

Regional production and consumption emissions associated with the Danish livestock products – a CGE multi-regional input-output approach

Topic: Modelling Carbon Footprints in the MRIO and CGE frameworks

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Global protein consumption is expected to rise with the predicted increase in the global population from 7.6 to 9.5 billion in 2050. While production emissions will rise accordingly, they will also partly be driven by higher consumer demand for goods and services. Recent studies have shown the importance of allocating emissions to final consumers based on international trade. Both inter and intra-regional sectoral interactions to satisfy consumer demand result in environmental repercussions such as greenhouse gases emissions embodied in trade. Using a CGE-multi-regional input-output model for Denmark, this study presents an environmental extension of the Local interregional (LINE) economic model, a regional input-output model using regional environmental accounts. Denmark is renowned for its agricultural orientation and high production and consumption of animal products. Our analysis comparatively evaluates the regional production and consumption emissions associated with different livestock products in Denmark. We investigate the carbon footprint of different livestock products with the two separate accounting methods (production- and consumption-based accounting) for five Danish regions. Information generated can be useful in formulating specific environmentally friendly policies associated with regional production and consumption of goods and services. The results achieved constitutes the basis for revealing the hotspots for demand-driven regional emissions and provide grounds for region-specific climate policies that will either mitigate or preclude national greenhouse gas emissions and carbon leakages between local regions. Furthermore, the model will allow for future regional planning of support for more sustainable food production and consumption (SDG 12), by implementing local bioresource management and technology systems for local alternative protein supply chain lowering the CO₂ footprint of consumption thereby contributing to SDG 13 on climate actions, delivering GHG emission reductions.

Keywords: Multi-regional input-output model, CGE, carbon footprint, livestock products