



## **WP6: Technology, specialisation, productivity**

Task 6.1: Total factor productivity in agricultural production (Lead: IAMO)

Task 6.2: Investigation of the food processing sector (Lead: CULS)

Task 6.3: TFP relations between agricultural production and food  
processing (Lead: UMIL)

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# Objectives

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- To access the exploitation of economies of scale and production possibilities (technical efficiency) and the impact of technical change in agriculture and food processing.
- To identify the relationships between total factor productivities TFP in agriculture and the performance of food processing industries.
- To identify sources of inefficiency and estimate how they define country-specific production and trade possibilities.

# Main results: Technical efficiency and TFP in agriculture

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- Significant heterogeneity in production structures in all EU member states (cereals, milk, pork)
- Considerable differences in technology among the countries.
- Economies of scale are pronounced in majority of countries in cereal, milk and pork productions.
- Scale efficiency have a significant impact on the productivity change in these countries.
- Technological change had a positive contribution to the production possibilities.
- The direction of biased technological is country specific.

# Main results – Technical efficiency and TFP in agriculture (2)

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## Technical efficiency

- Efficiency differences were found to be important reasons for variation in the production.
  - The top 10 % farmers highly exploit their production possibilities. This also holds for average farm. On the other hand, 10 % of the worst farmers waste their resources and may have problems to compete on the market.
- The developments of technical efficiency are rather stochastic.
- This also holds for factors determining technical efficiency developments.
- Leapfrogging among firms in technical efficiency is a common phenomenon in cereal as well as milk and pork production.

# Main results – Technical efficiency and TFP in agriculture (2)

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## TFP

- Leapfrogging can be denied as far as TFP development is concerned.
- Structural change seems to occur in a way that the most successful producers strengthen their positions and producers with poor performance fall more and more behind.
- Positive trend in TFP was found in majority of EU member countries.
- Technical change was identified as the important factor that contributed predominantly positively to TFP development.
- Finally, we did not observe catching up process from between the regions. => **despite a period of almost 10 years after accession the productivity differences in the agricultural among as well as within countries are substantial.**

# Main results – Technical efficiency and TFP in food processing

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## **Technology**

- Significant differences in technology among the countries.
- Intra- and intersectoral differences are important characteristics in EU food processing for all analysed sectors: slaughtering, fruits and vegetables, dairy and milling.
- No indication of economies of scale in the analysed countries.
- Technological change made a significant positive contribution to the production possibilities in the majority of countries.

## **Technical efficiency**

- Efficiency differences among food processors are important reasons for variation in production in all sectors:
- The metafrontier analysis shows that the differences in average technical efficiency are not large among the EU member countries.

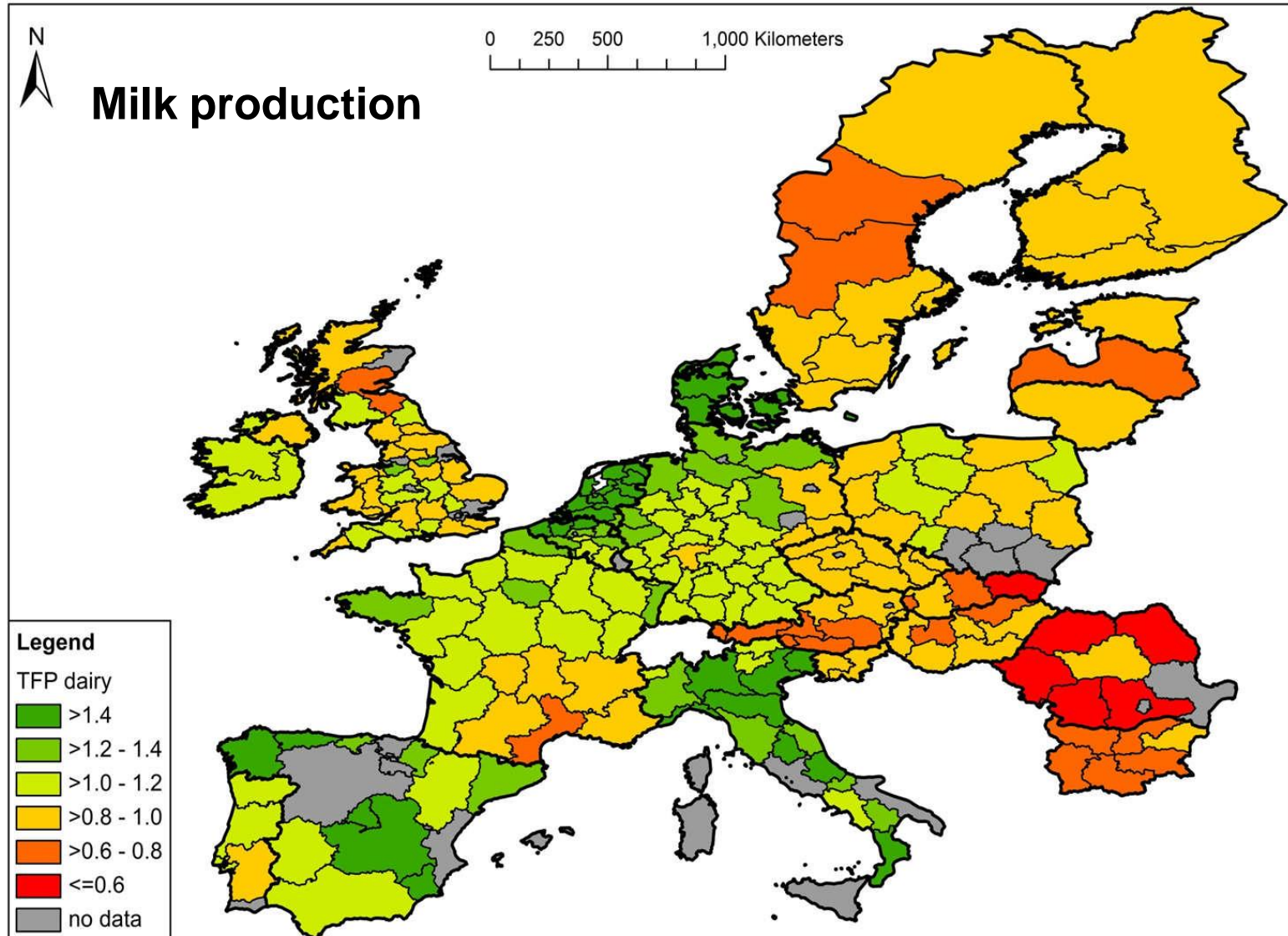
## Main results – Technical efficiency and TFP in food processing (2)

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### TFP

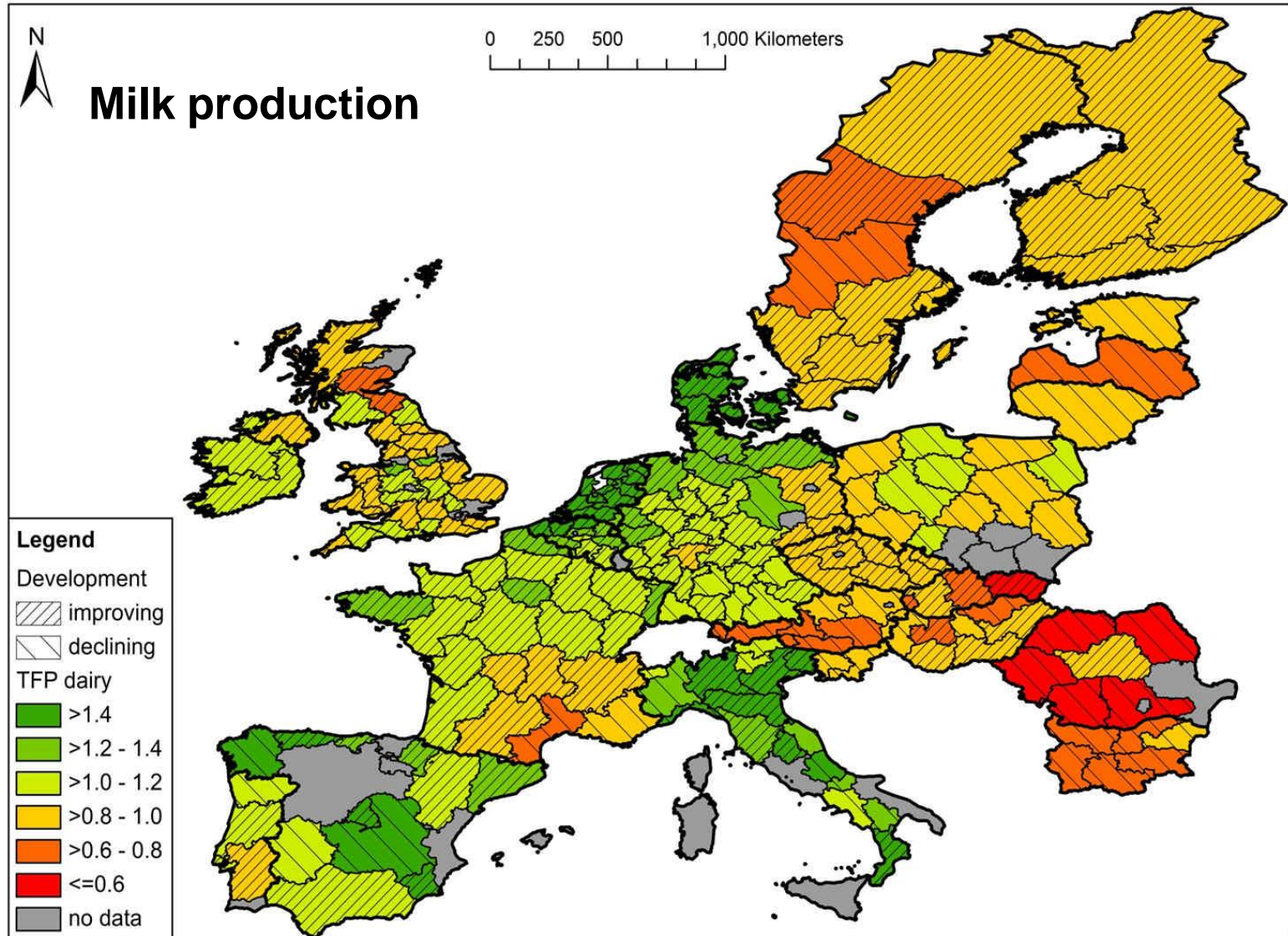
- The TFP estimates revealed significant differences among EU member countries, including Serbia,
  - **old member states have higher TFP than the new member states.**
- Technological change is an important factor that contributed predominantly positively to TFP development (slaughtering and dairy).
- The positive TFP development was observed in majority of countries,
- **But** slow catching-up process between countries and only in some cases.  
**=> despite a period of almost 10 years after accession, the productivity differences in the food processing sectors, among as well as within (some) countries, are quite substantial.**
- => the adoption of innovation is an important factor determining TFP growth, policy makers should focus their attention on supporting the spread of innovation and expertise, in order to support productivity growth in less-productive countries and thereby decrease the differences among countries in terms of productivity.

# Total Factor productivity





# Changes in TFP



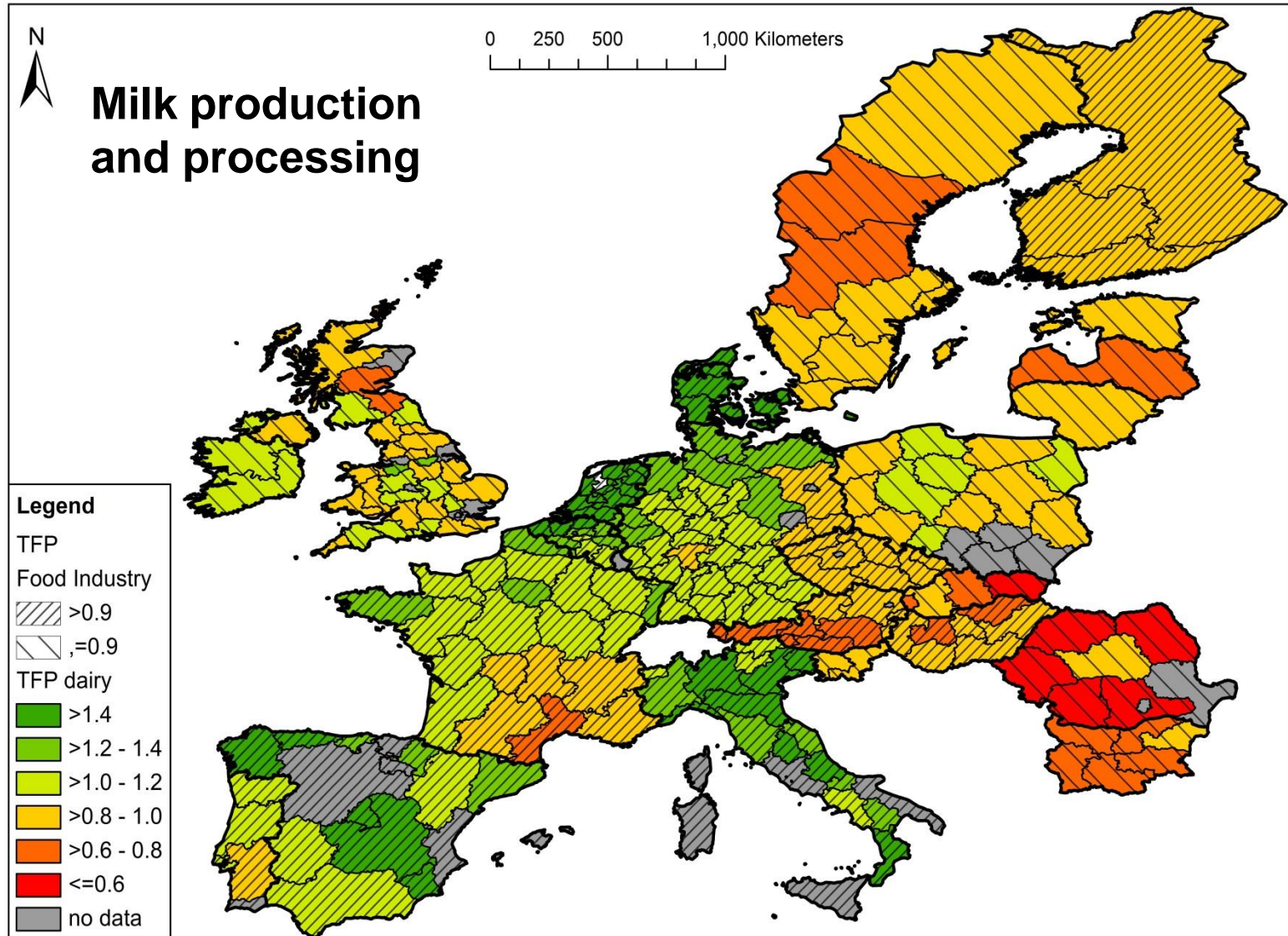
## Main results – TFP relations between agricultural production and food processing

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- The results of fitted stochastic frontier models confirmed that farm productivity has a positive effect on productivity and efficiency in the food processing industry, and that food processing productivity positively determines farm productivity and efficiency.
- The main findings show that import penetration in both final products and intermediate inputs systematically contributed to firm-level productivity growth. Yet the productivity growth effect induced by import penetration in upstream sectors is 10 times greater than the one at the industry level. Horizontal import competition coming from the EU15 and OECD countries exerts the strongest effect on productivity growth.

# Total Factor productivity

- relation between productivity in milk production and milk processing



# Policy recommendations

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- Recommendation 1: Enhance the support and adoption (spread) of innovation.
  - Since the technological change was identified as an important factor determining TFP on both levels (agriculture and food processing) the support of adoption of innovation is one of crucial way of sustainable TFP growth. This especially holds for NMS since the productivity differences between OMS and NMS are substantial.
  - Policy makers should focus their attention on supporting the spread of innovation and expertise, in order to support productivity growth in less-productive countries and thereby decrease the differences among countries in terms of productivity.

# Policy recommendations

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- Recommendation 2: Promote the improvements of the quality of input use.
  - Another source of technological progress is the improvements of the quality of input use. Together with recommendation 1 this is important factor of TFP growth.
- Recommendation 3: Promote a „good practise“
  - Since the results show that the most successful producers strengthen their positions and producers with poor performance fall more and more behind the support and promotion of a „good practise“ may help the less or poor performing farms and food processors to improve the competitiveness and to enter the path of sustainable growth. This also concerns the ability of the reduction of wasting resources due to inefficient input use.

# Policy recommendations

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- Recommendation 4: Promote a local cooperation between farmers and food processors.
  - Since the agricultural and food processing TFP is mutually related the closer cooperation between farmers and food processors may enhance the responsibility for the quality of input use as well as output and thus may result in the increase of productivity on both levels. Moreover, the closer cooperation may support the diffusion of technological progress.



Thank you for your  
attention!  
*Questions?*

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