

# **Methodology for Projecting Total Factor Productivity for the Private Nonfarm Business Sector**

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## **Introduction**

Section 3401 of the Affordable Care Act requires the incorporation of productivity adjustments to the market basket updates for select Medicare Prospective Payment Systems. The statute defines the productivity adjustment to be equal to the 10-year moving average of changes in annual economy-wide private nonfarm business multifactor productivity (MFP) (as projected by the Secretary for the 10-year period ending with the applicable fiscal year, year, cost reporting period, or other annual period) (the “productivity adjustment”). The Bureau of Labor Statistics (BLS) is the agency that publishes the official measures of productivity for the U.S. economy and states the following: “Multifactor productivity (MFP), also known as total factor productivity (TFP), is a measure of economic performance that compares the amount of goods and services produced (output) to the amount of combined inputs used to produce those goods and services.” Beginning with the November 18, 2021 release of productivity data, the BLS replaced the term MFP with TFP. BLS noted that this is a change in terminology only and will not affect the data or methodology. We refer readers to the BLS Web site at [www.bls.gov](http://www.bls.gov) to obtain the BLS historical published TFP data and for detailed information regarding the BLS method for estimating total factor productivity.

## **Methodology for Projection of TFP**

The projections of the components of TFP are currently produced by IHS Global, Inc. (“IGI”), a nationally recognized economic forecasting firm with which CMS contracts to forecast the components of the market baskets and TFP. In order to generate a projection of TFP, IGI replicates the historical TFP measure calculated by the BLS using proxy series derived from IGI’s U.S. macroeconomic models, which take into account a broad range of factors that influence the total U.S. economy. In Table 1 below, we identify each of the major TFP component series and the corresponding IGI proxy series.

**TABLE 1 —TOTAL FACTOR PRODUCTIVITY COMPONENT SERIES**

| <b>BLS Series</b>       | <b>IGI Proxy Series</b>  |
|-------------------------|--|
| Real value-added output | Nonhousing, nongovernment, nonfarm real GDP  |
| Labor input             | Hours of all persons in private nonfarm establishments, adjusted for labor composition effects |
| Capital services        | Forecasted BLS capital inputs developed using a regression model                               |

IGI found that the historical growth rates of the BLS components series used to calculate TFP and the IGI proxy series were consistent and, therefore, the IGI proxy series were suitable proxies for calculating TFP. We note that for benchmarking purposes, the historical growth rates of IGI’s proxy series were used to estimate a historical measure of TFP, which was compared to the historical TFP estimate published by the BLS. This comparison validated the use of the proxy variables in generating the TFP projection.

To create a projection of BLS' TFP index, the projected annual growth rates of each proxy series are used to “grow” the levels of the series published by the BLS. Using these three key concepts, TFP is derived by subtracting the contribution of labor and capital input growth from output growth using the following formula:

$$\begin{aligned} TFP \text{ growth} = & \text{Output growth} - [(\text{labor input growth} * \text{labor share}) \\ & + (\text{capital input growth} * \text{capital share})] \end{aligned}$$

BLS calculates the labor share and capital share by adding together the value of labor compensation and capital income to get total income (in current dollar terms) and dividing each measure by the total. IGI identified two proxy series that can be used to derive these BLS' income measures in the projection period: *Total wages, salaries, and supplements less total government employee compensation* and *Rental cost of capital for nonresidential fixed investment*. These derived income measures in the projection period are then used to calculate projections of the labor share and capital share.

Finally, the growth rates of TFP in the projection period are applied to the latest published historical level of BLS' TFP to derive a projection of annual index levels of TFP. The resulting TFP annual index levels are then interpolated to a quarterly frequency using the Bassie method for temporal disaggregation. The Bassie technique utilizes an indicator (pattern) series for its calculations. In this case, the index of *output per hour for the nonfarm business sector* (published by the BLS) is used as an indicator when interpolating the TFP index.