Regional economic and welfare effects of emission quota allocation

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Overview

China is featured by diversity of natural environment and resources and spatial heterogeneity of social-economic development because of its large scale of territory. In China, regional differences and interregional economic linkages have played key roles in China's regional economy development and spatial structure formation. As global warming and climate change issues are becoming increasingly serious, carbon dioxide emissions arouses people's attention. International emissions trading has become the most important policy instrument for regulating emissions to air, with the EU Emissions Trading System (EU ETS) being the most prominent example so far. An important element in any emission trading system (ETS) is how to allocate allowances. Difference of initial quota allocation and emission reduction cost among provinces in China is the driving force of unified national carbon trading market. The initial quota allocation of carbon permits will have important effects on regional economic development, industrial structure and interregional trading. Therefore, the allocation of the emission rights at the provincial level may not only take regional economic development into consideration, but also the regional reduction potential to achieve the goal, while at the same time emphasizing regional equity and a regional development strategy.

Methods

The allocation criteria of carbon emission permits and its influence on China's regional development were analyzed through the 30-province region CGE model. This paper attempts to simulate the unified national carbon trading market through provinces with a multi-regional CGE model in China. It concerns different initial quota allocations and their effect on regional economic. Commonly there are three principles in initial quota allocation: equity principle, auction principle and current production principle. We consider four types of allocation mechanisms: i) unconditional grandfathering, that is, a firm receives quotas based on historic performance, ii) conditional grandfathering, that is, a firm receives quotas based on historic performance but quotas are withdrawn to the extent the firm does not maintain its base year capacity, iii) allocation of quotas relative

to maintained capacity, and iv) allocation of quotas relative to current production, henceforth referred to as output-based allocation (OBA).

Expected results

Our expected simulation results show that: industrial intensity criteria without taking regional economic development into account, deepens the unbalanced development of regional economy; regional intensity criteria without taking industrial attributes into account, exerts little negative impact on regional harmonious development, but relatively high negative influence on high-carbon-emission industries. The two-step allocation scheme that the central government allocates emission permits to provincial governments based on regional economic development and then provincial governments allocate emission permits to emission resources or entities based on industrial attributes, is a feasible and operable choice.

Implications

In this paper we explore how various allocation mechanisms (auctioning and grandfathering etc.al.) may play out in the regional economy, pointing particularly to compare which mechanism is generally preferred over others from an economic welfare perspective by considering auction revenues return. One main insight from our analysis is that the choice of allocation mechanism not only has distributional impacts, but can also affect prices and quantities in the regional products markets, and thus the cost-effectiveness of the system.

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