Designing Carbon Pricing Instruments with Consideration of the Effective Carbon Rate: Reconciliation of Efficiency and Regional Equity

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[Abstract]

Key Words:

Carbon pricing, Implicit carbon pricing, Carbon tax, Emissions trading schemes, Efficiency, Regional equity, Policy design, Society 5.0

In recent years, there has been much discussion around carbon pricing as a means to reduce domestic emissions in Japan. However, stakeholders have raised the following concerns. First, the impacts of the regional emissions trading system in Tokyo and Saitama Prefectures both on emissions reductions and the economy have been insufficiently scrutinized. In particular, the economic impact of carbon pricing and its effect on innovation have been contentious. Second, the emissions reduction impacts of such existing and implicit carbon prices as fuel taxes and feed-in tariffs (FIT) have yet to be examined. Third, the economic impact of carbon pricing may be disproportionately borne by regions where energy-intensive industries are concentrated.

In this study, we have attempted to theoretically and quantitatively address the above-mentioned concerns. First, we evaluated the regional emissions trading schemes from the perspective of evidence-based policy making (EBPM). We found that the two regional ETS have been effective at reducing emissions, though their impact may be weaker for Saitama because the scheme does not provide penalties. On the other hand, we did not find evidence of carbon leakage when we measured the outsourcing of economic activities. Surprisingly, we found spillover effects of ETS to the facilities in non-regulated regions. Further, we found that the Saitama ETS simulated innovation by increasing R&D expenditures. Through empirical studies of household micro data, we determined that the burden of carbon pricing fell disproportionately on colder regions such as Hokkaido.

We also constructed computable general equilibrium (CGE) models that served several purposes. First, by examining the impacts of carbon pricing on regional economies, we determined the negative impact to be much larger in areas with heavy industries. However, the model indicates that such regional imbalances in the impact of carbon pricing can be addressed by redistributing carbon tax revenue. Second, using the newly created CGE model, we also examined the impact of fuel tax reform both on the Japanese economy and on CO_2 emissions. By equalizing the effective carbon rate across different fuel types, we can reduce CO_2 emissions while increasing GDP. Finally, we explored the possibility of introducing a double dividend for carbon taxes in the Japanese economy. We found that we could reduce CO_2 emissions while increasing GDP by recycling the carbon tax revenue to reduce the corporate tax or consumption tax.

On the basis of the above-mentioned findings, we proposed several carbon pricing options for the Japanese economy.

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