

The Effect of Outsourcing and Offshoring on BLS Productivity Measures

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Recent discussions about the extent of outsourcing and offshoring in the American economy have raised questions about their possible impact on productivity measures. In order to understand the impact, it is necessary to understand the construction of productivity measures and to look at historical trends in the productivity series.

Around 1990, output per hour or labor productivity in the business sector began growing at a faster rate than had been seen in the previous 17 years. Given that productivity measures tend to grow faster during the early stages of economic recovery, the faster growth rate was not widely viewed as unusual at the time.

What was unusual was that the rate of productivity growth accelerated even further beginning around 1995 when normally it would be expected to slow as the recovery matured. While several explanations have been suggested, most economists believed that firms were finally able to harness the information technology revolution to introduce new methods of production, management controls, and services. This view, sometimes called the New Economy Paradigm, argued that a new permanently higher trend rate of productivity growth has occurred. Others cautioned that another explanation may hold or that the effect of information technology might not be permanent.

The recession of 2001 seemed to further confirm the higher trend growth rate. While labor productivity growth did slow in 2001 compared to the previous 5 years, its growth was still rapid when compared to most other recessions. Productivity growth tends to be higher than average in recoveries, but coming out of the 2001 recession, business sector productivity growth advanced at its fastest rate since 1950 and maintained its rapid rate during 2003, including the dramatic 9.4% annual growth rate reported for the third quarter.

Consequently, we have experienced nearly 13 years of faster productivity growth. While a number of explanations have been put forth and to this list some have added measurement issues related to outsourcing and offshoring, any set of explanations should cover not just the last few years, but the entire 13 year period.

BLS produces a family of productivity measures. For the purposes of understanding how offshoring might affect these measures, the key distinction is between those measures that include intersectoral intermediate inputs as part of the output measure and those that do not. Among those that include intermediates, multifactor productivity measures compare output trends to more than one input and this framework can better help to trace the influence of offshoring on the productivity measures.

Business and Nonfarm Business Sector

The quarterly measures of labor productivity, defined as output per hour, for the business and nonfarm business sectors utilize an output measure that is derived from the National Income and Product Accounts produced by the Bureau of Economic Analysis (BEA). Output is measured as the delivery of value-added to final demand and so it does not include intermediate inputs. Imported finished goods and services to consumers reduce these output measures dollar for dollar.

Thus, outsourcing of production from manufacturing to domestic non-manufacturing industries has little if any effect on measures of business and nonfarm business sector output. Value-added has been shifted between the sectors but the total value-added produced domestically is unchanged. If the outsourcing is from manufacturing to businesses located abroad (“offshoring”), business sector output is lowered by the amount of value-added that is no longer produced in the U.S. It does not matter for measurement purposes if offshoring is an intermediate product or service such as a computer chip or call center services or the entire production of a final product or service such as a computer.

If it is assumed that an outsourced product or service is identical to the original, business sector output is unaffected by outsourcing from one domestic industry to another. However, labor productivity can differ between the original manufacturer and the new outsourced producer. As a result, aggregate hours may rise or fall somewhat, but the effect on business sector productivity will be quite modest.

In the case of offshoring, both business sector output and hours will fall. Again, the net effect on business sector labor productivity depends on the relative productivity of the lost output to the remaining output and any new output created. It is reasonable, however, to suppose that in this type of situation lost production may have taken place in plants with relatively low levels of productivity. If so, then offshoring might raise labor productivity, but as with domestic outsourcing the effect of this compositional effect is expected to be modest.

Manufacturing

For the quarterly manufacturing labor productivity series, the output concept is sectoral output, which is measured as the real value of shipments leaving the sector. Thus, this output measure includes intermediate inputs purchased from outside of the manufacturing sector. These intermediate inputs include materials, energy and purchased business services, whether purchased from domestic or foreign suppliers. When output is compared to a single input such as hours worked, productivity change also reflects the substitution of other inputs for labor.

Conceptually, the impact of offshoring is more pronounced in manufacturing measures than in the business sector measures, provided the domestic manufacturer is purchasing the offshored goods or services as inputs. (As with the business sector, the complete loss of manufacturing production to an importer of finished goods leaves productivity largely unchanged.) If a domestic computer manufacturer switches from domestic to foreign suppliers of intermediate inputs such as computer memory chips or call center services, real manufacturing sectoral output is unchanged because the real value of the computer is unchanged. Because U.S. jobs are lost (all other things unchanged), labor productivity will rise. If the U.S. manufacturer switches most of its production to off-shore facilities, labor productivity might rise substantially.

While the labor productivity measures provide us with the most timely look at productivity trends, they do not provide us with the most comprehensive view. Multifactor productivity measures compare output to two or more inputs and remove from the labor productivity measures the effect of substitution among inputs. Within this framework, it is possible to account for labor productivity growth as the sum of multifactor productivity growth and the contribution of shifts in the mix of inputs. The table below shows these data for manufacturing, where inputs include capital, hours, energy, materials, and purchased business services. Because these data are for manufacturing in its entirety, energy, materials and purchased business services are purchased from the domestic nonmanufacturing sector or imported. Outsourced and imported inputs are included but they can not be separately identified in these data.

Table 1. Sources of labor productivity growth in manufacturing, 1973-2001

(percent per year)

	1973-90	1990-95	1995-2000	2000-01
Labor Productivity	2.5	3.3	4.1	1.2
Equals:				
Multifactor Productivity	0.5	1.2	2.3	-0.8
Plus:				
<u>Input Deepening</u>				
Materials	1.0	1.0	0.7	1.1
Business Services	0.4	0.5	0.2	-0.4
Energy	0.0	0.1	0.0	0.0
Capital	0.6	0.5	0.8	1.3

Multifactor productivity plus the effects of input deepening may not sum to labor productivity due to rounding. All data are reporting using the Standard Industrial Classification system.

Labor productivity measures are from the Multifactor Productivity Trends program and may not equal those reported in the quarterly Productivity and Costs news release.

Source: Multifactor Productivity Trends in Manufacturing, 2001, USDOL 04-148, February 10, 2004.

The acceleration of labor productivity through 2000 is evident in the table above. The overwhelming portion of this acceleration comes from faster multifactor productivity growth, leaving little to be accounted for by capital deepening or domestic outsourcing or offshoring of materials and business services. In combination, increased use of materials and business services relative to labor contributes almost exactly the same amount in each of the earliest two periods and slows beginning in 1995. Therefore domestic outsourcing and offshoring explain none of the labor productivity speed-up. While this does not preclude imports from representing a rising share of materials and business services, it suggests a limit to the scope of their influence on productivity change. Because of data limitations, the manufacturing multifactor productivity measures are not yet available for years after 2001.

The final set of manufacturing data comes from the BLS international comparisons program, where labor productivity for manufacturing is measured as value-added output per hour worked. Value-added output is produced by the BEA. Value-added output measures the contribution of capital and labor to production and excludes intermediates. In this framework, outsourcing and offshoring have the same effect. Both output and

hours fall and, like the business sector, the net effect is likely to be slight. This is the case whether the lost production is an intermediate good or a final product.

The second table provides a comparison of the Bureau's family of manufacturing measures. All three measures show an acceleration in the growth rate of productivity. The measure of value-added output per hour grew slightly faster than the sectoral output per hour measure. This implies that combined intermediates grew slightly more slowly than sectoral output. It can be inferred from the similar pattern of sectoral and value-added productivity growth that intermediates are not a primary explanation of the faster productivity growth.

Table 2. Comparison of Bureau of Labor Statistics' Productivity Measures in Manufacturing

Percent per year

Period	Sectoral Output per Hour ¹	Multifactor Productivity ²	Value-Added Output per Hour ³
1979-1990	2.6	1.1	3.0
1990-1995	3.3	1.3	3.3
1995-2000	4.3	2.1	4.5
2000-2001	1.8	-0.8	0.4
2001-2002	6.5	N.A.	9.2 p
2003 1st Quarter	5.8	N.P.	N.P.
2003 2nd Quarter	2.8	N.P.	N.P.
2003 3rd Quarter	9.0	N.P.	N.P.

All data are reporting using the Standard Industrial Classification system.

p - Based on preliminary value-added measures from the gross product originating program of the Bureau of Economic Analysis.

N.A. – Data are not available.

N.P. – Not produced. Only annual data are only available for these series.

1. Sectoral output per hour is the real value of shipments leaving an industry (including the value of intermediate inputs) divided by hours at work. Data are from the quarterly Productivity and Costs News Release, December 3, 2003.

2. Multifactor productivity is sectoral output per combined units of capital, hours at work, energy, non-energy materials, and purchased business services. Data are from the annual Multifactor Productivity Trends in Manufacturing, 2001, USDOL 04-148, February 10, 2004

3. Value-added output per hour is sectoral output **less** the real value of intermediate inputs (materials, energy and purchased business services) per hour at work. Data are from the annual International Comparisons of Manufacturing Productivity and Unit Labor Cost Trends, March 26, 2004.

Source: Bureau of Labor Statistics

Summary

Productivity growth, however it is measured, accelerated in the 1990s and this faster growth has continued on during the last recession and recovery. Offshoring affects business sector productivity change only through changes in the composition of domestic production and its effect is likely to be small. In manufacturing, the combination of domestic outsourcing and offshoring has contributed about 1.5% per year to sectoral output per hour growth through 1995 but only about 1% per year thereafter and as a result, they do not appear to be an explanation for the productivity speed-up.

This conclusion must be qualified in two ways. First, there is no information on the relative importance of offshoring relative to domestic outsourcing and so it is not known if foreign suppliers have become a growing substitute for domestic suppliers of intermediate inputs. Even if they have, under reasonable assumptions, offshoring appears to explain only a small fraction of the productivity speed-up. Second, not all BLS data extend beyond 2001 and so it cannot be ascertained if there has been a sudden shift in trends. Even if there has, the impact of outsourcing and offshoring on productivity change is likely to be small.