Measures of Productivity Change: Which Outcome Do You Want?

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The measurement of productivity change is usually based on models that make use of strong neoclassical assumptions such as competitive equilibrium, constant returns to scale and perfect foresight. In such an environment, there is no role for profit. While neoclassical assumptions make it easy to interpret the estimates of productivity change, there is enough empirical evidence showing that such assumptions are not adequate for all markets. In this paper we discuss a large number of methodological choices that play a role in the construction of multi-factor productivity (MFP) measures. More specifically, we look at five input-output models for the measurement of productivity change, respectively based on gross output, gross and net value added, and gross and net cash flow, and extend these models with variations in the construction of capital input cost, which in turn lead to differently defined profit concepts. In the net- value-added and cash-flow based concepts, the cost of time-series depreciation and taxes are treated as intermediate input cost rather than as components of primary input cost. With respect to the measurement of capital input cost, we pay specific attention to the role of endogenous versus exogenous interest rates, the treatment of unexpected holding gains/losses, and the utilization ratio of capital. From a practical point, it is useful to consider when to use each of these different MFP measures and how these can be interpreted, so that an analyst will be in a better position to properly apply specific productivity measures to actual data. We provide numerical evidence on the impact of the various methodological choices, using sectoral national accounting data from the Netherlands' system of productivity measurement. However, it should be noted that the same methods can be used at lower levels of aggregation, even down to the firm level. We find that for some sectors the differences in productivity change with and without profits are substantial.

Keywords: Productivity, technological change, profit, profitability, input-output models, capital, interest rate, holding gains/losses.