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Productivity Gains, How Permanent?

by Paul W. Bauer, Jeffrey L. Jensen, and Mark E. Schweitzer

This *Economic Commentary* confirms unusually robust productivity growth of the last few years and explores reasonable assumptions about the likely future pattern of productivity growth. These assumptions can generate substantially different productivity growth paths. Government forecasts, which guide the major tax and benefit programs, have been increased in recent years yet remain cautious.

Recent measures of economic output show the economy has slowed dramatically, suggesting the current expansion may be coming to an end. While many are now awakening to the possibility that even the "New Economy" may experience negative output growth, it is impossible to ignore productivity's exceptional performance over the last five years. The accelerated growth we have seen was largely unanticipated outside of ardent proponents of the "New Economy." Regardless of the fate of this expansion, productivity growth is a key factor in all long-term economic forecasts, and policymakers responsible for planning various spending may now need to reevaluate their assumptions about long-run productivity growth.

Accurate forecasts of future productivity growth are important because even small changes have big effects over time. For example, a half-percent increase in productivity growth may sound small, yet it could add $1.2 trillion to the 10-year forecast of the federal budget surplus.[1] Social Security solvency estimates are also dramatically altered by assumed rates of productivity growth. That same half-percent increase would cut the cost of a 50-year fix to Social Security in half.[2] Indeed, any estimates of gross domestic product more than a few quarters into the future critically depend on what one assumes productivity will be.

By contrasting patterns of productivity growth over postwar expansions, this *Economic Commentary* shows the varied views policymakers may draw about the likely future pattern of productivity growth. In doing so, we update and expand the analysis of a prior *Economic Commentary*, "Productivity Gains During Business Cycles: What's Normal," written in July 1998. At that point in the current expansion, productivity had only just begun to show signs of unusually large late-cycle growth. Using similar statistical techniques, we show that this acceleration has continued over the last few years. We also examine some of the factors that contribute to productivity growth in order to understand better what might have led to the current surge and what is likely to occur in the future.

Postwar Productivity Growth

Two things obscure the pattern of productivity growth over the business cycle. First, productivity data are inherently noisy—more technically, the series's variance is large relative to its level compared to other major economic data series. Second, the length of past expansions varies greatly. To reveal the underlying productivity trend over the business cycle, a smoothing procedure must be used. Figure 1 shows the results of this procedure, which allows us to contrast the pattern of the current expansion with a statistical synopsis of the previous seven postwar expansions.

In a typical expansion, productivity growth starts quite rapidly, only to slow for the remainder of the expansion. This pattern has, of course, not been exactly repeated in every expansion. A way to envision the variability of the smoothed estimates is to plot the 95 percent confidence band (see figure 1). The band widens sharply toward the end of expansions because few expansions last that long. Because only one other expansion lasted longer than 37 quarters, we stop plotting the band at that point. There is no question that this expansion has been unusually long-lived.

Contrasting the current expansion with the smoothed statistical synopsis of previous expansions reveals the extraordinary nature of the last few years. Until the twenty-third quarter, this expansion appears to have been fairly typical, but in 1996, productivity growth surged at an unexpectedly rapid rate. Consequently, the attention devoted to productivity growth over the last few years has been well justified.

What remains unknown is whether this surge reflects conditions unique to this expansion or more permanent factors. In other words, how likely are future expansions to be like this one? Yet this information is key for predicting long-run outcomes accurately. Unfortunately, no amount of past data can completely relieve the policymaker from this fundamental uncertainty. In light of this, we try to constrain the uncertainty by showing how different the predictions for productivity growth over the business cycle can be, depending on how they're calculated.

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Looking to the Future

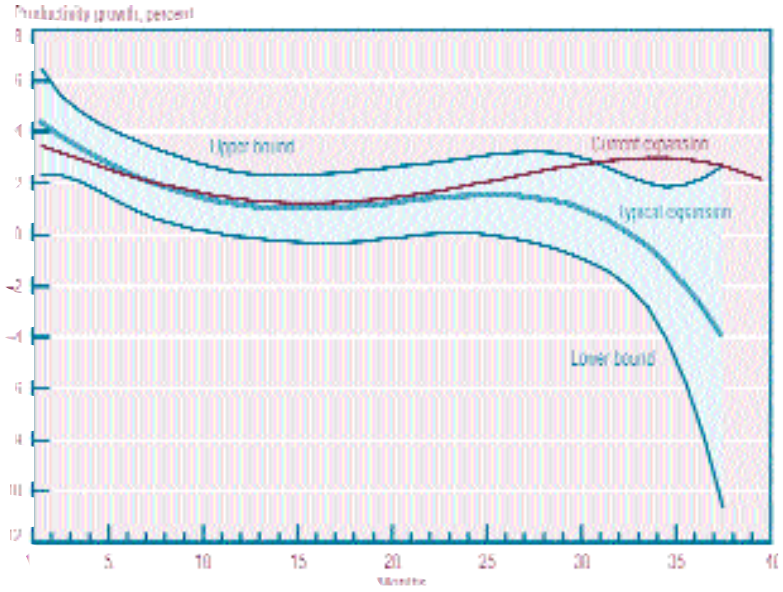
Predictions for the path of productivity growth depend on which parts of our history we assume are more relevant or likely to repeat. We consider three alternative assumptions we could reasonably make when forecasting future productivity growth. Conservative policymakers (option 1) might assume that the current expansion is an anomaly and base their forecasts on postwar data through 1991. Note that this is the same as the typical expansion in figure 1, as neither uses information from the current expansion. Averaged over the full business cycle (including the recession quarters), the conservative option predicts annual labor productivity growth of 1.8 percent. Even this option is somewhat more optimistic than prevailing views prior to this expansion, because most forecasts would have included a productivity slowdown term of about –0.6 percentage point, to account for the marked slowing in productivity growth in post-1973 expansions. The productivity slowdown no longer appears to be a permanent feature of the U.S. economy, and including an ad hoc adjustment only makes the current expansion more difficult to reconcile with the past data.

Another alternative would be for policymakers to employ all the available productivity data, and thus treat the current expansion as simply one of nine available business cycles (option 2, neutral). Under this option, labor productivity growth is expected to average 2.5 percent over the business cycle, in part because longer periods of productivity growth are expected.

Lastly, policymakers might adopt a view, in the spirit of New Economy proponents, that information from the 1973–91 slowdown should be fully discounted, because, some would argue, the economy is now on a permanently faster growth path. Constructing a forecast without this period yields our third alternative (option 3, aggressive). This assumption again raises the productivity growth forecasts in the later quarters. Nonetheless, this much more optimistic option only increases estimated long-run productivity growth over the business cycle to 2.8 percent, because longer cycles are already included and the estimates for early quarters are not substantially altered.

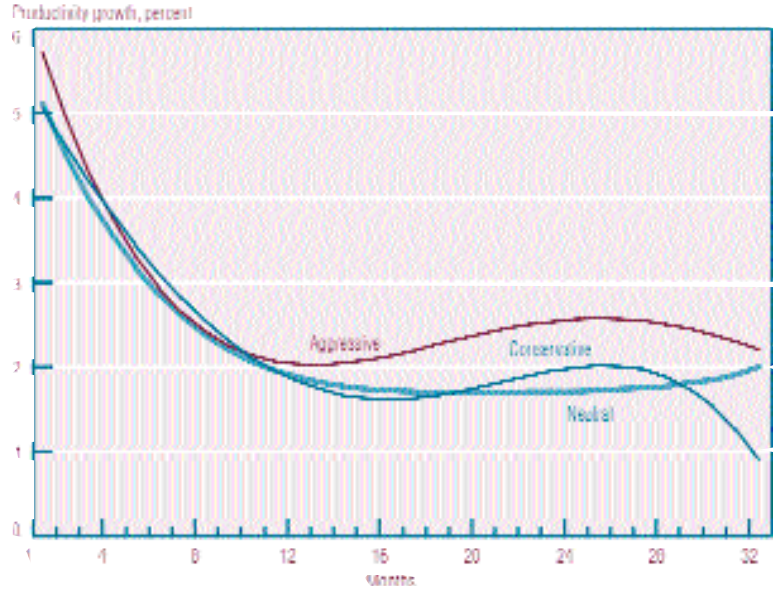
It is clear that the way we treat the data from the 1973–91 productivity slowdown and the current expansion makes a significant difference to the forecasts in the three options. Of course, more aggressive forecasts are possible by further emphasizing the last expansion, but historical evidence is still a reasonable constraint for something as hard to predict as productivity growth.

FIGURE 1 CURRENT AND TYPICAL EXPANSIONS



SOURCE: Authors' calculations.

FIGURE 2 THREE SCENARIOS



SOURCE: Authors' calculations.

Sources of Labor Productivity Growth

Which of these three assumptions is most reasonable? Understanding the sources of productivity growth might suggest an answer.

Overall labor productivity growth is the sum of the gains from capital deepening (an increase in the capital-to-labor ratio), from changes in input quality (the result of better trained or more experienced workers), and from multifactor productivity (an estimate of technological change often referred to as the *Solow residual*).[3] The Bureau of Labor Statistics calculates the most widely reported measure of multifactor productivity

TABLE 1 PRIVATE NONFARM BUSINESS PRODUCTIVITY

	1948 –99	1948 –73	1973 –79	1979 –90	1990 –95	1995 –99
Labor productivity	2.2	2.9	1.2	1.4	1.6	2.4
Contribution of capital deepening	0.8	0.8	0.7	0.8	0.5	1.0
Contribution of labor quality	0.2	0.2	0.0	0.3	0.4	0.3
Multifactor productivity	1.2	1.9	0.4	0.3	0.6	1.1

SOURCE: U.S. Department of Labor, Bureau of Labor Statistics, *Multifactor Productivity Trends*, 1999.

TABLE 2 ESTIMATES OF LONG-RUN PRODUCTIVITY GROWTH

Organization	1991	1999	2000	2001
Congressional Budget Office	1.3	1.7	2.3	2.7
Council of Economic Advisors	1.8	1.3	2.0	2.3
OECD	N/A	1.9	2.2	2.5
Social Security Administration	1.0	1.0	1.0	1.0
Conservative				1.8
Neutral				2.5
Aggressive				2.8

SOURCES: Congressional Budget Office, *The Budget and Economic Outlook*, various issues; Council of Economic Advisors, *Economic Report of the President*, various issues; Organisation for Economic Co-operation and Development, *OECD Economic Outlook*, various issues; Social Security Administration, *OASDI Trustees Report*, various issues; and authors' calculations.

(MFP). MFP is less widely known and reported than labor productivity because it is only available annually and, until recently, has been released only biennially. The reason for the delay and the relative infrequency of reporting is that MFP requires more data to calculate than labor productivity, which requires only estimates of output and labor input, both of which are available quarterly. In addition to output and labor, MFP also requires an estimate of capital, which is available only annually.

Table 1 presents the latest available figures for the decomposition of labor productivity into its various components. From the table, it is clear that the main cause of the 1973–91 slowdown was a sharp decline in MFP. This is unfortunate because, being the residual, it is the least predictable component. A much smaller share of the slowdown came from stagnant growth in labor quality, as baby boomers first entered the job market and a surge of women returning to work after caring for children increased female labor force participation.

The contribution of capital deepening was relatively stable over these periods.

In the long run, it seems likely that capital deepening will continue to contribute around 0.8 percentage point to overall productivity. Also, with no bulge in the demographic distribution and a strong emphasis on education and job training, the contribution of labor quality should continue at about 0.3 percentage point. The big question is what will happen with MFP, but unfortunately, these numbers cannot tell us.

Recent papers have sought to address this deficiency by reconsidering the strength of capital deepening in the economy, particularly in information and communication technologies.[4] This research has generally focused on identifying assumptions used to calculate the national income and product accounts that may be inappropriate for computers and related technologies. Correcting these deficiencies in the national accounts lowers the MFP estimates by boosting the share of productivity explained by capital deepening. This research has greatly clarified the importance of investments in information and communications technologies in the latest expansion. The research has lowered MFP growth in later years to a more typical rate, attributing about half of the *extra* MFP growth over the last five years to capital deepening. Even so, this still leaves policymakers to ponder not only whether this information-and-communications-technology-led capital deepening is sustainable but also whether the other half of the unaccounted-for extra gains in MFP growth will persist as well. These uncertainties keep this approach from dramatically narrowing the range of forecasts proposed earlier.

Comparison with Other Forecasts

We now compare our three options for estimating future labor productivity growth with some other prominent forecasts (see table 2). Note that most of the organizations considered have boosted their forecasts for productivity growth since the early 1990s. The exception is the Social Security Administration, which has held to its 1.0 percent long-run forecast throughout this period. At 2.7 percent, the Congressional Budget Office is the most optimistic at about the same rate as our aggressive forecast. The Council of Economic Advisors' forecast is a little more cautious, projecting only 2.3 percent growth, in line with our neutral option. The Organisation for Economic Co-operation and Development is the second most optimistic at 2.5 percent, the same as our neutral option.

How should policymakers proceed? We have shown that most of the recent increase in labor productivity comes from MFP growth, which cannot be traced to a specific, identifiable cause. The Social Security Administration's 1.0 percent estimate appears to be too low. It is not only below all three of our options, but also capital deepening and labor quality alone should be able to deliver at least this rate of growth. How much higher an estimate one chooses depends on how permanent the recent MFP growth gains are assumed to be. Of course, policymakers will have to periodically revise their forecasts as new information becomes available.

Conclusion

Despite the recent revision of previous estimates, the current expansion clearly has generated abnormally large late-cycle gains in labor productivity, which may indicate a shift to a higher trend rate of productivity growth. Alternatively, the recent surge could

be a one-time event. In making forecasts of future productivity growth, it is prudent to be cautious. Few forecasted the 1973 slowdown, and few predicted productivity's current resurgence. In any forecast, one would be well advised to consider the net cost of forecast error. For example, when planning for your retirement, assuming a high rate of return for your investments enables you to save less and spend more now, but the cost comes in the future when you may not have the resources that you planned to have. Of course, there is also a cost to assuming too low a rate. You end up saving too much, needlessly cutting your consumption now.

Footnotes

1. See David Wessel, "The Magic Elixir," *Wall Street Journal*, February 15, 2001.

2. See David Wessel, footnote 1.

3. For a more complete discussion of multifactor productivity growth and this decomposition, see Paul W. Bauer, " Are We in a Productivity Boom? Evidence from Multifactor Productivity Growth," Federal Reserve Bank of Cleveland, *Economic Commentary*, October 15, 1999.

4. Key research in this area includes Dale W. Jorgenson, "Information Technology and the U.S. Economy," *American Economic Review*, vol. 91, no. 1 (March 2001), pp. 1–32; Robert J. Gordon, "Does the 'New Economy' Measure up to the Great Inventions of the Past?" *Journal of Economic Perspectives*, vol. 14, no. 4 (Fall 2000), pp. 49–74; and Kevin J. Stiroh, "Investing in Information Technology: Productivity Payoffs for U.S. Industries," Federal Reserve Bank of New York, *Current Issues in Economics and Finance*, vol. 7, no 6 (June 2001).

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Paul Bauer is an economic advisor at the Federal Reserve Bank of Cleveland. Jeffrey Jensen is a former research assistant at the Bank, and Mark Schweitzer is an economist at the Bank.

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Federal Reserve Bank of Cleveland
Research Department
P.O. Box 6387
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