

The Dynamics of Climate Agreements

Bård Harstad
(harstad@kellogg.northwestern.edu)

In Progress - 6 October 2008

Abstract

How should climate agreements be negotiated and updated over time? Bad news: A sequence of short-term agreements can be *worse* than no agreement at all. Good news: The *first-best* can be implemented by over-ambitious agreements with renegotiation.

In every period of the model, N countries pollute and invest in abatement technology (R&D). This generates a dynamic common pool problem where each country abates and invests little in order to affect the other countries' R&D and pollution decisions in the future. *Short-term agreements* reduce pollution but they also create hold-up problems since high-tech countries are forced to abate the most in the bargaining equilibrium. Anticipating this, short-term agreements discourage R&D and, if N is large, *reduce* social welfare compared to the situation with no agreement. *Long-term agreements* are not ideal, either, since they specify pollution levels before the social cost of pollution is learned. Nevertheless, a long-term agreement is better than short-term agreements if N and the R&D-spillovers are large.

The first-best can be implemented by a particular *long-term agreement with renegotiation*. This long-term agreement should demand lower pollution levels than what is actually going to be optimal in the future. When renegotiating the over-ambitious agreement, high-tech countries have the most bargaining power. Anticipating this, countries invest more (and optimally) in advance. The larger is N and the R&D spillovers, the more over-ambitious the long-term agreement should be.

The analysis demonstrates the importance of combining environmental and R&D (trade) agreements. The results hold no matter whether the countries negotiate emission quotas, emission taxes or tradable permits.

Key words: Climate agreements, dynamic common-pool problems, dynamic moral hazard, length of contracts, renegotiation design, issue linkages (bundling environmental and trade agreements).