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Total Factor Productivity Growth in Agriculture, Adjusted for Greenhouse Gas Emissions:
Trends in Developed and Developing Countries over the 1990-2015 Period

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The growth in the total world population of the last century has led to a substantial rise of food demand. Although a slowdown of global population growth is foreseen for the next century, significant and persistent increases are expected in Africa and South Asia, with consequent higher pressure on food demand in the next future (FAO 2018).

Considerable improvements in agricultural productivity are needed to meet the increasing food demand, but such improvements cannot ignore the increasing negative impacts of agriculture on environment (e.g. eutrophication or climate change). In other words, sustainable productivity growth is needed.

This paper aims at analysing trends in total factor productivity (TFP) and in total factor productivity adjusted for greenhouse gas emissions (TFP_E) for the agricultural systems of a selection of developed and developing countries, over the period 1990-2015. To this end, we use data envelopment analysis (DEA) to compute Malmquist productivity indexes, further decomposed in order to identify the sources of productivity change (Fare et al. 1994). Environmental efficiencies, from which TFP_E is derived, are computed following the standard procedure used to identify the combination of inputs which minimizes costs (see, e.g. Bogetoft and Otto 2011). Instead of minimizing inputs cost, this procedure minimizes the amount of CHGs due to the inputs use. Data come from FAOSTAT and USDA databases.

References

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