

Consumption-based carbon emissions in a post-Kyoto regime until 2020

Topic: MRIO-showcase II: Special MRIO variants

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Objective

COP17 in Durban revealed once again the general willingness to commit to the 2°-target and the difficulty to reach an international agreement. There is strong evidence from model-based analysis that economic costs of reaching the 2°-target will be below global GDP growth of one year. Any feasible solution has to address a fair sharing of mitigation responsibilities across the globe. Using a multi-regional input-output model (MRIO) extended with carbon intensity coefficients, it is possible to calculate consumption-based carbon emissions. This paper combines two strands of research: It uses the results of a scenario analysis with GINFORS regarding mitigation efforts in line with the Copenhagen pledges for 2020 to then calculate the distribution of future consumption-based carbon emissions around the globe using the MRIO model GRAM.

Methodology

GINFORS is a dynamic macro-econometric input-output model that has been widely applied in analyzing environmental policy measures. GINFORS projections provide GDP development, energy balances and energy-related carbon emissions for 53 countries and two regions. Sectoral production structures and trade data are available for all OECD countries, their major trading partners and the large emerging economies. The results of the scenario analysis in GINFORS are used to project the MRIO coefficient matrix and the corresponding final demand matrix as well as the energy-intensity coefficient vector of the MRIO model GRAM, which is then used to calculate consumption-based carbon emissions of the given Post-Kyoto regime until 2020.

Results

Production-based carbon emissions will further increase in emerging economies, whereas OECD countries will have to reduce emissions according to their Copenhagen pledges. The results show that a consumption-based accounting of carbon emissions allocates more emissions to the industrialized countries than production-based accounting. However, the increasing final demand in the emerging economies may reduce net-exports and hence also the relative net-emissions embodied in these exports. Global responsibility for the larger part of carbon emissions will remain with the highly industrialized OECD countries. Still, the shift towards a higher responsibility of emerging economies is inevitable as these are growing faster and continue producing with more carbon-intensive technologies.