

For release on delivery  
8:15pm C.D.T. (9:15pm E.D.T.)  
October 19, 1995

Remarks by  
Alan Greenspan  
Chairman, Board of Governors of the Federal Reserve System  
before  
The Economic Club of Chicago  
Chicago, Illinois  
October 19, 1995

I appreciate this opportunity to address The Economic Club of Chicago. Your organization, founded nearly 70 years ago, has a well-established reputation as a valuable forum for discussion of some of the key economic issues facing the Midwest and the Nation. Tonight I hope to continue that tradition by stepping back from the narrower concerns that occupy much of my time to consider some of the fundamental factors that may shape our nation's economic future, perhaps well into the first decade of the twenty-first century.

Ancient soothsayers may have been able to penetrate the future, but unfortunately they chose to vouchsafe precious few tricks of their trade to today's central bankers. The most effective means we have for looking over the horizon is to try to identify which of the forces currently driving our economy are transitory and which are deep seated and likely to persist in the longer term.

One major deep-seated force that we can identify with some assurance is the trend toward an increasing conceptual content of output--the substitution, in effect, of ideas for physical matter in the creation of economic value. The roots of this trend 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 this century, the symbols of American economic strength

were our output 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 focused today's views of economic leadership increasingly on downsized, smaller, less palpable evidence of output, requiring more technologically sophisticated labor input. Our 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 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 long and growing list of almost wholly conceptual elements in our economic output. Indeed, it is perhaps the hallmark of our age that people are talking about substituting computerized "virtual reality" for real-life experiences!

These innovations are the extension of an established and likely irreversible trend. Over the past century, our standard measure of output of goods and services, adjusted for price change, has increased by approximately three percent per year, but the actual physical tonnage of that output has gone up significantly less. The difference reflects the substitution of impalpable concepts for physical volume. The expanding conceptualization of output has also led to a cumulative buildup of productive capital, which has meant less labor input per unit of output. This is a key to increasing productivity and, with it, our standard of living.

The process of conceptualization in output would seem 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--a subject I shall return to later. But it also is possible that some of the frenetic pace of change is 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 long time it typically has taken to translate a major new technology into increased productivity and higher standards of living. For

example, electric power, an innovation of the late nineteenth century, apparently did not fully show through in our productivity data (and one must presume our productivity) until the 1920s. Major infrastructure investments and other changes were needed to realize the potential of the new technology. The same may well be true of modern information technologies: New ways of doing business may be necessary to fully exploit the computing and communications tools now at our disposal.

In any event, realizing the full potential of these powerful new technologies is going to depend on the prevalence of another fundamental of economic growth--competition. We seem to have learned in recent years that growth can be hobbled by unnecessary or poorly designed regulation and by protection of business through barriers to free trade within a country and with other countries. Indeed, the unquestioned lesson of the failures of economic development in Eastern Europe after World War II is that government central planning, was incompatible with a vibrant economy. It suppressed the forces of competition and, almost surely as a consequence, stifled economic progress and growth as well. Virtually all of those countries are now endeavoring to build free-market, competitive economies as rapidly as possible.

The incentives associated with a competitive market are critical in determining the degree to which our endowments of natural resources and human skills are turned into wealth. If market forces are inhibited, wealth creation is almost certain to be disappointing.

It is almost surely the case that the development of the computer industry has done more to enhance the efficiency of American business generally than any other recent phenomenon. While the early development of mainframe computers was heavily concentrated in large corporate enterprises, the industry as we know it today owes much to the subsequent birth and growth of many smaller and more dynamic firms.

It is hard to imagine a more competitive environment than that which developed around the scores of small, "garage" based firms that advanced PC and workstation technologies and created the software that was needed to make computers more useful and "user friendly." These firms have created an industry that is the envy of our trading partners. Many of these garage firms went down the wrong path and fell by the wayside. Even the most successful remain vulnerable to the next successful innovation by a competitor. Schumpeter's view of creative destruction is nowhere more evident than in Silicon Valley. Our world leadership in computing doesn't reflect any government industrial policy; and fortunately, there has been no constraining set of regulations that might have stifled it.

If our superiority in producing computer-based technologies persuasively demonstrates the continuing vitality of our economy, why does such a large part of our populace seem discontented and insecure? There are doubtless many reasons, but the very pace of the conceptualization process I described earlier may provide at least a partial explanation.

As computers and various advanced telecommunications technologies have begun to dominate what it is we produce and how we produce it, the average age of our capital stock has undergone a significant decline. Our current capital stock is becoming obsolete far more rapidly than in past years.

The rapid turnover of this capital stock, and the concepts embodied in it, has important implications for the persons working with that capital. To keep up, to retain their full usefulness as operators of capital, workers are having to retool their knowledge and skills to match the accelerated pace of change. Job insecurity has grown as significant elements of our work force are being rendered technologically obsolete. This is clearly much more the case for older workers than their children who seem to have adjusted to the "computer age" much more readily.

Expanding globalization with its attendant increasing share of merchandise imports may also be adding to a sense of increased competitiveness and insecurity. But globalization directly cannot be a big player because it affects only a relatively small part of our work force--factory jobs, which account for fifteen percent of total employment, and some service activities.

Job insecurity, of course, is not a new phenomenon. It has always been prevalent in free labor markets. But it appears to have become particularly pronounced in recent years, perhaps because the rapid pace of technological change, has occurred alongside, and been associated with, the highly publicized

downsizing of many large corporations. Overall job growth has remained substantial despite these layoffs, but that seems not to have relieved the fear of displacement. And that fear has doubtless played a significant role in the slowdown in the growth of labor compensation as workers have in effect sought to preserve their jobs by accepting lesser increases in wages. While disciplined monetary policy is largely responsible for the disinflationary trends of the last fifteen years, subdued wage pressures have doubtless facilitated those trends.

There will eventually come a point, however, when workers will perceive that it no longer makes sense to trade off wage progress for incremental gains in expected job security. The concern about job loss will not have diminished, but there is a limit to how far it can go and hence to its effect on wage increases. At that point, efforts to achieve real wage gains at least commensurate with productivity improvements may exert pressures toward faster nominal wage increases.

Obviously, if an acceleration is accompanied by stable inflation and hence a growth in real earnings, that is all to the good. But we have to be careful not to lull ourselves into the presumption that somehow the institutional structure of the American economy and its increasing globalization is permanently suppressing inflation, and that monetary policy, as we move into the twenty-first century, need no longer be vigilant against inflationary pressures.



Also contributing to the prevailing dissatisfaction with our economic performance is the unevenness of wage gains in recent years. As output increasingly embodies ideas, labor force adaptation requires education. Not surprisingly, there has been a trend toward rising relative wages for those with higher levels of education. During the past fifteen years, the earnings of college graduates have increased relative to those who are high school graduates and, in turn, high school graduates have continued to open up their advantage over those who are high school dropouts. In fact, an increasing minority of our labor force has experienced real wage decreases, and surely this fact has accentuated unease, despite increases in living standards, on average, for our populace.

Clearly, we must focus on ways to improve the skills and earning power of those who appear to be falling behind. We need to raise the supply of better educated workers if the recent trend toward rising wage dispersion is to be contained. In the long run, better child-rearing and better schools are essential. But in the shorter run, 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. The bottom

line, though, as I indicated earlier, is that individuals are going to have to be prepared to maintain skills as new procedures and equipment become part of a rapidly evolving economy.

Finally, the changing nature of output also has important effects on how good our statistical measures are in capturing the reality of economic growth and thus our perceptions of it. If we do not know how we are doing as a society, we shall not be able to devise appropriate policy responses to changing environments. The proliferation of cutting-edge technologies is making it especially difficult to measure how well or poorly our economy is performing overall.

We depend on signals from the marketplace to judge what is adding value and providing utility and what is not: The structure of prices and quantities that derive from free-market interactions is a reflection of the relative worth of various goods and services. If people like what they are offered, they will buy, sales values will rise, and the market value of the capital assets that produce those goods will rise as well.

The aggregate market value of goods and services, that is the Gross Domestic Product, is an especially useful measure of our productive capabilities. Its major component, gross business product, is in effect the consolidated net sales of the economy.

These measures are not meant to be definitive measures of the general well-being of a society. Increases in crime and pollution, for example, tend to raise the outlays to combat them

and hence to raise the GDP. Depletion of natural resources in the production process adds to business output and GDP.

GDP is strictly a measure of economic output and, when measured against labor and capital inputs, a measure of productivity. Whatever its shortcomings, it is by far the best proxy that we have for the growth in our living standards.

Our conventional GDP measures for recent years exhibit some indications of a step up in productivity growth. But, in December, the Department of Commerce will officially shift the focus to a new measure of economic growth. In so doing, it will adjust for one bias in the current measure and--all other things equal--the result will be that reported growth in output and productivity in the last few years will be shown to be slower than current measurement formulas have been indicating. I should point out that the new output index has been calculated for some time as an experimental basis; consequently, it should hold no surprises for policymakers. But unless there are offsetting changes in the data owing to other revisions, new figures will accentuate the seeming conflict between the official statistics and what is suggested by the rather compelling reports of productivity improvement we hear from American businesses. This leads to a broader question. Setting aside the narrow technical issues of our formulas for aggregating diverse output, are we measuring the output itself properly? Have we been capturing the new types of value added which do not fall into our conventional accounting categories?

We never had any difficulty in recognizing that an integrated steel mill complex was of economic value, and it was appropriately categorized as capital investment in our gross domestic product. And we could see the addition of a steel mill or similar large capital asset at individual companies reflected in a comparable increment to the book value of the firm. The stock market values of the firm tended, to a greater or lesser extent, to match the book value that standard accounting procedures constructed. In recent years, though, the ratios of market to book values of American companies have risen substantially, and at a pace that appears to be faster than can be accounted for by declines in interest rates and equity risk premiums. What appears to be happening is that the increasingly important additions to the nation's capacity to produce, in the form of new wealth-creating ideas are by convention expensed rather than capitalized.

As a consequence, book values underestimate the true value of an apparently rising proportion of our companies. And because such outlays are also expensed in the construction of the GDP, it, too, increasingly underestimates the market value of goods and services. For example, capitalizing that part of corporate software outlays that are currently expensed would add--probably significantly--to measured capital investment. The same would be true of similar types of outlays that are currently expensed, such as those for research and development, some technical work force training, and other conceptual inputs. To

be sure, the net domestic product would not increase by the full amount of capitalization, because a substantial increase in depreciation is also implicit in such changed accounting procedures.

Clearly, we should allow market valuations, where they exist, to dictate what is capitalized and what is not, rather than leave it to accountants and accounting practices. It is market values that generally reflect what an economy believes is of value to it. In this context, it is reasonable to conjecture that our productivity and output have been growing faster than our existing data imply.

Even with such adjustments, we may still not be fully capturing the improvements in economic value and well-being that occur as a consequence of the extraordinary innovations in technology of late. Arthroscopic surgery has significantly shortened hospital stays and the quality of recovery from such surgical procedures. Supermarket check-out lines have been speeded, as have the accuracy of computation and payment. These types of value added, which enhance the quality of life, are not captured by our conventional national income accounting. Similarly, while mobile phones, cable TV, and satellite transmission are included, in part, in many of our measurements, the greater opportunities that they bring cannot be appropriately embodied in current GDP measurements. Moreover, the innumerable conveniences that have enhanced leisure and made day-by-day living less onerous are not captured either. While such factors

have always been mismeasured in our GDP to an extent, and there is the possibility that some elements of our GDP are overestimates, one gets the impression that, with increased conceptualization the relative bias has been increasing. The implication is that, properly measured, economic output has been growing faster than conventional measures suggest.

Moreover, as we move into the twenty-first century, there is scant evidence that the nature and pace of change is likely to slow materially. To be sure, the most visible force of recent change, the continuous downsizing of microprocessors, and hence computer and telecommunications equipment, may increasingly encounter physical limits. But almost as surely, new technologies will emerge, not now visible.

What we do know is that, excluding the sorrowful period of the Dark Ages, human knowledge has rarely been lost, nor technology reversed, and so one can presume that we will evolve in the twenty-first century and beyond in ways not now foreseeable. We can anticipate change to be pervasive and, if competitive forces are allowed free rein, and our fiscal problems resolved, we can expect ever higher living standards for all Americans.

Will Americans adjust to a frenetic pace of change and allow it to happen? While we have in the past, and almost surely will in the future, it is important that we recognize that adjustment is not automatic. We have episodes in recent human history where, for example, pressures of change were not easily

absorbed and people chose what appeared to be a greater degree of security rather than competitive challenge. Competitive forces create uncertainty and dislodgment, but they also bring with them an enhanced quality of living and the increased economic abundance so necessary to confront the problems that exist in societies throughout the world.

The advent of the twenty-first century will certainly not bring an end to the challenges we are facing in a rapidly changing world. From my viewpoint, however, there are a number of positive things happening in our economy now, that make it more likely that we shall be well positioned to meet those challenges successfully.