

Transient and Persistent Efficiency Estimation for Electric Grid Utilities Based on Meta-Frontier: Comparative Analysis of China and Japan

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Abstract : With the deepening of international exchanges and investment, the international comparison of power grid firms has become the focus of regulatory authorities. Ignoring the differences in the economic environment, resource endowment, technology, and other aspects of different countries or regions may lead to efficiency bias. Based on the Meta-frontier model, this paper divides China and Japan into two groups by using the data of China and Japan from 2006 to 2020. While preserving the differences between the two countries, it analyzes and compares the efficiency of the transmission and distribution industries of the two countries. Combined with the four-component stochastic frontier model, the efficiency is divided into transient and persistent efficiency. We found that there are obvious differences between the transmission and distribution sectors in China and Japan. On the one hand, the inefficiency of the two countries is mostly caused by long-term and structural problems. The key to improve the efficiency of the two countries is to focus more on solving long-term and structural problems. On the other hand, the long-term and structural problems that cause the inefficiency of the two countries are not the same. Quality factors have different effects on the efficiency of the two countries, and this different effect is captured by the common frontier model but is offset in the overall model. Based on these findings, this paper proposes some targeted policy recommendations.

Keywords : transmission and distribution industries, transient efficiency, persistent efficiency, meta-frontier, international comparison

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