

# Productivity Measurement: Reassessing the production function from micro to macro

Productivity is arguably the most important determinant for living standards, and so the apparent slowing in productivity growth in the past 10-20 years across developed economies is closely studied. Such analysis of productivity trends is reliant on good data and methods.

The economy is constantly changing, and the past couple of decades is no exception. The modern economy is more global, more digital, and more complex than in the past. Such trends might affect productivity measurement, and thus need to be considered carefully in productivity analysis.

This research reviews some of the recent and emerging developments in productivity measurement and methods of analysis. The issues considered are mostly universal in nature, but UK evidence and practice is highlighted where relevant. This paper includes nearly 150 references, so we hope it will be a useful reference for productivity researchers. It may also be of interest to those wishing to get an overview of the latest issues and advances in productivity measurement and analysis. It is impossible to be exhaustive on such a huge topic, so we focus on five key themes:

## 1. **Prices versus quantity and quality**

Determining the growth in “real output”, separate from price growth, is fundamental to productivity analysis. We review studies about how to measure prices of digital products, the role of free digital products, and the measurement of non-market output.

**2. Unit of analysis** Productivity can be measured for economies, regions, industries, and firms, each of which bring their own challenges and insights. We discuss issues of international comparability of productivity measures, the challenge of globalisation for measuring national output, issues in regional data, and innovations in defining and measuring industries. We also talk about recent advances in methods and data sources for firm-level productivity analysis.

**3. Missing capitals** Alongside labour, capital is the main input into production, but it can take many forms, not all of which are well measured. We describe the importance and measurement of intangible capital and human capital, which are often not fully included in productivity analysis. (In a later section we consider natural capital.) We also discuss how to measure the utilisation of the capital.

**4. The Economy and the Environment** The environment is increasingly recognised as important for economic analysis, and productivity is no exception. While the literature so far is small, we describe issues relating to natural capital as an input, environmental damage as a “bad” output, and investment in the environment as an unmeasured (good) output.

**5. GDP and Welfare** A criticism levelled at current GDP measures, and by extension many productivity measures which use GDP in them, is that it does not measure the things we care most about. This has led some to propose broader measures of welfare. We consider a range of such measures, and how they might relate to productivity.