The Impacts of Learning on International Technology Agreements for Climate Change Mitigation

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Abstract

This study investigates the impacts of learning on an International Technology Agreement (ITA). We assume that the role of R&D is to create a new environmental technology. It is also assumed that if the R&D provides the intended outcomes, the benefit of adopting the new technology is high; otherwise, it is low. The benefit of adoption may be uncertain, especially when evaluation of the R&D outcome takes a long time. Hence, we focus on the timing of learning relating to the benefit of adoption by using two different models. When countries decide whether to adopt technologies, they either know about the precise benefits of adoption (a model with learning) or they are unaware about them (a model with no learning). Our conclusions are summarized as follows. First, in a state of equilibrium, the total number of signatories, total number of countries conducting R&D, and social welfare are always greater in the no learning case than in the learning case. Second, all countries always choose to adopt technologies regardless of whether R&D succeeds in the no learning case. Conversely, in the learning case, all countries adopt technologies only when R&D succeeds. Third, regardless of the existence of learning, the expected social welfare with the ITA becomes higher than that without the ITA, except for the case in which the non-agreement state achieves the first-best. We conclude that learning impacts the effectiveness of the ITA negatively; uncertainty regarding the benefit of adopting a technology provides positive effects on the ITA.

Key words: Climate Change, Coalition Formation Game, Environmental R&D, International Environmental Agreements, Uncertainty, Learning

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