Short-term Distributional Effect of Carbon Reduction Policy Based on Industrial Abatement Cost Curve

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Carbon tax and carbon emissions trading are widespread policy tools used to deal with climate change. Using different carbon polices with domestic enterprises, the difficult problem from carbon tax implementation is how to determine carbon tax rates, namely the unit price of emissions. Carbon emissions trading needs to make sure the reasonable overall emissions level, namely the initial quotas. Uncertainties of tax rates and quotas are caused by the industrial abatement costs to incorporate technology, economic and market effects that are often adjustment. Therefore, how to identify the industrial abatement cost curve is becoming a key technology research for analyzing implementation effect of different carbon reduction policies.
This paper uses a 42-sector computable general equilibrium (CGE) model for China, and analyses the distributional impact of emissions reduction polices with different industries and income groups. This analysis simulates six abatement scenarios including of three subjects of the tax return (to enterprise, households, government) and two mechanisms of the emissions reduction (carbon tax and emissions trading). Assuming that carbon taxes are paid by the production enterprises, the investigation pays close attention to the distributional effect with different income groups and the transfer effect with industrial employments. Meanwhile, due to uncertainty of industrial emissions reduction cost curve, the sensitivity analysis aims to examine the simulation results. The research results suggest that the carbon tax and emissions trading are made increase to industrial emissions reduction cost, but the distributional effect of them is positive in the short term. From the area of influence perspective of view, the expenditure of lower income groups, especially the rural area, are less sensitive to the prices of energy and other energy-related commodities. Taking the subject of influence in account, revenue-recycling through carbon tax policy may ease the taxation burden of lower income households. Allocating the initial quota to industries for free, residential income would voluntary conveyance to emission enterprises. If reimbursed subject of tax are households, emissions trading mechanism would reduce the business profit of high emissions industries. In addition, the income distributional effect of abatement policies reveals an example, if higher income households (i.e. urban residents) increase unit income, the job’s opportunities of lower income group would increase, especially rural laborer, it is accelerating the urbanization in China. Finally, the simulation results show that the abatement effect of carbon tax and emissions trading coexisting is the most significant.