Rethinking Technology's Role in Economic Change

Ambitious effort to evaluate the role of technology in the U.S. economic future indicates need for regulatory reform, shifts in business practice, and emphasis on education

ABOUT 40% of all new investment in plant and equipment in the United States now goes to purchase information technology—computers, telecommunications devices, and the like. Just 10 years ago, the share was only 20%. That startling jump is one of the few concrete measures of a fundamental transformation under way in the American economy that is "likely to reshape virtually every product, every service, and every job in the United States," according to a new study by the Office of Technology Assessment (OTA).*

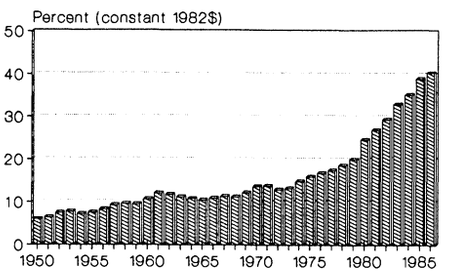
The study, one of the most ambitious undertaken by OTA, is a 4-year effort aimed at understanding the complex interplay between technology and economic change. It is not the usual extrapolation of trends dressed up as forecasts. Rather, it is an attempt to analyze the networks of producers and consumers, which together make up the American economy, in a way that looks at the quality of the products, services, and jobs involved. This approach is very different from the usual economic analyses that examine isolated slices of the American economy such as "agriculture."

It was not an easy task. "It turned out to be very difficult to get academics to think in the way we thought necessary," says Henry Kelly, who directed the study. What emerges from the effort is that the American economy is being reshaped by three principal forces: new technologies, a rapid increase in foreign trade, and changing tastes and values.

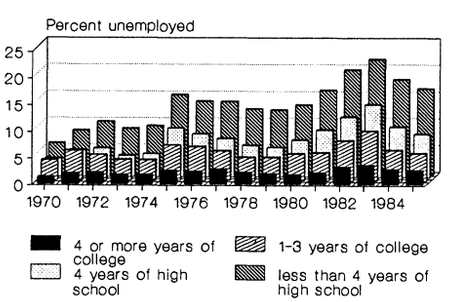
Information technology, says Kelly, "has fundamentally changed where to look for economic growth." It has also changed notions of efficient production because many emerging technologies can reduce the size at which enterprises can be economically competitive. This feature has already transformed the telecommunications business and the environment for regulated monopolies, and in theory should make it profitable for businesses to fill small market niches.

If there is a single take-home message from the voluminous study (500-plus information-packed pages), it is that the economy "is at a crossroads" and its future course rests on a disparate set of conscious choices. Whether the economy moves on a path leading to stagnation, rising imports, and growing unemployment, or on a path of rapid growth and technological change, will require "an unflinching reexamination of the way businesses are managed," and a thorough reassessment of the rules, regulations, and incentives adopted over the past few decades, the report indicates.

In short, the report suggests that ability to respond quickly to changing consumer tastes will place a premium on flexibility and should force corporations to move away from the centralized economic management and mass production that has dominated the industrial scene for much of the 20th century. At the national level, too, "prescriptive government planning [appears to be] less desirable." And in areas ranging from corporate income taxes (a case can be made for abolishing them) to labeling of consumer goods (informed consumers may make better choices), reforms are needed, the report says. In the regulatory arena, technological changes "may increase the need for regulations to protect the health, safety, and privacy of *individuals,*" but there is a crying need for a thoroughgoing reassessment of the confusing and often inconsistent mass of environmental regulations.



Information society. *Chart shows investment in information technology as percent of all investment in producer durables. Share has doubled in less than 10 years.*



Winners and losers. *Unemployment according to educational level. Technical change will demand more educated work force.*

A central theme that leaps out from much of the analysis is that education, broadly defined, will play a pivotal role in the coming economic transition and its impact on individuals. The changes already under way in the economy are placing "an unprecedented demand on the intellectual skills and knowledge of American workers," the report states. About 45% of the job growth between 1980 and 1986 was in professional and managerial occupations, and almost 50% of the new jobs created between 1983 and 1986 went to people with at least 3 years of college education.

The report notes that previous economic transformations were closely associated with major public investment in infrastructure such as railroads, canals, electric lines, and highways. In the coming economic transition, an equivalent infrastructure will be an educated population.

It is not an area in which the United States is doing very well. But the potential for applying new technology to the learning process is enormous and barely tapped. The report urges a major commitment both by the federal government and industry to research on understanding how people learn and to the development of new educational technologies. "If the fraction of gross expenditures invested in research were the same for education as for the average privately owned business in the United States, about $9 billion a year would be spent on education research. This is 60 to 90 times more than the present allocation."

The study also indicates that "the Nation's future has probably never been less constrained by the cost of natural resources." A decade or so after the economy went through wrenching change in the wake of wild fluctuations in oil prices, that conclusion may seem surprising. It stems from the observation that future areas of growth are likely to come from the application of technologies that require few natural resources. Indeed, "optimal use of new technology could result in a 40 to 60 percent *decline* in the use of natural resources, even when there is rapid economic growth," the report states. That is a far cry from the "limits to growth" philosophy of the early 1970s. ■

COLIN NORMAN

**Technology and the American Economic Transition* (OTA, Washington, DC 20510–8025, 1988), $20.