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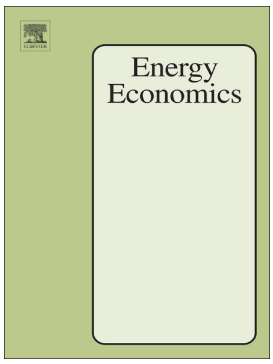

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Contributions to sector-level carbon intensity change: an integrated decomposition analysis

Qunwei Wang[a], Ye Hang[a,b], Bin Su[b,*], Peng Zhou[a]

[a] *College of Economics and Management, Nanjing University of Aeronautics and Astronautics, 29 Jiangjun Avenue, Nanjing 211106, China*

[b] *Energy Studies Institute, National University of Singapore, 29 Heng Mui Keng Terrace, 119620, Singapore*

Abstract: Exploring the factors driving sector-level carbon intensity change is important to inform targeted emission reduction policies. This paper proposes an integrated decomposition approach, combining production-theoretical decomposition analysis (PDA), index decomposition analysis (IDA) and attribution analysis (AA). The proposed approach can decompose sector-level carbon intensity change into nine driving factors, including two new pre-defined factors (i.e. the potential regional output structure effect and the output gap effect). This provides more detailed information about the influence of production technology related components, i.e. technical efficiency and technological change, and the contribution of each region to the individual driving factor. Industrial sectors across 30 provinces in China are used to demonstrate the integrated decomposition approach. The decomposition and attribution results show that the desirable output technological change effect is the dominant factor in decreasing industrial carbon intensity, of which Hebei, Shandong, Jiangsu, Liaoning and Henan are the main contributors. The potential energy intensity effect reduces industrial carbon intensity remarkably as well, mainly due to Henan, Liaoning, Shandong, Hunan and Inner Mongolia. Provinces are classifies into four performance groups based on the attribution results. Targeted industrial carbon intensity reduction policies should be implemented in different groups of provinces.

Keywords: sector-level carbon intensity; production-theoretical decomposition analysis; index decomposition method; attribution analysis; China

[*]Corresponding author. Tel: (+65) 6601-2075 ; Fax: (+65) 6775-1831

E-mail address: subin@nus.edu.sg ; subin.nus@gmail.com (B. Su)

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