EXPLORING THE CHANGES OF INDUSTRIAL CO_2 INTENSITY IN CHINA: AN INTEGRATED DECOMPOSITION APPROACH

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Overview

Exploring the driving factors of sectoral-level CO_2 intensity change is very important in informing targeted emission reduction policies. This paper proposes an integrated decomposition approach which combines production-theoretical decomposition analysis (PDA), index decomposition method (IDA), and attribution analysis (AA). The proposed approach can decompose sectoral-level CO_2 intensity change into nine driving factors based on the Shephard distance function, which provides more detailed information about the influence of both technical efficiency and technological change on sectoral-level CO_2 intensity. Furthermore, the proposed approach can identify the contributions of different regions to each driving factor. Industrial sector across 30 provinces in China are used to demonstrate the integrated decomposition approach.

The rest of this paper is organized as follows. Section 2 introduces the integrated decomposition approach for studying sectoral-level CO_2 intensity change. Section 3 presents an empirical study on China's industrial sector. Section 4 concludes this study.

Methods

Production-theoretical decomposition analysis (PDA), Index decomposition method (IDA), and Attribution analysis (AA)

Results

First, desirable output productivity and intensity are leading categories in promoting reducing industrial CO_2 intensity. Output gap is the main factor that inhibits decreases in industrial CO_2 intensity. The role of structure adjustment in industrial intensity reduction has not yet been totally explored.

Second, desirable output technological change and potential energy intensity effects play the dominant roles in decreasing industrial CO_2 intensity. Conversely, output gap and desirable output technical efficiency effects are the main contributors to hinder decreases in industrial CO_2 intensity.

Third, Hebei, Shandong, Jiangsu, Liaoning, and Henan are the main contributors to the desirable output technological change effect. The top five provinces contributing to the potential energy intensity effect are Henan, Liaoning, Shandong, Henan, and Inner Mongolia.

Conclusions

The integrated decomposition approach possesses two advantages: First, the contributions of different regions to each driving factor are investigated. Second, both energy use and desirable output production technology related (i.e., technical efficiency and technological change) factors are considered.

Provinces are divided into four types based on the percentage share results, and targeted industrial CO_2 intensity reduction policy should be implemented for different types of provinces.

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