Solar Radiation Management and Trade

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Abstract

We develop a trade-theoretic model of strategic Solar Radiation Management (SRM) in a dynamic setting with tariff policy. Two blocs of countries interact repeatedly, choosing SRM intensity and import tariffs. Although unilateral SRM is feasible and can generate a free-driver problem, linking trade policy to SRM restraint enables self-enforcing outcomes that sustain free trade and disciplined SRM deployment. We characterize the trigger level of SRM that aligns incentives and show how the enforceable cap depends on preference heterogeneity, trade gains, punishment severity, and patience.

A transparent calibration, mapping blocs to a cooler, richer North and a hotter, poorer South, illustrates the mechanism. For empirically plausible trade stakes and sufficient patience, the threat of trade retaliation can substantially curb overcooling incentives; when punishment is weak or actors are impatient, trade leverage fails. Overall, trade retaliation emerges as a conditional governance mechanism for SRM, distinct from counter-geoengineering, and clarifies when a trade-based "climate club" can discipline SRM deployment.

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