Renewable and Non-Renewable Energy Embodied in International Trade

Topic:
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In a context of increasing international economic integration, strengthened by the process of international production fragmentation, that is, by the spread of global value chains. Therefore, considering the exporting country (seller of the final product) as solely responsible for all the environmental impact produced by this product, emerges as a conclusion that may bias the results.
In this way, as it is difficult to observe a comparison between the environmental contributions of different countries in international trade, it is opportune to observe in the periods of 1996 (a relatively early stage of global value chains) and 2016 (near the peak of the development of international production fragmentation), what are the divergences between regions in terms of the participation of countries and regions of the world in the virtual trade of renewable and non-renewable energy. It becomes even more relevant in this observation to take into account the different energy matrices that exist, as well as the effective participation in the production of goods traded internationally, in order to avoid the bias mentioned earlier.
Through this work, the aim is to understand the distinct participation of each country in the virtual trade of these energies, as well as to investigate, even if succinctly, the presence of asymmetries between international environmental pressures exerted (suffered) by important players in trade in contrast with the actual energy patterns of the productive matrices aimed at exporting goods and services from these regions under analysis.
For the analysis, the EORA26 database was used, which contains input-output matrices and satellite accounts for 190 countries with 26 sectors for the period from 1996 to 2016 (free academic tier). Data such as intermediate consumption, final demand, and satellite accounts were used to form an aggregation resulting in the input-output matrix EORA26-30, which includes 16 regions, 14 countries, and 26 sectors. Satellite accounts were used to create two vectors, each for a part of the analysis, one for renewable energies and the other for non-renewable energies, both measured in terajoules. Specifically, for renewable energies, the accounts used were â€œHydroelectric Electricityâ€•, â€œGeothermal Electricityâ€•, â€œWind Electricityâ€•, â€œSolar, Tide and Wave Electricityâ€• and â€œBiomass and Waste Electricityâ€•. For non-renewable energy, the accounts used were â€œNatural Gasâ€•, â€œCoalâ€•, â€œPetroleumâ€• and â€œNuclear Electricityâ€•.
The methodology employed was applied to both types of energy considered. For both, the level of embodied energy in intermediate transactions per region with the rest of the regions was examined, as well as the portion of this embodied energy in total demand per region, resulting in embodied energy in transactions from one region to another. Thus, when done for all regions, it results in a matrix with 30 rows and columns, with 900 observations, where the main diagonal represents the energy used in the internal process of the country, while the others represent the energy embodied in international trade. By removing the values from the main diagonal, the rows of this matrix represent the embodied energy exported, while the columns represent the imported energy, where each row and each column represents a region. With this result, it was possible to find the net exports/imports of renewable and non-renewable energies from the regions under analysis for the periods of 1996 and 2016 from the EORA26-30 matrix.