Federal Reserve Bank of Cleveland

Labor Productivity Growth across States

by Paul Bauer and Yoonsoo Lee

Growth in labor productivity is one of the most keenly watched series at the national level. Not only is labor productivity growth closely tied to gains in wages and living standards, it also provides a direct measure of the country's competitive position over time. Moreover, trends in labor productivity growth figure prominently in long-term economic forecasts. For example, problems such as the budget deficit and social security funding become much less onerous with even a seemingly small 0.5 percentage point boost in annual labor productivity growth.

Similarly, labor productivity at the state level provides useful information on the health of a state's economy. However, no official state labor productivity figures are available. To obtain timely estimates, two hurdles must be cleared. First, the national measure of labor productivity is defined as output per hour, but hours worked are not reported at the state level—only the number of workers. Second, gross state product (GSP), the state-level counterpart to gross domestic product (GDP), is available only annually and with a lag of up to two years.

Neither problem is insurmountable. We can construct a measure of state labor productivity by looking at output per worker rather than output per hour. Although this alternative behaves somewhat differently in the long run and over the business cycle than the more familiar measure, the two are broadly similar. In addition, although official estimates of GSP are available only up to 2002, we can obtain reasonable estimates of GSP for 2003 and 2004 using state personal income data and U.S. GDP, two series that are published quarterly by the Bureau of Economic Analysis with a delay of only a few weeks.[1]

In this *Economic Commentary*, we first compare labor productivity estimates based on output per worker to the more familiar output per hour measure. Then, we estimate states' average annual labor productivity growth for two periods: 1977–2000 and 2000–04. Concentrating on the latter period, we look at how differences in output and employment growth affect labor productivity growth across states. Since the last business cycle peak in 2000, states boosted their average labor productivity growth to 2.3 percent—a gain of 1.2 percentage points over 1977–2000—but exhibited a wide variation across states. The Fourth District states all raised their productivity growth rates during this period. In Ohio, the gain resulted from modest output growth accompanied by sharp employment losses—a painful way to go, but one that may pave the way for future growth by making the remaining firms and workers more competitive.

Labor productivity growth, a measure of output per unit of work, is closely tied to gains in wages and living standards, and it provides a direct measure of a country's competitive position over time. The same holds true for states. Since the last business cycle peak in 2000, states boosted their average labor productivity growth to 2.3 percent. In Ohio, this growth came as a result of modest output growth accompanied by sharp employment losses. Although this has been a painful transition for the Fourth District, solid productivity gains have made the remaining firms and workers more competitive and may prepare the way for future growth.

Constructing Labor Productivity

Labor productivity is measured as output per unit of labor. At the national level, the standard measure of labor productivity growth is the output of private nonfarm business per hour worked. The numerator—output of private nonfarm business—omits government, a sector whose output can be hard to measure, and farms, where output can vary a great deal because of weather or crop prices. Hours worked is used in the denominator rather than the number of employees because it measures effort more accurately. For instance, the effort of two half-time workers putting in 20 hours per week is assumed to be equal to that of one full-time worker who clocks 40 hours per week.

At the state level, the number of hours worked is not available, so we are forced to use the number of workers instead. How much of a difference does it make when workers are used to measure labor input rather than hours? We can explore this issue at the national level, where both measures of labor input are available.

Although output per hour and output per worker are broadly similar, they differ in two significant ways. The first and most obvious difference is the way the two measures behave over the business cycle. During economic downturns, firms tend to retain workers but reduce their working hours, thus lowering output per

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FIGURE 1 LABOR PRODUCTIVITY GROWTH, 1977–2000

SOURCES: U.S. Department of Labor, Bureau of Labor Services; and authors' calculations.

FIGURE 2 LABOR PRODUCTIVITY GROWTH, 2000–04

SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; U.S. Department of Labor, Bureau of Labor Services; and authors' calculations.

worker compared to output per hour. During a recovery, this ratio reverts to its normal pattern: Firms tend to be cautious in hiring as demand rebounds, raising output per worker relative to output per hour. This occurred during the last business cycle peak as output per worker plunged in 2000 and 2001 but rebounded sharply in subsequent years.

Second, the two measures of labor productivity differ because there is a long-run trend toward fewer hours per worker, a result of both growth in the number of part-time workers and shorter average workweeks for full-time workers.

The bottom line is that when we make longer-term comparisons, as we do here, the two series will yield similar results, especially if one accounts for the trend toward fewer hours per worker. But when we consider year-to-year movements in productivity, this differing behavior over the business cycle must be kept in mind.

Labor Productivity Estimates

Figure 1 plots average annual labor productivity growth—measured by the ratio of private nonfarm GSP to employment—from 1977 to 2000. By this measure, states averaged 1.1 percent growth over this period, from a low of –0.4 percent in Alaska to Connecticut's comparatively blistering 2.8 percent. In the Fourth District, Pennsylvania led with 1.3 percent, followed by Ohio (0.8 percent), Kentucky (0.4 percent), and West Virginia (–0.3 percent).

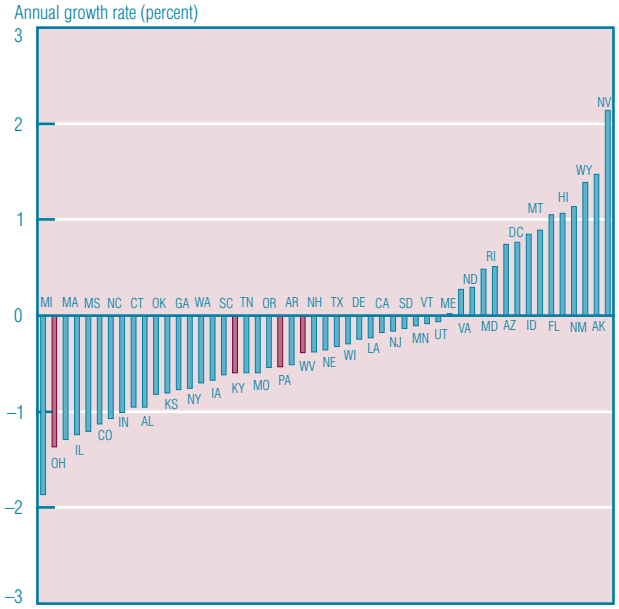
During the period since the last business cycle peak (2000–04), states' average annual labor productivity grew 2.3 percent—an increase of 1.2 percentage points over the previous period—but this gain was far from evenly distributed (see figure 2). This is not entirely surprising, considering the differential impact of the economic downturn on the states and their industries during these years. Delaware led the nation with average annual labor productivity growth that soared to 8.6 percent; eight states experienced declines, led by Alaska at –4.5 percent.

In the Fourth District, state labor productivity growth exceeded that of the nation from 2000 to 2004. In particular, West Virginia rose from the second-slowest growing state in 1977–2000 to the sixth-fastest growing, at 4.4 percent. Kentucky, at 2.4 percent, went from sixth slowest to midpack performer. Ohio and Pennsylvania, at 3.7 percent and 3.2 percent, also turned in solid numbers. Given that the current expansion has not been kind to the Fourth District, particularly Ohio, the region's strong relative labor productivity growth comes as a bit of a surprise. What is driving this turnaround in labor productivity, and why do the gains vary so widely across states?

Sources of Gain and Variation

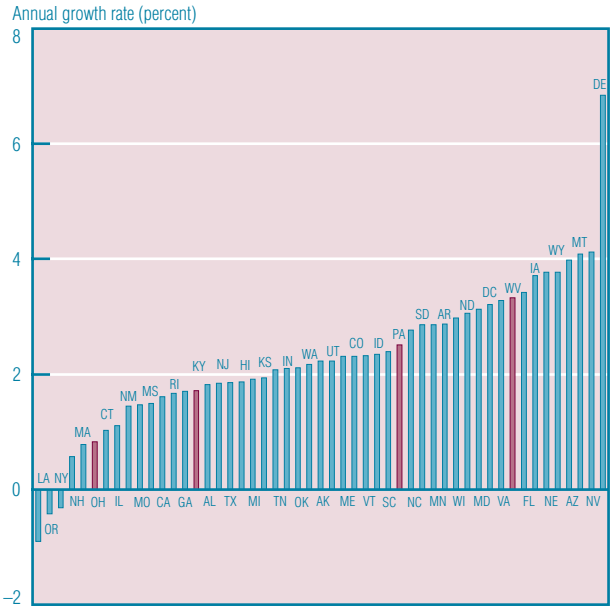
Nationwide, the acceleration in labor productivity growth has been attributed partly to technological advances in

FIGURE 3 EMPLOYMENT GROWTH, 2000–04



SOURCE: U.S. Department of Labor, Bureau of Labor Services.

FIGURE 4 OUTPUT (GROSS STATE PRODUCT) GROWTH, 2000–04



SOURCES: U.S. Department of Commerce, Bureau of Economic Analysis; and authors' calculations.

information technology such as computers and telecommunications. Therefore, some of the variation may reflect the fact that only some states have concentrations of these industries and the industries that benefit from them. Of course, states' fiscal policies, both tax and public infrastructure, also influence productivity growth rates.

To facilitate the study of labor productivity growth at the national level, the Bureau of Labor Statistics decomposes labor productivity growth into several components. The main components are capital deepening (an increase in the amount of capital per worker), the increase in the skills and experience of the average worker, and technological change (a residual category often called "multifactor productivity growth"). However, this cannot be done for states because the decomposition requires at least an estimate of capital and labor quality for each state over time.

We can better understand how the gains in labor productivity are being generated by looking at growth in GSP and employment separately. This is an important consideration because it has implications for the health of a state's economy and its finances. Although productivity gains achieved in isolation are good—who wouldn't want more output for a given input—if the gains come from falling employment (while GSP holds steady), this environment will prove more painful for states than if employment were rising and GSP were growing even faster. In the former case, tax revenue is likely to fall and demand for social services, such as unemployment benefits, will rise. In the latter case, the converse is true: Tax revenue is likely to rise while demand for social services falls.

Figure 3 plots state employment growth from 2000 to 2004. Reflecting the oft-cited "jobless recovery," only 15 states managed employment gains during this period, as average employment declined 0.2 percent. Nevada led the nation with a rapid 2.1 percent average annual employment growth rate, but the rates tail off sharply from there. Second-place Alaska managed only 1.5 percent, and Michigan, which trailed the nation, lost 1.9 percent of its employment each year. Within the Fourth District, Ohio lost 1.4 percent, second only to Michigan. Kentucky, Pennsylvania, and West Virginia did better but still lost 0.6 percent, 0.5 percent, and 0.4 percent, respectively.

This weak employment performance, particularly in Ohio, has been widely noted and discussed. But what has been going on with states' output has received less attention. Between 2000 and 2004, the average state's GSP grew 2.3 percent, and only three states (Louisiana, Oregon, and New York) saw GSP fall (see figure 4).

Delaware led the country in GSP growth. With almost a third of its GSP coming from finance and insurance, Delaware's growth appears to have been bolstered by the effects of the Gramm-Leach-Bliley Act of 1999, which liberalized banking and insurance legislation. Nationally, this legislation has prompted a number of mergers and relocations, some of which boosted output substantially in Delaware but added relatively little employment. Ohio (0.8 percent) trailed the other Fourth District states, whereas Kentucky (1.7 percent), Pennsylvania (2.5 percent), and West Virginia (3.3 percent) produced near the national average.

Two states illustrate how the same labor productivity growth can be achieved in very different ways. Despite Ohio's anemic GSP growth, its sharp decline in employment resulted in fairly strong labor productivity growth—in the top third of all states. In contrast, West Virginia experienced employment growth near the median and output growth among the top nine states. As a result, West Virginia's labor productivity growth landed in the top six states.

A closer examination of the relationship between labor productivity growth and employment growth reveals a negative correlation between the two during 2000–04. Although a negative correlation is frequently found during periods of economic downturn, over the course of an entire business cycle, there is no statistically significant correlation between labor productivity growth and employment growth. Downturns tend to see a lot of economic restructuring with less productive capital and workers becoming unemployed, thus boosting the productivity of the remaining workforce. As the recovery sets in, these resources are put back to work in more productive enterprises. The economist Joseph Schumpeter called this process "creative destruction" and considered it a natural part of the market economy's evolution over time. Like a forest fire, it prepares the way for future growth.

Summary

This *Economic Commentary* has shown how measures of labor productivity can be constructed for states and provided a first look at them. The data show that this measure of productivity growth varies widely across states. Examining growth in GSP and employment separately allows us to obtain a more complete understanding of regional economic performance. The period since the last business cycle peak has been a painful one for much of the Fourth District, but solid productivity gains have made the remaining firms and workers more competitive and may help to pave the way for future growth.

Footnotes

1. For full details, see Bauer and Lee's "Estimating GSP and Labor Productivity by State," Federal Reserve Bank of Cleveland, *Policy Discussion Papers*, forthcoming. Estimates of GSP are available on the Federal Reserve Bank of Cleveland's Regional Research and Data Web site at www.clevelandfed.org/Research/Regional/.

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