Post-Kyoto Climate Regimes: Per Capita Cumulative CO_2 Emissions versus Contraction and Convergence of CO_2 Emissions

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Summary

The Copenhagen Accord sets the target for the post-Kyoto international climate framework as limiting the global temperature increase to less than 2 degrees Celsius above the pre-industrial levels. In this paper, we construct a dynamic computable general equilibrium model and analyze the economic effects of two methods for allocating emission quotas across all countries under the post-Kyoto international climate framework. Two types of CO_2 emission quotas are considered: "historical responsibility" (HR), which allocates emission quotas such that the per capita cumulative CO_2 emissions for the 1950–2050 periods are equalized across all countries and "contraction and convergence of CO_2 emissions"(C&C), which allocates emission quotas such that the per capita CO_2 emissions in 2050 are equalized across all countries. Meinshausen et al (2009) states that limiting the cumulative CO_2 emissions over the 2000–2050 period to 1,440 Gt CO_2 yields a 50% probability of warming exceeding 2 degrees Celsius, relative to the pre-industrial levels. This paper assumes that the global cumulative CO_2 emissions from 2000 to 2050 are 1,440 Gt CO_2.

It is shown that the rates of decrease in the GDP of developing countries under the HR scenario are smaller than those under the C&C scenario. In addition, the rates of decrease in the GDP of industrialized countries under the C&C scenario are smaller than those under the HR scenario. China becomes the importer of emission rights in the long run, even under the HR scenario, whose allocation method is based on cumulative CO_2 emissions. Moreover, GDP loss in China increases over time (GDP losses in China worsen off over time).

Keywords: computable general equilibrium modelling; permit allocation; climate policy

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