

For release on delivery
3 00 p m local time (1 00 a m E S T)
November 18, 1996

Banking in the Global Marketplace

Remarks by

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at the

Federation of Bankers Associations of Japan

Tokyo, Japan

November 18, 1996

It is again a pleasure to be here in Tokyo at the invitation of the Bank of Japan. Tokyo's role as one of the world's key financial centers depends importantly on the confidence of the international community in the Bank of Japan and the great respect in which it is held. As Tokyo continues to evolve as a financial center, the role of the Bank of Japan will correspondingly increase, as well. Frankly, when I think about the potential for serious disruption in international financial markets, I take considerable comfort from the high degree of cooperation between the Bank of Japan and the Federal Reserve, with contacts at all levels and covering a full range of issues very strong and getting stronger.

The last time I addressed this distinguished group was four years ago. Since then, of course, much has happened in international financial markets. The processes of growth, globalization, and innovation have continued. Extraordinary advances in risk measurement and risk management -- and in sensitivity to risks in general -- have been perhaps the most salutary aspects of that ongoing evolution. Other developments, including the financial problems of banks and other financial institutions in Japan, but also, for example, the Mexican peso crisis and Barings, were less favorable and have posed serious challenges. Nonetheless, I believe that from a long-term perspective the responses to those challenges will prove to have had important positive consequences as well.

One notable response to the developments in international financial markets came from the leaders of the G-7 countries. At the G-7 Summit meeting in Halifax in 1995 and again in Lyon in 1996, they set in motion a series of initiatives aimed at promoting stability in international markets. I will say a few words about some of those initiatives in a few moments, because I think they deserve our attention. However, before doing so, I will focus

my remarks this afternoon on the nature of supervision, the sharing of risks between the private and the public sector, and the implications for the behavior of banks and bank supervisors

The nature of supervision and the sharing of risks

It is useful, I believe, to begin by reminding ourselves just why there is bank supervision and regulation. At bottom, of course, is the historical experience of the effects on the real economy of financial market disruptions and bank failures, especially when the disruptions and failures spread beyond the initial impetus.

But it is critical also to understand some key implications of the safety net provided to banks in most countries, involving in the case of the United States, for example, a system of deposit insurance, payment guarantees, and discount window credit. Since the safety net makes bank creditors feel safer, the banking system is larger, more stable, and more able to take risk and extend more credit than otherwise would be the case. In the process, banks contribute significantly to economic growth.

The safety net, however, also engenders a disconnect between risk-taking by banks and banks' cost of capital and funding and hence has made necessary a degree of supervision and regulation that would not be necessary without the safety net. That is, regulators are compelled to act as a surrogate for market discipline since the market signals that usually accompany excessive risk-taking are substantially muted, in part because the costs of deposit insurance or of access to the safety net more generally do not, and probably cannot, vary sufficiently with risk. The problems that arise from the short-circuiting of the pressures of

market discipline have led us increasingly to understand that the ideal strategy for supervision and regulation is to simulate the market responses that would occur if there were no safety net, but without giving up the basic requirement that financial market disruptions be minimized

These implications of the safety net highlight the dilemma of the regulator. How do we preserve an innovative and flexible banking system without either exposing the taxpayer to excessive potential costs or the financial system to excessive systemic risk?

In addressing these issues, it is important to remember that many of the benefits banks provide modern societies derive from their willingness to take risks and from their use of a relatively high degree of financial leverage. Through leverage, in the form principally of taking deposits, banks perform a critical role in the financial intermediation process, providing savers with additional investment choices and borrowers with a greater range of sources of credit, thereby facilitating a more efficient allocation of resources and contributing importantly to greater economic growth. Indeed, it has been the evident value of intermediation and leverage that has shaped the development of our financial systems from the earliest times -- certainly since Renaissance goldsmiths discovered that lending out deposited gold was feasible and profitable.

Of course, this same leverage and risk-taking also greatly increase the possibility of bank failure. Without leverage, losses from risk-taking would be absorbed by a bank's owners, virtually eliminating the chance that the bank would be unable to meet its obligations in the case of a "failure." Some failures can be of a bank's own making, resulting, for example, from poor credit judgments. For the most part, these failures are a normal and

important part of the market process and provide discipline and information to other participants regarding the level of business risks. Other failures can result from, and contribute to, the rare episodes of severe economic or market turmoil that affect broad segments of an economy and are not the consequence of the imprudence of individual banks. Because of important roles that banks and other financial intermediaries play in our financial systems, such failures could have large ripple effects that spread throughout business and financial markets at great costs.

Over time, societies have concluded that leverage and intermediation are essential to economic performance, but also that some bank failures could have unacceptable economic costs. In response, central banks were created and were accorded new responsibilities, and what we now call prudential regulation evolved. In the United States, these initiatives took the shape of the creation of the Federal Reserve in 1913 after several financial panics in the late 19th and early 20th centuries, and of federal deposit insurance and a broadened role for bank supervisors in the 1930s. While the responses in other countries were often less overt, they were generally still significant in their effects.

This expanded role of governments, central banks, and bank supervisors implies a complex approach to managing and even sharing the risks of failure between governments and privately owned banks. Some of what central banks do might be termed "shaping" or reducing some kinds of risks, primarily by providing liquidity in certain situations to reduce the odds of extreme market outcomes, in which uncertainty feeds market panics. Traditionally this was accomplished by making discount or Lombard facilities available, so that depositories could turn illiquid assets into liquid resources and not exacerbate unsettled

market conditions by forced selling of such assets or calling loans. Similarly, open market operations, in situations like that which followed the 1987 stock market crash, satisfy increased needs for liquidity that otherwise could feed cumulative, self-reinforcing, contractions across many financial markets.

Guarding against systemic problems also has involved, on very rare occasions, an element of more overt risk-sharing, in which the government -- or more accurately the taxpayer -- is potentially asked to bear some of the cost of failure. Activating such risk-sharing quite appropriately occurs at most maybe two or three times a century. The willingness to do so arises from society's judgment that some bank failures may have serious adverse effects on the entire economy and that requiring banks to carry enough capital to avoid any risk of failure under all circumstances itself would have unacceptable costs in terms of reduced intermediation.

If banks had to absorb all financial risk, then the degree to which they could leverage, of necessity, would be limited, and their contribution to economic growth, modest. Risk-sharing encourages leverage and intermediation. Eliminating risk-sharing and asking banks to remove the possibility of failure would lead to a much smaller banking system. To attract or at least retain equity capital, a private financial institution must earn, at a minimum, the overall economy's rate of return, adjusted for risk. In their management of market or credit risk, well-run banks carefully consider potential losses from most possible market outcomes and hold sufficient capital to protect themselves from all but the most extreme situations. But banks and other private businesses recognize that to be safe against all possible risks implies

a level of capital on which it would be difficult, if not impossible, to earn a competitive rate of return

On the other hand, if central banks or governments effectively insulate private institutions from the largest potential losses, however incurred, increased laxity could be costly to society as well. Leverage would escalate to the outer edge of prudence, if not beyond. Lenders to banks (as well as their owners or managers) would learn to anticipate central bank or government intervention and would become less responsible, perhaps reckless, in their practices. Such laxity would hold the potential of a major call on taxpayers. And central banks would risk inflationary instabilities from excess money creation if they acted too readily and too often to head off possible market turmoil.

In practice, the policy choice of how much, if any, of the extreme market risk that government authorities should absorb is fraught with many complexities. Yet we central bankers make this decision every day, either explicitly or by default. Moreover, we can never know for sure whether the decisions we made were appropriate. The question is not whether our actions are seen to have been necessary in retrospect, the absence of a fire does not mean that we should not have paid for fire insurance. Rather, the question is whether, *ex ante*, the probability of a systemic collapse was sufficient to warrant intervention. Often, we cannot wait to see whether, in hindsight, the problem will be judged to have been an isolated event and largely benign.

Thus, governments have been given certain responsibilities related to their banking and financial systems that must be balanced. We have the responsibility to prevent major financial market disruptions through development and enforcement of prudent regulatory

standards and, if necessary in rare circumstances, through direct intervention in market events. But we also have the responsibility to assure that private sector institutions have the capacity to take prudent and appropriate risks, even though such risks will sometimes result in unanticipated bank losses or even bank failures.

Our goal as supervisors, therefore, should not be to prevent all bank failures, but to maintain sufficient prudential standards so that banking problems which do occur do not become widespread. We try to achieve the proper balance through official regulations, as well as through formal and informal supervisory policies and procedures.

To some extent, we do this over time by signalling to the market, through our actions, the kinds of circumstances in which we might be willing to intervene to quell financial turmoil, and conversely, what levels of difficulties we expect private institutions to resolve by themselves. The market, then, responds by adjusting the cost of capital to banks. Throughout most of this century, we have made our decisions largely in a domestic context. However, in recent decades that situation has changed markedly for many countries and is rapidly changing for all.

While failures will inevitably occur in a dynamic market, the safety net -- not to mention concerns over systemic risk -- requires that regulators not be indifferent to how banks manage their risks. To avoid having to resort to numbing micromanagement, regulators have increasingly insisted that banks put in place systems that allow management to have both the information and procedures to be aware of their own true risk exposures on a global basis and to be able to modify such exposures. The better these risk information and control systems, the more risk a bank can prudently assume.

Role of banks

The use of new technology and instruments in rapidly changing financial markets means that some bank balance sheets are already obsolescent before the ink dries. They are not even necessarily indicative of risk exposures that might prevail the next day. In such a context, the supervisor must rely on his evaluation of risk management procedures as a supplement to -- and in extreme cases, a substitute for -- balance sheet facts. As the 21st century unfolds, the supervisors' evaluation of safety and soundness, of necessity, increasingly will be focussed on process, and less on historical records.

Well-functioning risk management systems are necessary, but not sufficient, for taking on greater risk. Banks must also have the capital resources to absorb the inevitable losses that result from risk-taking and still remain solvent. Thus, banks are required to maintain both reserves consistent with expected losses and capital sufficient to absorb the vast majority of unexpected losses that experience and data suggest could occur, but whose timing and size are not predictable.

Determination of appropriate capital levels is not just a regulatory concern. Increasingly, bankers are treating the determination of proper capital levels as integral to the meeting of shareholder goals. Shareholder value is maximized, almost surely, when long run *risk adjusted* return on equity is maximized. One method of quantifying the risk adjusted return is to measure returns -- net of expected losses -- against the capital that should be allocated to a transaction to reflect that transaction's risk. Some bankers are doing exactly that: quantifying risks, allocating sufficient capital to cover those measured risks, and then trying to focus on those lines of business for which risk adjusted returns to allocated capital

are the highest. It does not matter whether the bank concentrates on low risk, low capital business, or on high risk, high capital business, only that it concentrates on businesses for which it has a comparative advantage, that is, businesses that earn an above average rate on its internally allocated capital, after provisions for expected losses. Regulators should take notice of this emerging business philosophy -- for a bank that properly measures its risks and allocates capital to those risks is well on its way to being a safe and sound bank, as well as one that meets its shareholders' objectives.

Most bankers in recent years have been confronted with an increasing complexity of financial instruments and transactions. However, these complexities would not have arisen in actual market circumstances without the technological advances that also allowed these risks to be measured and managed. Banks can now quantify the dimensions of risks for instruments and transactions that we could only conceptualize a few years ago. Consider just two examples of what risk quantification permits today: securitization and the day-to-day control of market risk in a portfolio of complex derivative contracts. In both of these cases, risk quantification is a prerequisite to informed risk-based pricing. Moreover, the comparison of the risk-based price to current market conditions is critical to management decisions regarding withdrawing, cutting back, or expanding a bank's scale of activity in specific credit markets.

The largest U.S. banking organizations are moving into new areas of risk evaluation for internal management purposes, including the quantification of credit risk. They have -- or are developing -- procedures for allocating capital against various types of loans, based on estimates of credit risk for various categories. For example, in middle market lending at these

institutions, a first step is to classify loans into various rating categories -- usually 1 to 10, with 1-rated loans being equivalent to triple-A securities and 10-rated loans about to be written off as loss. Periodically, each loan is re-evaluated and re-categorized if necessary. Such categorizations have been done for some time, but the more sophisticated banks are going an important step beyond this point. They are using historical data to estimate the mean and variance of defaults and actual losses on each grade of loan. The result can be interpreted as attempting to infer the loss probability distribution for each category or subportfolio of loans, and for the entire loan portfolio.

Consider how such information can be used. Estimates of expected losses and the probability distribution of unexpected losses are critical for pricing credits correctly and deciding whether competitive market rates thus imply withdrawing, cutting back, or expanding various types of credit. A prerequisite, however, is a judgment by management as to the proper amount of capital to allocate to each of the subportfolios or risk categories so that risk-adjusted rates of return can be calculated.

These capital allocations, as I noted, are for internal management, not regulatory, purposes. But I am impressed with what they teach us, the regulators, and what they imply for regulatory capital. The internal capital allocations used by banks in the United States range from less than 2 percent for highly rated loans to 20 percent or more for the most risky credits. In addition, credit enhancements, such as most junior positions in securitized loan pools, can have theoretical capital allocations that widen still further the range of appropriate internal capital allocations. Compare this wide range of internal capital allocations with the 8 percent, one-size-fits-all Basle standard. In fact the average risk-based capital ratio for large

U S banks approaches 12 percent, far above the 8 percent minimum. Nonetheless, consider the anomaly of a bank with a 12 percent risk-weighted capital ratio being viewed by the public as having a strong capital position when the bank's own capital allocation models suggest that it should have 15 percent capital, or more. The supervisor, I believe, is not being misled in most such cases, and should be capable of making the appropriate judgmental adjustments. Moreover, the markets clearly make such adjustments. I note that banks with very high risk-based capital ratios still may not achieve triple-A ratings on their debt, and some do not even have single-A ratings.

We at the Federal Reserve are beginning a review of the internal credit risk-capital allocation models of major U S banks in order to understand better the strengths and weaknesses of these models. We already know, however, that there has been an irreversible application of risk measurement technology without which banks would not be able to design, price, and manage many of the newer financial products, like credit derivatives. These same or similar technologies can and are beginning to be used to price and manage traditional banking products.

The widespread adoption of these techniques lies in the future, but, as I suggested earlier, some forms of risk quantification are now being used by banks to enhance shareholder values. Unfortunately, some bankers believe that new technologies and the growth of some activities will reduce their franchise values by driving down spreads. On the other hand, the byproducts of these new technologies include lower underwriting expenses and the more accurate estimation of probable losses. These byproducts act to offset the effects of

increasing competition created by the new technologies, both by raising profits on existing operations and by opening up opportunities with customers previously not served

More generally, and of much greater importance, rapidly changing technology is broadening and deepening financial markets while inevitably enhancing competitive pressures. In one sense this trend has been with us since the industrial revolution, but it has clearly accelerated in recent years in banking markets. Because the hot hand of competition is always putting pressure on us, we in our darker moments wish it would just go away. I very often succumbed to such melancholy when I was in the private sector. But we are wrong. Competition is the force which keeps us on our toes, makes us better and more productive, and creates higher market values for our banking institutions, just as it does for other firms. Competition is what has raised our standards of living for generations.

Technological change and the accompanying competition are irreversible, and those banks unwilling or unable to adapt to them will lose market share and suffer lower risk-adjusted rates of return. But the banks that embrace the cost-cutting and risk-reducing effects of the technology will, in my judgment, tend to find it a rewarding experience.

Role of supervisors

As financial markets change, regulators too must adapt to the new technology, and, in this regard, some important lessons are being learned. Technological change is not the sole province of the private sector. For example, the private sector, for a considerable time, has been accustomed to product planning cycles in which the planning of the replacement product is begun, if not well along, by the time a new product is being introduced. Similarly,

regulators are beginning to understand that the supervision of a financial institution is, of necessity, a continually evolving process reflecting the continually changing financial landscape. This is not a fault, but rather a description of an appropriate regulatory process. Indeed, given our own long lead times, we must begin designing the next generation of supervisory procedures even while introducing the latest modification, much as you are forced to do for your own products.

Increasingly, the new supervisory techniques and requirements try to harness both the new technologies and market incentives to improve oversight while reducing regulatory burden, burdens that are becoming progressively obsolescent and counterproductive. This is becoming especially true in evaluating the capital adequacy of banks. One example is the recent consensus reached by international banking regulators to use internal model approaches for measuring market risks at banks and allocating regulatory capital to those risks. Looking further down the road, the Federal Reserve Board has been studying an alternative capital allocation process for market risk, the so-called pre-commitment approach. This methodology would provide market and other financial incentives for banks to choose their own capital allocations for trading risk that they believe are consistent with their own risk management capabilities, as well as with regulatory objectives. With the Board's encouragement, the New York Clearing House Association is organizing a pilot study of the pre-commitment approach. The next natural step is to begin to review ways to harness, for supervisory purposes, the banks' own models for the measurement of credit risk.

The decision to craft a bank's capital requirements for trading activities around accepted and verifiable internal risk measures was an important step in the supervision and

regulation of large, internationally active banks. It is all the more noteworthy because it recognizes the importance of both quantitative and qualitative criteria in the measurement and management of trading risks. As risk management techniques evolve for other bank activities, supervisors will need to understand the new procedures and how they affect overall banking risks.

Time and again, though, events are demonstrating that despite the complexity of transactions and the alleged sophistication of management systems, it is the lack of simple basic policies and controls that so often lead to problems at banks. Fortunately, in many cases, the technology that has enabled institutions to design complex new products also provides the techniques with which the resulting risks can be identified, measured, and controlled. Management also must have the knowledge and motivation to employ these techniques to ensure that risks are adequately contained. We must never forget that no matter how technologically complex our supervisory systems become, the basic unit of supervision on which all else rests remains the human judgment of the degree of risk on a specific loan, based on the creditworthiness and character of a borrower. If those credit judgments are persistently flawed, no degree of complexity of supposed risk dispersion or elegance of credit models will help.

Today's technology allows us to measure risk in ways that were unthinkable a decade ago. The next decade will likely produce further dramatic changes. But already today, we can seriously begin to contemplate a regulatory quantification of what we mean by the *soundness* of a financial institution. Recall that while the objective of bank regulation and supervision is to assure a minimum level of prudential soundness, the precise meaning of

soundness has always been tenuous and ill-defined. This is why judgment has been, and will continue to be, a critical component of prudential supervision. However, the technology and techniques banks have developed, and are developing, allow us greatly to improve that judgment by constructing measures of soundness in probability terms. If we can obtain reasonable estimates of portfolio loss distributions, soundness can be defined, for example, as the probability of losses exceeding capital. In other words, soundness can be defined in terms of a quantifiable insolvency probability. Moreover, one can conceive of definitions of soundness that go beyond simply the probability of insolvency to encompass also the level and variability of losses to a deposit insurance fund in the event of insolvency. All of these approaches, however, require the regulators to establish targets regarding acceptable failure rates or an insurance fund's exposure to potential losses. Note that a bank could meet any particular quantitative soundness standard by increasing its capital or by reducing the riskiness of its portfolio.

I do not mean to suggest that we have reached the point at which we can now establish quantitatively precise soundness standards. We have not. These procedures are in their infancy and are hampered by the lack of micro data bases which have to be laboriously constructed at, or by, individual banks. Moreover, ascertaining relevant probabilities, the basis of an evaluation of soundness, presupposes an estimation of the shape of these distributions, arguably the most difficult aspect of this process. The technical methodology is also changing with experience and with conceptual progress in the academic and professional communities.

Within the United States, the Federal Reserve and other bank supervisors are placing growing importance on a bank's risk management process and are strengthening our supervisory procedures, where necessary, to assist examiners in identifying management weaknesses and strengths. We are also working to develop supervisory tools and techniques that utilize available technology and that help supervisors perform their duties with less disruption to banks. These improvements range from software designed to download data about a bank's loan portfolio to an examiner's personal computer, to simply more thoughtful reviews of internal management reports. Such automation enhancements will permit examiners, themselves, to analyze more efficiently the various concentrations within loan or investment portfolios and, therefore, help them to identify the underlying risks and discuss those risks with bank management.

Countries in which supervisors conduct on-site examinations or otherwise review specific loans or loan portfolios may find such technology particularly useful. Within the United States, the growing volume and complexity of transactions, particularly at the largest institutions, require such productivity enhancements and other modifications to our supervisory procedures in order for us to do our job effectively. For example, rather than evaluate a high percentage of a bank's loans and investment products by reviewing individual transactions after the fact, we will increasingly seek to ensure that the management process itself is sound, and that adequate policies and controls exist. While still important, the amount of transaction testing, especially at large banks, will decline.

However, supervisors everywhere should expect bank boards of directors and senior managements to perform their leadership and oversight roles. By themselves supervisors

cannot expect to detect or prevent every unsound practice, nor to ensure that all weak management processes are improved. We can expect our banking systems to be sound only by ensuring that directors and managers provide guidance regarding their appetite for risk, that they bring personnel to the bank with the integrity and skills to do the job, and that they monitor compliance with their own directives.

Encouraging and promoting sound qualitative risk management and internal controls has been and should remain a high priority of bank supervisors. Indeed, it is as important, in my view, as the development of quantitative prudential standards.

Supervisory cooperation

Let me turn briefly to the G-7 initiatives to which I referred earlier. The communique from the Lyon Summit meeting in June stated four objectives designed to promote stability in international financial markets.

First, cooperation among the authorities responsible for the supervision of internationally active financial institutions should be enhanced. The largest banks in every country -- and even many of the smaller banks -- are now actively engaged in international markets. Their organization charts cut across national boundaries. Therefore, it has become important that supervision also be seen in an international context. Increasingly also their organization charts cut across the sometimes subtle boundaries between banks and other financial and non-financial institutions. In order to maintain financially sound institutions and financial markets, cooperation across countries and between bank and nonbank supervisors is desirable and, at times, essential.

To be sure, bank supervisors from G-10 countries have been actively working together in the Basle Committee on Banking Supervision and its predecessor committees since the mid 1970s. Supervisors of securities firms have also been working together in IOSCO. But it is only fairly recently, and in part a result of the encouragement by G-7 leaders in Halifax, that banking and securities supervisors have been trying to coordinate their efforts. This is not an easy task, since the philosophy of, and motivation for, supervision of banking activities are different from the supervision of securities operations. What kind of supervisory information needs to be shared among supervisors, which supervisors need to be involved, and in what circumstances, are difficult questions but properly are being addressed. The Joint Forum, which includes insurance regulators as well, is struggling with these questions and with the complex question of how financial conglomerates ought to be supervised. I am confident that these various efforts will help to promote a safer global marketplace, but they are not the last word. As our supervisory systems mature, so too must our international cooperation develop further.

Second, risk management should be strengthened and transparency should be improved. I do not intend to say more than I already have about risk management, but I would like to emphasize the importance of transparency, by which I mean in this context enhanced reporting and public disclosure of financial activities. Market and supervisory pressures have led to substantially more, as well as more meaningful, public disclosure of risk positions and risk management procedures. I might note also that, earlier this year, a central bank working group under the able chairmanship of Shinichi Yoshikuni of the Bank of Japan recommended a reporting system that, when fully implemented, will add considerably to our

knowledge of derivatives market activities. This and other initiatives will enable financial market participants as well as supervisors more information and a better perspective with which to evaluate the activities of individual firms. It is only through adequate disclosure that market discipline can effectively be brought to bear as an important complement to supervisory oversight. In an increasingly complex and integrated global marketplace, the scope and sophistication of disclosures by individual institutions must increase commensurately. If they do not, institutions will find themselves being shut out of markets not by regulators but by their counterparties.

Third, prudential supervision in all market economies must be enhanced, and by their history this applies in particular to emerging market economies. This is an area of work that has attracted considerable attention from a wide range of national and international bodies. With emerging market economies growing rapidly, with the close interrelationship between macroeconomic and financial system performance and stability, and with international financial transactions involving these countries becoming increasingly important, it is difficult to exaggerate the importance of sound financial systems in these economies, for their own sake and for the sake of global financial stability. Ultimately, of course, it is the responsibility of those countries themselves to ensure adequate prudential standards. But we all have key roles to play in sharing our experiences and our expertise, and in offering leadership and guidance.

Finally, the G-7 leaders felt that the implications of the recent technological advances associated with electronic money should be studied. Central banks have studied many aspects of electronic money. My own sense is that the issues raised are not yet matters that threaten

global financial stability. But it is an engrossing area. We should make sure we understand how that technology is developing and what it might mean, while at the same time we allow scope for continued innovation and technical change.

Conclusion

To conclude, let me reiterate the basic principle I put forward earlier. Our soundness standards should be no more or no less stringent than those the market place would impose. If banks were unregulated, they would take on any amount of risk they wished, and the market would price their capital and debt accordingly. Ideally, banks should also face regulatory responses to their portfolio risks that simulate market signals. And these signals should be just as tough, but no tougher than market signals in an unregulated world. Perfection would occur if bankers had a genuinely difficult choice deciding if they really wanted their institutions to remain insured or become unregulated.

In the final analysis, such an approach is the only way to control the moral hazard of the safety net, to balance stability requirements with risk-taking. An important -- and increasingly feasible -- prerequisite in achieving that balance is for the regulators to quantify what their goals are, especially what is meant by soundness. Measuring actual risks relative to these goals would be facilitated if regulators harness for supervisory purposes the market-oriented tools already used internally by banks for management purposes.

When seeking to implement this principle and utilize new technologies, we must take care to remember that we are unlikely ever to be able to measure risk in absolutely precise ways. Quantification procedures are still extrapolations of the past, and behavior is always

changing. Models will still doubtless be haunted by specification and estimation errors. The global financial marketplace will still remain highly complex, and I have no doubt that participants will continue to invent instruments and procedures that models will not be able to capture until sufficient experience is gained. Thus, I am not proposing nor do I anticipate that bank supervisors will be relying on a black box based on statistical and econometric rules. I am suggesting, however, that new paradigms are in the process of evolving which will provide us with tools that will permit greater quantification of both risk standards and risk management. Such quantification will not solve all of our problems, nor will it ever substitute for human judgment, which ultimately is the technology we must rely on to parse the most difficult problems. Nonetheless, quantification will facilitate great improvements in both risk management and what regulators will be able to do. The financial world is dynamic and I have little doubt that there will be a continuous need to modify what we develop. In the end, judgment must be augmented with technology, and technology must be tempered with judgment.

Financial institutions and regulators around the world have a common interest in using evolving new technologies to meet their own separate objectives: maximizing shareholder value and maintaining safe and sound financial systems. One cannot be done without the other. And, as financial institutions increasingly apply these new technologies, supervisors will be replacing their procedures with those that depend increasingly on risk management, risk quantification, market simulations, and -- within the confines of law -- reduced barriers. The "best practice" for supervisors is to assure that regulatory restrictions are not a barrier to the "best practices" of the institutions they supervise. If institutions succeed in employing

improved risk management and all its tools in order to increase the risk adjusted rate of return, shareholders, the financial system in general, and our economies as a whole, all will be better off