

## Higher Wages Accompany Advanced Technology

*Economists have long studied the development and diffusion of new technologies. This interest stems from the fact that technological progress is one of the basic engines of economic growth.*

*This brief examines the use of new production technologies. Using U.S. Census Bureau data from the 1988 Census of Manufactures and the Survey of Manufacturing Technology (SMT), this Brief reports on the finding that manufacturing plants using advanced technologies are larger and pay higher wages than other plants.*

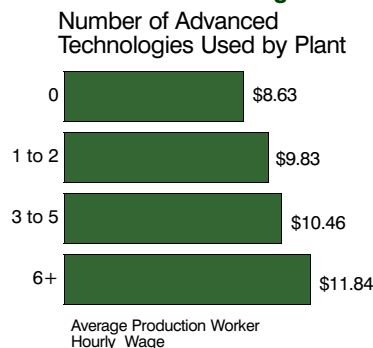
### High Technology Means High Wages.

Seventeen advanced technologies specific to the manufacturing sector were examined in the 1988 SMT. Of these technologies, plants using the following six advanced technologies were selected for a detailed study of the connections among plant size, wages of production workers, and advanced technology usage:

- Computer-Aided Design/Computer-Aided Engineering.
- Numerical Controllers/Computer Numerically Controlled Machines.
- Computers Used on the Factory Floor.
- Local Area Networks.
- Automated Sensors for Materials.
- Robotics and Automatic Sensors.

Drawing upon a data base of over 10,000 U.S. manufacturing plants, researchers found that technology-intensive plants pay significantly higher production-worker wages than plants that adopt few or no advanced technologies. The average hourly wages paid by plants adopting various numbers of advanced technologies ranged from \$8.63 at plants using no such technologies to \$11.84 at plants using six or more such technologies.

### Wages Rise with Use of Advanced Technologies



### Advanced Technologies Are Popular With Large Manufacturers.

More than 80 percent of the large plants—those employing 20,000 or more workers—use advanced technology. The data show that the larger the plant—

- The higher the likelihood that it uses any one of the six advanced technologies: only 1.5 percent of the large plants use none of the advanced technologies, compared with over 30 percent of the small plants.
- The more advanced technologies it uses: 79 percent of plants employing 500 or more people use five or more advanced technologies. Only 13.2 percent of the small plants (employing from 20 to 99 people) did so.

Also, the data show that the greater the number of advanced technologies selected by large plants, the higher the wages.

### Even Small Manufacturers Play the High-Tech, High-Wage Game.

The adoption of advanced technology is associated with higher wages even in manufacturing plants employing fewer than 100 production workers (even though the wage gains do level off after three or more advanced technologies are chosen by these smaller plants).



SB/93-14  
Issued August 1993

U.S. Department of Commerce  
Economics and Statistics Administration  
BUREAU OF THE CENSUS

Wages ranged from \$8.67 per hour at plants with no advanced technology to \$10.13 per hour at small plants that had selected six or more advanced technologies.

**Technology Adoption Affects Wage Rates Independently of Plant Size.**

The data provide a persuasive case for supporting the independent effect of technology on wages:

- Wages rise with technology adoption, regardless of plant size.
- Larger plants pay higher wages, particularly when the plants employ 500 or more workers.

Although researchers have found that, on the average, large plants pay higher wages, the reason for this difference has not been fully documented. However, these data imply the following explanation:

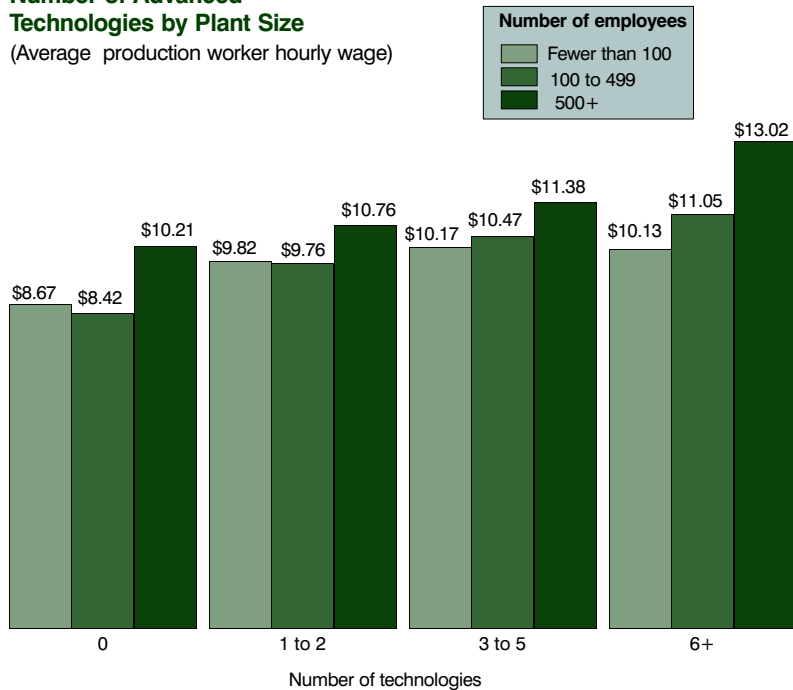
- Large plants are more likely to be technology-intensive.
- Technology intensive plants require workers with greater skills.
- Higher worker skill levels command higher wages.

**High-Tech Plants Have Certain Hallmarks.**

Plants are more likely to adopt advanced technology not only when they are large, but also when they are—

- Owned by multiunit firms.

**Number of Advanced Technologies by Plant Size**  
(Average production worker hourly wage)



- Engaged in defense-related production.
- Have already adopted one advanced technology.
- Have high levels of past research and development (R&D) expenditures relative to sales.

In regard to the latter characteristic, a plant ranking high on R&D expenditures has the advantage of holding “information capital” (that is, the stock of knowledge that precedes the decision to adopt advanced technology).

*The full research report upon which this information is based contains complete descriptions of the data bases, the statistical methods used, and data limitations.*

*This Brief is one of a series that presents information of current interest based upon research conducted at the Center for Economic Studies (CES) of the U.S. Census Bureau. The CES houses highly specialized longitudinal microdata files on the U.S. manufacturing sector. One of the Center’s missions is to develop projects and procedures for enhancing researcher access to these files with confidentiality protection. For further information, contact Robert H. McGuckin, 301-763-2337.*

**Contacts**

Wages and Advanced Technology  
Timothy Dunne  
University of Oklahoma  
405-325-3748

Economic Statistical Briefs  
Kathy V. Friedman  
301-763-2747