Analyzing the Changes in China's Final-demand-driven Environmental Emissions with an Input-output based Structural Decomposition Analysis

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Abstract: Assessing the environmental emissions driven by final demands is critical to realize a more sustainable and fundamental mitigation. In view of this, this study focused on the total emissions driven by one unit increase of different final products, i.e., emission multiplier. This study performed an input-output based structural decomposition analysis about the changes in COD, ammonia nitrogen, SO2, NOx, soot and dust, industrial solid waste and CO2 emission multipliers for 41 final products during 2007-2012 in China. The main data required here include the input-output tables and environmental emissions statistics. Results show that during the examined period the emission multipliers were in general decreasing. The main contributor to this phenomena was technical effect, i.e., reduction of emissions per unit output. An important feature of the technical effect in this period was that the technical factors that had significant contributions were concentrated in only eight sectors. Moreover, the technology effect in this period presented obvious spillover effect. Although the contribution of structural factors was far less good as the technical factors, there were still some structural adjustments that had led to significant synergistic mitigation effects. However, the NOx and/or CO2 multipliers of some final products increased during this period. In addition, although most of the technical effects in this period were with high efficiency, four factors were identified which could be efficient but were with small contributions. The problem of structural effect was more prominent: most of the structural factors with high efficiency were with small contributions; more than 1/3 of the structure effect that were with obvious contributions played positive roles. This study contributed to the existing studies by performing a detailed sector-level structural decomposition analysis, adopting the demand-side indicators to describe environmental quality, and considering multiple environmental discharges simultaneously.

Keywords: emission multiplier; input-output; structural decomposition analysis; China