Kamil Makieła

Investigating the structure of aggregated production function*

Abstract

For some time now, tracing sources and cross-country differences in economic growth have been focal points of Frontier Analysis applications in macroeconomics. One of key aspects in the econometric approach (also known as parametric) is the optimal choice of parametric specification of the macroeconomic (also known as aggregated) production function. It is the cornerstone of the analysis because functional parameterization has a profound impact on output growth decomposition, and thus tracing sources and cross-country differences in economic growth. If this step is handled properly the econometric approach allows us to extract more information given data (e.g., in comparison to nonparametric approach). However, if a production function is poorly specified it can lead to inconsistent results. The choice of parametric specification is usually either engineered to answer specific research question or dictated by pragmatism, that is, whatever the current cannon in the literature is.

This paper investigates model choice in a broad set of macroeconomic production functions and based on three relevant, yet different criteria: 1) highest marginal data density – the building block of Bayesian model selection, a general tool for comparing competing model specifications; 2) Lindley-type testing – Bayesian procedure that "mimics" classical hypothesis testing; useful to assess significance of model restrictions; 3) convergence diagnostics – MCMC method requires monitoring if the chain converges to its sought after limiting stationary distribution; if it does not or its mixing speed is very low the corresponding model is less practical to use than others (i.e., needs significantly more runs to achieve the same numerical efficiency as others). The three stage procedure is necessary because not all criteria may point towards the same conclusions as they examine different properties of the simulation results. Also for this reason, it comes natural to select the optimal model through a process of elimination as it is proposed in this paper.

The analysis is carried out using Bayesian Stochastic Frontier Analysis (BSFA) based on data from 30 countries (27 UE Member States, USA, Japan and Switzerland) over 15 years (1996-2010).

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