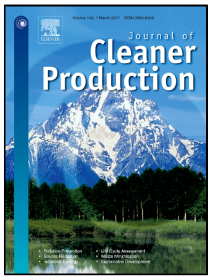

Can environmental regulation promote the coordinated development of economy and environment in China's manufacturing industry? ——A panel data analysis of 28 sub-sectors

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Highlights

(1) Eco-efficiency is introduced as an indicator to reflect the degree of the coordinated development of economy and environment in China manufacturing industry. The findings show that at present, the eco-efficiency level of China manufacturing industry is less than 1 and in a state of inefficiency. Moreover, the eco-efficiency levels of most sub-sectors are less than 1. Hence, the degree of the coordinated development of economy and environment in China manufacturing industry is relatively low.

(2) The effects of environmental regulation on technical innovation and eco-efficiency in China manufacturing industry are nonlinear. The quadratic component of environmental regulation is introduced to estimate the optimal regulation intensity that can promote the improvement of eco-efficiency. We find that in the high and low eco-efficiency groups, the impact of environmental regulation on technical innovation is an inverted "U" type while that on eco-efficiency is an "U" type. Technical innovation induced by environmental regulation does not completely promote the improvement of eco-efficiency. In the medium eco-efficiency group, the impacts of environmental regulation on technical innovation and eco-efficiency are both "U" type. Stronger environmental regulation can not only encourage the manufacturing industries to conduct technical innovation and obtain economic performance but also can push forward the focus of technical innovation converting from traditional technologies to energy-conserving and environmental-protection technologies.

(3) Significant industry heterogeneity exists in the effects of environmental regulation on technical innovation and eco-efficiency. By calculating the inflection points of "U"–shaped curve and inverted "U"-shaped curve, in the high eco-efficiency group, "weak" Porter hypothesis is verified in the cultural, educational and sports products, furniture manufacturing, printing, tobacco products, and instrument and meter industries and "strong" Porter hypothesis is established in the communication facilities and oil processing industries. In the medium eco-efficiency group, apart from the special-purpose industry, "weak" Porter hypothesis holds true in other industries while "strong" Porter hypothesis takes effect only in the metal products and non-ferrous metal industries. In the low eco-efficiency group, "weak" Porter hypothesis is attested in the wood processing industry and "strong" Porter hypothesis is ineffective in all industries.