

# ECONOMIC COMMENTARY

Federal Reserve Bank of Cleveland

PERIODICALS

## Has Manufacturing's Presence in the Economy Diminished?

by Randall W. Eberts and John R. Swinton

Through most of this century, manufacturing has been the keystone of the American economy. The production of durable and nondurable goods has ranked first in employment, in capital investment, and in contribution to gross national product (GNP) for at least the last 40 years.

Although manufacturing currently accounts for about 20 to 22 percent of GNP—or roughly \$814 billion annually, there has been much debate about whether or not it is on the decline, and whether or not its prominence has been overshadowed by the service industries.

Pessimists, who fear decline, say that manufacturing's total employment share has dropped steadily since World War II; optimists, who reject decline, claim that manufacturing's total GNP output share has remained constant during the same period.

Both views are correct. A debate, however, centered only on this simplistic view of manufacturing's role as a creator of jobs and supplier of finished goods overlooks other important interactions with the economy. In addition to creating jobs and supplying consumer goods, for example, manufacturing also buys goods and services from other sectors and provides them with goods used for production.

Through these linkages, one sector's performance affects growth in other sectors and, relatively, affects the entire economy.

Consequently, the importance of manufacturing depends upon the degree of its interaction, or linkages, with other economic sectors.

■ **Linkages and Economic Growth**  
Linkages run in two directions, backward and forward. Backward linkages are purchases by one sector of goods and services from other sectors. Forward linkages are the sales of goods and services for use in producing another sector's goods and services. An industry can stimulate national economic growth both by buying from and selling to other sectors. In terms of backward linkages, the potential for an industry to stimulate economic growth is directly related to the amount of raw materials, intermediate goods, and labor services it purchases from within the domestic economy in order to manufacture its own products.

For instance, if the steel industry purchases more intermediate goods and labor services per dollar of output than the paperboard container industry, an increase in steel output will generate more activity throughout the economy than an equal increase in the production of paper products.

In terms of forward linkages, however, an industry stimulates the econ-

Much has been written and said about the "decline" of manufacturing in America. The arguments pro and con, however, have centered on a simplistic view of manufacturing's role in the economy. Even though its share of employment has fallen, for example, manufacturing still maintains its strength through its linkages with the rest of the economy.

omy by making and selling production materials more efficiently and thus at a lower price. Providing other sectors of the economy with relatively low-cost production materials allows these sectors to expand because of a cost advantage. In turn, these sectors can pass on the benefits of lower production costs to other sectors that purchase from them. The cumulative effects eventually permeate throughout those economic sectors that are linked directly and indirectly.

However, to improve production, products must be produced with less material and effort. It is especially important to reduce labor costs because they are a large part of the cost

of production. This is where manufacturing faces an internal conflict. To effectively stimulate the nation's economic growth through backward linkages, manufacturing should spend a large percentage of its sales income on goods and services from other sectors, including hiring workers. To affect growth through forward linkages, however, the cost of these goods and services should claim very little of manufacturing's income.

#### ■ Forward Linkages

Traditionally, manufacturing has been the primary supplier of production goods to other economic sectors. The only sector that begins to approach manufacturing in the size and extent of its forward linkages is services.<sup>1</sup> In recent years, services have matched about 80 percent of manufacturing's forward linkages, as opposed to 45 percent in 1947.

Since manufacturing is linked to more sectors of the economy than any other industry, its ability to provide goods efficiently is vital for the health and growth of our economy. Over the last 40 years, manufacturing's labor productivity (measured as output per hours worked) has increased faster than productivity of the economy as a whole, and has increased significantly faster than service-sector productivity. Between 1948 and 1986, manufacturing productivity increased at an average annual rate of 2.8 percent, while service productivity increased at only a 0.9 percent rate (figure 1).

Higher productivity increases in manufacturing than in services should result in services prices increasing more rapidly than goods prices. This appears to be the case. For example, from 1959 to present, prices of manufactured goods as measured by the GNP fixed-weight deflator, rose at average annual rate of 3.4 percent, versus 5.3 percent for services (figure 2).

The benefits of efficient production go beyond low-cost output. Productivity increases result from a skilled

labor force and technological innovations. While workers hone their skills, techniques are perfected within the manufacturing process. Thus, a viable manufacturing sector fosters greater technological innovation and a more highly skilled labor force.

#### ■ Backward Linkages

Significant productivity increases in manufacturing have come at the cost of backward linkages. Labor has been particularly affected; manufacturing employs fewer workers now than it did in the past and many jobs have been lost. However, other aspects of backward linkages from manufacturing to the rest of the economy have not changed significantly over the years.

Although fewer workers are employed in manufacturing, for example, they still earn more money and claim a greater share of total sector revenue than in services. Furthermore, roughly the same share of manufacturing output goes toward purchasing intermediate goods today as it did 40 years ago.

**Labor:** As mentioned above, manufacturing's share of total employment has declined over the last 40 years from 35.4 percent in 1947 to 23.9 percent in 1987. In contrast, services' employment share increased from 11.5 percent to 18.6 percent. Manufacturing's employment share declined again last year—during a year that many people considered good for manufacturing.

Even though manufacturing employment increased by more than 400,000 workers in 1987, this 2.4 percent growth rate fell short of the 2.9 percent increase in the nation's total employment. As a result, manufacturing's share of total employment slipped again, from 18.9 percent in January 1987 to 18.8 percent in January 1988. In contrast, the service sector, with 23.6 percent of the economy's jobs, generated 33.8 percent of total new jobs, or more than twice as many jobs as the manufacturing sec-

tor created. As a result, manufacturing continues to lose employment ground to the service sector.

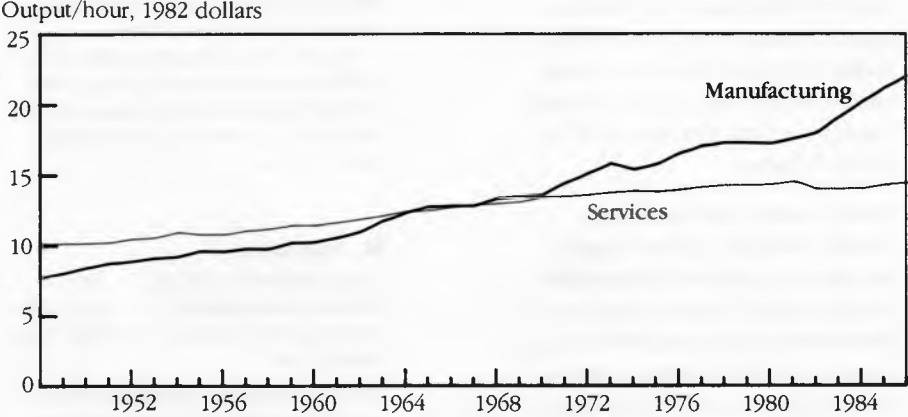
Productivity is the basic reason behind the opposite employment trends shown by manufacturing and services. Manufacturing firms are more efficient. They employ half as many workers today per unit of output than they did in 1947. With widespread cost-cutting measures and extensive capital improvements, this trend of increasing productivity should continue.

However, the number of workers is only part of the equation describing the effect on the economy of manufacturing's use of labor services. The other part is labor compensation. Even though it takes far fewer manufacturing workers to produce goods today than in the past, the compensation of these workers has remained constant at about 60 percent of value added (figure 3).<sup>2</sup> Furthermore, manufacturing workers are paid much more than service workers. As a result, labor costs per unit of output have remained relatively constant over the past few decades.

**Intermediate Inputs:** Manufacturing also spends roughly the same percentage of income on goods purchased from other sectors. Judging from U.S. input-output tables for selected years, there is no material difference in the use of intermediate inputs in recent years as compared to their use 40 years ago. For instance, in 1977 (the most recently available benchmarked input-output table) the manufacturing sector purchased 64 cents of intermediate inputs for every one dollar of output produced. In 1947, one dollar of output required 62 cents of intermediate inputs.<sup>3</sup>

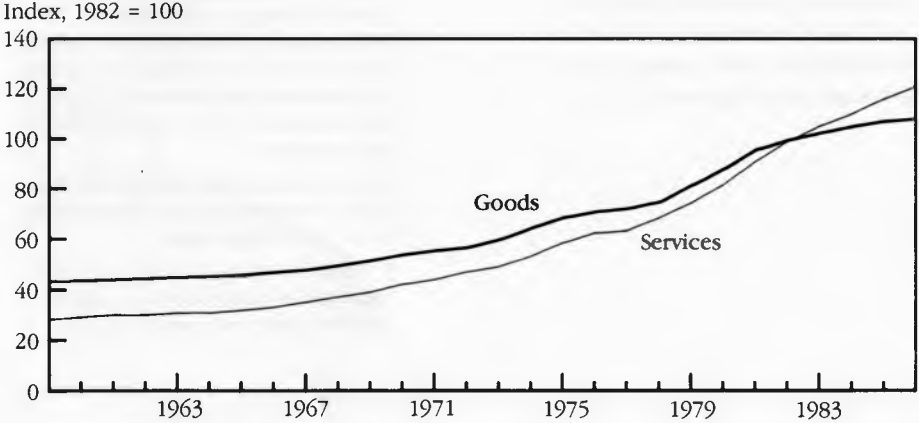
The composition of goods and services purchased from other sectors, however, has shifted. In 1947, manufacturing purchased 20 percent of its intermediate inputs from the agricultural sector. More recently, this percentage has fallen to 6 percent.

FIGURE 1 PRODUCTIVITY (Full Time and Part Time)



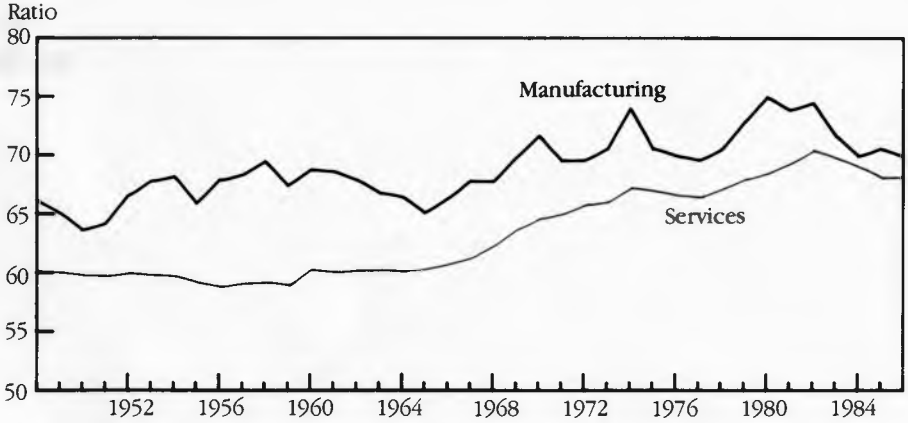
SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis.

FIGURE 2 GNP FIXED WEIGHT SERIES (Goods and Services)



NOTE: Fixed-weight deflators represent the price change of a fixed basket of goods over time.  
SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis.

FIGURE 3 COMPENSATION/VALUE ADDED (Manufacturing and Services)



SOURCE: U.S. Department of Commerce, Bureau of Economic Analysis.

Purchases of services have taken the opposite trend. In 1947, services comprised 7 percent of manufacturing's intermediate inputs, 30 years later they comprise 12 percent. The amount of intermediate goods and services purchased by manufacturers from other manufacturers has remained relatively constant.

**Secondary Backward Linkages:** Although an increase in manufacturing has a significantly smaller direct effect on employment today than 40 years ago, the manufacturing sector is still an integral part of the economy through its purchases of goods and services from other sectors.

For instance, consider the link between manufacturing and the service sector. As we have noted, the service sector now plays a more important role as a supplier to manufacturing than it did in the past. Furthermore, as the service sector expands it will, through its backward linkages, buy more labor and intermediate goods from other sectors.

With manufacturing buying more services, and services buying more labor, we would expect manufacturing to indirectly generate employment.

We estimate that a million dollar increase in manufacturing output in 1947 would have increased service employment by 2.01 workers. The same rise in output in 1987 would increase service employment by 2.81 workers, a 40 percent rise. Thus, even though the amount of manufacturing employment has declined over the last eight years, manufacturing still has a strong effect on employment growth in other sectors.

Change in manufacturing output also affects the total compensation of service employees. A million dollar increase in manufacturing output in 1947 would have resulted in an additional \$17,221 expenditure on labor services (measured in 1982 dollars using the Consumer Price Index as a deflator).

In 1987, the same dollar increase in manufacturing output would have produced an additional \$62,685 spent on labor services (again measured in 1982 dollars). The increase comes from two sources. The first is an increase in the purchase of services by manufacturers. The second source is an increase in the compensation per service worker over this time period.

These estimates of the effect of an increase in manufacturing output represent only "first-round" effects in the service sector. Manufacturing increases raise demand for output from other sectors. This, in turn, further increases demand for employment and output in the service sector and in other sectors.

The total effect of an increase in manufacturing output on the other sectors remains about the same today as it did in 1947. For every dollar generated in the manufacturing sector in 1947, 2.5 dollars were generated in the economy. Today, that ratio has fallen only slightly to 2.3. Consequently, the ability of manufacturing's linkages to generate additional income within the economy has remained roughly the same over the last 40 years.

#### ■ Conclusion

Despite the well-publicized drop in manufacturing's total employment share, the importance and impact of manufacturing on the economy has remained relatively constant. Production of manufactured goods has maintained a constant percent of GNP for the last 40 years.

Manufacturing wages and fringe benefits have also claimed roughly the same proportion of value added over this period, and the purchase of intermediate goods and services from other sectors has maintained about the same percentage of sales output. In addition, sustained increases in manufacturing's labor productivity has benefited the nation by providing goods to the rest of the economy more efficiently.

In short, all the evidence indicates that manufacturing will continue to be a vital and viable sector of our economy for a long time to come.

*Randall W. Eberts is an assistant vice president and economist at the Federal Reserve Bank of Cleveland; John R. Swinton is a research assistant at the bank.*

*The views stated herein are those of the authors and not necessarily those of the Federal Reserve Bank of Cleveland or of the Board of Governors of the Federal Reserve System.*

#### ■ References

Cohen, Stephen S. and John Zysman, *Manufacturing Matters: The Myth of the Post-Industrial Economy*. (New York: Basic Books), 1987.

Robert Z. Lawrence, *Can America Compete?* (Washington, D.C.: The Brookings Institution), 1984.

#### ■ Footnotes

1. We define the services sector to include all activities under Standard Industrial Code (SIC) categories 70-89, which includes among other sectors personal services, health services, and business services. This definition includes neither wholesale and retail trade nor financial and communication services.
2. Stated simply, value added is the value of output shipped from the firm minus the cost of intermediate inputs.
3. The value of output found in the input-output tables is defined as value-added plus the value of intermediate inputs.

**Federal Reserve Bank of Cleveland  
Research Department  
P.O. Box 6387  
Cleveland, OH 44101**

**BULK RATE  
U.S. Postage Paid  
Cleveland, OH  
Permit No. 385**

Material may be reprinted provided that the source is credited. Please send copies of reprinted materials to the editor.

#### **Address Correction Requested:**

Please send corrected mailing label to the Federal Reserve Bank of Cleveland, Research Department, P.O. Box 6387, Cleveland, OH 44101