

Economic and environmental impacts in Brazil of global dietary changes

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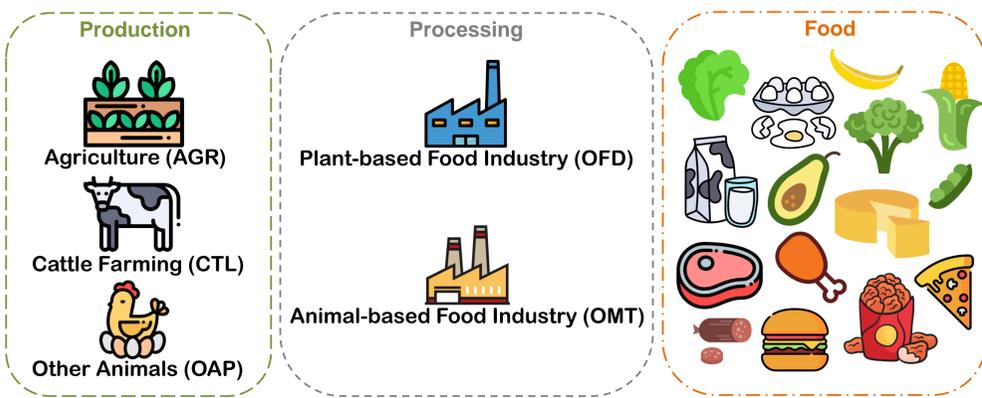
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Introduction

- There is growing understanding that global dietary changes are essential to achieve several Sustainable Development Goals (SDGs). Food standards should be examined not only for their health impacts, but also for their impacts on the environment and, in particular, their link to climate change.
- National dietary guidelines recommending lower red meat consumption, particularly among heavy consumers, could help reducing GHG emissions significantly in a near future. Efforts to mitigate climate change through economy-wide GHG emissions reductions may induce changes in human diet.

Methodology and Data

- Total Economy-Assessment (TEA) is a recursive dynamic, multi-regional and multi-sectorial Computable General Equilibrium (CGE) model that tracks the production and distribution of goods, energy and food in particular, in the global economy. Brazil is one of the 18 world regions represented in TEA, which has a sectoral breakdown of 20 sectors. The food supply chain is explicitly represented by Agriculture, Livestock (cattle, fish and others animal products), Plant-based Food Industry and Animal-based Food Industry sectors.



- We assess the impacts of three different scenarios (Dietary change; 2.0C; 1.5C) in relation to Reference scenario (REF). The scenarios account for:

- Global behavioral diet change**, reflecting normative targeted reductions in animal-based food preferences in a tendential scenario.

In order to consider the entire food production and consumption chain, exogenous changes in food preferences impact the final demand of families as intermediate sectors. The reduction of 50% (relative to REF) of the preference for animal-based food by 2050 is offset by an increase in the preference for plant-based food. To ensure healthy levels of protein consumption, we consider that one plant-based calorie has 75% of the protein content of one animal-based calorie.

- Global emissions budgets**, i.e., global CO₂ emissions limits for the end of this century.

Budgets of CO₂ emissions to limit global mean temperature rise below 2°C (1,000 GtCO₂) and 1.5°C (400 GtCO₂) above pre-industrial levels by the end of this century. In these climate scenarios, is assessed a broad carbon pricing involving all sectors of the economy, activities which burn fossil fuels (mainly emitting CO₂) as well as emissions associated with the AFOLU sector (included CH₄ and N₂O emissions).

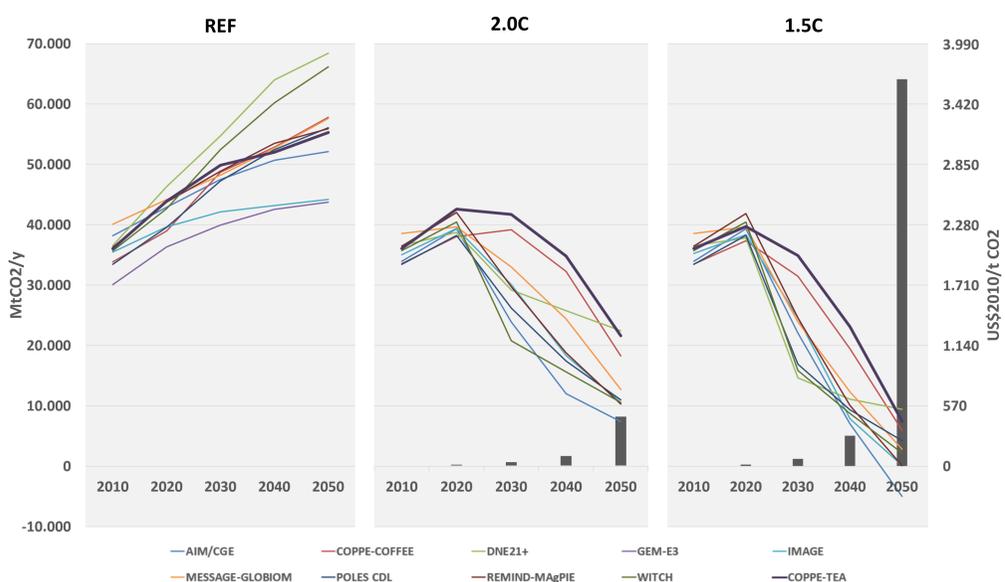


Figure 1: Global CO₂ emissions and COPPE-TEA's GHG price projections

Results

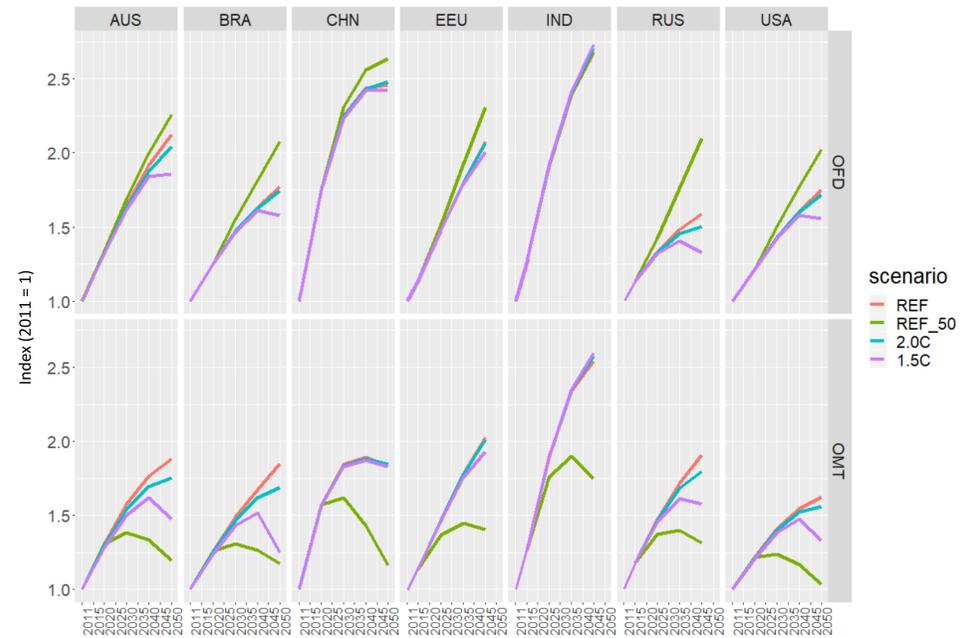


Figure 2: Household final demand for foods of processing sectors in selected regions

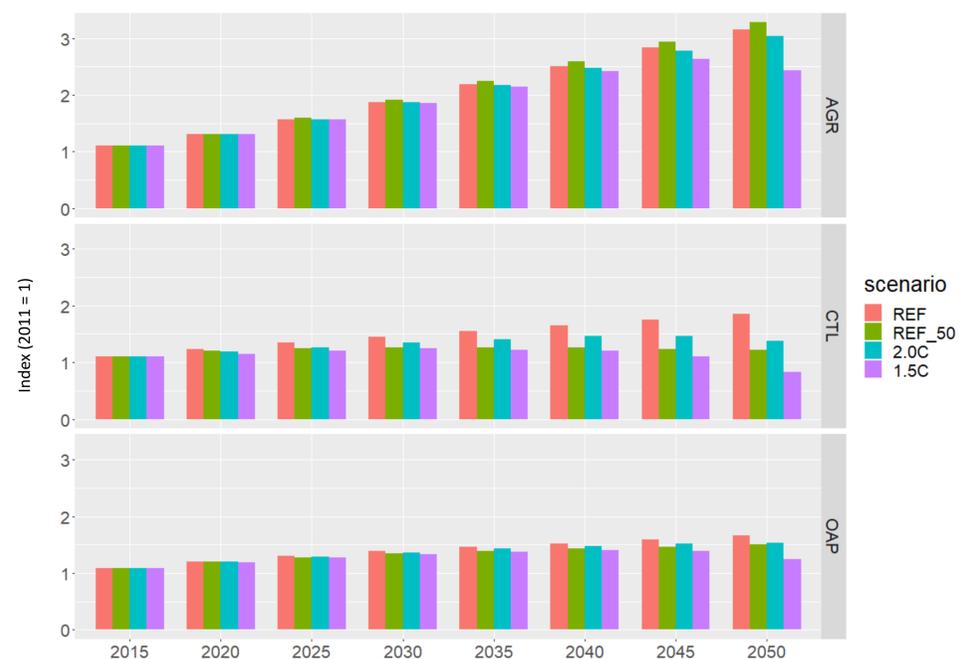


Figure 3: Brazilian production sectors output

Discussion and Conclusions

- TEA is a potential tool to improve the modelling of a full economic-energy-environmental system.
- In a worldwide view, a behavioral diet change scenario (REF₅₀) could reduce household final demand for animal-based food and increase for plant-based food more than climate scenarios (2.0C and 1.5C).
- In climate scenarios, the diet change may be induced by a GHG pricing. In Brazil, it could reduce both agriculture (AGR) and livestock (CTL and OAP) production as well as the final demand for animal-based food (OMT).
- Climate policy assessments, in particular, those including non-CO₂ gases pricing, must observe the real impacts on global food industry chains. A CH₄ pricing may lead to a greater pressure on animal-based food prices.
- Decrease in animal-based food consumption may not necessarily lead to an increase of caloric or protein content due to plant-based food intake.

Acknowledgments

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For more information

