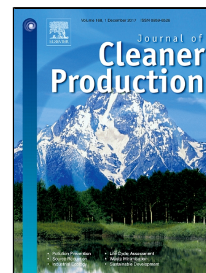


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Determining the Optimal Carbon Tax Rate based on Data Envelopment Analysis

Minyue Jin¹, Xiao Shi^{2*}, Ali Emrouznejad^{3*}, Feng Yang¹

Abstract

Carbon tax policy is widely used to control greenhouse gases and how to determine a suitable carbon tax rate is very important for policy makers considering the trade-off between environmental protection and economic development. In an industry regulated by carbon tax policy, we consider two competing firms who sell ordinary products and green products respectively. In order to promote the firm who sells ordinary product to reduce carbon emissions, the government of China imposes carbon tax on the ordinary products. For the government, three objectives are considered when it makes carbon tax policy. They are increasing the government revenue, reducing the government expenditure and decreasing the carbon emissions. For the firms, it is important to explore their pricing strategies taken into account of the government tax policy. To find an optimal carbon tax rate and to achieve the three objectives simultaneously, we consider this as a multiple criteria decision-making problem. Hence, we propose to use a centralized data envelopment analysis (DEA) approach to solve it. We find that when one firm produces ordinary products and the other produces green products, the government may set a high tax rate. While when both firms sell ordinary products, the optimal tax policy for each firm is different and the government may impose a higher tax rate for one firm and a lower tax rate for the other firm.

Keywords: Carbon tax policy; government revenue; government expenditure; carbon emissions; centralized DEA approach

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