

Remapping embodied carbon emissions in China's exports

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A clear and exact picture of CO₂ emissions embodied in trade has significant policy implications, such as addressing responsibility-sharing in international climate negotiation. Embodied carbon in exports of China, the world's largest carbon emitter and largest export economy, has been a focus of both academic and political debates. This study calculates embodied CO₂ emissions in China's exports in 2012 based on an input-output technique approach that captures provincial differences in the production structure of ordinary and processing exports. We show that the traditional calculation approach overestimates domestic emissions embodied in China's exports by 23.4% and underestimates embodied foreign emissions by -29.3%. The reason for the biased estimation mainly lies in a few coastal provinces and industry sectors. Distinguishing between ordinary and processing exports from these provinces and sectors therefore represents a potential solution to the biased estimation problem of embodied CO₂ emissions in China's exports.

We first construct China's inter-province input-output table in 2012 that captures the spatial divergence in ordinary and processing exports in 30 provinces. This is the first database that presents the regional diversities in trade patterns at provincial level. Second, we embed the inter-province input-output table into inter-country input-output table obtained from WIOD. This dataset allows us to trace the sources and destinations of embodied CO₂ emissions in provincial exports. Both domestic and foreign provinces' emissions may be embodied in China's exports, and the exported products may be absorbed by different countries or regions. The literature adopts input-output model, first proposed by Leontief, to trace sources and destinations of carbon transfer flow. Yet, the original Leontief insight is not sufficient to quantify the embodied emissions in exports at the bilateral level. This study adopts a bilateral trade accounting framework to trace carbon transfer flows that China's exports are engaged in.