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INDUSTRIAL ENERGY CONSERVATION AND EMISSION REDUCTION TOTAL FACTOR PRODUCTIVITY IN CHINA

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Abstract

For the purpose of evaluating the effect of environmental regulations addressing Energy Conservation and Emission Reduction (ECER) on Chinese industry, this paper introduces a non-radial, non-oriented and slacks-based data envelopment analysis (DEA) model, energy conservation and undesirable output reduction slacks-based Malmquist index (EUSM index) and its decompositions. This model can simultaneously measure energy and non-energy inputs along with pollutant emissions in addition to desirable outputs. Based on the EUSM and traditional model, this study estimates Chinese industrial Total Factor Productivity (TFP) from 2005 to 2010. The results indicate that ECER TFP continuously increase over the whole study period. Compared with traditional TFP, we find that the stringent regulations regarding ECER promote technical progress, which is mainly due to efficiency change, and the quality of industry in the East is higher because of its coordination and innovation. Chinese industrial technological progress is mainly due to technical efficiency, regardless of whether ECER constraints exist. The command-and-control approach cannot promote technical change as effectively as market-based and public participation approaches. Empirical results also preliminarily validated the Potter hypothesis in Chinese industry. Therefore, the more stringent environmental regulations would help to improve the Chinese industrial ECER TFP.

Key words: energy conservation, emission reduction, environmental regulation, Potter Hypothesis, total factor productivity

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