The future of energy intensive industries in Europe after the Paris agreement

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Within the framework of the 2015 Paris climate agreement, the European Union (EU) has set itself ambitious greenhouse gas (GHG) emission reduction targets. Reaching those targets will require major changes in Europe's economic structure. This raises questions regarding the future of several energy-intensive activities, such as basic metal, glass, cement and chemical production. This study looks at how the position of those industries within the EU's production network might be affected over the next three decades by climate policies aiming to prevent a rise in global temperatures exceeding 2ËšC relative to preindustrial times.
We begin by constructing a set of forward-looking multi-regional input-output (MRIO) tables reflecting hypothetical future states of the world under different climate policy scenarios. Specifically, two projected time series of global MRIOs are obtained, one for a business-as-usual expected development, and the other considering the technologies necessary to fulfil the 2-degree Paris agreement scenario. Both run until 2050 at five-year intervals with fine industry resolution. We use the resulting tables to analyze the centrality of energy-intensive industries in the European economy and how it would be affected under more stringent climate change policies. To this end, key sector analysis techniques are employed.
We combine two main sources of information: 1) a base-year statistical MRIO table that describes the global economy with a high degree of industry detail but can only be observed in the current time period, and; 2) a set of simulated country-level input-output (IO) tables obtained through a computable general equilibrium model (CGE), which provides a natural way of handling future counterfactual scenarios but cannot match the fine representation of international trade and productive activities of the statistical MRIO. To obtain the forward-looking MRIOs for our analysis, we calibrate the base-year table to meet the restrictions implicit in the relevant CGE-generated scenario-based IO tables. For this purpose, the KRAS algorithm of Lenzen et al. (2009) is used. The base-year MRIO table was retrieved from Exiobase (Stadler et al., 2018) and relates to 2011. The CGE model underlying our analysis is the General Equilibrium Model for Economy-Energy-Environment (GEM-E3) developed and maintained by the European Commission's Joint Research Centre (Capros et al. 2013). A complete description of the scenarios employed in this study can be found in Keramidas et al (2018).
Naturally, the 2015 Paris climate agreement has already received a great deal of attention from environmental economists. In particular, a number of studies have already appeared that take IO approaches â€“ e.g., in a recent volume edited by DejuÃ¡n et al. (2018). With respect to this strand of literature, we believe that our research presents three elements of interest. First, in contrast to most existing contributions which focus on the power sector, our analysis is primarily concerned with energy-intensive manufacturing. Secondly, we seek to assess climate policy's impact on the structure of the economic system, rather than on employment or GHG emissions levels. Finally, the methodology that we propose for integrating dynamic economy-energy-environment models into the MRIO framework represents an alternative to other approaches documented in the literature, such as those of De Konig et al. (2016) and Wiebe (2016).

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