Trade 4 Sustainable Development

HORIZON 2020

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101000551

Environmental Impact of Agri-food trade liberalization: do stakeholders have a good intuition?

CGE toolbox integration to handle environmental indicators

Stakeholders workshop

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Katarzyna Zawalińska, CASE

Błażej Jendrzejewski, Jan Hagemajer, Vitaliy Krupin
CASE

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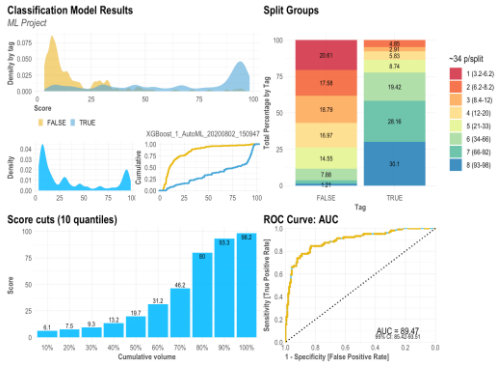

CGEBox
Modular Extendable Flexible

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What will be the future environmental impact of agri-food trade liberalization on different groups of countries?

1. In what **future** economic situation will those liberalizations take place?

2. What will be an importance of **environmental impact** compared to economic and social ones? Which SDGs addressed?

3. What type of **trade liberalization** is it going to be?

4. How big the impact will be in **developed vs developing countries**?

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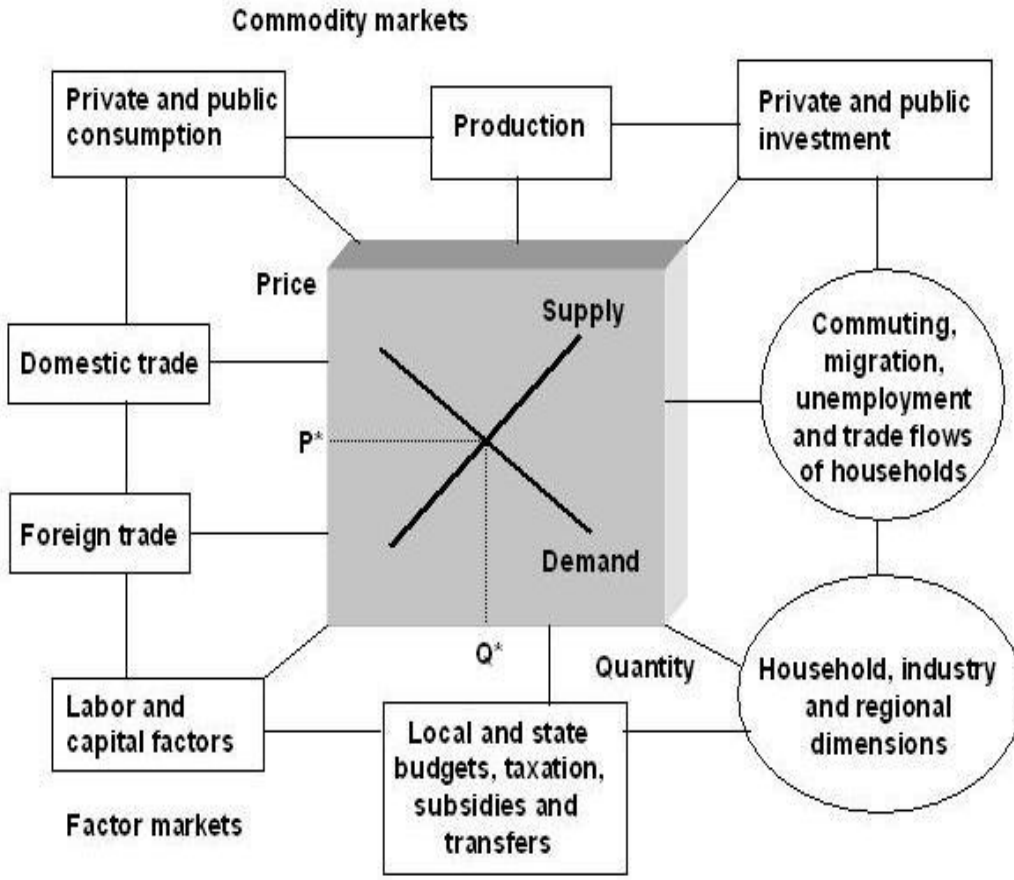
Method: Computable General Equilibrium model named CGEBox

Strong in THEORY:

- Type of model: **Computable General Equilibrium model**
- Based on the **solid theory** developed by the Nobel Prize winner Wasiliy Leontief
- Combines the **newest trade theories** such as heterogeneous firm model like Melitz with taste for variety, fix cost for industry entry, fix costs on trade links, price mark-ups and thus monopolistic competition
- 21 agricultural and food sectors



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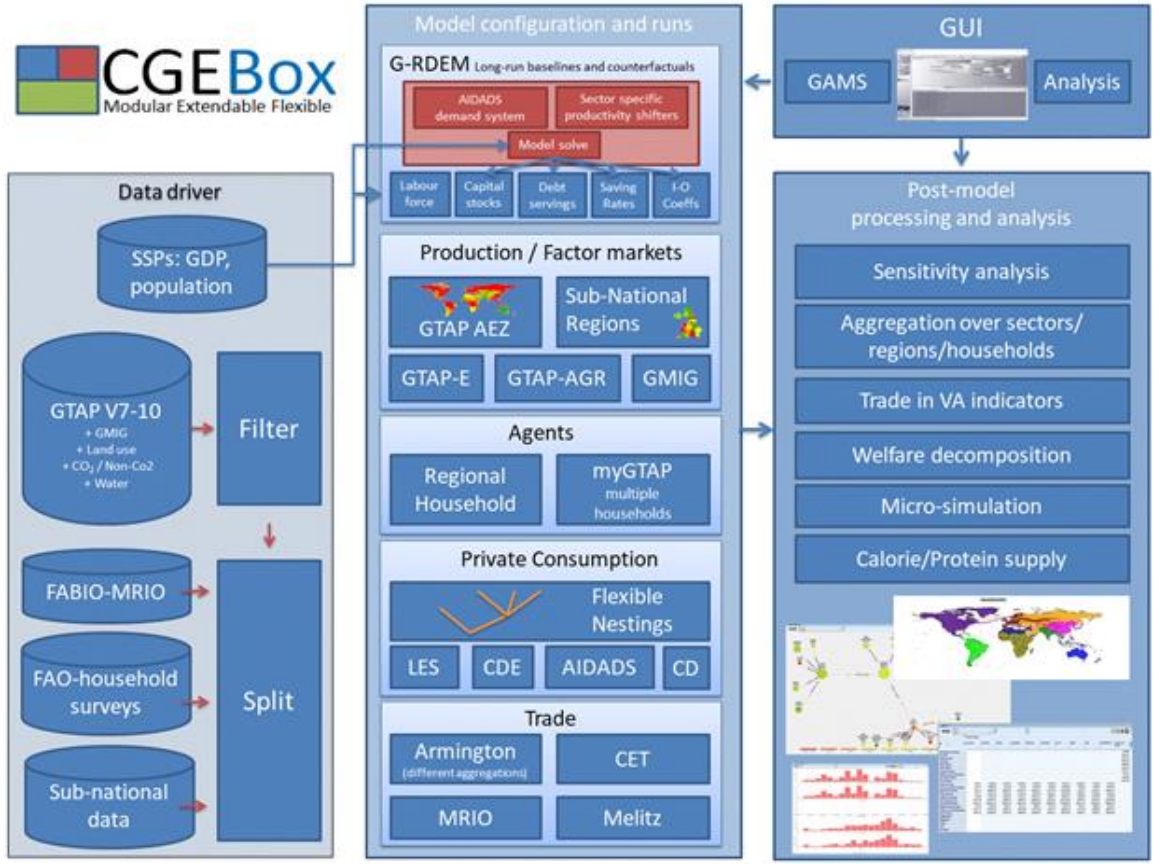
Method: Computable General Equilibrium model named CGEBox

Powerful in PRACTICE:

- GTAP based Global Trade Model consisting of many modules for agri-food trade analyses
- 21 agricultural and food sectors
- The whole economies modelled all over the World
- 280 sub-regions (incl. NUTS2) in Europe apart from all other World continents
- Allows for various trade liberalizations and for several "future" scenarios (SSPs)



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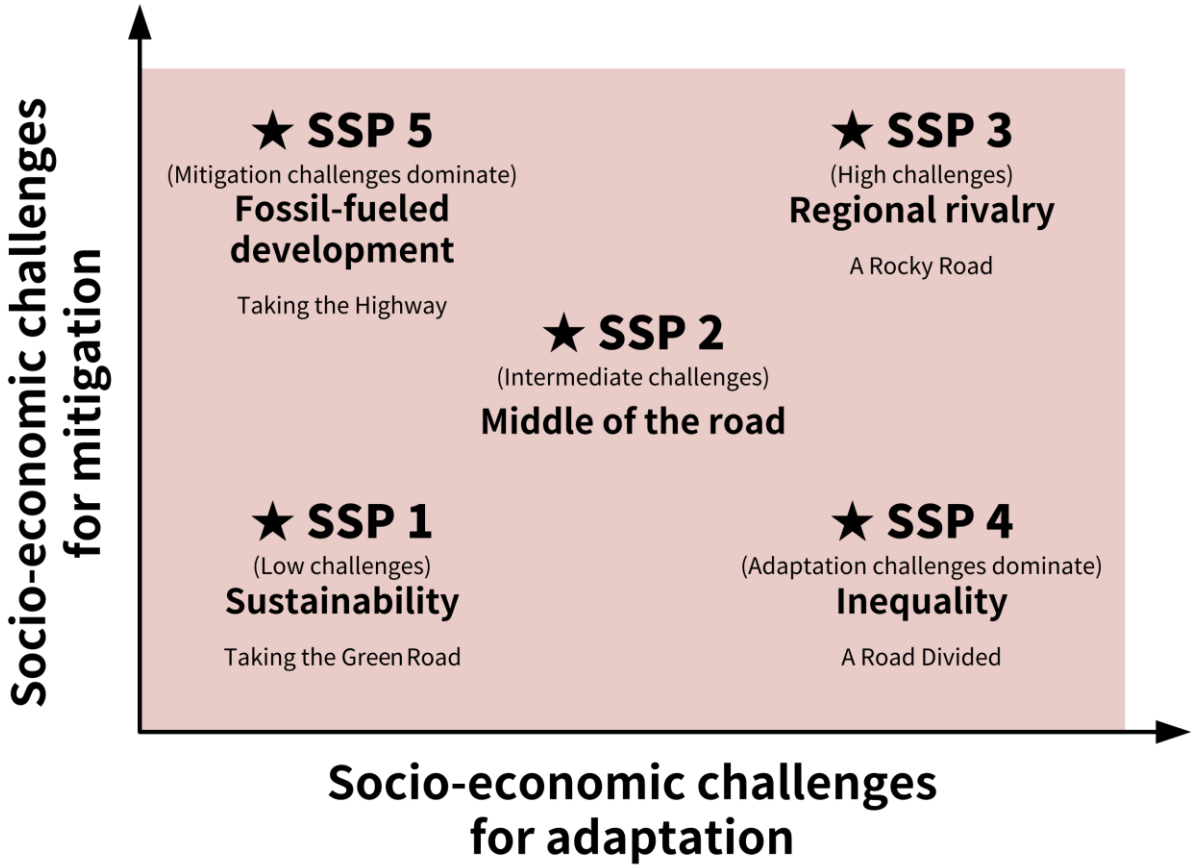
What will be the future?

Shared Socio-economic Pathways (SSPs) by UNECE



	SSP 1 Sustainability	SSP 2 Middle of the road	SSP 3 Regional rivalry	SSP 4 Inequality	SSP 5 Fossil-fueled development
International Trade	Moderate	Moderate	Strongly constrained	Moderate	High, regional specialization
Demand for meat in EU	Low	Medium	High	Elites: high; Rest: low	High
Feed import	Low	Moderate	Low	High	Moderate
Meat production	Low	Moderate	High	Moderate	High
Feed production	Moderate	Moderate	High	Moderate	Moderate
Agricultural prices	Relatively high	Moderate	High	Relatively low	Low
Labour availability	Moderate	Moderate	Low	High	High
Food industry structure	Mixed	Mixed	SMEs	Multinationals	Multinationals
Consumption trends	Healthy, natural and sustainable	Mix	Origin	Slenderness	Diversity

Source: O'Neill, B. C., Kriegler, E., Ebi, K. L., Kemp-Benedict, E., Riahi, K., Rothman, D. S., van Ruijven, B. J., van Vuuren, D. P., Birkmann, J., Kok, K., Levy, M., & Solecki, W. (2017). The roads ahead: Narratives for shared socioeconomic pathways describing world futures in the 21st century. Global Environmental Change, 42, 169–180. https://doi.org/10.1016/J.GLOENVCHA.2015.01.004

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Which SDG indicators are addressed?

- Water use efficiency
  (SDG 6.4.1; SDG 6.4.2)

- CO_2 emissions per unit of manufacturing value added
  (SDG 9.4.1)

- **CO_2 emissions from agriculture**
- **CH_4 emissions from agriculture**
- **N_2O emissions from agriculture**
- CO_2 emissions from fuel combustion (Food Transport Emissions)
- CO_2 emissions per unit of GDP
  (all above indicators under SDG 13.2.2)

- Post-simulation calculation of Herfindahl index of sectoral specialisation.
- *(our own proposed indicator)*

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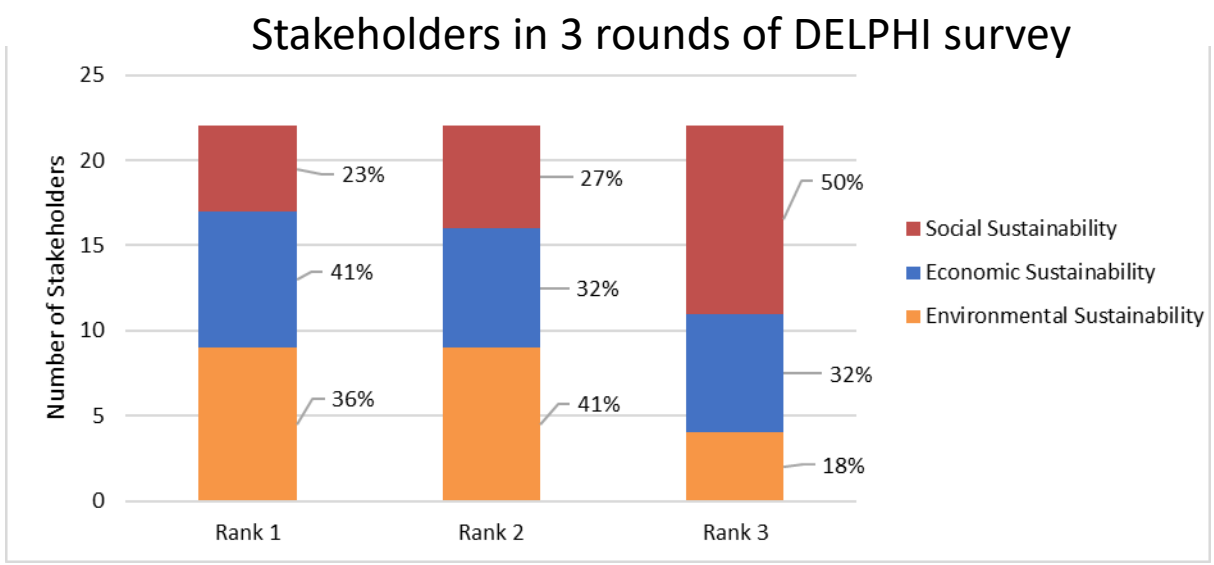
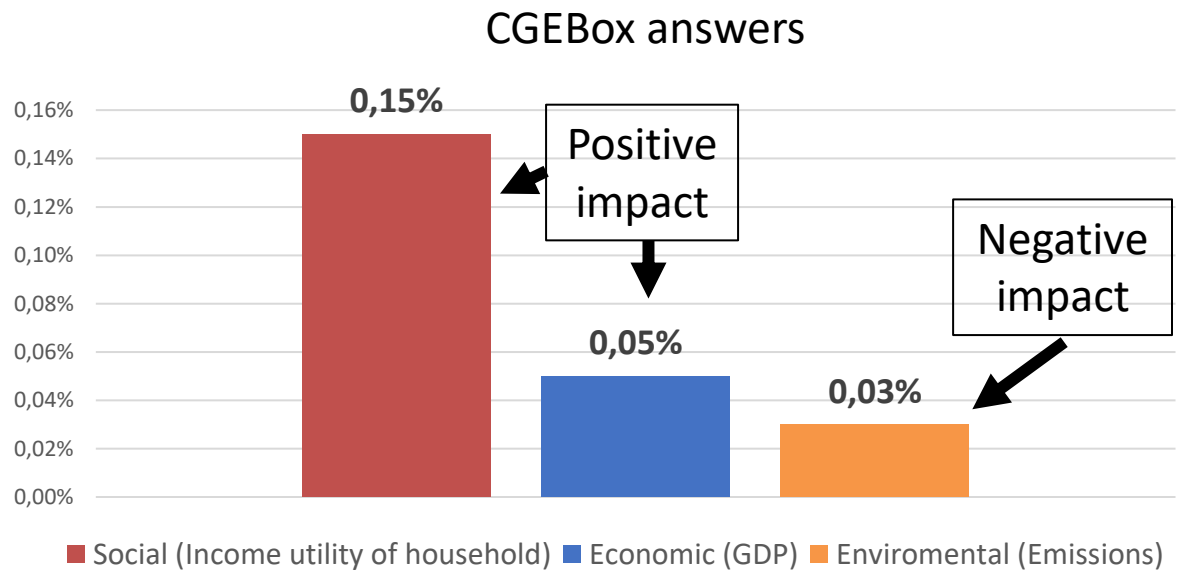
What is Stakeholders view vs CGEBox model ?

Which aspect of sustainability (economic, social or environmental) would be the most affected by full liberalization in agri-food trade?



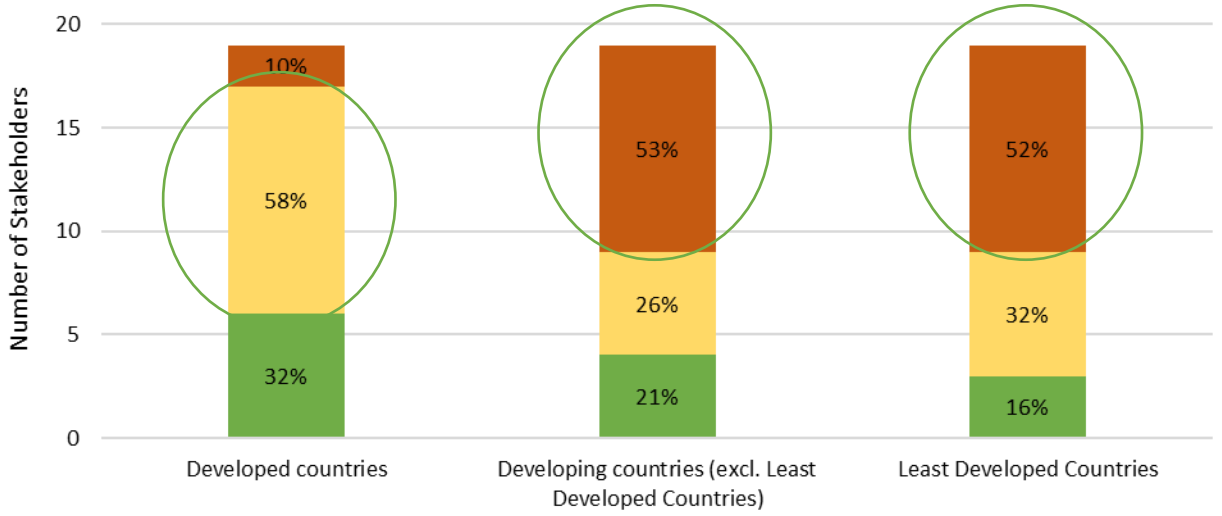


- ❑ The **stakeholders' answers are in line with those by the model results**.
- ❑ The stakeholders were right that **the highest is social impact** (in red) of agri-food trade liberalization, **then economic** (in blue) and **environmental** (in orange).
- ❑ Interestingly they came up to that result after the 3 rounds of the Delphi survey. In step one and two they though that **economic (in blue) and environmental (in orange)** impact were bigger than social.
- ❑ It means that **the stakeholders are more accurate the more they interact with each other**

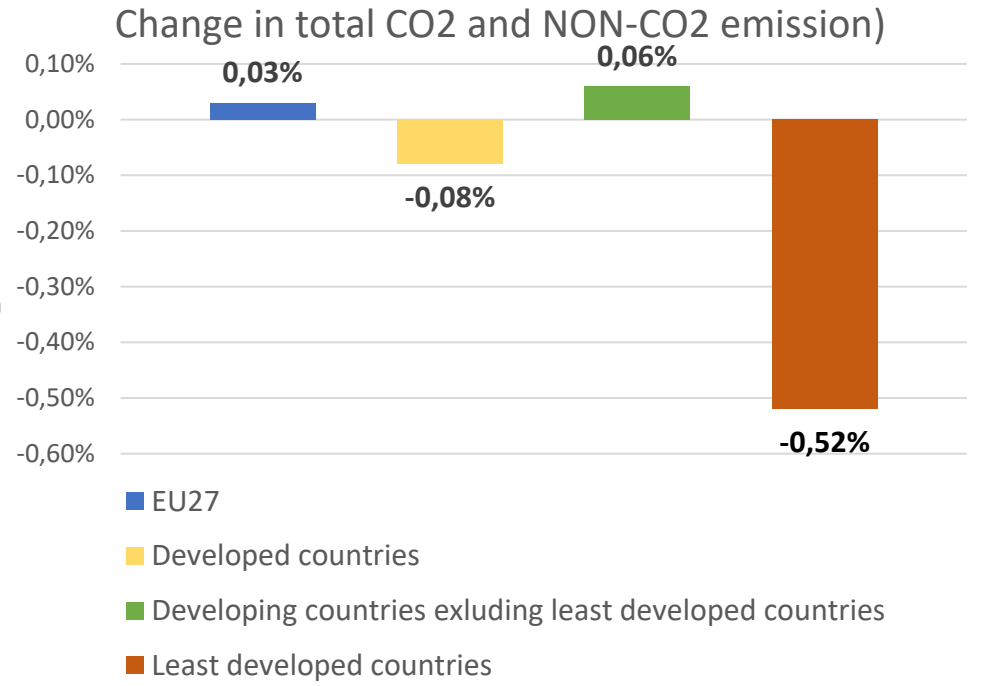
What is Stakeholders view vs CGEBox model ?

What level of environmental impact (high, medium, low) do you expect from liberalization in agri-food trade on different groups of countries?

Stakeholders



CGEBox answers



- **The stakeholders** were right that **the highest environmental impact** (in orange on left hand side) of agri-food trade liberalization is **on least developed countries** (in orange of right hand side)
- However, the **stakeholders also predicted** the same **high impact on developing countries** and **medium on developed, while the model predicts medium / low impact on developed countries** and **low impact on developing countries.**

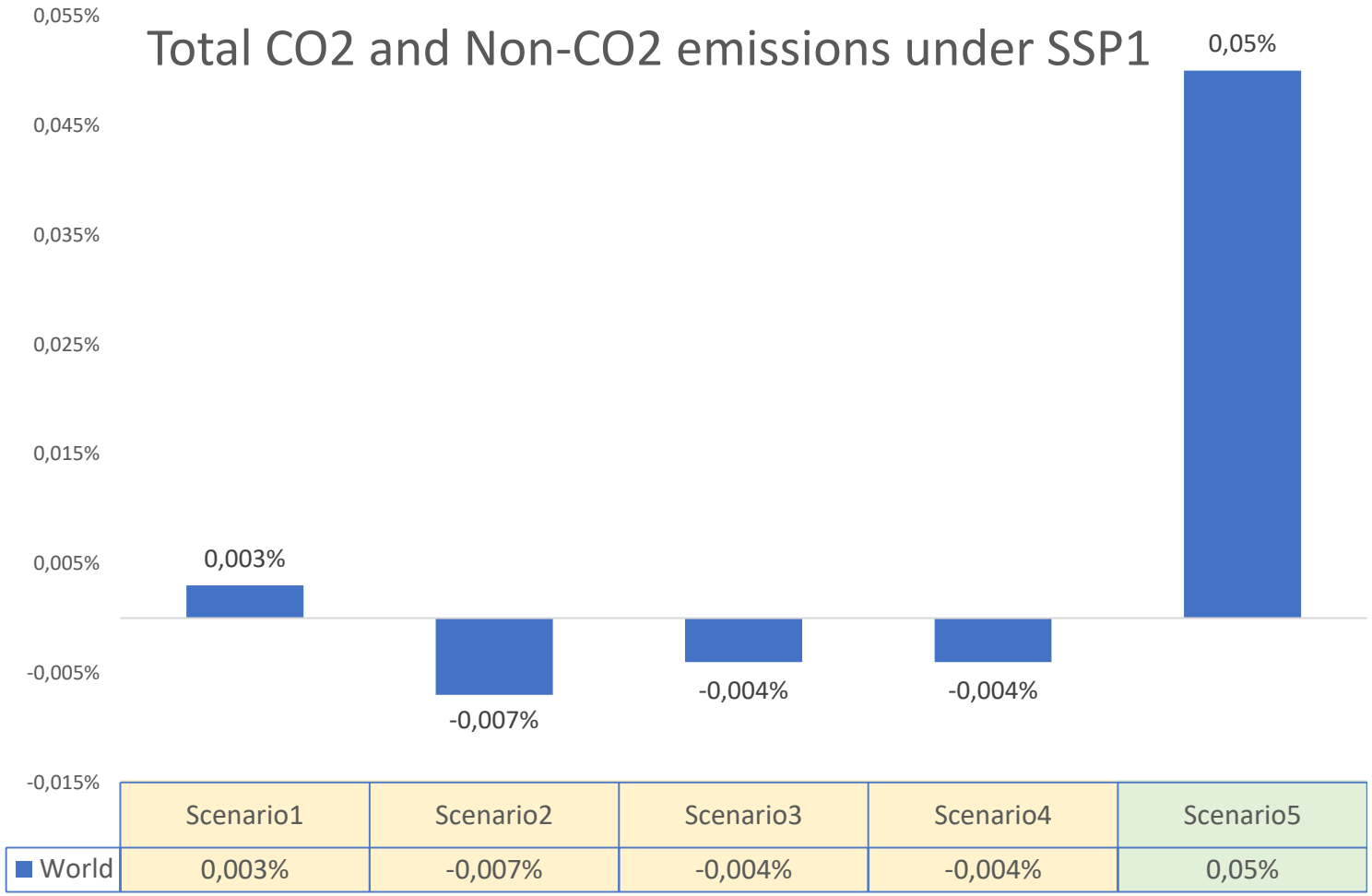
What type of liberalization? 5 scenarios for liberalisation

4 trade liberalisation scenarios with countries which have lower agriculture emissions than EU27:

- Scenario1 (Crop liberalisation)
- Scenario2 (Meat liberalisation)
- Scenario3 (agricultural liberalisation: Crop & Meat)
- Scenario4 (agri-food liberalisation: Crop & Meat & Processed Food)

1 trade liberalisation scenario with all countries:

- Scenario5 (Crop & Meat & Processed Food liberalisation)



	Scenario1	Scenario2	Scenario3	Scenario4	Scenario5
World	0,003%	-0,007%	-0,004%	-0,004%	0,05%

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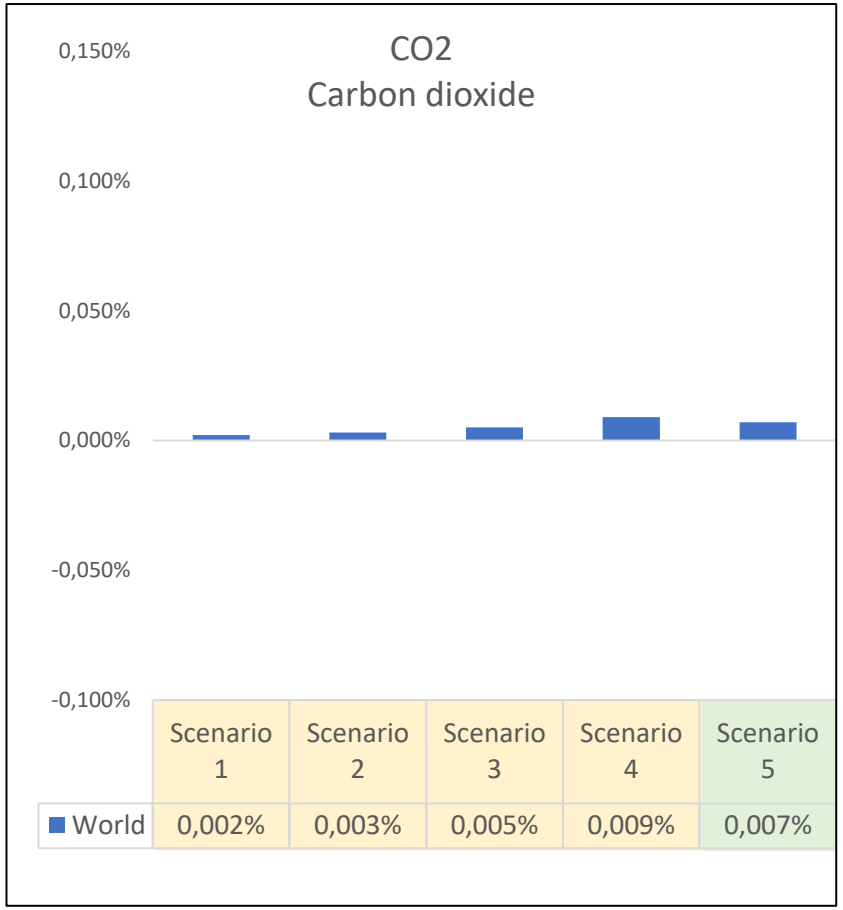
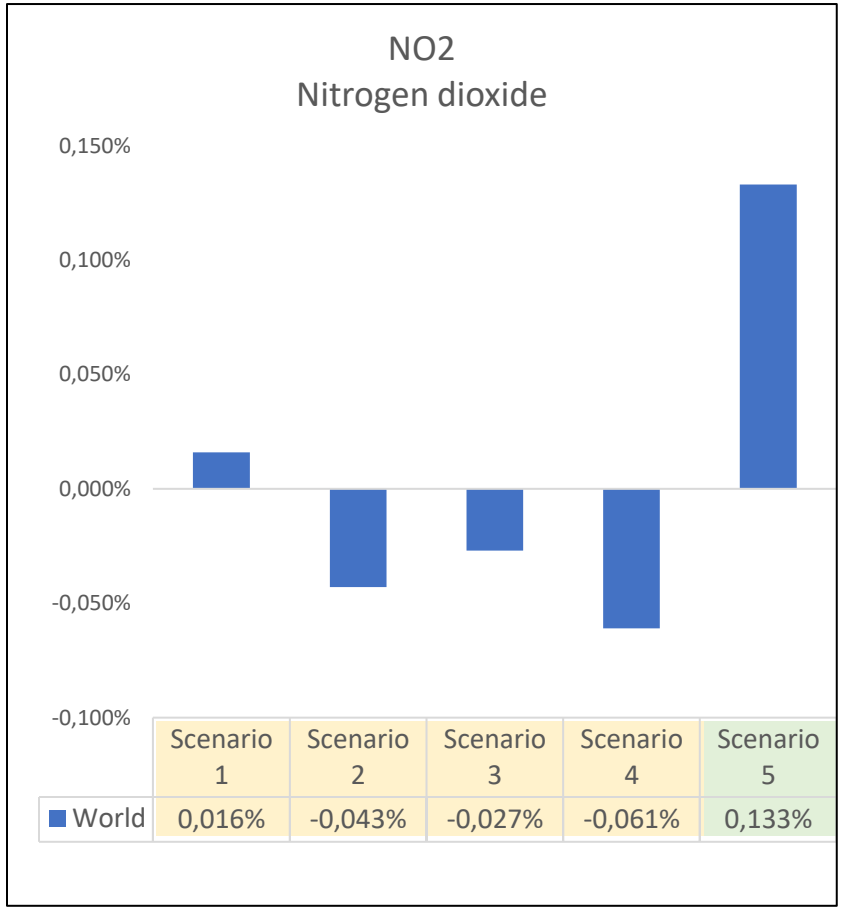
Preliminary results

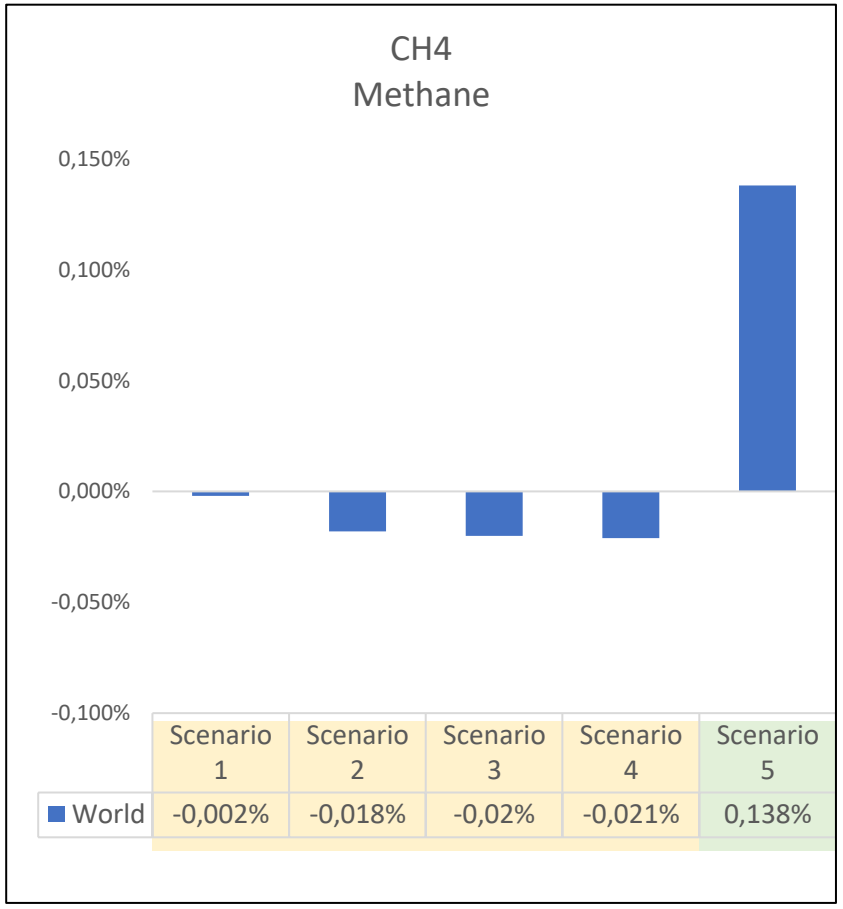
Impact of 5 trade liberalization scenarios on world emissions



	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
World	0,002%	0,003%	0,005%	0,009%	0,007%



	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
World	0,016%	-0,043%	-0,027%	-0,061%	0,133%



	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
World	-0,002%	-0,018%	-0,02%	-0,021%	0,138%

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Work ahead and stakeholders help welcomed

- What **type of liberalizations** shall we consider?
  - Developing more policy **scenarios** apart from full liberalization and trade with lower emitters
- Which **road ahead** (shared-socioeconomic pathway) is the most likely? Other future scenarios?
  - So which shared socio-economic pathways (**SSPs)** should be the most investigated?
  - Any other **future development** for consideration?
- Which other environmental issues would be worth considering in modelling?
  - **Measuring** the different aspects of environmental impact (other indicators?)
- Which other questions to **stakeholders** could be asked to compare the answers with the CGEBox results?
  - What else **can we ask the stakeholders** to verify their expectations/intuition?

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