ABSTRACTS

Session 4: ASSESSING THE FEASIBILITY OF APPLYING THE GROWTH ACCOUNTING APPROACH TO CALCULATE INTER-COUNTRY AGRICULTURAL EATFP

Timo KUOSMANEN Green productivity in agriculture - A critical synthesis

This report has been prepared for the OECD with a view towards the development of the green growth strategy for the agricultural sector. The objectives of this study include: 1) Critical review of the literature for available approaches for measuring green productivity in agriculture. 2) Proposing an operational method for assessing green productivity in agriculture at cross-country level. 3) Applying the proposed method to real empirical data. Regarding the first objective, we pay particular attention to the frontier approaches to TFP measurement, where the aggregation of inputs and outputs is conducted by applying shadow prices rather than market prices. We briefly review parametric, nonparametric, and semi-nonparametric approaches as methodological alternatives to frontier estimation and discuss specific methodological issues related to agriculture, such as modelling of damage control inputs, the material balance accounting and its interpretation, and the modelling of production risk. In the empirical part of the paper, we examine a panel of 13 OECD countries over the time period 1990 – 2004. As for the input variables, we compare three alternative model specifications: i) The economic model (ECON) that includes the conventional production factors: labour, capital stock, and the land area. ii) The environmental model (ENV) that includes the agricultural green-house gas emissions, the nitrogen stock, the phosphorus stock, and the land area as the environmental resources. iii) The mixed model (MIX) that includes all input variables of both the ECON and ENV models described above. These three models are estimated using three alternative methods: a) Stochastic Frontier Analysis (SFA). b) Data Envelopment Analysis (DEA). c) Stochastic semi-Nonparametric Envelopment of Data (StoNED). The empirical application indicates large differences across countries in both the level of TFP and its growth rate. Further, the results differ considerably depending on the specification of the set of input variables and the choice of the estimation method. Our findings suggest that the results are relatively robust to the assumptions regarding the functional form of the frontier, and that explicit modelling of stochastic noise is a more critical factor in this application.