CBO's Revised Method for Estimating and Projecting Potential TFP

Potential total factor productivity (TFP) is a key input in the 10-year economic and budget projections that the Congressional Budget Office (CBO) periodically issues. This document, which was prepared by Robert Arnold of CBO's Macroeconomic Analysis Division, describes a change in the method used by CBO in its January 2005 *Budget and Economic Outlook* to estimate potential TFP over history and project its future values. That change in method is in part a response to new information: A number of revisions to the data series used to calculate TFP have changed its estimated rate of growth during the late 1990s—in particular, by slowing the pace of the expansion in productivity that occurred during the 1995-1999 period.[1]

An important feature of recent economic performance is the robust growth of labor productivity and of TFP, both of which picked up during the late 1990s and have accelerated even more since the 2001 recession. Annual growth of TFP, for example, averaged 0.8 percent during the 1973-1994 period; between 1994 and 1999, it quickened, climbing to a 1.3 percent average annual rate. That pickup in growth caused TFP to move above CBO's estimate of its trend and raised the possibility that TFP had shifted to a new, faster, trend rate of growth.

Understanding that spurt is particularly important to forecasters who, like CBO, must project the growth of gross domestic product (GDP) many years into the future. If the increase in TFP growth is considered permanent, then projected average growth of real (inflation-adjusted) GDP over the next 10 years will be very fast. Conversely, if the increase is considered temporary, projected GDP growth over the medium term will be much slower.

In 1999 and 2000, before the revisions reduced the extent of the acceleration in TFP recorded in the late 1990s , analysts sought to understand the reasons for the sudden increase in growth. Although observers still disagree about its cause, the leading explanations at the time centered on the role of computers and information technology (IT) in the U.S. economy. (That focus largely arose because the acceleration coincided with explosive growth in IT spending in such areas as personal computers, telecommunications, and computer networks.) Some analysts contended that the acceleration would be permanent, arguing that the expanded use of computers and telecommunications technology would allow firms in all sectors of the economy to reduce costs and improve efficiency more rapidly than had been possible before.

By contrast, CBO assumed that much of the acceleration was temporary, focusing more on the production of computers than on their use in its estimation of the trend in TFP growth. In particular, CBO attributed a portion of the spurt in overall productivity growth to the faster growth of productivity in the sector of the economy that manufactures computers. Much of the increase in that sector's productivity can be ascribed to the quicker pace of technological change in the production of computers, largely as a result of rapid improvements in the quality of components, such as semiconductors and disk drives. Those quality improvements are counted as increases in output in the productivity measures.

Beginning with the projection described in its *Budget and Economic Outlook* for January 2000, CBO began including a special adjustment in its estimate of potential TFP to help explain the late-1990s surge in productivity

1. .See Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2006 to 2015* (January 2005), Box 2-1. For more details on CBO's method for estimating potential output and potential TFP, see Congressional Budget Office, *CBO's Method for Estimating Potential Output: An Update* (August 2001).

growth.[2] Specifically, CBO modeled TFP growth in the computer sector separately from TFP in the rest of the economy by removing the effects of changes in computer quality from the historical data for TFP before it estimated the TFP trend.[3] The effect of changes in computer quality were then added to the estimate of trend TFP to compute potential TFP. That procedure allowed the full impact of those changes to be reflected in the estimate of potential TFP. When incorporated in the January 2000 projection, the adjustment explained about two-tenths of a percentage point of the late-1990s acceleration in TFP growth.

Since January 2000, however, revisions to the historical data used to calculate TFP have cut the late-1990s acceleration roughly in half; at the same time, strong productivity growth during the 2001-2004 period has pulled up CBO's estimate of the TFP trend. Consequently, the revised data for TFP no longer rise above its trend during that period, and the special adjustment used to explain the late-1990s bulge in TFP is no longer necessary. It has now been dropped from CBO's January 2005 estimate of potential TFP. That change in method raises the trend in TFP growth slightly—by about a tenth of a percentage point—leaving it at an estimated 1.3 percent, on average, during the 10-year projection period.

2. .For more details, see Congressional Budget Office,"Has the United States Entered a New Era in Productivity Growth?" Appendix A in *The Budget and Economic Outlook: Fiscal Years 2001-2010* (January 2000).

3. .CBO estimates the trend in TFP (and other variables) using the fitted values from a piecewise linear regression. For more details, see Congressional Budget Office, *CBO's Method for Estimating Potential Output: An Update*.