

## Tracking carbon emissions within the EU following changes in consumption patterns

Topic: Household Impacts

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The European Union (EU) is an outgrowth of a multinational organization which includes countries with different characteristics, income inequality, wealth disparity, fiscal policies and so on, while having common objectives, such as climate change mitigation, that lead them to understand and adapt policies involving them all. Each Member State plays a role in economic systems through both production and demand side, which has thus significant influence on the environment. Consumption patterns and lifestyles in each country drive atmospheric emissions embodied throughout production chain, thus being a key element of climate policy as changes in demand both national and international level can contribute to reduce emissions. Recent studies have shown that wealthier countries consume and import intensive products in emissions that are produced in developing countries with low efficiency technologies to then produce and export high-value products (see Davis and Caldeira, 2010; Hertwich and Peters, 2010; Peters et al. 2011; Feng et al. 2013, Fernández-González et al. 2014).

In this context, this work aims to track emissions embodied in trade within the European Union using a Computable General Equilibrium (CGE) model calibrated on a multiregional input-output (MRIO) model of the 27 EU Member States, plus the rest of the world, for 35 industry sectors in the year 2008. We first allocate carbon emissions to countries and sectors according to the components of final demand (i.e. households, exports, public expenditure and investment). Second, we simulate scenarios in order to analyze the effects of carbon taxes designed both in line with the EU Emissions Trading System (EU ETS) and alternative measures designed according to differences observed among Member States (e.g. income, behaviour, technology). The objective of these simulations is to observe whether European Union strategies against climate change can be effective and equitable with regard to current behaviour patterns, as well as whether the less developed Member States face the same struggle as wealthier countries to achieve emissions abatement targets.

KEY WORDS: MRIO, CGE model, Carbon emissions, EU strategies.

JEL classification: C68, D57, P16, Q51.

### References

- Davis, S.J., Caldeira, K., (2010) Consumption-based accounting of CO<sub>2</sub> emissions, *Proceedings of the National Academy of Sciences*, 107 (12), 5687–5692.
- Feng, K., Davis, S.J., Sun, L., Li, X., Guan, D., Liu, W., Liu, W., Hubacek, H. (2013) Outsourcing CO<sub>2</sub> within China, *Proceedings of the National Academy of Sciences*, 110 (28), 11654-11659.
- Fernández-González, P., Landajo, M., Presno, M.J. (2014), The driving forces behind changes in CO<sub>2</sub> emission levels in EU-27. Differences between member states, *Environmental science & policy*, 38, 11 – 16.
- Hertwich, E., Peters, G. (2009) Carbon Footprint of Nations: A Global, Trade-Linked Analysis, *Environmental Science Technology*, 43, 6414–6420.
- Peters, G.P., Minx, J.C., Weber, C.L., Edenhofer, O. (2011) Growth in emission transfers via international trade from 1990 to 2008, *Proceedings of the National Academy of Sciences*, 108(21), 8903–8908.