

Designing International Climate Agreements: An Economic Analysis of Free-riding Incentives

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Abstract

International environmental agreements have been and are negotiated to facilitate mitigation efforts on climate change. To avoid severe impacts, global cooperation is required as the reduction of greenhouse gas emissions represents a global public good. However, free-riding incentives impede the voluntary contribution of abatement by sovereign countries. The present thesis studies how climate cooperation could advance under different treaty designs in the face of free-riding incentives. The thesis uses integrated assessment models to quantify regional differences with respect to costs and benefits from mitigating climate change and identifies regions that gain from cooperation as well as potential losers. Within the numerical models, transfers are found to enhance cooperation such that stable agreements could close the gap between full cooperation and no cooperation roughly half with respect to global welfare. The magnitudes of transfer payments show comparably moderate magnitudes resulting from modeling assumptions on costs and benefits of mitigation. Following this assessment, the thesis studies the implementation of payments. Adverse effects of transfers are identified which have the potential to impede cooperation on climate change. Moderate magnitudes of transfers are found to be of advantage by limiting the potential adverse effects on recipient countries, for which negative consequences could especially be relevant when transfers are based on equity considerations. Defining the obligations of a treaty in a more moderate way might enhance cooperation also with respect to two other design options: (i) including unrestricted emissions trading with countries that do not have abatement targets and (ii) formulating the obligations of a treaty in emission assignments. The thesis finds that both treaty design options imply additional welfare gains for which the coalition pays and that no country can be excluded from. While global welfare is enhanced, free-riding is likely to become more attractive. In turn, (i) restricting the amount of emission permits in the market for the coalition or (ii) basing a treaty on emission taxes may enhance the participation in the agreement because welfare gains for free-riders are reduced. However, the thesis finds that both agreements under ambitious or moderate obligations could be more successful with respect to global welfare depending on modeling parameters.