

Firm heterogeneity in measuring China's carbon footprint

Topic: Tracing Carbon Emissions in Global Value Chains II

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I-O Table is widely used in measuring and calculating carbon dioxide emissions. The ordinary I-O tables, however, only reflect the supply-demand relationship among different industries, and ignores the firm heterogeneity in each sector. This paper examines carbon dioxide emissions, emission intensity, carbon footprint and embodied carbon emission intensity of 42 industries of China by the use of an adapted I-O table that for each sector distinguishes between firm ownership (Chinese owned enterprises and Foreign-invested enterprises) and trade pattern (processing exports and non-processing trade). A comparison of calculation results from the ordinary I-O tables and the adapted I-O table has also been conducted. The results show that firm heterogeneity has significant effect on carbon emissions and carbon emission intensity. In 2007, 93% of emissions come from Chinese owned enterprises with high carbon emission intensity, while only a small part of emissions come from other types of firms, with relatively low intensity. Carbon emissions and intensity of firms involved in the non-processing trade are much greater than those of firms involved in the processing trade. Comparative analysis also shows that ignoring firm heterogeneity will make the embodied carbon for export overvalued by 20%, and that of domestic final demand underestimated by about 7%. Difference is more considerable when the result is obtained at sector level. For example, the embodied carbon emission of domestic final demand in communication equipment sector is 70% higher than the ordinary calculated results. In addition, after introducing the new index - embodied carbon emission intensity, the results indicate that foreign-invested enterprises produce a few emissions, but will greatly promote the carbon emissions of upstream Chinese owned enterprises involved in the non-processing trade. Chinese owned enterprises involved in the non-processing trade produce many emissions, and also promote emissions of upstream Chinese firms to be higher than the national average. Although considering firm heterogeneity will not change the calculated results of the total carbon emission of China, it should be emphasized that it will significantly reduce the potential biases of estimated industrial carbon emissions and carbon footprint, at the same time, help us better understand the internal relationship between the division of production process and carbon emissions of enterprises.