

Executive Summary

Cooperation on climate change under economic linkages - How the inclusion of macroeconomic effects affects stability of a global climate coalition

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Game-theoretic models of international cooperation on climate change come to very different results regarding the stability of an international agreement including all countries, depending on the stability concept used. In particular, models based on the core-stability concept posit that a stable global agreement always exists, if the functions describing country behavior satisfy certain common assumptions. However, this encouraging result does not seem to be supported by reality. We argue that a weakness of such models is the fact that they base the costs of emission reduction measures purely on domestic action. Consequently, these models miss important international macroeconomic effects of emission reduction measures, such as technological spillovers and changes in fossil fuel prices.

We remedy this weakness by extending the game-theoretic model to include the international macroeconomic effects of emission reduction measures. The global dynamic computable general equilibrium model DART and damage functions from the RICE model are used to quantify the theoretical model.

Contrary to the classical model, we find that, if assumed damages from climate change are in the range given by the IPCC, a stable global agreement does not exist. This is mainly due to the fossil fuel exporting region Australia / New Zealand, which is negatively affected by lower fossil fuel prices resulting from global emission reduction measures. Also, other countries do not have a sufficient incentive to compensate fossil fuel exporters for their participation in a global agreement, because the gains of further cooperation are small. If damages from climate change are assumed to be higher than the IPCC range, we find that a stable global agreement is possible, as in the classical model.

Our results point to two alternative ways forward in the climate negotiations to remove blockades by countries losing from mitigating climate change. The first option calls for a *coalition of the willing* to compensate blocking countries for participation in a global agreement. Such compensation would not be rational, if the decision is based purely on a benefit-cost analysis of GHG abatement. However, if other arguments such as fairness principles are taken into account, the necessary compensation might be justifiable. The second option calls for the *coalition of the willing* to abandon the UNFCCC process and to try to consummate an agreement among this coalition. This option could come close to the environmental effectiveness of the grand coalition.