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**Remarks by**

**Alan Greenspan**

**Board of Governors of the Federal Reserve System**

**at the**

**VIIIth Frankfurt International Banking Evening**

**Frankfurt am Main, Germany**

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Lord Mayor, ladies, and gentlemen, it is an honor to be in this city to talk about the evolution of global finance. To be sure, participants in Frankfurt's financial markets have not been coronated as were some of the Holy Roman Emperors depicted in this magnificent room. But the impact of the Bundesbank, of the private institutions active here, and of the prospective European Central Bank has been, and no doubt will be, profound. This evening, I will not talk specifically about Frankfurt or the implications of EMU, and certainly not about the Holy Roman Empire, but rather about the evolution of global financial markets in general.

World financial markets are far more efficient today than ever before. Changes in communications and information technology, and the new instruments and risk-management techniques they have made possible, enable an ever wider range of financial and nonfinancial firms to manage their financial risks more effectively. They can now concentrate on managing the economic risks associated with their primary businesses.

Still, for central bankers with responsibilities for financial market stability, the new technologies and new instruments have presented new challenges. Some argue that market dynamics have been altered in ways that increase the likelihood of significant market disruptions. Whatever the merits of this argument, there is a clear sense that the new technologies, and the financial instruments and techniques they have made possible, have strengthened interdependencies between markets and market participants, both within and across national boundaries. As a result, a disturbance in one market segment or one country is likely to be transmitted far more rapidly throughout the world economy than was evident in earlier eras.

A global financial system, of course, is not an end in itself. It is the institutional structure that has developed over the centuries to facilitate the world-wide production of goods and services. Accordingly, we can better understand the evolution of today's burgeoning financial markets by parsing the extraordinary changes that have emerged, in the past century or more, in what we conventionally call the real side of economies: the production of goods and services. The same technological forces currently driving finance were first evident in the production process and have had a profound effect on what we produce, how we produce it, and how it is financed. Technological change or, more generally, ideas have increasingly altered the nature of output so that it has become progressively more conceptual and less physical.

In the United States, for example, the weight of our gross domestic product today measured in tons is only modestly higher than several decades ago. The huge rise in the real, or price-adjusted, value of output since then is the result much more of the generation and development of ideas than of the exploitation and transformation of physical resources. As a consequence, a much smaller proportion of the measured real gross domestic product constitutes physical bulk currently than in past generations. Because the accretion of knowledge is, with rare exceptions, irreversible, this trend almost surely will continue into the 21st century and beyond.

The changes in what we usually view as physical product have been dramatic. The purpose of production, of course, has remained the same: to serve human needs and values. But output of comparable utility now generally is smaller and lighter. Our radios used to be activated by large vacuum tubes, today we have pocket-sized transistors to perform the same

function. Thin fiber optics have replaced huge tonnages of copper wire. Advances in architecture and engineering, as well as the development of lighter but stronger materials, now give us the same working space in buildings but with significantly less concrete, glass, and steel tonnage than was required in an earlier era. The process is interactive. The development of the insights that brought us central heating enabled lighter-weight apparel fabrics to displace the heavier cloths of the past. The breakthroughs in medical research that have revolutionized health care are only the beginning of a growing list of almost wholly conceptual elements in our economic output.

As the relative cost of transporting goods falls dramatically as a consequence of such physical downsizing, the rising conceptual content of output becomes a major factor in the increasingly rapid globalization of merchandise trade. International trade in, say, construction gravel or scrap metal is limited by weight or bulk. High-value computer products, in contrast, make up an expanding share of world trade. Obviously, the less the bulk and the lower the weight, the easier goods are to move, especially over long distances and across national boundaries. Thus, for the United States, after we adjust for average price changes, tons shipped per real dollar of both U.S. exports and imports are now less than half of what they were in 1970. The downsizing of American trade is patently a reflection of the extent to which conceptualization is also dominating the economies of our trading partners throughout the world.

Of course, a significant part of the pronounced expansion in international trade has resulted from the breaking down of trade barriers over the years. However, the political

processes that have led in that direction to an important extent have been themselves pushed by the technological changes in the composition of goods and services

Not unexpectedly, as goods and services have moved across borders, the necessity to finance them has increased dramatically. But what is particularly startling is how large the expansion in cross-border finance has become, relative to the trade it finances. To be sure, much cross-border finance supports investment portfolios, doubtless some largely speculative. But in the end, even they are part of the support systems for the efficient international movement of goods and services. The relative expansion of cross-border financial transactions is, in itself, another manifestation of conceptual trade, as a single financial product is broken into many pieces that, in turn, are traded.

Specifically, world trade measured in nominal dollars was  $2 \frac{1}{3}$  times as large in 1994 as it was a decade earlier. The stock of cross-border assets held on balance sheets by banks at the end of 1994, also in dollars, was more than 3 times as large as at the end of 1984. Off-balance-sheet growth has been, of course, much larger. Nonbank cross-border transactions have also grown enormously.

Such rapid expansion in cross-border banking and finance should not be surprising given the extent to which low-cost information processing and communications technology have improved the ability of customers in one part of the world to avail themselves of opportunities offered anywhere in the world on a real-time basis.

These developments enhance the process whereby an excess of saving over investment in one country finds an appropriate outlet in another. In short, they facilitate the drive to equate risk-adjusted rates of return on investments worldwide. They thereby improve the

worldwide allocation of scarce capital and, in the process, engender a huge increase in risk dispersion and hedging opportunities. If we can resist protectionist pressures in our societies in the financial arena as well as in the interchange of goods and services, we can look forward to the benefits of the international division of labor on a much larger scale in the 21st century.

What we don't know for sure, but strongly suspect, is that the accelerating expansion of global finance may be indispensable to the continued rapid growth in world trade in goods and services. It is becoming increasingly evident that many layers of financial intermediation will be required if we are to capture the full benefits of our advances in finance. Certainly, the emergence of a highly liquid foreign exchange market has facilitated basic forex transactions, and the availability of more complex hedging strategies enables producers and investors to achieve their desired risk positions. This owes largely to the ability of modern financial products to unbundle complex risks in ways that enable each counterparty to choose the combination of risks necessary to advance its business strategy, and to eschew those that do not. This process enhances cross-border trade in goods and services, facilitates portfolio investment strategies, enhances the lower-cost financing of real capital formation on a worldwide basis and, hence, leads to an expansion of international trade and rising standards of living.

Achieving those benefits surely will require the maintenance of a stable macroeconomic environment. An environment conducive to stable product prices and to maintaining sustainable economic growth is a prime responsibility of governments and, of course, central banks. How well we central bankers do our job has implications for

participants in financial markets. We provide the backdrop against which individual market participants make their decisions.

In the context of rapid financial market changes, disruptions are inevitable. The turmoil in the European Exchange Rate mechanism in 1992 and the plunge in the exchange value of the Mexican peso at the end of 1994 and early in 1995 have shown, for example, how the new world of financial trading can punish policy misalignments with amazing alacrity. Notwithstanding, the economic consequences of such disruptions will be minimized if they are not further compounded by financial instability associated with fluctuations in underlying inflation trends. Reserve currency countries, like the United States, have a special responsibility to provide an anchor of stability for themselves and the world at large. Such countries face a high demand for their financial instruments, a substantial share of which is related to volatile portfolio motives.

As international financial markets continue to expand, central banks thus have twin objectives: fostering macroeconomic stability and maintaining safe and sound financial institutions that can take advantage of stability while exploiting the advantages of new technological advances.

The changing dynamics of modern global financial systems require that central banks address the inevitable increase of potential systemic risk. It is probably fair to say that the very efficiency of global financial markets, engendered by the rapid proliferation of financial products, also has the capability of transmitting mistakes at a far faster pace throughout the financial system in ways that were unknown a generation ago, and not even remotely imagined in the 19th century.

Certainly, last year's Barings Brothers collapse shows how much more rapidly losses can be generated in the current environment relative to a century earlier when Barings Brothers confronted a similar episode. Current technology enables single individuals to initiate massive transactions with very rapid execution. Clearly, not only has the productivity of global finance increased markedly, but so, obviously, has the ability to generate losses at a previously inconceivable rate.

Moreover, increasing global financial efficiency, by creating the mechanisms for mistakes to ricochet throughout the global financial system, has patently increased the potential for systemic risk. Why not then, one might ask, bar or contain the expansion of global finance by capital controls, transaction taxes, or other market inhibiting initiatives? Why not return to the less hectic and seemingly less threatening markets of earlier years?

Endeavoring to thwart technological advance and new knowledge and innovation through the erection of barriers to the spread of knowledge would, as history amply demonstrates, have large, doubtless adverse, unintended consequences. Suppressed markets in one location would be rapidly displaced by others outside the reach of government controls and taxes. Of greater importance, risk-taking, so indispensable to the creation of wealth, would surely be curbed, to the detriment of rising living standards. We cannot turn back the clock, and we should not try to do so.

Rather, we should recognize that, if it is technology that has imparted the current stress to markets, technology can be employed to contain it. Enhancements to financial institutions' internal risk-management systems arguably constitute one of the most effective



countermeasures to the increased potential instability of the global financial system

Improving the efficiency of the world's payment systems is clearly another

The availability of new technology and new derivative financial instruments has facilitated new, more rigorous approaches to the conceptualization, measurement, and management of risk. There are, however, limitations to the statistical models used in such systems owing to the necessity of overly simplifying assumptions. Hence, human judgments, based on analytically looser but far more realistic evaluations of what the future may hold, are of critical importance in risk management. Although a sophisticated understanding of statistical modeling techniques is important to risk management, an intimate knowledge of the markets in which an institution trades, and of the customers it serves, is turning out to be far more important.

In one sense, risk-management systems were exposed to a very severe real-life stress test in 1994, when sharp increases in interest rates created large losses in fixed income markets. I assume that as a consequence, firms' models and judgments are sounder today than those that prevailed in early 1994. But the Barings episode suggests that further improvements to internal risk-management systems as well as internal controls are needed, in some instances very significant improvements.

To be sure, we should recognize also that if we choose to have the advantages of a leveraged system of financial intermediaries the burden of managing risk in the financial system will not lie with the private sector alone. With leveraging there will always exist a remote possibility of a chain reaction, a cascading sequence of defaults that will culminate in financial implosion if it proceeds unchecked. Only a central bank, with unlimited power to

create money, can with a high probability thwart such a process before it becomes destructive. Hence, central banks will of necessity be drawn into becoming lenders of last resort. But implicit in the existence of such a role is that there will be some sort of allocation between the public and private sectors of the burden of risk of extreme outcomes. Thus, central banks are led to provide what essentially amounts to catastrophic financial insurance coverage. Such a public subsidy should be reserved for only the rarest of disasters, triggered, at most, a handful of times per century. If the owners or managers of private financial institutions were to anticipate being propped up frequently by government support, it would only encourage reckless and irresponsible management practices.

In theory, the allocation of responsibility for risk-bearing between the private sector and the central bank depends upon an evaluation of the private cost of capital. In order to attract, or at least retain, capital, a private financial institution must earn at minimum the overall economy's rate of return, adjusted for risk. In competitive financial markets, the greater the leverage, the higher the rate of return, before adjustment for risk. If private financial institutions have to absorb all financial risk, then the degree to which they can leverage will be limited, the financial sector small, and its contribution to economic growth, minimal. On the other hand, if central banks effectively insulate private institutions from the largest potential losses, however incurred, increased laxity could threaten a major drain on taxpayers or produce inflationary instability as a consequence of excess money creation. In practice, the policy choice of how much, if any, of the extreme market risk that central banks should absorb is fraught with many complexities. Yet we central bankers make this decision every day, either explicitly or by default.

It does seem clear, however, that under the currently structured international financial system, if central banks do not choose to absorb the most extreme risks, private financial institutions will surely be daunted by the specter of unlikely, but enormous and unhedgable losses. Private institutions would naturally adopt an attitude of caution that would render them far less effective in the financing of wealth creation. Nonetheless, as experience amply demonstrates, all risk with limited and extreme exceptions must remain within the private financial system.

The probability that central banks can thwart the kind of chain reaction to which I just referred will be immeasurably enhanced if world payment systems can achieve something closer to real time settlement. Herstatt and other time dependent risks are deceptively large, as the report issued in March by the BIS Committee on Payment and Settlement Systems has now made clear.

Technology has already markedly contained this risk by shortening the payment and settlement cycle of a broad segment of financial transactions. Reducing float, of course, requires costly investments in computer and telecommunications technology, as well as the opportunity costs associated with holding large cash and securities balances to effect settlements. In that sense reducing float implies a significant tradeoff between risk reduction and cost. But while technological advances and lower costs have increased the risk of systemic breakdown, so has the same technology enabled the financial community, both private and public, to contain such risks.

In conclusion, we must assure that our rapidly changing global financial system retains the capacity to contain market shocks. This is a never-ending process.

Mutual self interest in an expanding global financial system is fostering broadening cooperation among the monetary authorities of the larger trading nations. The markets are beginning to dictate a merging of interests not only on the monetary front, but in fiscal affairs, as well. As last year's G-10 study on Saving, Investment and Real Interest Rates pointed out, "the effects on real interest rates of changes in fiscal deficits in one country are now spread across all countries integrated into the global financial system."

Clearly, the challenges of the changing international environment in which we all operate dictate that public officials and private market participants maintain and strengthen the sound working relationships that we have built up in recent years. These relationships epitomize the kinds of contacts that will be essential in meeting the common challenges of the rest of this decade and into the 21st century.