

A marginal extraction analysis for low-carbon global supply chains.

Topic: Input-output analysis for policy making (Chair: Jing Meng, University College London)

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For climate change mitigation, industries need to establish green supply chains through an effective restructuring strategy. To identify effects of restructuring of the relevant global supply chains (GSCs) on the CO₂ emissions at globe, I propose a new input-output framework with a focus on marginal restructuring of GSCs of a particular industry. Based on the latest world input-output database (WIOD) in 2014, I firstly estimate the global CO₂ emissions from the GSCs of the particular sector (automobile sector in Japan, Germany and United States in this study). Secondly, I apply the expanded hypothetical extraction method, called the marginal extraction method (MEM) to the WIOD. The proposed MEM can describe the hypothetical GSC structure in which a unit of a trade coefficient (one percent in this study) of a relevant industry in a relevant country is extracted and substituted by the same industries in other countries (i.e., the marginal restructuring of the relevant GSC). Thirdly, I compare between the global CO₂ emissions from the actual and restructured automobile GSCs and estimate the impacts of the marginal restructuring of the GSCs. The results show that the marginal restructuring of Chinese manufacturing sectors of Electrical equipment and Basic metals had a significant CO₂ reduction effect in the Japanese automobile GSC. The case studies of Germany and US show that the Russian basic metals sector and the Chinese machinery and equipment sector are the key sectors to reduce the CO₂ emissions through GSC restructuring, respectively. Based on the results, I discuss practical trade policies for CO₂ mitigation through GSC restructuring and finally conclude that the MEM can help policy makers to design effective climate policies for green restructuring of GSCs.