something like 50 different strategies applied across hundreds of markets and tens of thousands of instruments. But I say "apparently" because there's no transparency in the hedge-fund industry, so we don't have the details of exactly what happened. But apparently this $10 billion hedge fund ended up putting all of its chips not just on one strategy, not just in one market, but actually on one single trade—the March/April 2007 calendar spread in natural gas! It was literally one very large trade that allegedly caused the firm to unravel. That someone can choose to bet a $10 billion franchise on a single trade seems to be an astonishing breach of not just proper corporate governance, but reason itself.

But my point in focusing on this exceptional case is that, in the hedge fund industry, there are no disclosure requirements or governance standards of any kind. Given the role that hedge funds are likely to play in financial crises, this is certainly an area that bears further study.

Thank you.

Progress in Risk Management?

Merton: My answer to your question is yes, we have made progress—but the effects of this progress have not all been good. We have made a lot of advances since those days, both in understanding and measuring risks, and in managing them. But what we sometimes fail to recognize is that there is a "reaction function" that accompanies innovations of all kinds. As you understand risk better, you measure it better, and you manage it better. But, as things become safer and people become more confident, they tend to take more risk somewhere else.

One of my favorite examples of this tendency is four-wheel drive. I think most of us who live in New England would agree that, if you have to go out in another couple of months when it's snowing, you're unquestionably safer if you have a car with four-wheel drive rather than two-wheel drive. But suppose I told you that, during the last 15 years—when four-wheel drive has become widely available—passenger accidents per miles haven't declined at all. So, safety has not really increased.
What's the key to this paradox? Well, I have a neighbor in Maine who describes the advantages of four-wheel drive this way: You can go a lot farther into the woods before you get stuck. So, in the old days with two-wheel drive, if you saw four inches of snow, you would put off that visit to the family. But with four-wheel drive you go—and instead of going 15 miles an hour, you now go 30. Most of the time, you get there more reliably and faster—that's the benefit. But you also get people taking risks that were not acceptable before but are acceptable now because they can be managed better. And so we end up using a potentially safety-increasing innovation not to make ourselves safer, but to achieve those other benefits.

So, to return to my point, there have been dramatic improvements in financial risk management. The world's financial institutions, including central banks, today know far more about their risks and how to manage them than they did 10 years ago. The practice of two-way marking-to-market of positions of over-the-counter derivative contracts, with collateral transfers similar to the margin provisions of exchange-traded future contracts, is now almost universal—and that's a huge advance in reducing counterparty risk. Another important advance is the information available to market participants. The VIX-like contracts for trading implied volatility on equity market indexes and on single-name stocks give us forward-looking market assessments of future return volatility. And global investing with its broader diversification of risks has increased by orders of magnitude in the last ten years.

That's the good side of financial innovation. The costs of innovation—greater complexity, speed, and trading volumes with lags in developing the infrastructure necessary to support them, which are now dominating our newspaper headlines—are much easier to see. But identifying the cause of these effects is more subtle. Better risk measurement and management have given people the confidence and the tools to reduce the amount of risk capital and, at the same time, to design and introduce more complex instruments into the financial system.

So what we have here are two partly offsetting effects of innovation—one that is reducing the risk of companies and their investors, and another that is encouraging greater risk-taking. And from a social or regulatory standpoint, the goal is to find the right balance between these two effects or forces. Finding that balance is a much more difficult and subtle task than determining whether financial innovation is generally a good thing. For there's no question in my mind that we have made enormous progress in understanding and managing risk—and I also have no doubt that, given enough time, the benefits of such progress will far outweigh the costs.

And let me also say that what we need going forward is not fewer financial engineers, but more of them—and in places of greater influence and control. Risk and innovation, including derivatives, are not going away, and we need senior management, boards, and regulators of financial institutions who understand them.

Lessard: Bob, I'm struck by the parallels between the problems in our financial systems and some recent developments with large real projects, particularly oil and gas projects and big infrastructure projects. My sense is the big blow-ups are coming from what I call "peripheral compound" risks. They are risks that somebody in the organization was aware of, but that were not in the firm's "central field of vision." And I would also agree with your argument that, while risk management of such projects has become far more sophisticated and effective, it has encouraged people to accelerate the pace and heighten the complexity and risk of projects.

The Role and Future of Credit Ratings
Marc Zenner: I think we would all agree that credit ratings have played a big role in the current crisis by providing cover for a lot of this risk-taking—and I'm thinking not only of Freddie and Fannie, but of many large institutions and investors with no government backing, explicit or otherwise. Many highly experienced and sophisticated investors allowed their investment decisions to be guided by the ratings. They effectively said to themselves, “My goal is to earn the highest return I can while maintaining a AAA rating”—and, in so doing, they were effectively handing over their risk management function to the rating agencies. But, as investors have been learned the hard way, a AAA rating no longer carries the assurance of return of principal and interest it once did, at least in the case of structured products. And in my experience, industrial companies have long placed too much weight on credit ratings when setting their own capital structure targets.

So, my question is about the future role of the rating agencies. Will investors and companies continue to entrust this critical risk measurement function to these relatively small groups of people—people whose recognition of problems often lags the market's, despite their access to management? For example,
In today’s markets, we now see securities with AAA rating carrying yields of LIBOR plus 450 basis points. That tells us that one of these indicators of credit quality has got to be wrong. And if it is the rating agencies that prove to be wrong, what kind of trust will their ratings command in the future?

Lee Wakeman: To answer this question, you have to ask another one: Where do the rating agencies really have information that investors don’t have? And my sense here is that the agencies have long had, and will continue to have, an important edge in evaluating the credit of individual companies. That’s what they know how to do, and where they have a competitive edge over markets. The big mistake of the agencies was being lured into areas like structured products where they have no experience or expertise—and where the history of past prices has become irrelevant, since the very nature of those instruments has changed the market. And so while I think Moody’s and S&P will continue to rate individual companies, I have doubts whether the structured products that I expect to return in the next five years or so will carry ratings from the same agencies.

Zenner: I agree with Lee’s point about competitive advantage. But even so, when you see industrial companies rated AA or AAA now financing themselves at rates we associate with companies rated single B, you have questions about both parties, the agencies and investors. Both of them can’t be right.

Merton: On this question of ratings and rating agencies, a lot of people have pointed to lack of transparency as a major contributor to the current financial crisis. But let me say first that I can’t think of any past crisis where people have said, after the fact, that there’s been enough transparency. And I would even suggest that we now have greater transparency—or at least far more information—about looming credit problems than there was 10 years ago. What I’m thinking about here is the credit default swap, or CDS, market that prices credit everyday. For some 800 companies and nearly every sovereign, we now have legions of serious professionals putting serious money into buying and selling credit protection and trading those spreads every day—and those prices are transparent and available to everyone. You may disagree with some of the spreads quoted, but if you do, you’re free to enter into the market on the side that you think is mispriced. To see the progress in this, just compare the information and transparency generated by the CDS market to the good old days where one relied on occasional credit ratings that rarely changed after being given—and where we had sparsely and infrequently traded corporate bonds with only dealers knowing the transactions prices. And we had bank loans that, after being stuck into a book, rarely saw their values changed even though a whole lot may have changed in the economy and the credit markets.

So, for all our problems at the moment, we have taken some important steps forward. And, as for this issue of the future of rating agencies, I don’t think there’s any way we can do without some version of what we now have. There are so many investor institutions and contracts around the world that require investment-grade ratings that we have to have some reasonably reliable, agreed-upon way of determining what’s investment grade and what’s not.

The big challenge to me is to figure out the right relationship between the ratings evaluations and the information that already exists in markets—and that’s a very contentious issue in the rating agencies at the moment. There are two basic positions on the proper use of market data in setting ratings. People at Moody’s have taken the view that ratings should incorporate at least some market data. But S&P has argued that, if you rely on market data, you’re chasing your tail and failing to provide an additional or independent source of information to credit-market investors. My own feeling about this is that we should use all the data available to come up with the best estimate of the rating.

Andrew Lo: In thinking about this ratings question, it might be helpful to go back to the fundamental insight in Stew’s pecking order theory. We’ve just talked about the rating agencies and the problems they have created by covering risks they didn’t really understand. But what about equity? We don’t worry about ratings when buying equity, right? We all know, or should know, that equity is risky—riskier than debt. But the important difference with equity is that everybody understands that the value of equity is highly sensitive to information, and that investors are on their own. We all understand that if we want to invest in the stuff, we better devote resources to figuring out if it’s good investment, or have advisers we can rely on for that. But, as a general rule, we don’t rely on third parties like rating agencies to tell us that what we’re doing is okay.

Now, one alternative to this has been...
What we have here are two partly offsetting effects of innovation—one that is reducing the risk of companies and their investors, and another that is encouraging greater risk-taking. From a social or regulatory standpoint, the goal is to find the right balance between these two effects or forces. Finding that balance is a much more difficult and subtle task than determining whether financial innovation is generally a good thing. For there’s no question in my mind that we have made enormous progress in understanding and managing risk—and I also have no doubt that, given enough time, the benefits of such progress will far outweigh the costs.

Robert Merton
meant to be a fair rate of return for bearing the risk of a lower, AA- minus credit?

**Merton:** I thought you were going to ask a slightly different question. Picking up first on Andrew’s comment, a “AAA” rating has always meant to me that you don’t need to understand the underlying assets to prudently make the investment. So, on this basis, it doesn’t make sense for us to criticize an Australian or German bank for investing in U.S. real estate without understanding the risks. Though we all have bank accounts, I doubt any of us have a clue about the assets or liabilities of our bank...because we assume we don’t have to know. But it’s possible we might wake up one day, and discover we might have to know that. So, that’s what “AAA” means—the confidence that someone else has done the work to verify that default is such a remote possibility that you don’t need to worry about the risk of the underlying assets.

But, to your point, we too saw structured senior debt tranches with AAA ratings issued at 250 basis points over LIBOR. And we should have said to ourselves, “There appears to be a $20 bill lying on the floor—and either it’s not really there, or it’s attached to something that’s going to get me into trouble.” Some things are just too good to be true; and if someone is willing to pay you in size 250 over LIBOR, they must either be very desperate, or have fantastically good uses for that cash. And, as an investor, you need to try to get to the bottom of that. But I agree with your point that there’s a major discrepancy between the ratings and some of the yields we’re now seeing.

And let me just add that whether you decide to pick up that $20 bill depends a lot on whether you are marked-to-market daily with overnight funding or a private equity firm with permanent capital and multi-year performance evaluation. People with overnight funding and daily mark-to-market are now faced with a kind of liquidity risk they’ve never seen before, and never imagined they would see. And this can have some big effects on behavior.

Imagine that you’re in the middle of a poker game—one that you’ve been playing for years—and you put down your royal flush and go to pull in the chips, and someone says, “No, that’s not your pot.” You say, “What do you mean?” “We’ve changed the rules.” “What are the new rules?” “Not gonna tell you.” How would you feel about continuing to play in that game? I think most players are going to pull back until they are convinced they understand the new rules of the game.

And that’s kind of what’s happened in the so-called liquidity shocks to financial markets we have seen in this crisis. When you’re an investor in AAA-rated securities, it’s not supposed to matter that you don’t know much about the assets underlying that security. And then you wake up one day and they tell you that it does matter very much what those assets are worth and you should therefore have had the skills and data necessary to do that evaluation. The rules of that market changed, and the traditional investors in that market—who were not equipped to handle the new rules—have simply exited the market. The result has been a rapid and nearly complete loss of liquidity, where transactions cannot take place at almost any price.

Of course, the crisis itself is not simply the result of such liquidity shocks. The crisis has come from a dynamic interplay between liquidity and the credit shocks caused by very large, and likely permanent, losses in real estate and some corporate assets. But liquidity problems have played a major supporting role in this.

But I’m not disagreeing with your point about the inconsistency between ratings and yields as a signal for more careful investigation. My point is only that when things go bad, we often blame market players for not having been diligent enough in their risk assessment, or not having demanded enough transparency. But if that diagnosis of the problem has turned out to be right after the fact, it may not have been at all clear, or fair to expect it, when the assessments needed to be made. And when we get around to doing the pathology on this, I think we’re going to find that a lot of that happened over the last few months.

But now it’s time to go to lunch. And let me thank you all for taking part in this discussion.