

GSAPS THE SUMMARY OF DOCTORAL THESIS

Essays on the Effectiveness of International Environmental Agreements : Quantitative Analysis on Environmental and Economic Aspects

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Due to globally intensified environmental degradation, especially in trans-boundary environmental problems, realistic and effective international instruments are necessary to tackle these issues. In this context, International Environmental Agreements (IEAs) have been established as a mode of transnational cooperation for coping with global environmental deterioration and related problems. However, owing to the persistent self-interested characteristic of international policy, the effectiveness of the IEAs is being questioned.

Along with the proliferation of IEAs, studies to evaluate the effectiveness of IEAs have increased. However, results from previous studies are still open to dispute due to the difficulties of framing and conducting IEA effect assessments. Furthermore, previous research has mostly been conducting analysis only in consideration of environmental effectiveness, which involves the effect of IEAs in terms of eliminating or reducing pollutants. Therefore, there is a need to broaden research subjects and models to comprehend the effectiveness of IEAs more clearly and broadly in order to qualify the concept of effective international environmental cooperation and work toward this end.

Based on this context, the following main research question arises: *“Is there any possibility of establishing IEAs to simultaneously enable sustainable economic development while addressing the adverse effects on the economy? How do IEAs with the notion of common responsibility and differentiated responsibility affect the environmental and economic performance of member countries?”* To answer this question, three sub-questions are answered by three essays described from Chapter 3 through Chapter 5.

First, to grasp the effectiveness of IEAs, it is necessary to accurately evaluate the effectiveness of existing IEAs on emission reductions. One of the major limitations of the existing literature is the failure to grasp the effect of IEAs controlling for the characteristics of each nation. In this sense, scholars have indicated the intrinsic limitations of predicting the effectiveness of IEAs, such as dealing with hypothetical situations or controlling external factors. Therefore, it is necessary to consider the average differences in emissions for participants and non-participants over the periods; thus the following sub-question is addressed. Sub-question 1: *“How do IEAs concerning different pollutants affect emission reduction in consideration of the emission reduction trends of participants and non-participants?”*

Next, the economic burden caused by pollutant reduction by IEAs is one of the significant considerations when countries decide whether to participate in IEAs. Indeed, emerging economies are concerned about expected damage to their economies. Therefore, IEAs such as the Kyoto Protocol have recently tried to decrease the negative effect on economic performance with market-based mechanisms. In this regard, the second sub-question is as follows. Sub-question 2: *“How much economic burden is placed on member countries by participating in IEAs? Is there any possibility to simultaneously improve economic performance while reducing pollutants of member countries?”*

Finally, based on the understanding of the effectiveness of IEAs on environmental and economic aspects, Sub-question 3 seeks evidence of which regime elements of IEAs positively affect the environments and economies of participants. Sub-question 3: *“Which regime elements of IEAs*

have a beneficial effect on the environmental and economic performance of member countries?”

This thesis is organized as follows. Chapter 1 provides general information about this thesis including background, research questions, and hypothesis. Chapter 2 reviews previous studies and develops a theoretical framework for evaluating the effectiveness of IEAs.

Chapter 3 examines the environmental and economic effectiveness of the IEAs by performing a quantitative assessment on four protocols (the Helsinki, Sofia, Oslo, and Geneva Protocols) of the Convention on Long-Range Transboundary Air-Pollution (LRTAP). The impact evaluation method, which combines the Difference-in-Difference (DID) method with the Propensity Score Matching (PSM) method, was employed in the analysis, using panel data from 50 countries that participated in the 1979 Geneva Convention. The results demonstrate that the Sofia Protocol had a significant effect on both the environmental and economic performances while other three protocols had no discernible effect.

Chapter 4 investigates the impact of the Kyoto Protocol on environmental performance and economic improvement using the impact evaluation technique combining the DID and PSM methods, using country-level panel data of 209 countries for the periods from 1997–2008 and 2005–2008. The first hypothesis, which perceives the effect of the protocol in terms of reducing carbon dioxide (CO₂) emissions, is accepted with the result of more effective CO₂ emission reduction among Annex I Parties. In contrast, the second hypothesis, which assumes a positive effect of IEAs on economic performance, is rejected. From the prediction based on the result of the statistical analysis, emission reductions caused by the Kyoto Protocol exceed the negative effect on the GDP.

Chapter 5 evaluates regime elements affecting the environmental and economic effectiveness of IEAs using databases of 123 IEAs of 23 international environmental regimes based on Breitmeier et al. (2006) and Böhmelt and Pilster (2010). To generate the database of the economic effectiveness on member countries, the impact evaluation technique is conducted for 209 countries from 1970–2008. Regime elements have an effect on the effectiveness of IEAs are identified using the Bayesian methodology with Markov Chain Monte Carlo (MCMC). The result indicates that one of the legalization elements, rule precision, have a negative effect on environmental performance while legally bound IEAs show a significant improvement of economic performance. On the other hand, flexibility mechanisms of IEAs are likely to have a positive impact on both environmental and economic performance of member countries.

This thesis will contribute to a better understanding of the effectiveness of IEAs on member countries in terms of not only environmental effect but also economic respects. With the precise impact evaluation methodologies, the empirical findings in the main chapters could identify the consequences of IEAs with a greater degree of precision. Chapter 6 will synthesize those findings and discuss policy implications.

References

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