Institute of Agricultural Economics

Use of Simulation Models for CAP Impact Assessment: The Hungarian Perspective with a Focus on CAPRI

Norbert Potori

EU CAP Network Good Practice Workshop

University of Bari, 4 April 2025

CAPRI competency development path

Made possible through
- previous experience with AGLINK, EUSIM, and in-house developed simulation models
- management's recognition of the strategic importance and dedication of necessary resources (*not an AG Ministry request*)
- personal connection with a skilled professional
- encouragement from the modelling community, with particular support from the JRC

Financing
- own budget comprising funding from the AG Ministry and market revenues
- Horizon & other projects

Core modelling team
- a mathematician/programmer
- a virologist modeller transitioned into economics
- with other duties, hindering capacity development

Support team
- agricultural economists (key experts in specific product chains) as scenario designers and evaluators of modelling results

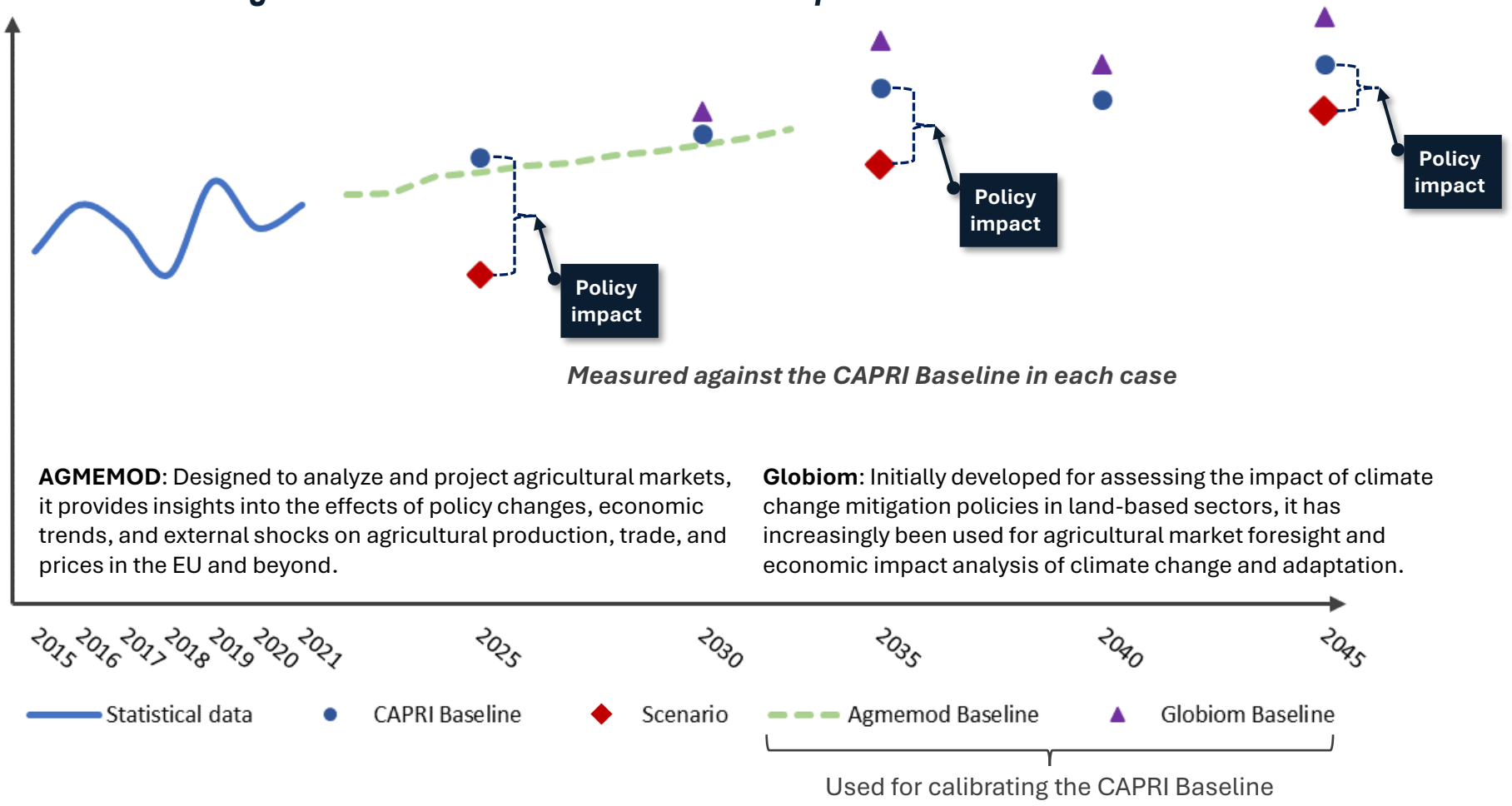
Timeline

- 2015: first spark ignites
- 2016: learning process begins
- 2018: MFF
  - AG Ministry and private company interest
  - Brexit & CAP budget cuts scenarios
- 2019: VCS for protein crops
  - exercise, scientific interest
  - coupled support scenarios
- 2020: COVID break
- 2021-2022: impacts of the EU ban on cages
  - COPA-COGECA as client
  - transition scenarios for the pig and layer sectors
  - swapping of FADN data
- 2022-2026: FOODCoST (Horizon project)
  - scenario for EU-wide adoption of soybean pricing method
- 2023-2026: Tools4CAP (Horizon project)
  - scenario for the emission mitigation potential of altering nutrient flows through policy measures

'… to support the design, monitoring and evaluation of the CAP-SP by stimulating MS to adopt methods and tools tailored to their needs. The project will empower policymakers in CAP governance towards the green transition and the achievement of sustainability and resilience goals. It will deliver ready-to-use tailored quantitative and qualitative solutions, including modelling tools with foresight capacity (e.g. CAPRI, … etc.)'

For clarification before any examples…

Understanding CAPRI Baselines and assessed impacts



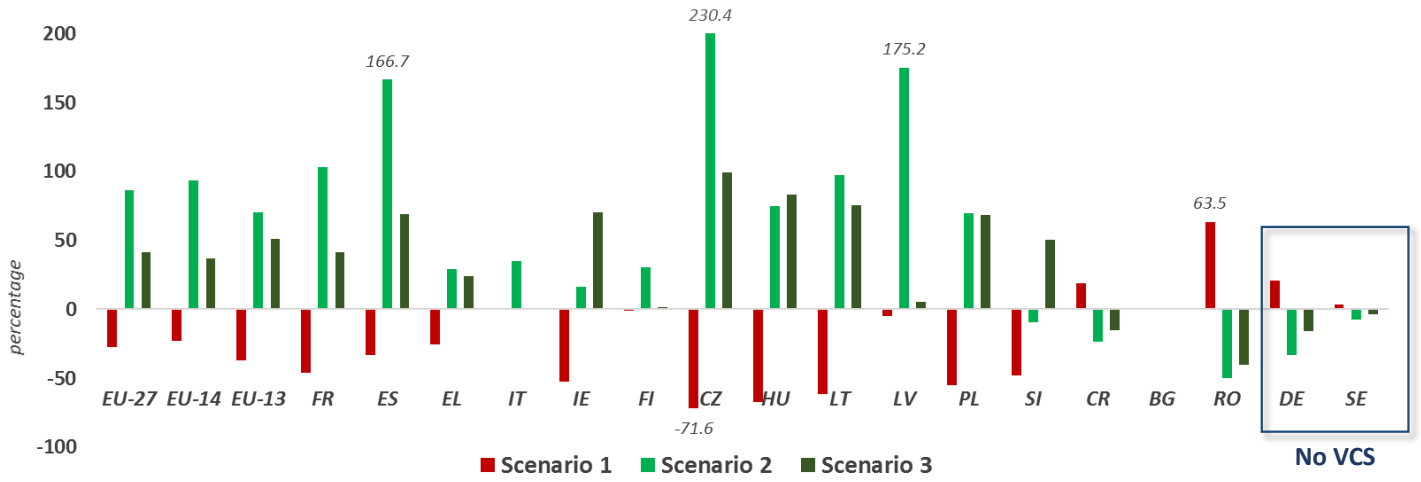
AGMEMOD: Designed to analyze and project agricultural markets, it provides insights into the effects of policy changes, economic trends, and external shocks on agricultural production, trade, and prices in the EU and beyond.

Globiom: Initially developed for assessing the impact of climate change mitigation policies in land-based sectors, it has increasingly been used for agricultural market foresight and economic impact analysis of climate change and adaptation.

Example #2 (2019)

Results

Changes in the area under pulses (vs the 2030 Baseline)



Observations

- considerable changes at the aggregate level
  - ➞ pronounced incentivising effect of VCS in contrast to soybeans
- apparently huge potential for further growth with increased VCS

☝ *production and market structures?*

Source: own calculations

To what extent could the coupled support for protein crops contribute to the further expansion of protein crop production in the European Union?

A CAPRI based analysis

Potori, Norbert[1] – Savoly, Janos[1] – Molnar, Zsuzsa[1]

Sofia 23-25 October 2019

[1] NARIC Research Institute of Agricultural Economics (AKI), Budapest, Hungary

Scenarios

2030 Baseline
- CAPRI Baseline 2.4
  - ➞ CAP 2014-2020
  - ➞ with Brexit

Scenario 1
- no VCS for protein crops
  - ➞ basic payment (SAPS) envelopes increased

Scenario 2
- highest amount of specific unit payment applied for all protein crops at the national level
  - ➞ basic payment (SAPS) envelopes decreased
  - ➞ protein crops support over 2% of national DP ceilings

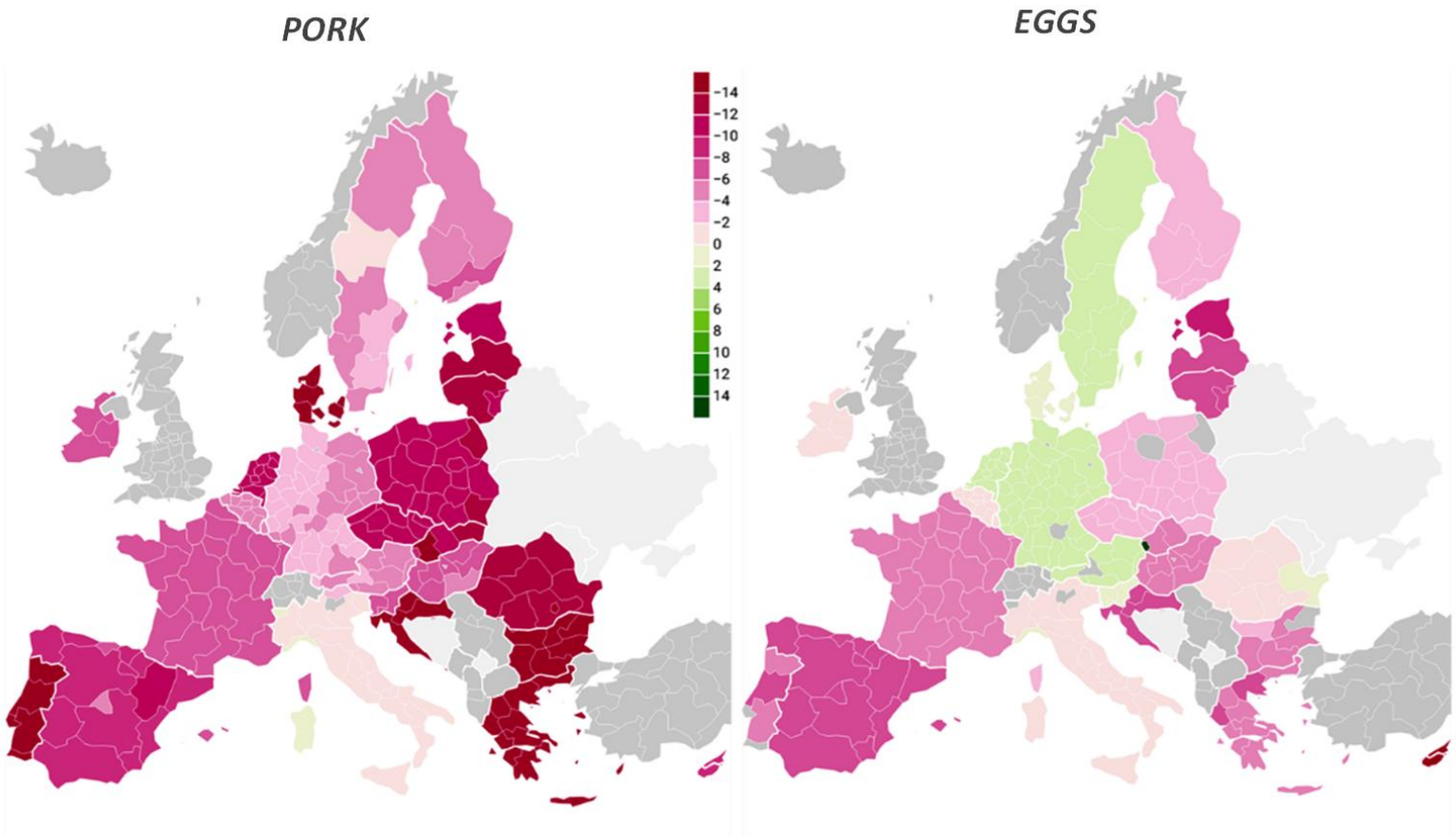
Scenario 3
- specific unit payments doubled at the national level
  - ➞ basic payment (SAPS) envelopes decreased
  - ➞ protein crops support over 2% of national DP ceilings

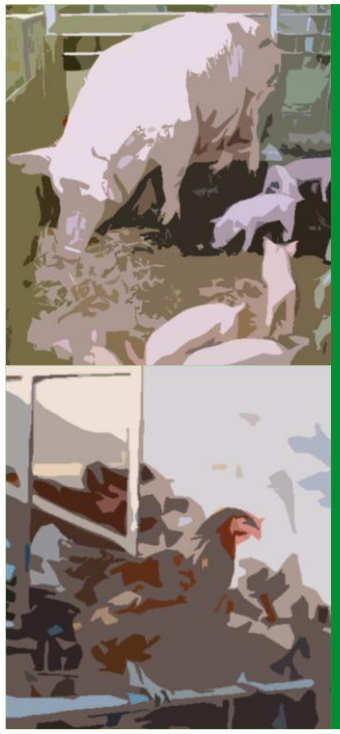
☝ major shortcoming: incentives of production on EFA's not captured

Focus on soybeans and pulses

Example #3 (2021-2022)

Changes in regional (NUTS-2) production in Scenario B1 (2035)





'End the Cage Age' Impact Assessment

CAPRI model results

Norbert Potori, AKI

31 May 2023

Authors: Mihaly Himics[1], Peter Witzke[1], Janos Savoly[2], Zsolt Szabo[2], and Norbert Potori[2]

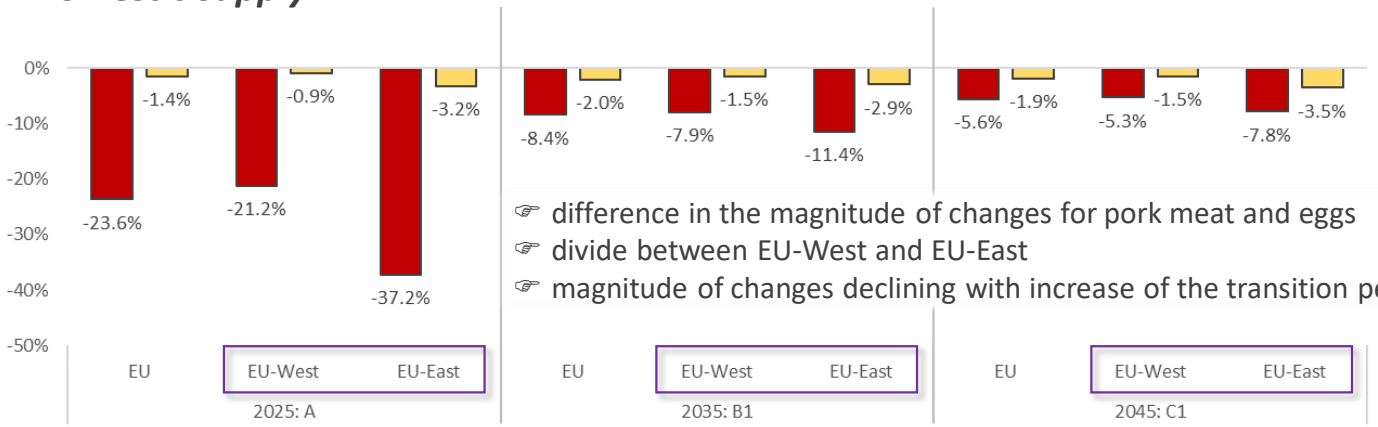
[1] *European Centre for Agricultural, Regional and Environmental Policy Research (EuroCARE), Germany*
[2] *Institute of Agricultural Economics Nonprofit Kft. (AKI), Hungary*

- **Scenario A – immediate transition**, full EU policy impact: all farmers are forced to transition by (1 January) 2025
- **Scenario B1** – **transition by 2035,** full EU policy impact: farmers refrain from any further advancement in transitioning before the transition deadline
- **Scenario C1** – **transition by 2045**, full EU policy impact: farmers refrain from any further advancement in transitioning before the transition deadline

Example #3 (2021-2022)

Estimated changes in domestic supply and use

Domestic supply

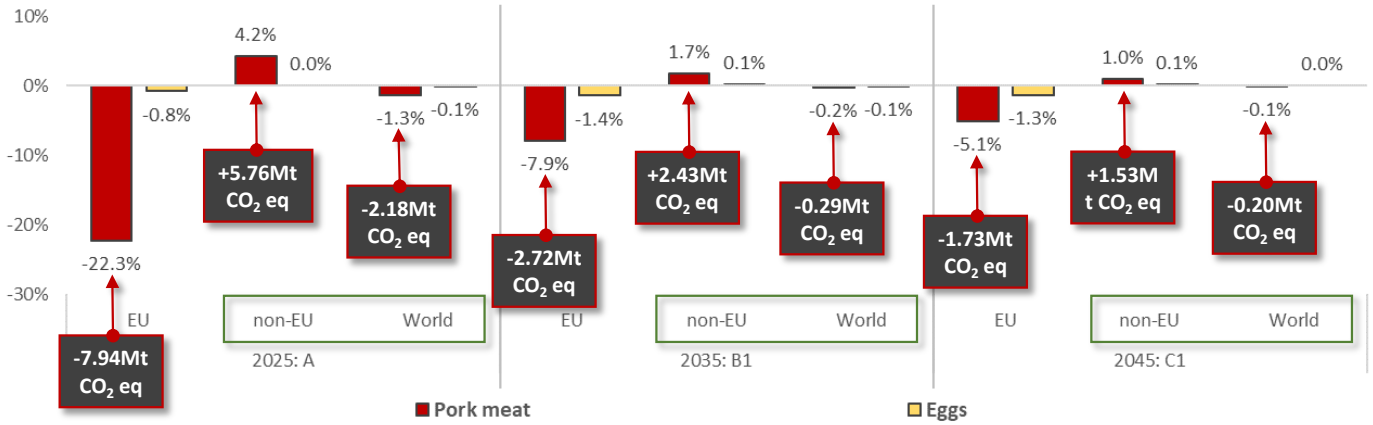


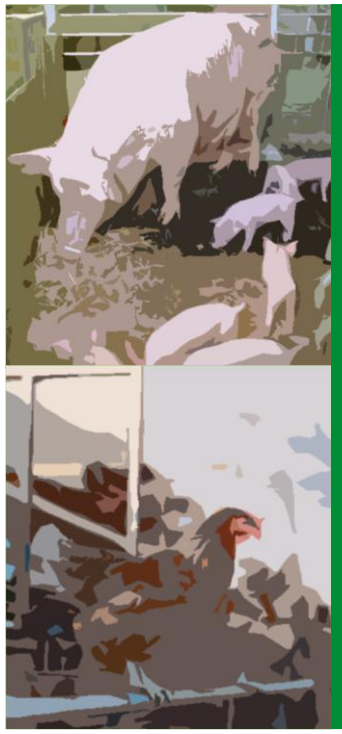
- ☞ difference in the magnitude of changes for pork meat and eggs
- ☞ divide between EU-West and EU-East
- ☞ magnitude of changes declining with increase of the transition period

Estimated changes in the GWP

GWP

☞ GWP increase in non-EU pork meat production





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Strengths (own perspective)

- *Policy-relevant*: designed for ex-ante analysis of CAP reforms, trade agreements, and sustainability measures
- *Comprehensive coverage*: represents the entire EU agricultural sector from regional (NUTS 2) to national and EU levels, with global trade linkages
- *Economic & environmental integration*: assesses policy impacts, market responses, and environmental effects in a comparative-static framework
- *Robust methodology*: partial equilibrium model with detailed supply-side responses, calibrated using FADN, FSS, etc. and other model inputs (AGLINK/COSIMO, GLOBIOM, etc.)
- *Scenario-based analysis*: enables detailed policy simulations under different assumptions
- *Well-established and recognized*: a widely accepted tool in the EU's modelling framework, regularly used by the COM and research institutes
- *Open-source*: other developers can build upon the model, ensuring its evolution over time

Limitations (own perspective)

- *Partial equilibrium*: does not account for broader macroeconomic effects
- *Static assumptions*: demand, behavioural responses, and technological changes are modelled with fixed elasticities
- *Limited farm-level detail*: focuses on regional aggregates, less suitable for analysing individual farm impacts and adoption of practices
- ☞ FADN fundamentals
- *Computational complexity*: running large-scale scenarios requires significant expertise and computational resources (also GAMS pose an additional challenge)
- *Limited expert support*: few experts available to assist with complex issues requiring in-depth understanding

Payoffs (own perspective)

- ✓ improved policy advice through data-driven insights
- ✓ engagement with the modelling community and participation in joint projects
- ✓ growing scientific publication activities

Experiences with AGMEMOD and beyond

AGMEMOD is a dynamic, regional, partial equilibrium modelling system operating at the commodity balance level to analyse agricultural markets and policy impacts in EU MS

- AKI supplied data and participated in the evaluation of the first AGMEMOD results
- later participated in result evaluation sessions and promotional workshops
- updated data and revised equations for HU (and beyond) in collaboration with the AGMEMOD team
- have been intending to use it parallel with the in-house developed AKISIM (and later CAPRI) for calibrating the baseline
- researchers and the CAPRI core team have frequently been attending AGMEMOD training sessions

Same payoffs as with CAPRI

- improved policy advice through data-driven insights
- engagement with the modelling community and participation in joint projects
- growing scientific publication activities

AKISIM is a dynamic, regional, agent-based simulation model to analyse agricultural markets and policy impacts in the main arable and livestock sectors

- based on 2k FADN farms acting as individual agents
- development also encouraged by JRC's intention to link MS regional models with their modelling systems
- have been intending to use it for assessing EU and national policy impacts at the national level
- in-house development and use, and classification of modelling results by the AG Ministry led to lack of scientific publications and thus recognition

Agrárközgazdasági Intézet

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Thank you for your attention

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