Development of productivity and its components in Slovak agriculture before and after EU accession: analysis of the impact of CAP introduction on the performance indicators of Slovak crop and livestock farms

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Aim of study

- The aim was to investigate the impact of the accession of the Slovak Republic to the EU and the associated increased dependence of the local farms on subsidy policy on the indicators of the total factor productivity change, its components, and input bias of technical change.

STAGE 1:

- Productivity analysis: Malmquist indices and Luenberger indicators

STAGE 2:

- Panel data analysis: Random Effects Models

STAGE 1: Productivity analysis

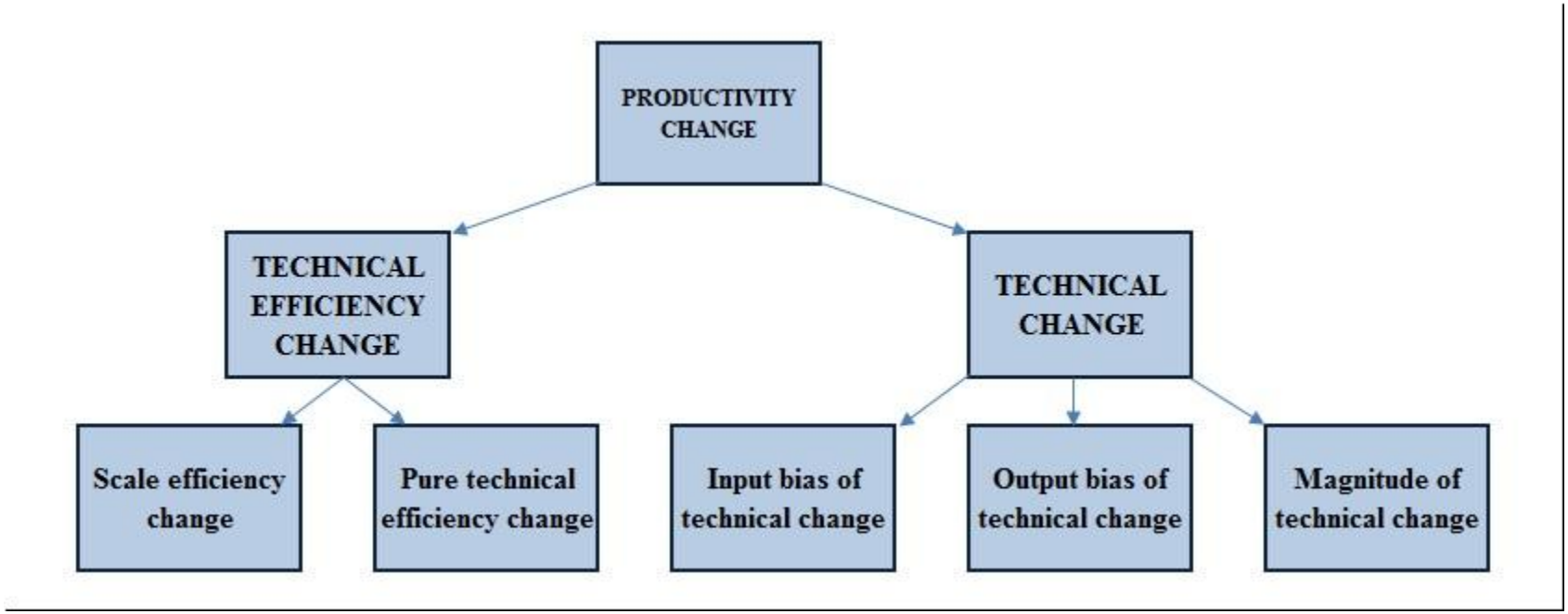
MALMQUIST PRODUCTIVITY INDEX (MPI)

- Proposed by Caves, Christensen, and Diewer (1982)
- The basis for calculations are the values of output Shephard distance functions, estimated by a non-parametric method of Data Envelopment Analysis
- The calculated value of MPI can be compared with a value of 1

LUENBERGER PRODUCTIVITY INDICATOR (LPI)

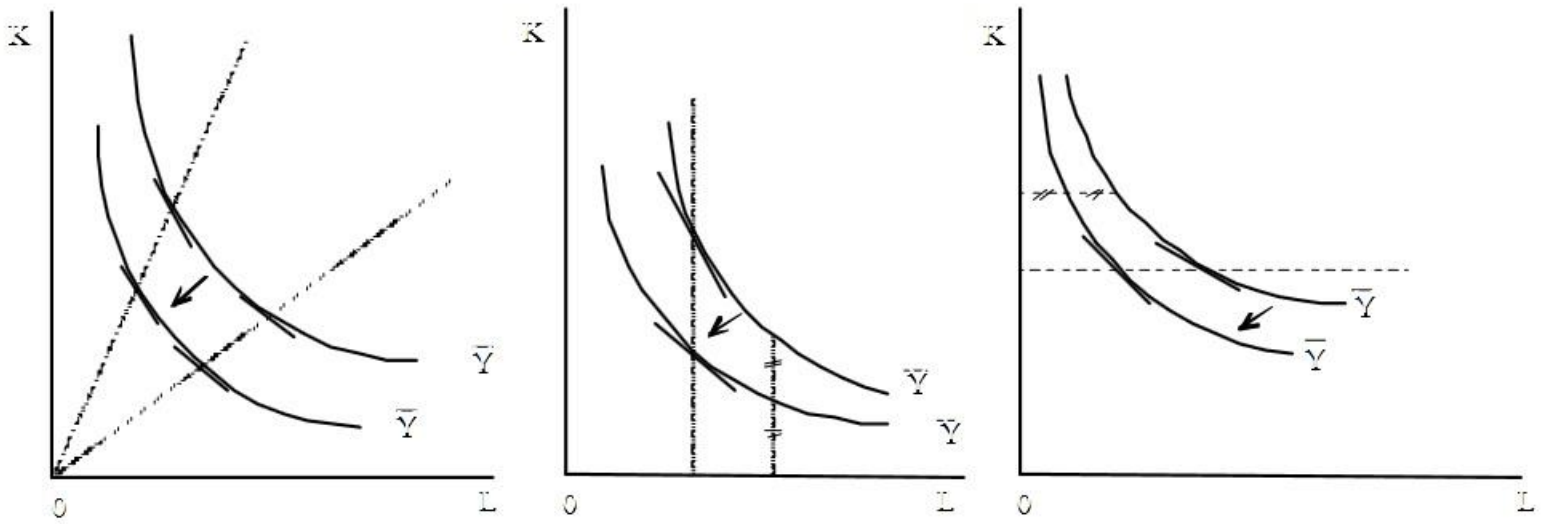
- Proposed by Chambers, Färe, and Grosskopf (1996)
- The basis for the calculations are the values of directional distance functions, estimated by the method of Data Envelopment Analysis
- The calculated value of LPI can be compared with the value of 0

Total factor productivity change decomposition



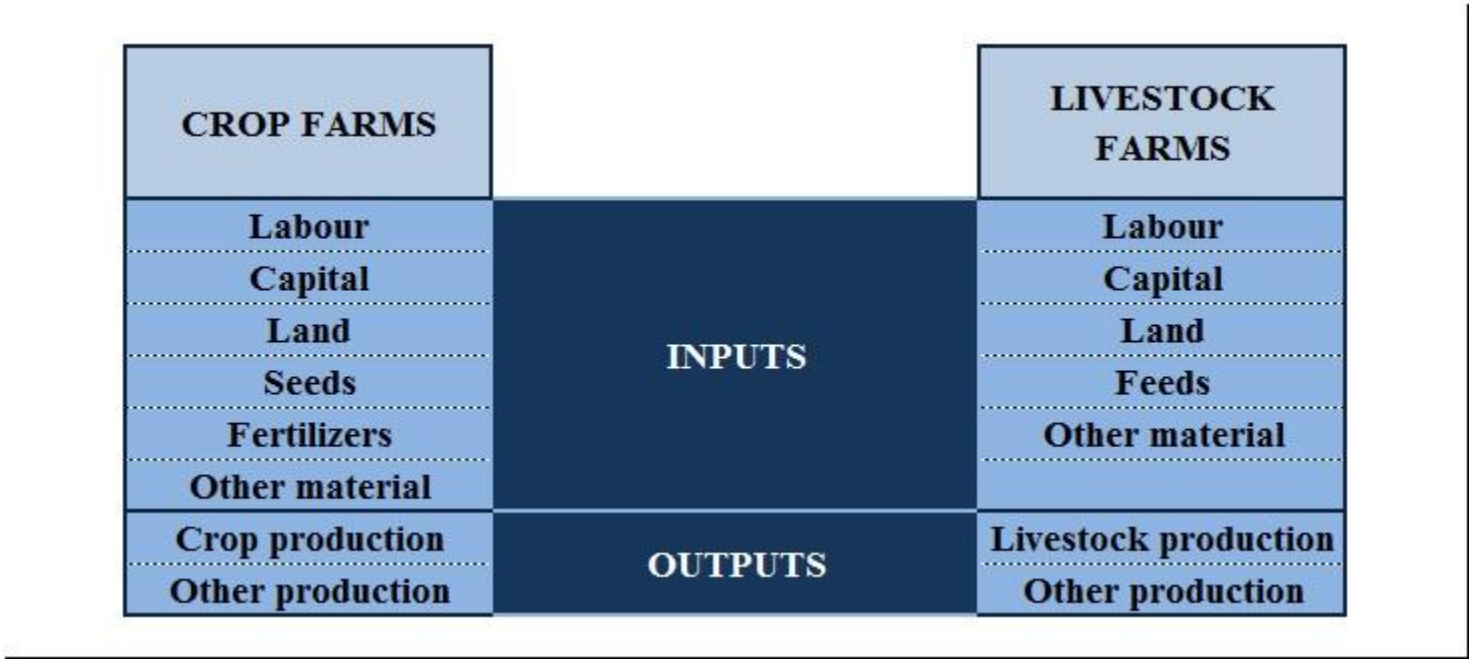
Hicks-neutral and biased technical change

- Estimation of input bias of technical change for individual input pairs on the basis of the comparison of the values of input bias of technical change index and ratios of individual input pairs in the years t and t+1



- *Source: Acemoglu (2011)*

Inputs and outputs



STAGE 2: Panel data analysis

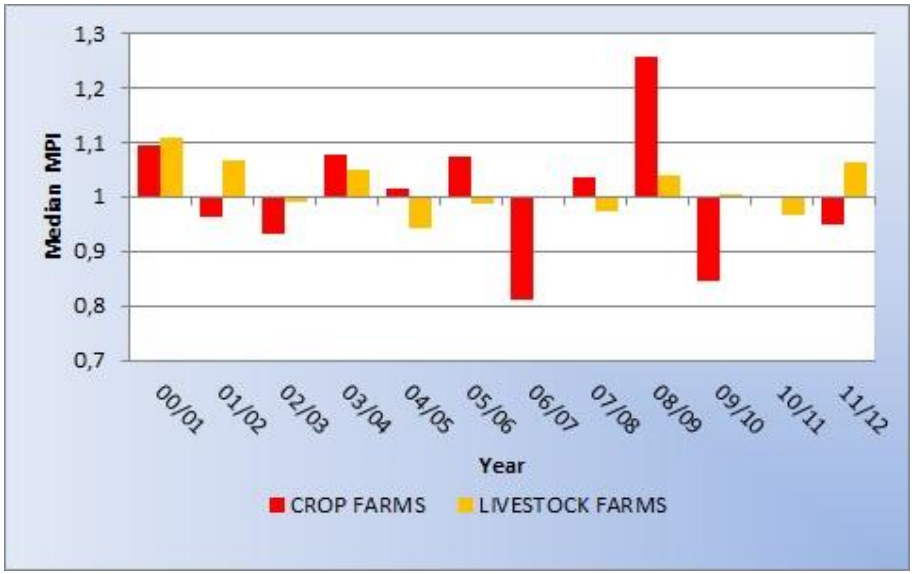
- Random Effect Model and logit Random Effect Model
- The effect of Slovakia‘s accession to the EU was modeled through dummy variable
- Dependence on subsidies was measured by the proportion of total farm subsidies received on its total revenues.

Data

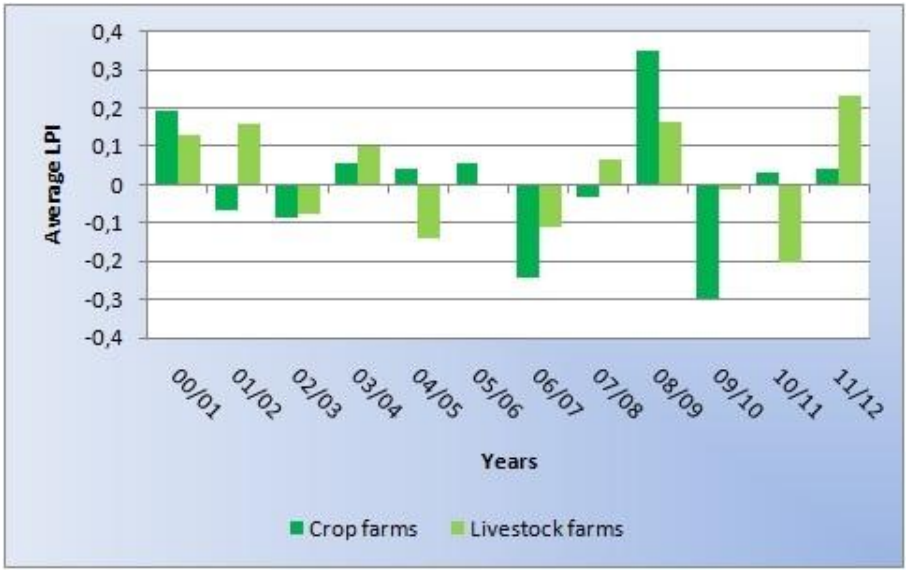
- Source: The Database of Information Sheets of the Ministry of Agriculture and Rural Development of the SR
- 73 crop farms and 97 livestock farms
- Years 2000-2012

Development of farms‘ Total Factor Productivity in the years 2000-2012

MPI: Median values



LPI: Average values



Source: own calculations

Performance development of Slovak farms (2000-2012)

- Crop farms: Slight increase of TFP
  (average LPI = 0,003)
- Livestock farms: Greater increase of TFP
  (average LPI = 0,025)
- Average technical progress of both types of farms
- Average regress of technical efficiency of both types of farms

Input bias of technical change (2000-2012)

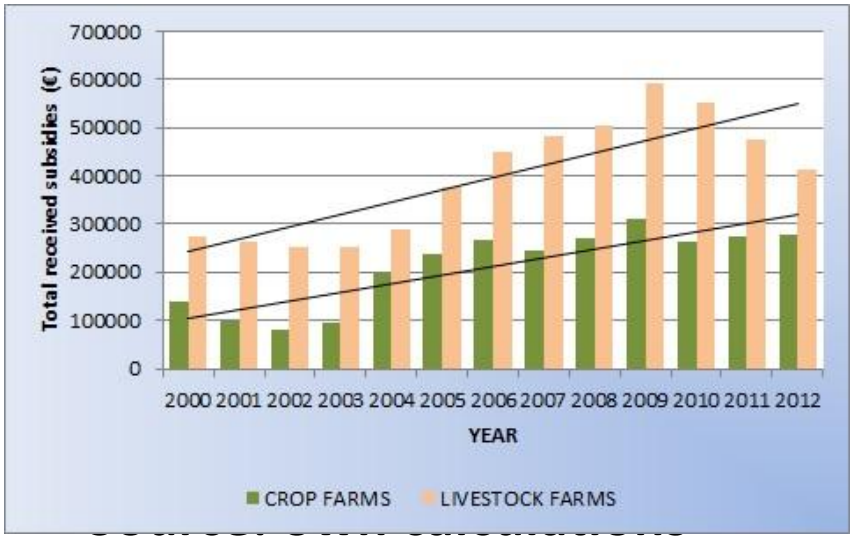
- Inputs are shown in order from the most intensifying to the most mitigating factors:

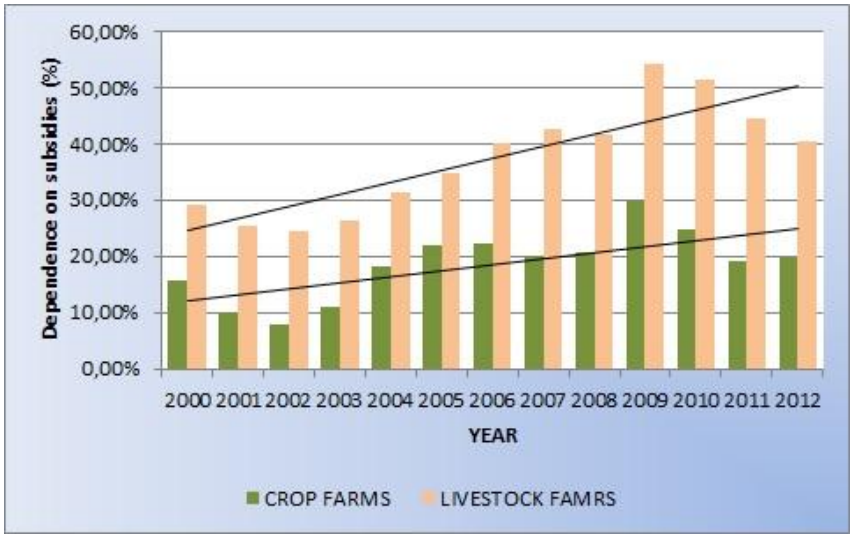
# Crop farms	# Livestock farms
1. Capital	1. Capital
2. Fertilizers	2. Others
3. Seeds	3. Land
4. Others	4. Labour
5. Land	5. Feeds
6. Labour	

Subsidies and their share on total farm income (2000-2012)

THE SHARE OF SUBSIDIES IN TOTAL FARM INCOME

Period	Crop farms	Livestock farms
2000-2004	11%	26%
2004-2012	22%	42%
Overall	**19%**	**37%**





Impact of the EU accession

After the EÚ accession there was:

- worse development of the total factor productivity of the both types of farms (significant difference in the case of livestock farms)
- significantly worse development of the technology of crop farms
- significantly worse development of the technical efficiency of livestock farms
- increase in the likelihood of fertilizers-using and other inputs-saving TCH in crop farms
- Increase in the likelihood of feeds-using and other inputs-saving TCH in livestock farms
- significant increase in the likelihood of other material-saving and other inputs-using TCH in livestock farms

Impact of the change in subsidies/income ratio

- Impact on TFP was the net effect of the positive, investment induced productivity growth and the negative effect of efficiency losses (Rizov et al., 2012).
- Positive impact on the TFP change of crop farms due to significant positive effect on their technical change
- Significant negative impact on the TFP of livestock farms due to significant negative effect on their technical efficiency change
- Increase in the subsidies/income ratio caused significantly increased likelihood of fertilizers-saving and other inputs-using TCH (crop farms), feeds-saving and other inputs-using TCH (livestock farms), and land-using and other inputs-saving TCH (both types)

Conclusion

- Average growth of the productivity of both types of farms (driver: technical progress, brake: regress of technical efficiency)
- Hicks-non-neutral character of the technical change in the Slovak agriculture
- Significant increase of the subsidies/income ratio after EU accession
- The effect of the CAP introduction: Worse development of the productivity of both types of farms after joining the EU than in the previous period.
- The effect of changes in the subsidies/income ratio: The net effect of positive, investment induced productivity growth and the negative effect of the loss of efficiency for both types of farms

References

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THANK YOU FOR YOUR ATTENTION.