

For release on delivery  
Expected about 2 30 p m C S T (3 30 p m E S T)  
March 18, 1996

Remarks by  
Alan Greenspan  
Board of Governors of the Federal Reserve System  
at the  
New Orleans Forum  
New Orleans, Louisiana  
March 18, 1996

Good afternoon. It is a pleasure to participate in this forum, and I look forward to taking questions from the audience later in the program. Congressman Baker has suggested that a major theme of this meeting is the future role of banks and other financial service providers. The last few years, and surely the future, have been, and will be, significantly affected by the same basic forces shaping the real and financial economy world wide. Relentless technological changes. This afternoon, I would like to describe some of these and discuss a few of their more important implications.

The United States is currently confronting a set of forces pulling us in divergent directions. The rapid acceleration of computer and telecommunication technologies can reasonably be expected to raise appreciably our productivity and standards of living in the twenty-first century certainly, and quite possibly in some of the remaining years of this century.

In the short run, however, the fallout from rapidly changing technology has created a marked degree of uncertainty and insecurity among a significant segment of our work force.

It should not be surprising to find that when the stock of plant and equipment with which most Americans have to interact in their daily jobs is turning over rapidly, human skills are subject to obsolescence at a rate perhaps unprecedented in American history.

This process is part of a broader set of forces. An ever increasing conceptualization of our Gross Domestic Product, the substitution, in effect, of ideas for physical matter in the creation of economic value. The roots of increasing conceptualization of output lie deep in human history, but the pace of such substitution

probably picked up in the early stages of the industrial revolution, when science and machines created new leverage for human energy. Nonetheless, even as recently as the middle of the century, the symbols of American economic strength were our outputs of such products as steel, motor vehicles, and heavy machinery—items for which sizable proportions of production costs reflected the value of raw materials and the sheer manual labor required to manipulate them. Since then, trends toward conceptualization have focussed today's views of economic leadership increasingly on downsized, smaller, less "concrete" evidence of output, requiring more technologically sophisticated labor input.

Radios used to be activated by large vacuum tubes, today we have elegantly designed pocket-sized transistors to perform the same function—but with the higher quality of sound and greater reliability that consumers now expect. Thin fiber optic cable has 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 but in buildings with significantly less concrete, glass, and steel tonnage than was required in an earlier era.

The process of conceptualization in output seems to have accelerated in recent decades with the advent of the semiconductor, the microprocessor, the computer, and the satellite. Under the circumstances, it has puzzled many of us that the growth of output as customarily measured has not evidenced a corresponding pickup. Of course, output may not be measured correctly. Indeed, the financial markets' valuations of equities have been suggesting that we increasingly expense items which should be capitalized and, hence, underestimate the growth of our GDP and productivity. But is it also possible that some of the frenetic pace of change is mere

wheel spinning—changing production inputs without increasing output—rather than real advances in productivity?

A number of commentators, particularly Professor David of Stanford University, have suggested that much of the wheel spinning, if that is what it is, reflects the extended time it typically has taken to translate a major new technology into increased productivity and higher standards of living. It may be that the big increases in productivity resulting from the introduction of computers and communications equipment still lie ahead. If true, this would not be unusual. Past innovations, such as the advent of electricity or the invention of the gasoline-powered motor, required considerable infrastructure before their full potential could be realized.

Electricity, when it substituted for steam power late last century, was initially applied to production processes suited to steam. Gravity was used to move goods vertically in the steam environments, and that could not immediately change with the advent of electric power. It was only when horizontal factories, newly designed for optimal use of electric power, began to dominate our industrial system many years after electricity's initial introduction, that productivity clearly accelerated.

Similarly, it was only when modern highways and gasoline service stations became extensive that the lower cost of motor vehicle transportation became evident.

It is possible that the computer-telecommunications revolution is too new to as yet fundamentally improve standards of living overall.

Moreover, to be fully effective, innovations also require a considerable amount of human investment on the part of workers who have to deal with these devices daily. On this score, I sense that we still may not have progressed very far, relative to potential. Compared to the facility with which the average citizen handles

another complex device—the automobile—most workers and consumers still appear to possess only rudimentary skills when it comes to making computers do what is wanted of them. Mass acceptance and full exploitation of computer technologies—the analogue of what was accomplished in making cars that were affordable, standardized, and easily operated—probably still lie ahead.

In the meantime, we have a situation in which there are some serious mismatches between the skills of workers and the requirements of technologies that have, and are, advancing rapidly, and these mismatches are affecting pay differentials between the skilled and the unskilled. As conceptualization of output has moved apace, the relative economic value of intellectual skill has clearly increased. During the past fifteen years, for example, the earnings of college graduates have risen relative to those who are high school graduates. In turn, high school graduates have continued to open up their advantage over high school dropouts. In fact, a significant minority of our labor force has experienced real wage decreases. This development surely is one factor in the unease that is all too prevalent, as well as in the apparent widening of the distribution of incomes in recent years.

We must be alert to the need to improve the skills and earnings power of those who appear to be falling behind. On-the-job training is a critical necessity—to overcome the educational deficiencies of all too many of our young people, and to renew the skills of workers who have fallen behind the rapidly rising curve of technological change. It has become quite apparent that many firms have concluded that it makes more sense to invest in such training than to bid up wage scales in a zero-sum competition for the existing limited pool of well-qualified workers. As a bottom line, though, workers in many kinds of pursuits probably had better look forward to a lot of hard work acquiring and maintaining the skills needed to cope with a rapidly

evolving economy. The notion that early education could be crafted to support the needs of one's lifework is rapidly changing. Education is increasingly becoming a lifetime activity. Over time, as workers acquire new skills and as computer applications continue to become evermore user-friendly, the present income mismatches should diminish.

It is not just labor that is affected by the relentless technological change. Once proud high tech firms are being destabilized by new technologies developed by upstarts. But even the latter are already looking over their shoulders at other upstarts with still newer technologies. Outsized rewards to high skills induce others to emulate them and, hence, staying at the top has become ever more precarious. More generally, entrenched economic advantage is being increasingly challenged by a global competition which shows no signs of abating.

The same forces that have been reshaping the real economy have also been transforming the financial services industry. Once again, perhaps, the most profound development has been the rapid growth of computer and telecommunications technology. The advent of such technology has lowered the cost and broadened the scope of financial services. These developments have made it increasingly possible for borrowers and lenders to transact directly and for a wide variety of financial products to be tailored for very specific purposes. As a result, competitive pressures in the financial services industry are probably greater than ever before.

Technological innovation has accelerated the second major trend—financial globalization—that has been reshaping our financial system, not to mention the real economy, for at least three decades. Both developments have expanded cross-border asset holding, trading, and credit flows. In response, both

securities firms and U S and foreign banks have increased their cross-border operations. Once again, a critical result has been greatly increased competition both at home and abroad. With respect to foreign operations, foreign offices of U S banking organizations have for some time been permitted, within limits, to meet the competitive pressures of the overseas markets in which they operate by conducting activities not permitted to them at home. In the evolving international environment, these off-shore activities have included global securities underwriting and dealing, through subsidiaries. In this activity, U S banking organizations have been among the world leaders, despite limitations on their authority to distribute securities in the United States. Similarly, foreign offices of securities firms have engaged in banking abroad.

The third development reshaping financial markets—deregulation—has been as much a reaction to technological change and globalization as an independent factor. Moreover, the continuing evolution of markets suggests that it will be increasingly difficult to maintain some of the remaining rules and regulations established for a different economic environment. While the ultimate public policy goals of economic growth and stability will remain unchanged, market forces will continue to make it impossible to sustain outdated restrictions, as we have recently seen with respect to interstate banking and branching.

The three forces—the technological revolution, globalization, and deregulation—have transformed the way financial institutions, especially banks, carry out their unchanging function: measuring, accepting, and managing risk. Nowhere is that more clearly evident than in the financial derivatives market. Although some types of derivative instruments have existed for hundreds of years, the scale, diversity, and complexity of financial derivatives activities have greatly increased in the last fifteen years.

The economic function of derivative contracts is to allow risks that formerly had been combined to be unbundled and transferred to those most willing and able to assume and manage each risk component. Banks, other financial institutions, nonfinancial businesses, and governments have become increasingly aware of the necessity of managing financial risk. Indeed, they have discovered that, if left unmanaged, such risks could jeopardize their ability to perform successfully their economic function. Derivatives are the vehicles that allow all lenders and borrowers to adjust their risk profile at low cost. Clearly, the present scale and complexity of these instruments could not exist without the use of computers and the rapid expansion of telecommunications. They could not be priced properly, the markets they involve could not be arbitrated properly, and the risks they give rise to could not be managed properly, without high powered data processing and communications capabilities.

*In addition to the dramatic changes associated with derivatives, the pressures unleashed by technology, globalization, and deregulation have inexorably eroded the traditional institutional differences among financial firms. Examples abound. Securities firms have for some time offered checking-like accounts linked to mutual funds, and their affiliates routinely extend significant credit directly to business. On the bank side, the economics of a typical bank loan syndication do not differ essentially from the economics of a best-efforts securities underwriting. Indeed, investment banks are themselves becoming increasingly important in the syndicated loan market. With regard to derivatives instruments, the expertise required to manage prudently the writing of over-the-counter derivatives, a business dominated by banks, is similar to that required for using exchange-traded futures and options, instruments used extensively by both commercial and investment banks. The list could go on. It is sufficient to say that a strong case can be made that the evolution of financial*



technology alone has changed forever our ability to place commercial and investment banking into neat separate boxes

Nonetheless, not all institutions would prosper as, nor desire to be, financial supermarkets. Many specialized providers of financial services are successful today and will be so in the future because of their advantages in specific financial services. Moreover, especially at commercial banks, the demand for traditional services by smaller businesses and by households is likely to continue for some time. And the information revolution, while it has deprived banks of some of the traditional lending business with their best customers, has also benefitted banks by making it less costly for them to assess the credit and other risks of customers they would previously have shunned. Thus, it seems most likely that banks of all types will continue to engage in a substantial amount of traditional banking, delivered, of course, by ever improving technology. Community banks, in particular, are likely to provide loans and payments services via traditional on–balance sheet banking. Indeed, smaller banks have repeatedly demonstrated their ability to survive and prosper in the face of major technological and structural change by providing traditional banking services to their customers. The evidence is clear that well–managed smaller banks can and will exist side by side with larger banks, often maintaining or increasing local market share. Technological change has facilitated this process by providing smaller banks with low cost access to new products and services. In short, the record shows that well–managed smaller banks have nothing to fear from technology, deregulation, or consolidation.

Most projections of the future United States banking structure call for a substantial reduction in the number of American banks. But these same projections also predict that thousands of banks will survive the consolidation trend, reflecting both

their individual efficiencies and competitive skills, on the one hand, and the preferences of the marketplace on the other. Such analysis, done by the Federal Reserve Board's staff and others, merely reinforces my own view that the franchise value of the U S community bank—based on its intimate and personalized knowledge of local markets and customers, its organizational flexibility, and, most of all, its management skills—will remain high, assuring that community banks continue to play a significant role in the U S financial system.

But while I am optimistic regarding the future of banks of all sizes, I would emphasize that technological change, globalization, and regulatory erosion will eventually make it impossible to sustain outdated restrictions without mounting inefficiencies and unnecessary costs. In addition, these forces will be supplemented and magnified by piecemeal revisions to federal regulation and sweeping changes in state laws. This was the pattern that we observed in the evolution of interstate banking and branching, a pattern that finally led the Congress to repeal artificial restrictions on the ability of banking organizations to expand geographically.

With the authorization of interstate banking and branching, the task remains of modernizing the activities permissible for banking organizations. The most pressing reform needed is repeal of Glass–Steagall. Our experience over several years with Section 20 securities subsidiaries of bank holding companies, and the increased dealing activities of banks in derivatives, securities, and foreign exchange, suggest that the risks resulting from repeal of Glass–Steagall are manageable. The Board, as you know, has been a strong supporter of such reform and we continue to believe that legislation should be enacted as soon as possible. I would underline that the difficulties this legislation has faced may well be indicative of the difficulties of other legislative reforms in the years ahead. The changes in products, methods, and delivery

systems that are made possible by technological change create a sense of instability  
Unstable environments often induce concerns among firms and individuals and  
understandable resistance to disruption of accustomed rules, regulations, and statutes  
History makes clear that such efforts can only be holding actions In a globally  
integrated economy—indeed, in a national economy where state legislatures have  
been more willing to enact reform than Congress—the ability to delay the new has  
been severely weakened Our inability to enact reform only means that markets will  
move more quickly to innovate around the obstacles, harming the currently regulated  
The public, however, will ultimately receive the benefits of innovation and technological  
change

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