Chain-Consistent Tight Bounds of True Index Numbers of Productivity: An Application to EU KLEMS Data

By Carlo Milana°

Abstract

It has been seldom recognized, after an early recognition by Samuelson (1947, p. 151) and successive systematic developments of Afriat, that price levels can be reconstructed (up to a constant) using several observation points directly and simultaneously. The ratios of these price levels are mutually consistent by construction and thereby satisfy the circularity or transitivity test as well as other desirable requirements. By contrast, to the best of our knowledge, all the other existing index number methods fall into the realm of the so-called "impossibility theorem", failing in particular the circularity test intrinsically. This paper builds on the recent reappraisal of this approach by Afriat and Milana (2008) and compares it with akin non-parametric techniques that are based on revealed preferences. An application to productivity measurement using EU KLEMS data highlights the usefulness of the method.

Key words: Aggregation, Index number theory Non-parametric analysis, Price level, Price index, Productivity measurement.