The Short-term Effects of Carbon Taxation in China: An Analysis Based on Energy Input-Output Model in Hybrid Units

Topic: Energy and emissions
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The aim of this paper is to evaluate the effects of c Carbon tTaxation in China, including the distributional effects on different household groups based on income levels, the effects on economic growth and emissions reductions. For this purpose, we build a price model based on an energy input-output table in hybrid units. The advantage of the energy IO model in hybrid units is that it satisfies energy conservation conditions easily, which ensures the consistency of the energy total requirements flows. The databases used for our simulation include the 2012 Chinese input-output table, the energy consumption data by industries, the Household Sample Survey, and China Residential Energy Consumption Survey (CRECS 2012). The main results indicate that, in short-term, it a carbon tax has a relatively small negative impact on GDP. There are, however, relatively significant emissions reductions. The results of the distributional effects show that, for urban residents, the impacts of carbon taxation on different household groups have areveal relatively small differences, and are slightly regressive. Yet for rural residents, a carbon tax may be significantly regressive, and it also reveals that rural residents are affected much more than urban residents. As further analysis, by constructing quadratic programming models, we investigate the effects of redistributing the carbon tax paid by households in order to offset the negative distributional effects of carbon taxation. The results reveal that if the amount of carbon tax directly paid by households is given to the groups with low income levels, the regressivity of carbon tax will be removed largely. If the total carbon tax directly and indirectly loaded by households is reallocated to the groups with low income levels, the situation of inequality will be improved. Then, using Miyazawa's input-output model, we compute interrelational income multipliers. The results indicate that the household groups with high income levels would benefit largely from the income increases in household groups with low income levels, which means that compensation to groups with low income is a superior choice for redistribution of carbon tax.