

# Biofuels and agricultural markets

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SOCIAL SCIENCES GROUP  
WAGENINGEN UR

- SCENAR2020
- Current research WUR-MNP: EURURALIS 2
- Focus for further study





# **Prospective study 2020**

**Scenar 2020 Understanding Change**

**The Future of Agriculture and the Rural World**

by

Peter Nowicki (ECNC), Hans van Meijl, Martin Banse  
(WUR-LEI), Andrea Knierim (ZALF) et al.



## Scenar 2020 Objectives

- Identification of major future trends and driving factors;
- Identification major perspectives and challenges for agriculture and rural regions until 2020;
- Development of a well defined and **solid baseline** scenario in order to identify policy effects (two alternative scenarios);
- Regional SWOT analysis (Strength, Weaknesses, Opportunities, Threats)
- DG Agri project: published by DG Agri and discussed with commissioner [CAP reforms, Health check and after 2013]



## 1<sup>st</sup> & 2<sup>nd</sup> Level Drivers

***Exogenous*** (= where patterns are not likely to change)

- Population growth patterns
- Macro-economic patterns
- Consumer preferences
- Agri-technology
- Environmental conditions/patterns

***Endogenous*** (= where changes are easier to achieve)

- Agricultural policy
- Structural policy
- Environmental policy
  - Biofuel directive
- WTO and other international commitments



## Policy Scenarios

- **Baseline:** continuation of trends in exogenous drivers, and pursuing current policy objectives including conclusion of the Doha Round on the basis of the EU offer on November 2005
- **Regionalisation:** no Doha Round, therefore bi-lateral and multi-lateral negotiations and internal market encouragement
- **Liberalisation:** strong move towards open markets, and no more income support

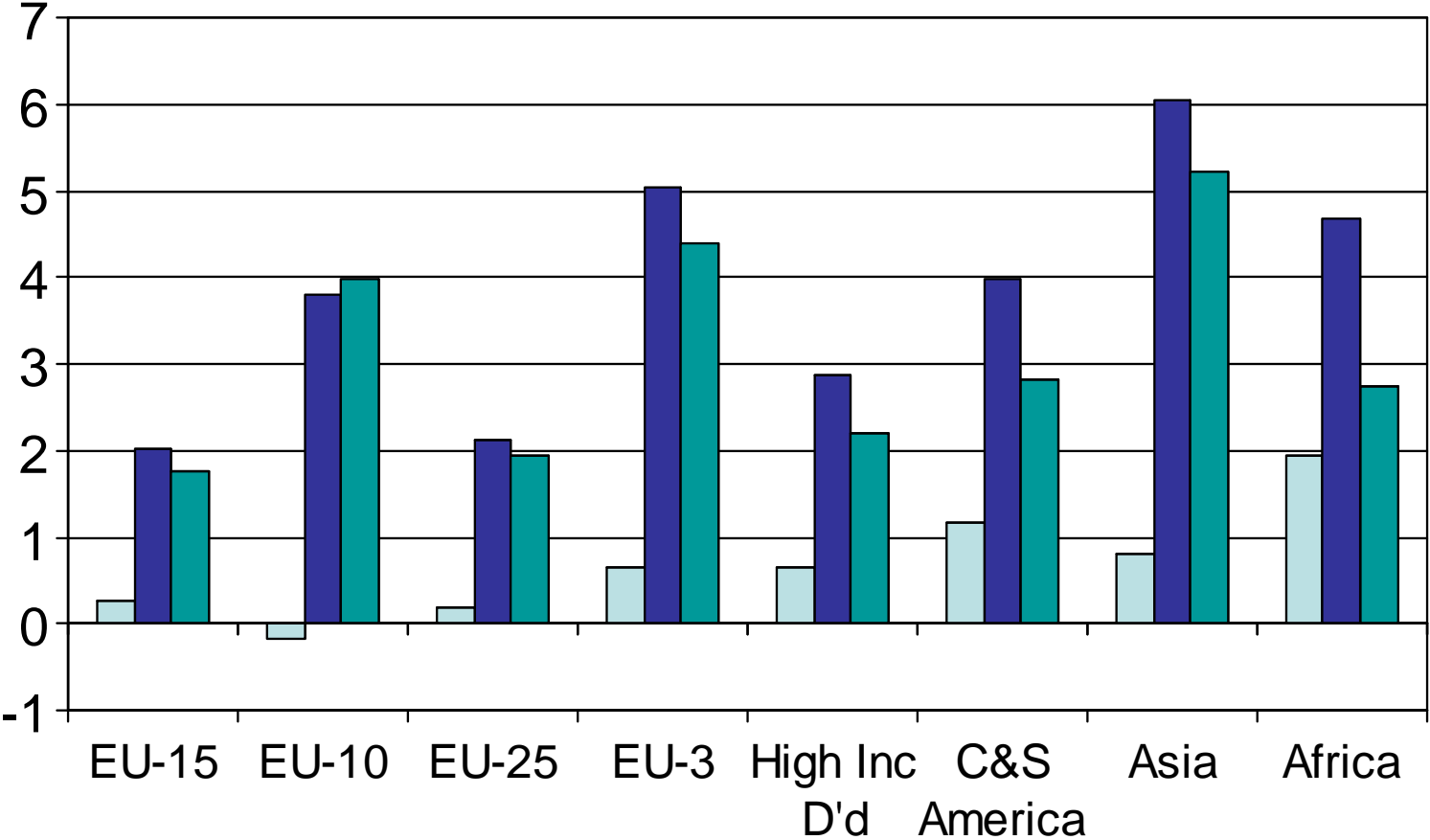


# Regional and sectoral coverage

|                  | Agricultural | Rest of economy       |
|------------------|--------------|-----------------------|
| Global           | LEITAP-IMAGE |                       |
| EU/national      | ESIM         | LEITAP                |
| NUTS 2<br>HARM 2 | CAPRI        | TSA or<br>downscaling |
| Grid             | CLUE-s       |                       |



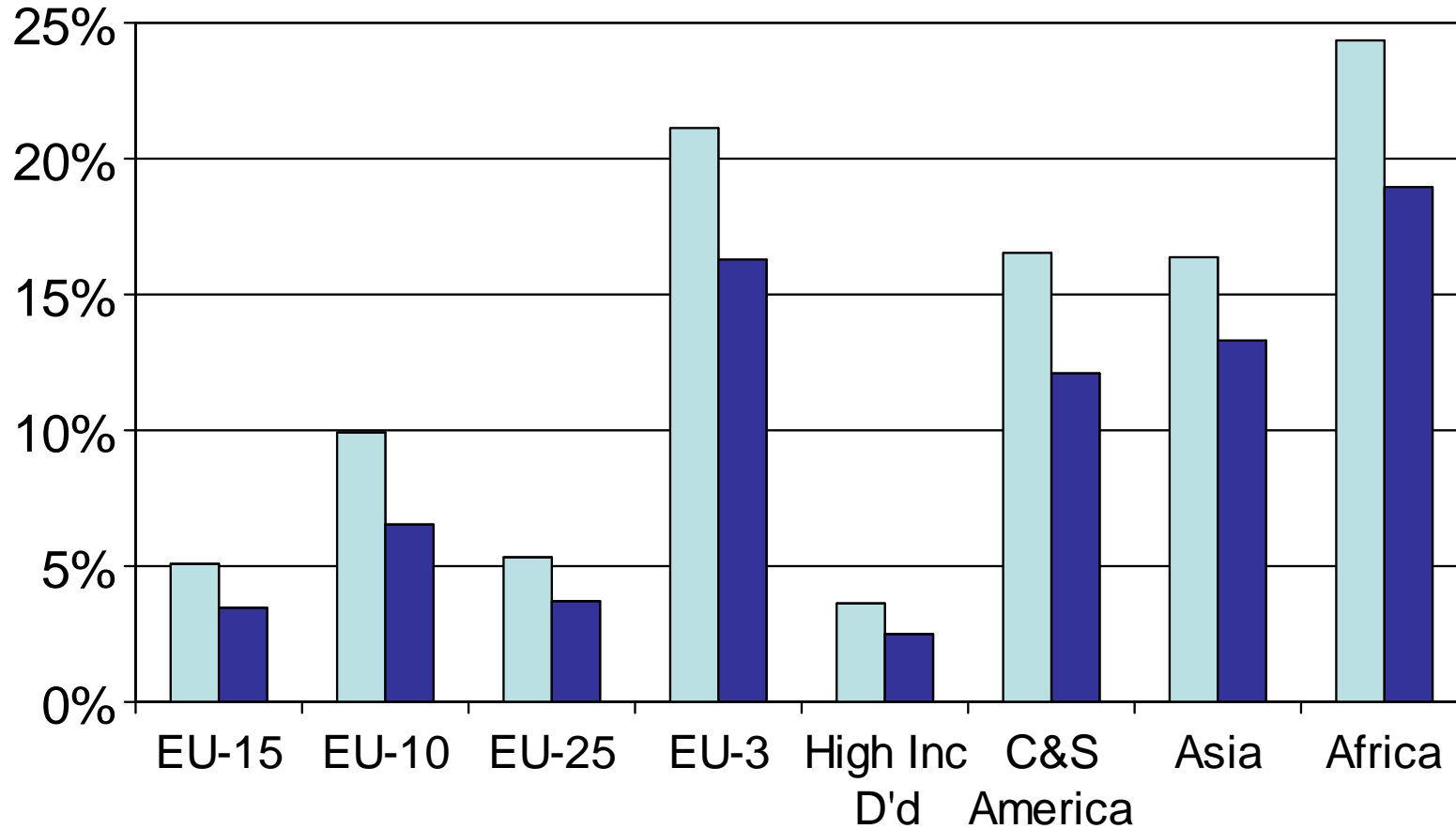
# GDP, population and GDP per capita, annual growth rates in % (2005-2020)



POP GDP GDP per capita



## Share of the Agri-food sector in GDP , in % (2004, 2020)

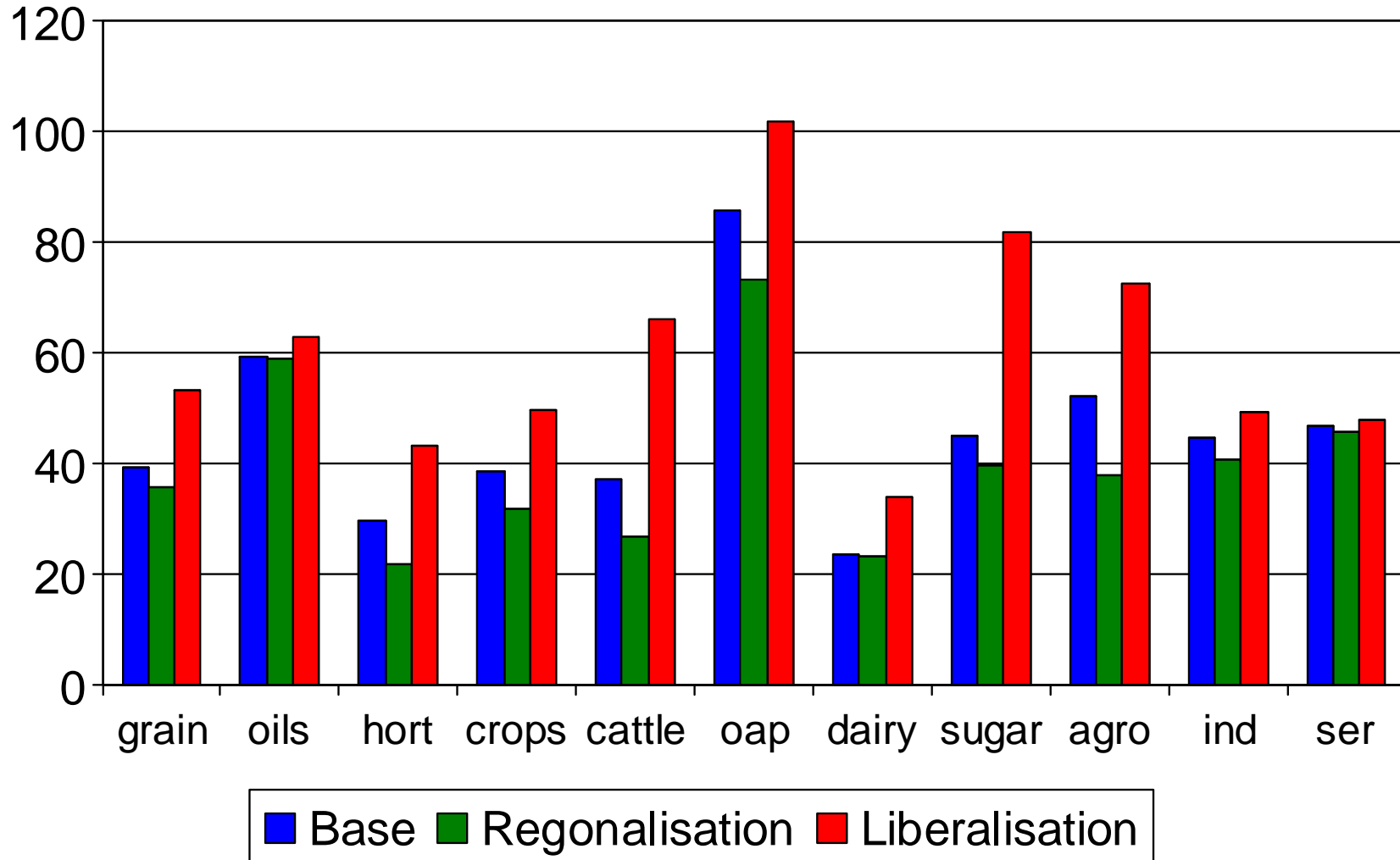


■ Base 2004 ■ Base 2020



# Growth in World Trade

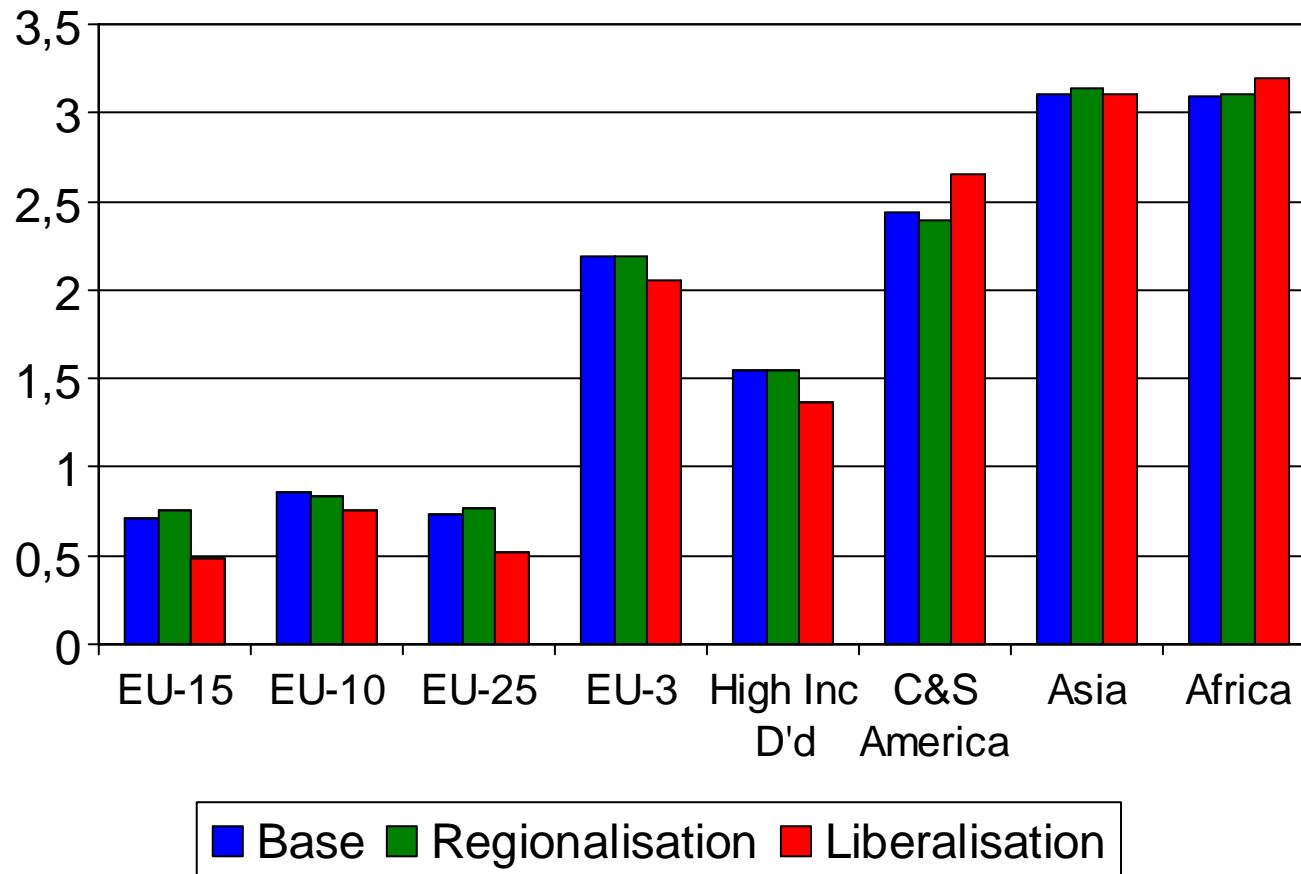
between 2005-2020 in %





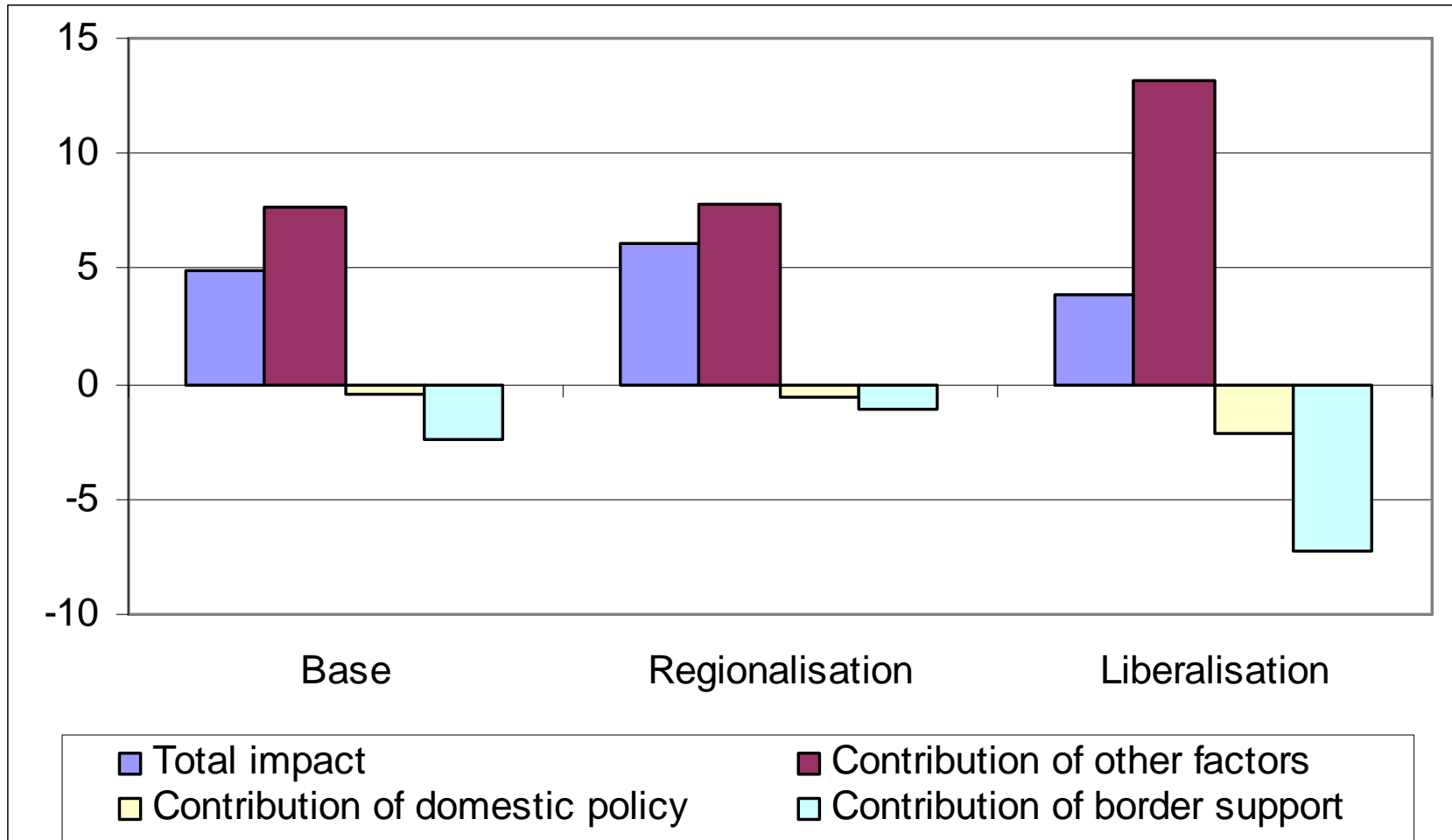
# Growth in Crop Production

annual growth rate, 2005-2020 in %





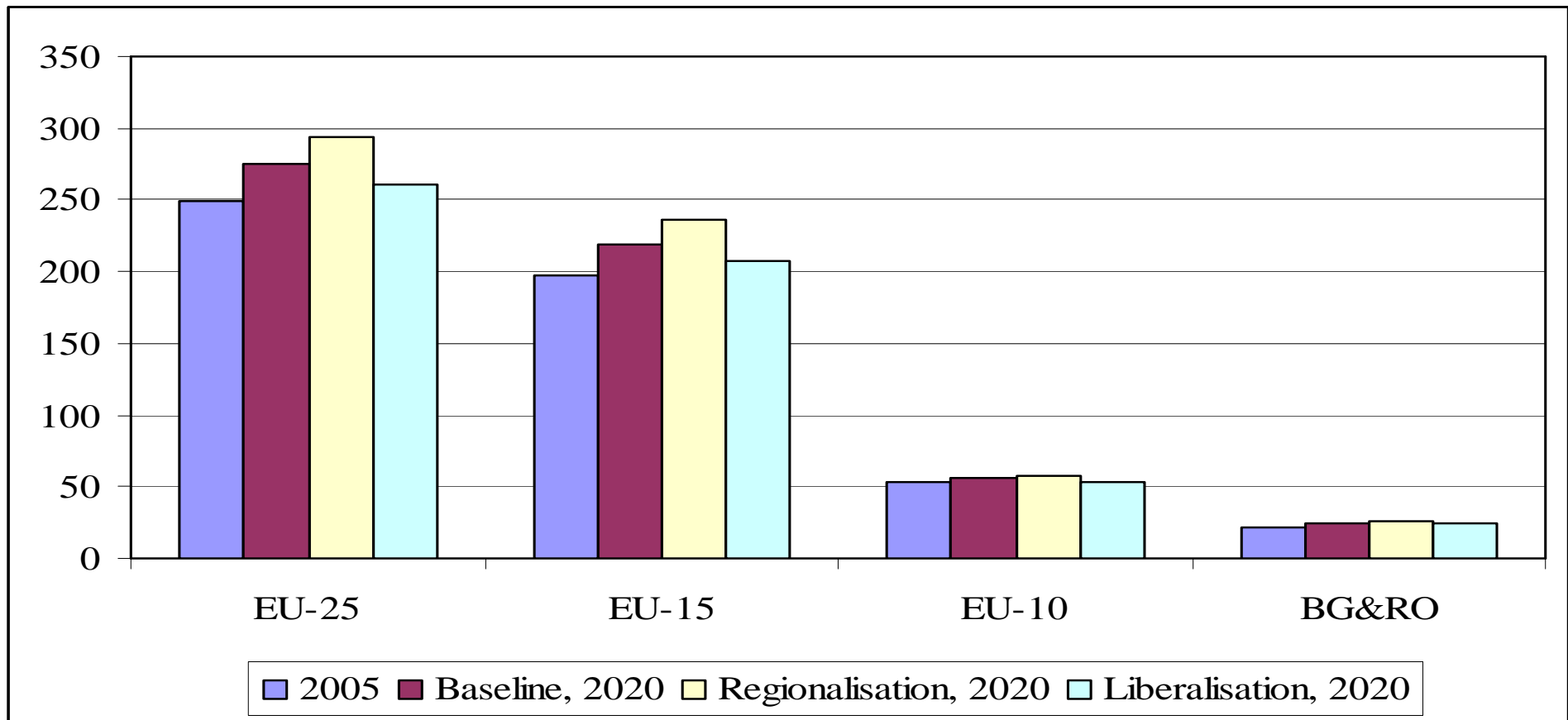
# Decomposition of production growth of CAP-products in EU15, 2005-2020 in %





## ... and falling land values help keeping production...

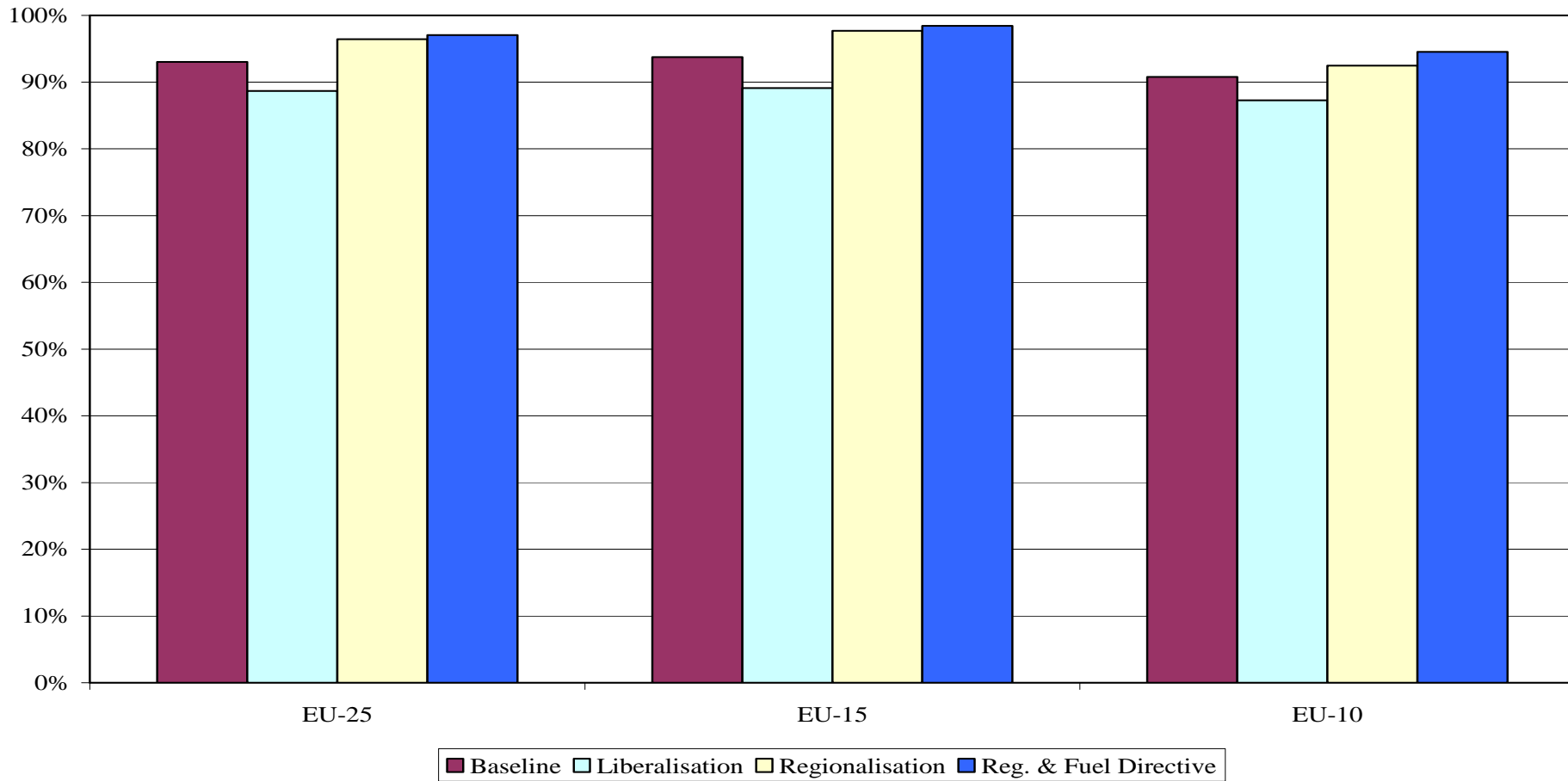
Production of Cereals (mio t)





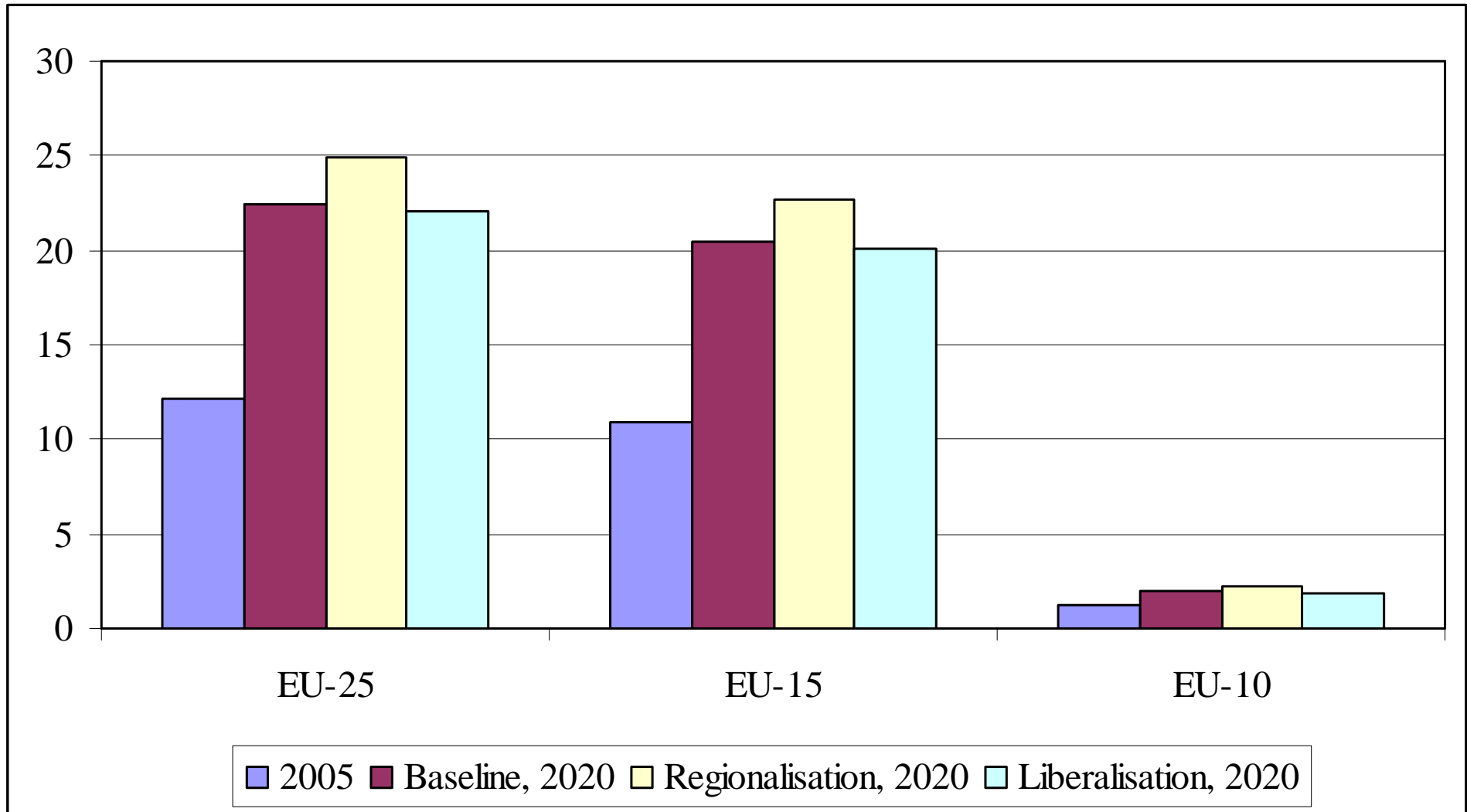
... and land use stable, with a high potential impact from biofuel/bioenergy demand.

Agri land use / UAA (2005=100%)



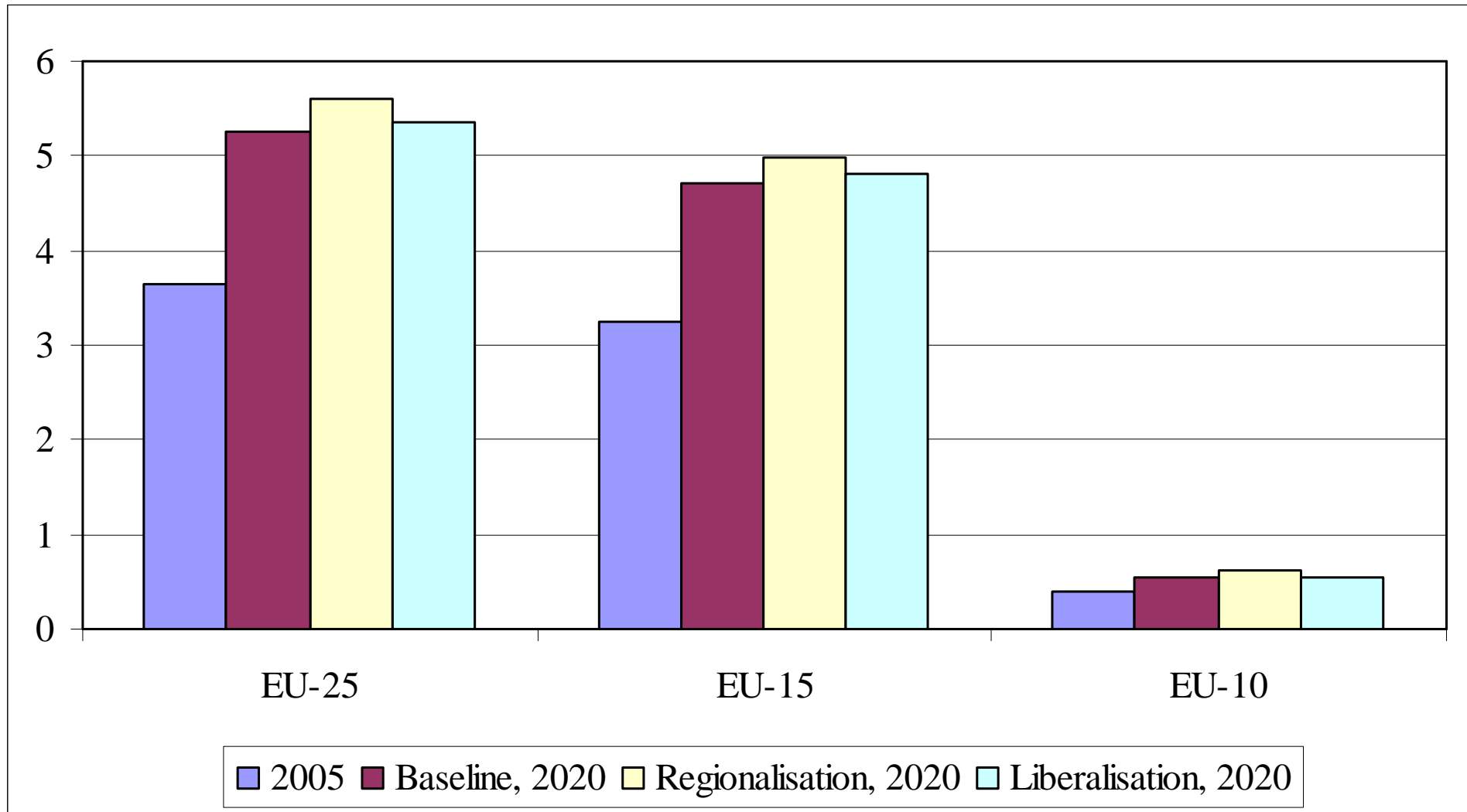


# Production of Energy Crops (mio t)





## Area sown with Energy Crops (mio ha)





## Implementing the Biofuel directive (mio t)

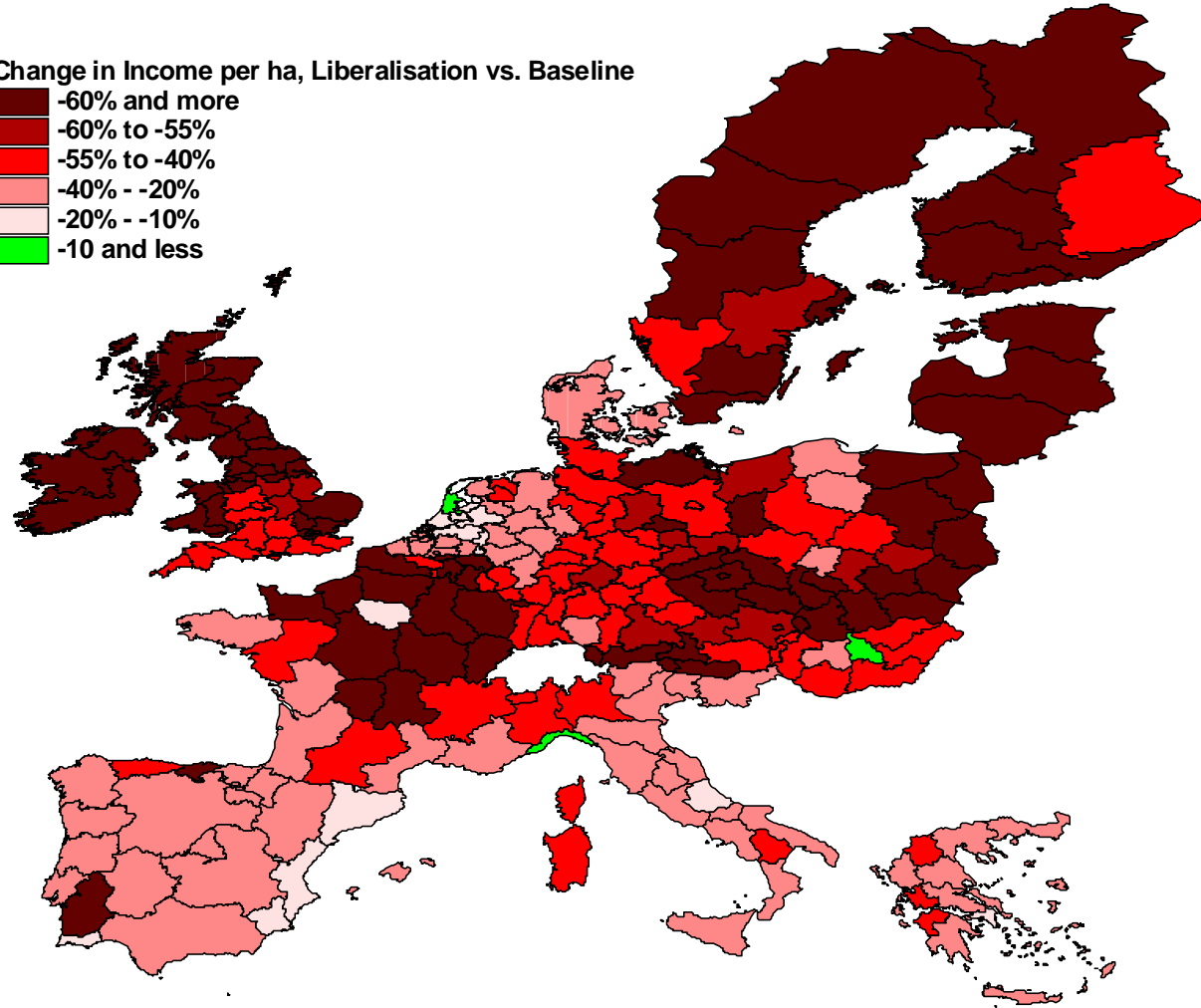
|                         | 2005  | 2010  | 2020  |
|-------------------------|-------|-------|-------|
| <b>EU-25</b>            |       |       |       |
| Biofuels crops          |       |       |       |
| - Production            | 12.12 | 27.66 | 39.89 |
| - Area (in mio ha)      | 3.65  | 6.98  | 8.62  |
| Biofuels                |       |       |       |
| - domestically produced | 3.79  | 8.74  | 12.60 |
| - (net)-imported        | 0.81  | 6.30  | 8.40  |
| <b>EU-15</b>            |       |       |       |
| Biofuels crops          |       |       |       |
| - Production            | 10.91 | 25.06 | 36.33 |
| - Area (in mio ha)      | 3.25  | 6.23  | 7.72  |
| Biofuels                |       |       |       |
| - domestically produced | 3.42  | 7.92  | 11.49 |
| - (net)-imported        | 1.02  | 5.76  | 7.49  |



# Changes in farm income / ha: Liberalisation vs. Baseline

Change in Income per ha, Liberalisation vs. Baseline

- 60% and more
- 60% to -55%
- 55% to -40%
- 40% - -20%
- 20% - -10%
- 10 and less



## Major uncertainty: energy markets Impact of biofuels may be underestimated

- Meeting 10% of EU energy requirements for transport in 2010 could take up 43% of current land use for cereals, oilseeds, set aside and sugar beet.
- The 5.75% objective for 2010 in itself will require 15.03 mio tonnes of biofuels. If the feedstocks are all grown domestically, this would be equivalent to 12.02 mio ha, or 9.4% of EU-25 agricultural land demand.
- A corollary of the increased demand for biofuels is the increased resort to bio-based materials (partially motivated to replace plastics, a petroleum derivative); the conjunction between the demand for biofuels and the demand for biobased materials is likely to create competition with other demands for agricultural commodities.

## Major uncertainty: energy markets

### Impact of biofuels may be underestimated

- The demand for biofuels derived from agricultural commodities could be rapidly offset by biomass, using second-generation bio-energy production technology, as early as 2015.
  - The second generation of bio-fuels is currently considered to be more beneficial because the reduction of greenhouse gas emissions is larger and it is (perhaps) less land intensive.
- Non-food demand of agricultural products (e.g. energy) competes with food demand. This implies:
  - increasing food prices with possible adverse effects on food importing (developing) countries;
  - land expansion with implications for the environment. A trade-off between lower greenhouse gas emissions and adverse effects of this expansion and intensification in terms of for example biodiversity.
- Energy demand causes major uncertainty. However, it is now too early to deal with it fully given the uncertainties with regard to oil prices

## Challenges for agriculture as identified by the study

1. Structural change process in agriculture is a long-term driver that continues *with or without* policy changes.
2. EU is facing an increasing diversity of structure and structural adjustment. The livestock sector faces important challenges and restructuring.
3. Alternative policy settings may not produce very different effect on the overall production. However, the regional impact may prove to be more significant.
4. The process of liberalisation has a greater impact on agricultural income than on agricultural production and land use.
  - a) The reduction of border support and export refunds has a higher impact on production, than a reduction of direct payments.
  - b) The reduction of direct payments has a higher impact on agricultural income than on agricultural production.
5. Increasing segmentation of EU markets will take place. This will be enhanced by further trade liberalisation and enlargement.



## EURURALIS 2.0 (1st May)

- Impact trends on world and EU agriculture and rural areas
- FOOD-FEED-FUEL on a global scale in 4 scenarios (2030)
  - Economic modeling integrated with biophysical model (IMAGE-MMNP)
  - Focus CAP policies and first generation biofuels
  - Impact biofuel directive on
- Sustainability: People, profit and planet
- EURURALIS 3: second generation



## Focus of further study

- A baseline or **scenario evaluation** study of land availability for food, biodiversity and climate change, assuming different biofuel percentages in the world.
- A study on the **possibilities of intensifying agriculture** worldwide and the effect on biodiversity, nature and food.
- A study on the possibilities and effects of
  - **second generation biofuels**
  - improvements of the **efficiency of traditional biomass use**.
- A **comparison with other climate change and biodiversity policies** on effects (P, P,P), costs and public support.
- Policy advice





# Conclusions

1. Alternative policy scenarios seem to have little impact on the overall production levels (though more on income and structure)
2. “Liberalisation” would:
  - a) affect production levels mainly through increased market access, rather than from income support
  - b) show a significant impact on income and agricultural assets, including land (though this may help facilitating the structural adjustment process)
3. However, at regional level, the impact may be more significant
  - a) A process of liberalisation would lead to intensification in the most competitive regions and an extensification of production in others
  - b) Adjustment processes in agriculture might be accompanied by an adverse or supportive economic and social situation
4. An increasing number of rural areas will become increasingly dependent on other sectors and will be driven by factors outside agriculture



## Regional analysis – Conclusions of the study

1. Rural areas within the EU-27 are very diverse
2. Rural areas are not stable:
  - Demographic trends (e.g. eastern exodus) may have a significant bearing on rural dynamics;
  - Most rural areas are driven by urban economies rather than rural economies;
  - Rural activities can exist with or without agriculture (rural dynamics is not equivalent to strong agriculture);
  - Marginalisation of rural areas is more than just one problem (out-migration, economic perspective, environmental conditions).....



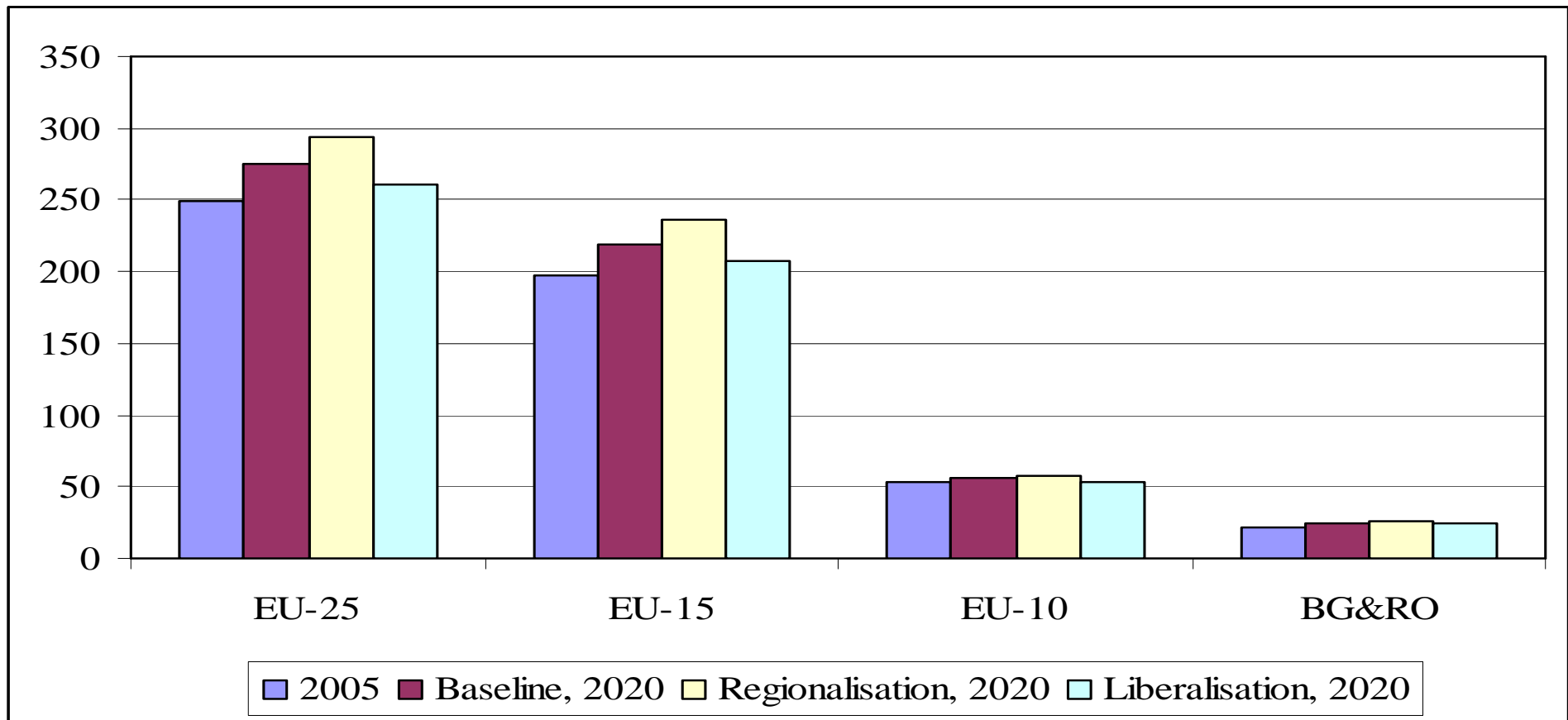
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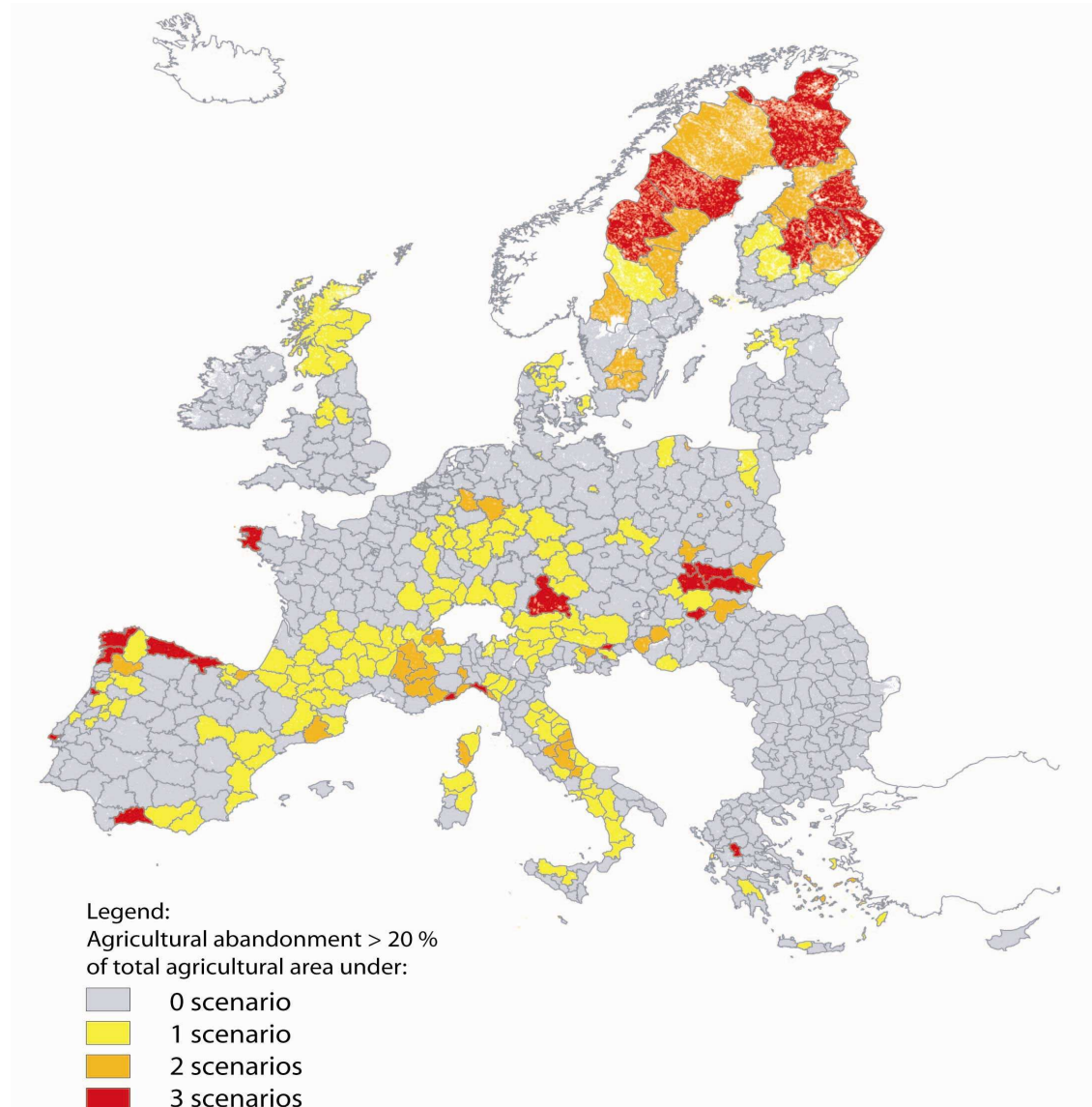
## ... and falling land values help keeping production...

Production of Cereals (mio t)





# Land abandonment in marginal areas is largely an ongoing process that could be strengthened by the process of liberalisation



Legend:  
Agricultural abandonment > 20 %  
of total agricultural area under:

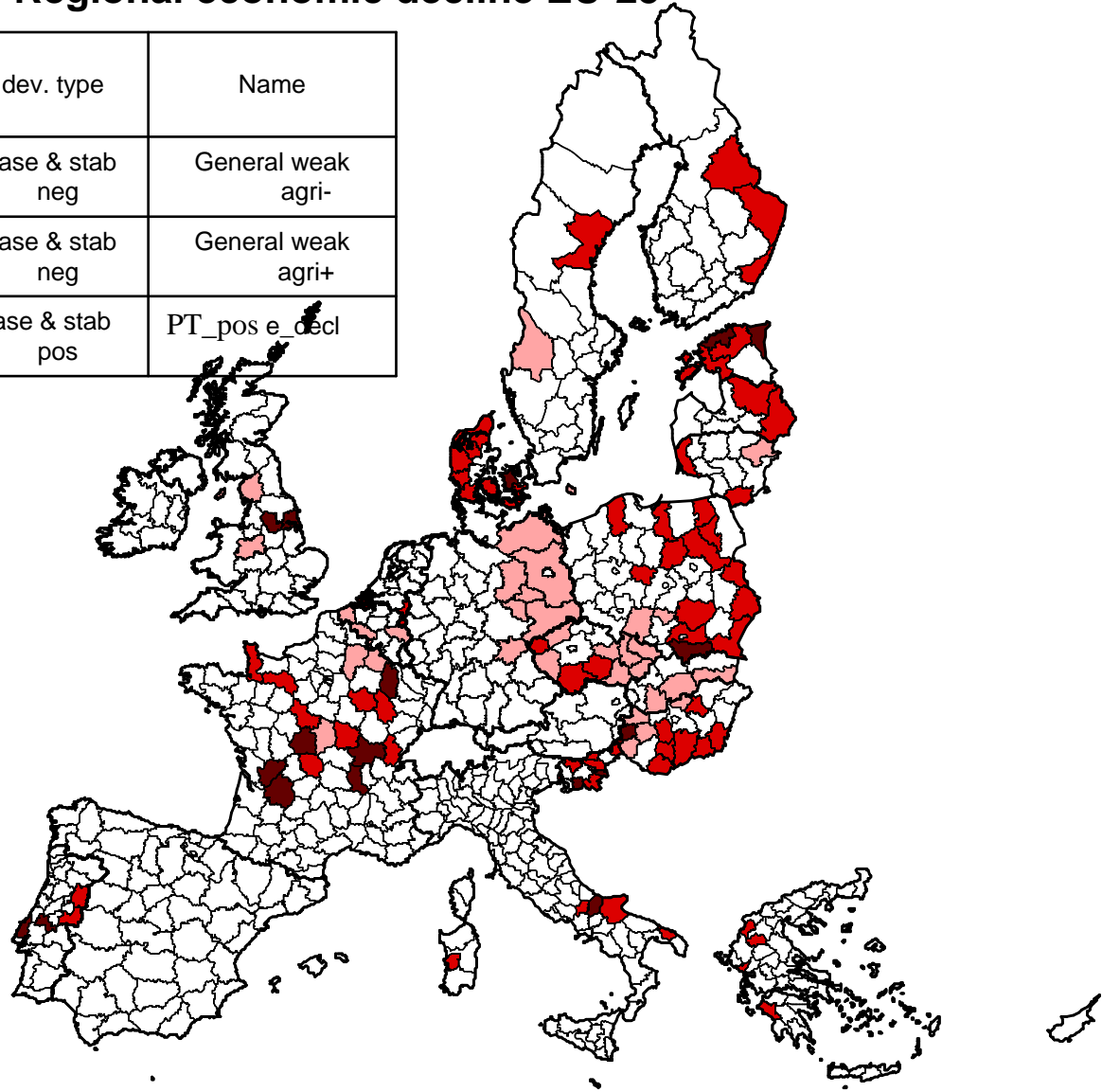
- 0 scenario
- 1 scenario
- 2 scenarios
- 3 scenarios



# Economic, agricultural and population factors determine vulnerable regions ...

## Regional economic decline EU-25

|           |    | Econ. Baseline type | Pop. dev. type      | Name               |
|-----------|----|---------------------|---------------------|--------------------|
| Light red | 36 | E_decl_agri-        | Decrease & stab neg | General weak agri- |
| Red       | 63 | E_decl_agri+        | Decrease & stab neg | General weak agri+ |
| Dark red  | 20 | E_decl_agri-/+      | Increase & stab pos | PT_pos e_decl      |





## ...and possible winning regions.

### Regional strong economic growth EU-25

|             |    | Econ. Baseline type | Pop. developm. Type | Name             |
|-------------|----|---------------------|---------------------|------------------|
| Light green | 34 | E_grow_agri-/+      | Decrease & stab neg | E_grow PT_neg    |
| Dark green  | 88 | E_grow_agri-/+      | Increase & stab pos | General strength |

