

Carbon Footprint Analysis Based on the Structural Position in the Global Supply-Chain Networks

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For developing fair and effective policies to mitigate climate change, it is important to understand the characteristics of sectors constituting the global supply chain network and implement policies that consider these characteristics. Production, consumption, and betweenness-based emissions identify the large emitters, the larger final consumers indirectly contributing to larger emissions, and critical transmitters, respectively. However, the three emission accounting methods are independent and have distinct criteria, and cannot compare the specific characteristics each sector has. Focusing on the structural position of sectors in the global supply chains, this study develops the attribution analysis framework for inter-sector transactions which allows us to reveal the characteristics of sectors and transactions and visualize their interconnections within the complex supply chain network. We also apply the attribution analysis of each sector and transaction to a multi-regional IO table and clarify emission attributions of key sectors and transactions to elucidate the best strategies for CO₂ emission reduction in the global supply chain. Our results show that the transaction from the Chinese basic iron to the Chinese fabricated metal production has production-oriented characteristics and would reduce CO₂ emission effectively through the adoption of renewable energies in the Chinese basic iron sector. Furthermore, the transaction from the Chinese basic iron sector to the Chinese motor vehicle sector would require the Chinese construction sector to reduce its life-cycle CO₂ by changing its input structure. Our analytical framework thus proposes specific policies that could effectively reduce specific sectors and transactions' carbon footprint.