Can China's Energy Intensity Constraint Policy Promote Total Factor Energy Efficiency? Evidence from the Industrial Sector

Shuai Shao[1], Zhenbing Yang[2], Lili Yang[3] and Shuang Ma[4]

Executive summary

To achieve the green transformation of China's economic development, the Chinese government should improve energy restriction and strengthen environmental governance as soon as possible. Improving energy efficiency is generally regarded as the key to resolving the abovementioned problems. Indeed, such thinking has been introduced into the medium- and long-term planning of China's national economic and social development. In particular, at the beginning of 2006, the Chinese government launched the 11th "Five-Year Plan" (FYP). For the first time, a mandatory energy-conservation target was added into the FYP, i.e., the energy consumption per unit of gross domestic product (GDP) should decline by 20% from the 2005 level. China's central and local governments then rolled out a series of relevant measures to execute the new energy intensity constraint policy (EICP). However, existing studies have paid little attention to the actual effects of the EICP.

Based the backgrounds described above, in this paper, we use a fixed-effect stochastic frontier analysis (SFA) medol based on a translog production function to calculate the total factor energy efficiency growth (TFEEG) rates of China's 36 industrial sub-sectors over 2001–2014. Furthermore, we employ the difference-in-differences (DID) method, to investigate for the first time the average and marginal effects of China's EICP on industrial TFEEG. Also, we estimate the superposition effect caused by the introduction of a carbon intensity constraint policy (CICP) on the TFEEG, through the difference-in-difference-in-differences (DDD) strategy. Finally, using counterfactual, re-grouping and quasi-DID analyses, we conduct a series of robustness tests of the empirical results.

We find that the TFEEG in China's industrial sector experienced an overall declining trend between 2001 and 2014. The implementation of the EICP has had a significantly negative effect on the improvement of the TFEEG of sub-sectors with higher levels of energy intensity. After the implementation of the EICP, the TFEEG rate of these sub-sectors declined by 4.31%, compared to the rate of the other sub-sectors. The results of a series of robustness tests indicate that such a negative effect is credible. The marginal effect in the first two years after the implementation of the EICP was significantly negative, while the superposition effect of the introduction of a CICP on industrial TFEEG remained negative. Thus, the Chinese government should reinforce the implementation of energy-saving policies by introducing additional

1 School of Urban and Regional Science, Shanghai University of Finance and Economics. Shanghai 200433, China. E-mail: shaoshuai8188@126.com.

2 Corresponding author: School of Economics, Nanjing University of Finance and Economics. Nanjing 210023, China. E-mail: yzbshufe@126.com.

3 School of International Economics and Trade, Shanghai Lixin University of Accounting and Finance. Shanghai 201209, China. E-mail: liil0910@126.com.

4 School of Economics and Statistics, Guangzhou University. Guangzhou 510006, China. E-mail: shuangma@chfs.cn.

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market-oriented auxiliary policies to propel the green development transformation of China's industrial sector.

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