

## Knowledge, Economics and Technology

*By Bill Hobby*

Long-term economic forecasts are like long-term weather forecasts. They are often wrong because there is a lot we do not know about economics and meteorology.

Things may be getting better in economics. New economic theory is focusing on knowledge as a primary driver of economic growth. According to currently accepted theory, production is determined by the amount of capital and labor in an economy--plus what is now thought of as a wildcard.

The wildcard is new technology. Current theory treats technological progress as a fudge factor: Whatever economic growth cannot be accounted for by increased labor and equipment is said to be caused by technology.

The emerging theory recognizes what common sense tells us anyway: that new technology does not just happen. It is caused by the growth of knowledge. Knowledge is another form of capital. Economists now think of capital as money invested in buildings and equipment--things we can see and touch.

Knowledge, economists are now beginning to realize, is human capital. It is measured not in square feet on a factory floor or in the cost of machines that wear out, but in average years of education of the work force, in numbers of Ph. D. degrees, in numbers of new patents.

Knowledge, however, like machines and buildings, has to be paid for by saving. In order to grow (and create more jobs), countries have to invest in knowledge just as they do in factories. Countries that invest the most in teaching their citizens how to make things are the most prosperous. It follows from this theory that investment and knowledge spur each other on. Experience and common sense confirm this truth. The growth areas of the last few decades have centered around laboratories and research universities.

Silicon Valley in California, the Research Triangle in North Carolina, the spinoffs from MIT and Harvard in the Boston area, the spinoffs from Johns Hopkins University in Baltimore are national examples.

In Texas, the Dallas-Fort Worth area prospers because of the growth of high-tech industries to the north and the Supercollider to the South. The largest employer in Houston is the Texas Medical Center. The M. D. Anderson Cancer Center and two medical schools make it a major research center. Austin has attracted two big research operations (MCC, Sematech) because of the University of Texas. San Antonio is becoming a major center of biotechnology.

The new developments in economic theory are described in recent issues of *The Economist*, an English weekly magazine. They are largely the work of Paul Romer, a professor at the University of California at Berkeley.

Under the classical theory, poor countries should grow faster than rich ones. As we know, they do not. The poorest countries, mainly in the Southern hemisphere, get poorer all the time despite growing populations (labor) and some new capital from foreign aid.

Nor does the classical theory adequately explain the slow growth of the American economy as a whole. Inadequate investment in equipment explains some of the problem, but not all. (Proportionately, we reinvest less than half as much as Japan, less than three quarters as much as Germany.)

Despite low investment in plant and equipment, American exports have almost doubled since 1986. Why? As we all know, we don't sell many cars in Japan. Fortunately, not all American businessmen are as

dumb as the overpaid automaker executives. Texas-based computer manufacturers, like Dell and Compaq, don't seem to have much trouble selling their products overseas. Dell recently opened a factory in Ireland.

American entertainment companies like Walt Disney and Time-Warner sell music and television programs very profitably all over the world. Technology-based companies that make pharmaceuticals and computer hardware and software compete very well. General Electric, Microsoft, Apple, Motorola, Intel, Cray, Procter & Gamble, Philip Morris, Johnson & Johnson dominate their world-wide markets.

We don't hear those companies whining to Congress that they cannot compete because of the nasty old Japanese. What's the difference? The successful companies invest in human capital--knowledge. The new ideas, as *The Economist* says, "with luck, may end the short-termism of economics and push long-term growth to the front of policy-makers minds."

"If (the new theory) leads governments to think harder about education, investment, research and development, trade reform, intellectual property rights and so on, it will be a breakthrough indeed," concludes *The Economist*.

*Written in February 1992.*