

International Environmental Agreements under Heterogeneity

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論 文 内 容 の 要 旨

With the development of economics and technologies, environment has deteriorated in the past centuries. Forming International Environmental Agreements (hereafter IEAs), which requires countries' voluntary participations and stipulates these participants' abatement responsibilities, is a promising way to combat for global environmental degradation. Based on the rules of IEAs, member countries coordinate their actions so as to reach a common goal. Specifically, such actions include: decrease or avoid emission activities; financially support other countries to abate pollutants and so on.

Previous studies employing one shot game to model the formation of IEAs assume that countries are symmetric, in terms of the benefits and costs from abatement of pollutant emissions. Nevertheless, such assumption is unreasonable since countries differ in the technology levels and geographic location. Therefore, in this doctoral thesis, we choose three representative IEAs that solve different transboundary pollutant problems and reexamine their efficiency considering asymmetric countries. This thesis includes five chapters.

The first chapter explains the research background. After reviewing some former literature, we also briefly introduce the motivations and objectives to show the importance of this thesis.

In the second chapter, we compare the effectiveness of internal and external transfers in multilateral IEAs with two types of countries and two-sided strong asymmetry. To make it clear, developed countries have sufficiently larger abatement benefit and abatement cost parameters than developing ones. The game modelling IEAs with internal transfers requires all member countries to reallocate their welfare while that modelling IEAs with external transfers requires some free riders to transfer welfare to countries that will later become IEA members. Our results show that both transfers are effective to enlarge the size of IEAs and to increase all countries' social welfare. What's more, external transfers are always preferred.

The third chapter explores the efficiency of uniform abatement level and uniform emission tax in multilateral IEAs with unlimited types of asymmetric countries. Rather than maximizing coalition welfare, member countries decide the uniform abatement level and uniform emission tax via pairwise majority voting. We find that IEAs under neither of the above-mentioned uniform regulatory policy can include more than two asymmetric countries. However, if an internal transfer scheme is well designed, the larger IEA is possible.

In the fourth chapter, we investigate the efficiency of bilateral IEAs formed by two asymmetric countries in the context of strategic delegation. We assume that the developed country has higher abatement cost than the developing counterpart and its households also value environment more than that of the latter.

Allowing households of each country to elect the government via pairwise majority voting, which is the so-called strategic delegation, our result confirms the existence of incentives to choose a less green government in the cooperative case. Moreover, cooperation is conducive because both the total payoff of all households and the aggregate abatement levels are increased, comparing with the situation when no cooperation is allowed.

The last chapter concludes this doctoral thesis. Our main contributions are as follows. First, external transfers are more effective than internal transfers when assuming two types of countries with strong asymmetry. Second, neither uniform abatement level nor uniform emission tax is an useful instrument to induce the large stable IEAs when assuming unlimited types of countries. Therefore, it is necessary to employ transfers among member countries to achieve efficient result. Third, when considering domestic politics in the bilateral environmental agreements with two asymmetric countries, cooperation is effective even though households in both countries elect less green governments. Overall, this doctoral thesis fills the research gap for theoretical studies in IEAs using one shot game, since there are few works considering heterogeneity among countries.