

## **A Spatial Structural Decomposition Analysis of Carbon Footprint of Household Consumptions for Japanese Regions**

Topic: Environmental input-output modeling VII

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Climate policies increasingly tend to be discussed at the regional level as well as the international or national level. When we consider developing more effective climate policies, we inevitably need regional analyses of global warming.

This study focuses on CO<sub>2</sub> emissions influenced by consumer behavior and is concerned about spatial variations of emissions at the sub-national (regional) level. In estimating carbon footprint, which refers to consumption-based emissions indirectly generated to satisfy final demand, it is useful to apply multi-regional input-output (MRIO) approach. This study analyzes regional carbon footprint of household consumptions by using the MRIO table which consists of all 47 prefectures in Japan.

In calculating carbon footprint, we originally construct the dataset of emission coefficients in industries at the regional level corresponding to the district of our MRIO table based on regression analysis to better consider spatial variations of emission intensities. Furthermore, based on the methodology in Kagawa and Inamura (2004) and Zhou and Imura (2011), we apply structural decomposition analysis (SDA) across regions in Japan to investigate main factors generating spatial variations in carbon footprint.

The MRIO analysis reveals net exporters and net importers of emissions by quantitatively identifying carbon leakage among regions. Furthermore, the SDA demonstrates how consumer behavior at the regional level influences total emissions in Japan. Finally, we discuss regional policies to effectively reduce emissions from the point of view of consumer behavior.