In 1987, the same dollar increase in manufacturing output would have produced an additional $6.008 billion in 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 for a long time to come.

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.

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ECONOMIC COMMENTARY
Federal Reserve Bank of Cleveland

Has Manufacturing's Presence in the Economy Diminished?
by Randall W. Eberts and John R. Swinton

Introduction

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By 1987, the same dollar increase in manufacturing output would have produced an additional $6.008 billion in 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.

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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. 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 hour 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 an average annual rate of 3.6 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 innovation. 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 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 55.4 percent in 1947 to 28.9 percent in 1987. In contrast, services' employment share increased from 11.5 percent to 18.6 percent. Manufacturing's employment share declined 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 16.9 percent in January 1987 to 16.4 percent in January 1988. In contrast, the service sector, with 23.6 percent of the economy's jobs, generated 3.8 percent of total new jobs, or more than twice as many jobs as the manufacturing sector 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 that 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 labor productivity. The other part is labor compensation. Even though it takes far fewer manufacturing workers to produce goods today than was the case in the past, the compensation of these workers has remained constant at about 60 percent of value added (figure 3). 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 (1959 to present). However, manufacturing's share of total employment has declined over the last 40 years from 55.4 percent in 1947 to 23.6 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 16.9 percent in January 1987 to 16.4 percent in January 1988. In contrast, the service sector, with 23.6 percent of the economy's jobs, generated 3.8 percent of new jobs, or more than twice as many jobs as the manufacturing sector created. As a result, manufacturing continues to lose employment ground to the service sector.

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