

Assessment of Guangdong Carbon Emission Trading With AIM/CGE Model

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Summary: As one of the most developed and one of the largest energy consumption areas in China, Guangdong has been chosen by the Chinese government as the setting for trials on low carbon transition. In recent years, Guangdong has achieved the highest GDP among all the provinces of China, and contributed more than 11% to the total GDP of the country. It also accounts for about 8% of total energy consumption, and coal still dominates as the primary energy supply. For example, Guangdong consumed 19.6 million tons of coal equivalents in 2007, and coal accounted for 49.1% of this consumption. To address climate change and realize low carbon development, Guangdong has committed to reduce CO₂ emission intensity per unit of GDP in 2015 by 19.5% compared with 2010 level and decided to implement carbon emission trading system. In the first stage, the power, cement, oil refinery and iron and steel sector which caused about 58% of the total CO₂ emissions in Guangdong are allowed to implement carbon trading.

In order to evaluate the economic impact of Guangdong carbon emission trading system (ETS), this study uses the two-region provincial CGE model developed by NIES to simulate the implementation of carbon trading policy under the constraint of carbon intensity reduction target. For comparing the abatement contribution of different countermeasures in completing the target, five scenarios are constructed. To evaluate the effects of ETS policy, a reference scenario (BaU scenario), which has no policy intervention, is developed first. After the BaU scenario, this study designed four kinds of policy scenarios. Two scenarios are setting intensity decrease rate target and sector cap (SAV and SAVET scenario as the 33% reduction target from 2010-2020), another two scenarios are set as absolute sector cap target which means more rigid target (LCE and LCET scenario as the 40% reduction target from 2010-2020). SAV and LCE scenario are not using carbon trade for the four sectors.

From the simulation results, we can see that the change of the key index data. When setting the reduction target for the four policy scenarios, it will bring the carbon abatement cost for all sectors. And this carbon price will increase the cost and decrease the demand of some sectors, which will cause the GDP loss. Compared SAV with LCE scenario, we can see that the bigger reduction target, the bigger loss in GDP. Compared LCE with LCET, the carbon price of four sectors reduce and the GDP loss decrease. It shows that the carbon trade can reduce the total abatement cost. But for the SAV and SAVET scenario, the GDP loss difference is not big. From the abatement cost of other sector, we can see that as the other sector will not allow to trade, the carbon price of other sector is big. This situation can still reduce the GDP loss. So if we want to consider the effect of ETS, we should allow more sectors implement carbon trade.