

“Now, when we think about schools, one thing that's fascinating is that the ability of teachers to share their best ideas, their best ways of presenting knowledge, with each other. Today it's quite limited. And here, where you have the digital media, it will become very straightforward...

“Well, another area, and the first area all this will come to pass, is in business. Since this group talks about economics, I have to say that one great way to think of this electronic world is to think of it as hyper-capitalism. That is, taking the idea of a market and what it can do in terms of matching buyers and sellers and reducing the friction in that matching process to be almost zero. So that if you want an expert consultant who has certain references, who costs a certain amount, you can find that resource wherever you're interested in it.

“If you want to buy a product and you want to see what everyone else who bought that product, or some professional review organization, has to say, that information will be out there. If somebody's a columnist who's really famous and they decided, heck, they don't need a, they don't have to be inside a newspaper, they can go out here and just publish on their own. And if enough people choose to visit their material, the royalties that accrue to them will be very, very substantial. And so we take and make things much more efficient than they ever have been before.

“Now this, as I've said, will take time. This year, we're doing a lot to understand electronic information. Next year, we'll have a lot of trials where these high-bandwidth connections are being built. And even typical PCs will be connected up with this ISDN. And I believe that, by the turn of the century, a substantial number of homes in the U.S. - over 20 million - will be connected up to this.

“And I have to admit, in the past I've often been overly optimistic about how quickly these things would roll out, but there's no doubt in my mind that this is the direction that things are going in, and I really believe that time frame is quite feasible. In fact, many of the people in industry think it'll

happen even faster.

“There's certainly some concern about what this all means. There are people who worry that some people will have it in the early days and others won't. There are people who worry about privacy. There are people who just worry about the kind of change it will bring. What does it mean for the job that they do, or the things that they've learned?

“And all of those are very legitimate concerns, but we certainly don't have the choice of stopping these advances. In fact, the U.S. is likely to be very much at the forefront of these. All of the technologies - chips, software, communications, entertainment - the things that will really drive this forward, the kind of risk-taking that we see here in technology companies - should allow the U.S. to do extremely well, not only at using this here, but also providing it as a product around the world.

“I really see it as something that provides immense opportunity, and really gets back to the original vision of Microsoft 20 years ago, this idea of a computer on every desk, in every home. So I hope you get a sense of how excited I am by this.”

**Alan Greenspan:  
Ideas and Economic Value**

*Federal Reserve Board Chairman Alan Greenspan addressed The Economic Club of Chicago on October 19, 1995, on the subject of economic measurement and change in the nature of economic value.*

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“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 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...

“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 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...

“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...

“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 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 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 15 years, subdued wage pressures have doubtless facilitated those trends.

“There eventually will 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 one point, efforts to achieve real wage gains at least commensurate with productivity 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...

“During the past 15 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.”