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ANALYZING THE EFFICIENCY AND PRODUCTIVITY OF SLOVAK FARMS SPECIALIZING IN LIVESTOCK

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Introduction

Background for this research is to estimate the productivity and efficiency of livestock farms and possible changes in management practices that ultimately contribute to sustainable farming practices and healthy food production. Management is identified as one of the main sources of inefficiency that can be improved through better management. Improving the technical efficiency of the farm means less use of inputs, lower production costs, and thus affecting the profitability of farms, which is the driving force behind farmers' motivation to adopt new management techniques. The use of Malmquist indices shows how farmers can benefit from applying operational management tools to assess their performance.

Methodology and data

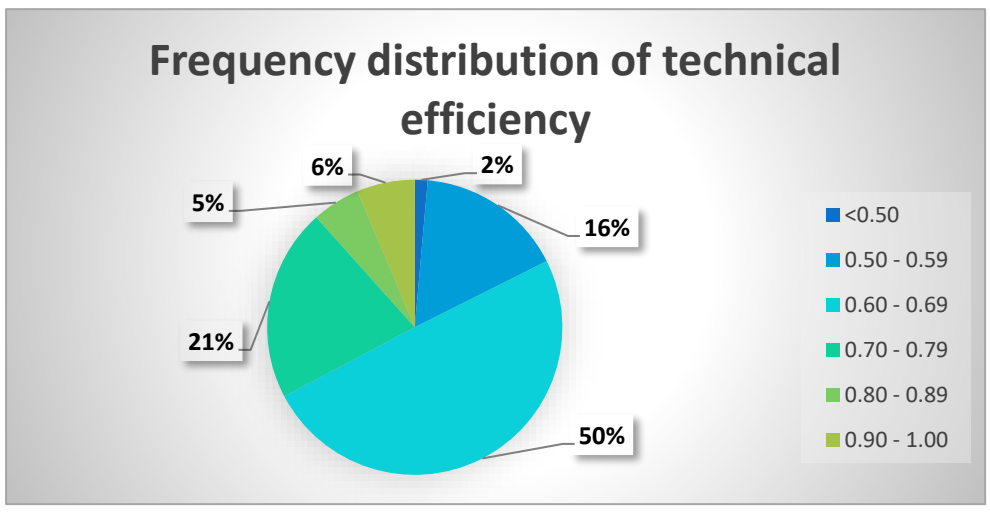
An input-oriented DEA model has been applied to investigate the degree of efficiency and productivity of Slovak livestock farms over the period 2004-2013. Data of 284 farms from the FADN were analyzed. Total factor productivity change was measured by Malmquist indices (M_0) and decomposed to technical efficiency change (*TECH*) and technological change (*TCH*). Further, we identify sources of efficiency changes by decomposition of technical efficiency change to managerial efficiency (*PECH*) and scale efficiency changes (*SECH*). This procedure makes it possible to identify farms with the best management practices and can also provide them with the necessary knowledge for farm management. By using these farms as benchmarks, inefficient farms can identify which changes in input resource use are needed to increase overall performance.

$$M_0(x^t, y^t, x^{t+1}, y^{t+1}) = \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)} \cdot \left[\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^{t+1})} \cdot \frac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^t, y^t)} \right]$$

$$= TECH(x^t, y^t, x^{t+1}, y^{t+1}) \cdot TCH(x^t, y^t, x^{t+1}, y^{t+1})$$

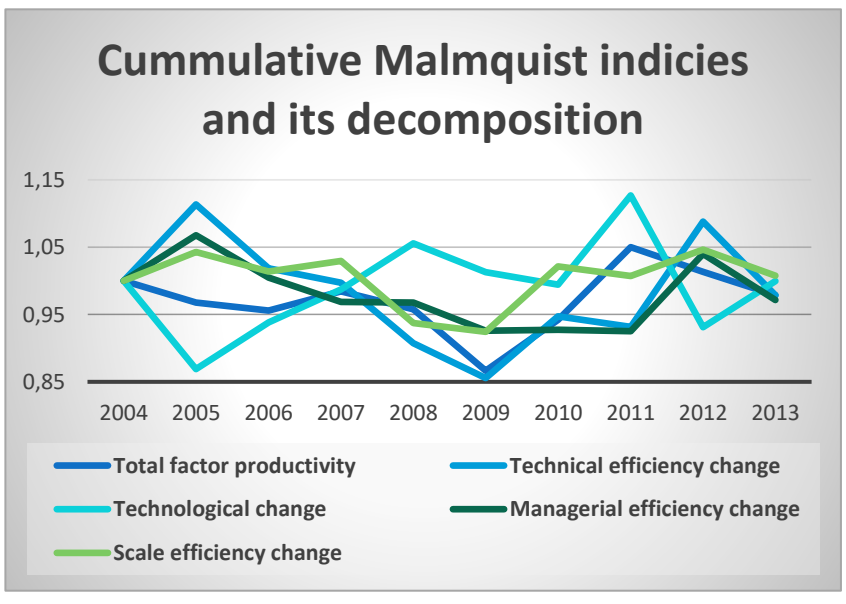
$$TECH(x^t, y^t, x^{t+1}, y^{t+1}) = \left[\frac{D_o^t(x^t, y^t|VRS)}{D_o^t(x^t, y^t|CRS)} \cdot \frac{D_o^{t++}(x^{t+1}, y^{t+1}|CRS)}{D_o^{t+1}(x^{t+1}, y^{t+1}|VRS)} \right] \cdot \left[\frac{D_o^{t+1}(x^{t+1}, y^{t+1}|VRS}{D_o^t(x^t, y^t|VRS} \right]$$

$$= SECH(x^t, y^t, x^{t+1}, y^{t+1}) \cdot PECH(x^t, y^t, x^{t+1}, y^{t+1})$$



Results

Results suggest that on average, a potential 31% reduction in input use could be achieved provided all livestock farms operated efficiently, assuming no other constraints on this adjustment. Reducing waste of input resources and costs may prove to be the most effective way to increase the viability of livestock farms, as farmers have more control over inputs. In 2012 farms specialized in livestock improved their performance compared to the best farms by 17%, mainly due to improvement of the managerial efficiency by 12% and improvement of scale efficiency by 4%.



Conclusion

We found that the productivity of farms specializing in livestock farming declined over time. The technical efficiency of all livestock farms remains stable over the period under review, with technological changes being negative over time. The negative development of technical efficiency was mainly due to a decrease in managerial efficiency of 3% compared to the average managerial level at the beginning of the period. To improve the productivity and efficiency of livestock farms, these results are useful for management in creating the optimal level of inputs in designing an appropriate policy framework to address identified problems in livestock production.

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