Efficiency measurement of Kosovo crop farms
Data Envelopment Analysis

Iliriana Miftari¹, Ekrem Gjokaj², Dmitry Zvyagintsev²

¹Department of Agricultural Economics-Faculty of Agriculture and Veterinary-University of Prishtina
²Food and Agriculture Organization of the United Nations

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INTRODUCTION
Efficiency as a criterion, it serves as bedrock for policy and planning approaches towards sustainable development. Efficiency within economics context can be found in two main bodies of theory such as production theory (technical efficiency, production efficiency) and the welfare economics (allocative efficiency, intertemporal efficiency). Improving productivity and efficiency of farms is considered as one of the core component for increasing competitiveness.

OBJECTIVE OF THE STUDY
The main objective of this study was to estimate efficiency of the Kosovo farms oriented in crop production.

Within this context the study aimed to achieve the following specific objectives:
- Estimate technical efficiency of the crop farms
- Estimate scale efficiency of the crop farms

METHODOLOGICAL APPROACH
Technical efficiency measurement was estimated using Data Envelopment Analysis (DEA).

- It is a non-parametric technique
- It is a non-stochastic approach
- It fits a piece-wise linear frontier using a linear programming technique

MODEL ORIENTATION
Input oriented model under Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) assumption for technical efficiency estimation.

![TE Orientation Diagram]

Figure 1: Technical efficiency; TE = 0C'/0C²

DATA
Efficiency estimation based on FADN data 2013.

RESULTS
The average TE score for crop farms under the assumption of VRS was estimated to be 0.578, which indicates that on average crop producers could further reduce the level of inputs used and still remain at the same level of the output produced.

Table 1: Input oriented of technical and scale efficiency scores for crop farms

<table>
<thead>
<tr>
<th>Efficiency</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>TE_CRS</td>
<td>42.13</td>
<td>24.23</td>
<td>10.12</td>
<td>100</td>
</tr>
<tr>
<td>TE_VRS</td>
<td>57.81</td>
<td>27.19</td>
<td>21.25</td>
<td>100</td>
</tr>
<tr>
<td>SE</td>
<td>70.50</td>
<td>11.00</td>
<td>47.62</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2: Bias-corrected technical efficiency scores for crop farms

<table>
<thead>
<tr>
<th>Orientation</th>
<th>Bias-corrected efficiency score</th>
<th>Bias-corrected 95% CI†</th>
<th>SD of bias-corrected efficiency score</th>
</tr>
</thead>
<tbody>
<tr>
<td>TE_CRS</td>
<td>34.31</td>
<td>23.76 - 43.09</td>
<td>23.79</td>
</tr>
<tr>
<td>TE_VRS</td>
<td>51.69</td>
<td>41.36 - 58.10</td>
<td>29.06</td>
</tr>
</tbody>
</table>

Note: CI-confidence interval; † 2000 replications were used for bootstrapping.

CONCLUSIONS
- The majority of crop farms were not operating at maximum efficiency and there was considerable potential for technical efficiency improvement.
- Based on the slacks calculation it was revealed that total inputs was most excessively used by farmers.
- The mean of technical efficiency scores under CRS and VRS assumption was not equal, indicating the existence of scale inefficiency.
- For most of the farms included in the sample the inefficiency of scale was mainly present due to being a too small farm.

References:

Contact:
Department of Agricultural Economics – Faculty of Agriculture and Veterinary – University of Prishtina, Kosovo
Department of Landscape Ecology and Resources Management, Faculty of Agricultural Sciences, Nutritional Sciences, and Environmental Management
Justus-Liebig-University Giessen, Germany
Iliriana Miftari, e-mail: iliriana.miftari@uni-giessen.de, Iliriana.Miftari@universitaet-prishtina.de