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Remarks of

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I am pleased to have the opportunity to be with you this evening and to take this occasion to step back from the day-to-day concerns of monetary and regulatory issues and consider a number of the deep-seated, longer-run forces that have been shaping the U.S. economy. In particular, I want to focus on some broad considerations that I believe to be important in assessing the prospects for sustained economic growth and rising standards of living

I believe that an appreciation of these longer-run economic developments can provide useful insights into one of the striking features of the current situation: the depressed state of consumer confidence. According to a number of surveys of American households, confidence about economic prospects, after bouncing back in the spring and summer of 1991, has again sagged considerably. Indeed, consumers' attitudes about business conditions and about their personal finances are at quite low levels--levels that, in the past, have been associated with much more severe economic stress than we are currently experiencing. Such extraordinary apprehension, for example, characterized the deep economic contractions of the early 1980s and the mid-1970s.

To be sure, our recent economic performance has been disappointing when measured against the norms of previous recoveries--or even against the forecasts made last summer. After two quarters of moderate growth, real gross domestic product increased at less than a 1 percent annual rate in the final quarter of 1991 and, at that point, had retraced only slightly more than half of its decline from late 1990 and early 1991. Rehiring has been particularly slow, and recent employment trends have been weak.

I suspect, however, that what troubles consumers, and indeed everyone, more fundamentally, is that the current pause in activity

underscores their sense of a retardation in the growth of American living standards over the long run. So long as the recovery remained convincingly on track last spring, these latent concerns did not surface. But when the recovery failed to meet expectations, nagging worries reemerged about what our nation's long-run economic prospects are and whether the current and future generations will live as well as previous ones.

The recent decline in homeownership among young households is an obvious case in point. In 1980, for example, 61 percent of households headed by a 30- to 34-year old were homeowners; in 1990, by contrast, only 52 percent of households in that age group were owners. However, the homeownership rate among the parents of these younger households did not change between 1980 and 1990, in part, because the older households had experienced a higher incidence of homeownership in their younger years.

In several recent public opinion polls, two-thirds of the adults interviewed indicated that they do not expect their children to have a higher standard of living than they are currently experiencing. This expectation is clearly too pessimistic because it implies that productivity--that is, output per worker--may actually fall over the coming years. Such an event is highly unlikely, short of a dismantling of part of our physical capital facilities.

Nonetheless, coupled with the homeownership experience, the record of productivity growth and trends in real wages and family incomes provides ample explanation for professed longer-term concerns. Although we saw some improvement in productivity trends during the 1980s--at least relative to the dismal experience of the late 1970s--our performance fell far short of the experience of earlier generations. And that disappointing performance was reflected not

only in the persistent struggle by American businesses to gain a competitive edge in world markets but also in the lackluster growth in the real income of too many American families. Average real income per family rose at less than a 1 percent annual rate between 1973 and 1990. By contrast, in 1973, American families had experienced two and a half decades after World War II in which their real income had expanded at a robust rate of 2-3/4 percent each year.

Another contrast between the pre- and post-1973 periods, and a potential significant factor in the current state of long-run concerns, is that the distribution of family income has become more dispersed in the more recent period, reversing the trend toward more equal distribution that characterized the first two decades after World War II. The variation in the distribution of family income in the United States, overall, since 1947 has not been dramatic, and some have argued that the 1960s was an aberration and that current distributions are closer to historical norms. Nonetheless, in the / early postwar era, gains in real income were fastest for low-income families; in the more recent period, not only has the entire distribution been rising slowly, but gains for low and middle income families have lagged.

The United States does not appear to be alone in having experienced sluggish gains in real earnings and some widening in the dispersion of income in recent years. The phenomenon has evidently occurred in other industrialized countries, such as Canada, Germany, Sweden, and Australia. This would suggest that, in seeking to discover the factors underlying this development, we should be examining global, fundamental forces.

From the U.S. experience, it is obvious that education and skill is an important aspect of the story. In the past decade in

particular, those individuals with less formal education and skill realized significantly lesser gains in real income than those who had more education and were more highly skilled. In fact, a significant part of our work force has experienced a decline in real earnings and a retardation of living standards even as underlying levels of average real income for the nation as a whole were still rising. Presumably a considerable part of recent consumer discouragement reflects the concerns of those who have been losing ground.

These developments in wages and income, while a bit disturbing, should not be too surprising when one considers the profound changes in technology that have affected production and labor markets over the past several decades.

More specifically, we have experienced a pronounced rise in that part of the value of economic output that is conceptual rather than physical. The form of the output and the means of production have become increasingly less physical or tangible. The weight of our gross domestic product today measured in tons is only slightly higher than several decades ago. The huge rise in the real value of output since then is the result much more of ideas than of the exploitation and fabrication of physical resources. Because the accretion of knowledge is, with rare exceptions, irreversible, this trend almost surely will continue into the twenty-first century.

The changes in what we usually view as physical product have been dramatic. The purpose of production, of course, has remained the same: that is, to serve human needs and values. But output of comparable utility now generally has less bulk and weighs less. 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 but in buildings 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 is only the beginning of a long list of growing almost wholly conceptual elements in our economic output

The increasing substitution of concepts for physical effort in the creation of economic value also has affected how we produce that economic output: the use, for example of computer-assisted design systems, machine tools, and inventory control systems. Offices are now routinely outfitted with high-speed information-processing technology. Even the physical quantity of goods consumed in creating economic services has changed. Financial transactions, which were historically buttressed with reams of paper, have been progressively reduced to electronic signals, although the rise in the volume of activity has kept the use of paper growing

Economic value has always reflected relative locations. Coal in London was always of more value than coal at Newcastle. The quintessential production of value in the United States at the turn of the twentieth century was the combining of vast quantities of iron ore from the Mesabi range with the coals of western Pennsylvania to make steel in the Pittsburgh district.

The comparable value creation at the turn of the twenty-first century will surely be the transmission of information and ideas, generally over complex telecommunication networks, where their new location will have added to economic value in the same manner that ore

moved from the Mesabi did a century earlier or coals from Newcastle centuries before that.

Hence, as one might expect, the downsizing of economic product has also affected world trade. International trade in, say, construction gravel or scrap metal is limited by weight or bulk. High-value computer components, in contrast, are major and increasing factors in world trade. Obviously, the less the bulk and the lower the weight, the easier goods are to move; particularly, the easier they are to move across national boundaries. Thus, we should not be surprised to find that, after we adjust for average price changes, pounds shipped per real dollar of both exports and imports have declined roughly 3 to 5 percent per year since 1970. The downsizing of our imports is, of course, a reflection of the extent to which conceptualization is also dominating the economies of our trading partners

The growing contribution of intellectual products to output has largely been reflected in the explosive growth in information-gathering and processing techniques, which have greatly extended our analytical capabilities and have had enormous consequences for virtually all facets of our economic lives. For instance, the proportion of workers directly using a computer at work jumped from one-fourth to one-third in just the five years from 1984 to 1989 and has doubtless increased further since then. More broadly, over the past decade, the growth in demand for workers who can efficiently absorb information and perform analytical tasks apparently outstripped the growth in supply. In the statistics on wages and labor market experience, we see a rise during the 1980s in the monetary returns to those individuals with higher levels of education and skill training.

This shift is not simply a change in the composition of production and employment away from goods-producing industries and toward the service sector. Neither is it a consequence of changes in the demand for our goods in world markets. Indeed, the relatively strong growth in demand for workers with conceptual skills compared with the demand for those with physical skills has been occurring in all types of industries, even manufacturing. A half century ago, for example, to move heavy coils of steel strip around a plant often required a good deal of human brawn. Today, instructions transmitted through a computer keyboard will accomplish the same task.

The ease and speed of technology transfer across national boundaries, as well as among domestic industries, has been another important aspect of the changing economic environment. Producers in other industrialized countries, by maintaining rapid rates of capital formation and having the flexibility to innovate quickly, have been able to capitalize on knowledge developed by themselves and others. As a result, they now compete successfully with U.S. firms in high-technology products. And among the developing countries, advances in automation have allowed producers to equip their low-wage work forces with modern machinery and to become highly competitive in many areas, including consumer electronics, steel, and textiles.

In this environment, America's prospects for economic growth will greatly depend on our capacity to develop and to apply new technology. Admittedly, our ability to retain control over new ideas and products has become more difficult because of the rapid international diffusion of technology. But we must not fall behind in converting scientific and technological breakthroughs into viable products.

The attainment of rising living standards in the future for all our people depends critically on our ability to increase productivity growth, and that will require greater amounts of investment--in human capital and in research and development, as well as in the more tangible plant and equipment.

Regarding human capital, workers who are better educated and are equipped with the skills to deal with complex problems or processes generally can adapt more readily to the changing demands of the economy. They can switch jobs more easily, and they tend to spend less time unemployed. In coming years, we should see some increment to the growth rate of productivity simply from the aging of the work force and the accompanying shift to a mix of workers with more years of experience. But, with conceptual advances likely to continue, an increasing proportion of workers will need to be equipped with the ability to apply new ideas and processes in their work. To some extent, the diffusion of the resultant technological advances throughout various types of economic activity should be speeded by the development of ever more user-friendly applications.

We probably all have had some experience with the diffusion of technology and with its effect on our productivity. I can recall when routine statistical analysis, arguably of economic value, required the programming effort of a trained technician and the use of a considerable amount of computation time. Indeed, I remember a generation ago devoting hours in the development of a detailed Fortran code that would then be fed into the huge mainframe computer next door. Today, thanks to the development of high-level applications software and the increased power of computers, similar calculations are done daily in a manner of minutes on desktop PCs by students with

only a marginal understanding of the complex process they are initiating.

The economic value of expanding user-friendly applications is manifested in the extraordinary rise in the stock market values of software firms in recent years. Such applications enhance the marginal productivity of lesser skilled workers, enabling them to produce, and be paid for, increasingly higher value-added products. Part, but only part, of this higher value added has accrued to the producers of software, and the expected future increases have become embodied in their current equity prices.

Clearly, we need to accelerate the pace at which our stock of all types of knowledge is growing. By this I mean increasing the flow of inventive activities--usually measured by research and development expenditures. These activities more often than not result in changes in technology that, in turn, increase the amount of output that can be realized with a given amount of labor and capital

Most indicators suggest that in recent years the expansion of inventive activity may not have been keeping pace with the rate at which the structure of our economy was becoming dependent on ever-changing world technology. This is suggested in the data on spending for research and development, on the employment of scientists and engineers conducting R&D, and on the number of patents granted. Indeed, the United States used to have the highest R&D spending as a percentage of gross domestic product in the industrialized world. Japan and Germany have, however, been steadily increasing their ratio of R&D to gross domestic product, and during the 1980s their ratios pulled even with the United States. However, we must be hesitant in drawing significant conclusions from this because much of such

information reflects the input of research effort, not necessarily the successful output

In addition to enhanced human capital, we must be willing to maintain a high level of business investment in order to outfit our productive facilities with the most up-to-date technology and machinery. But here, too, recent trends have not been favorable for the United States. During the 1980s, investment net of depreciation--that is, the portion of investment spending that actually adds to the nation's capital stock--declined noticeably as a share of net national product. The effect that this decline had on our productive capacity was offset, to some extent, by increased productivity of certain types of short-lived equipment such as computers. Nonetheless, the quantity and quality of investment have apparently been inadequate to demonstrably speed the growth of productivity

Prospects for investment in coming years will depend on many factors, but they undoubtedly will be improved by the adoption of sound incentive-oriented macroeconomic and structural government policies. I have long argued that bolstering the supply of domestic saving available to support productive private investment must be a priority for fiscal policy. In that regard, reducing the call of the federal government on the nation's pool of saving is essential. At a minimum, maintaining a commitment to the elimination of the structural budget deficit over the coming years will help enormously to alleviate the concerns of the American people about our economic future

An improvement in private saving is also desirable, but, to date, we have had little success in designing policies to boost private saving. Nonetheless, our history suggests that in the past we have saved and invested at higher rates and hence can presumably do so again.

As I indicated earlier, our ability to raise investment will determine our success in achieving a higher sustainable trend in economic growth. But no single policy or program, by itself, is likely to ensure that result. Rather, improving productivity will require action on many fronts, in both the public and the private sectors.

In closing, I would like to note that I was brought up in an age when Americans could seemingly do anything we put our minds to. Even during difficult times, American attitudes have traditionally been characterized by a buoyancy that seems to be lacking at the moment.

Many of the challenges that we face today have evolved from the rapid changes in the economy of recent years: intensified international competition, spreading deregulation, technological advances, and financial innovations. All such changes in the structure of the economy naturally create frictions, at least temporarily. As those frictions dissipate, however, I have no doubt that the economy will emerge healthier. And, if we are able to boost our investment in people, ideas, processes, and machines, the economy can operate more effectively as it adapts to change. This would create an even greater payoff of a broadly based rise in living standards over the longer run. I trust that as such trends become increasingly evident, the current deep-seated fears of the future will rapidly fade and the optimism that has characterized Americans through the generations will reemerge.