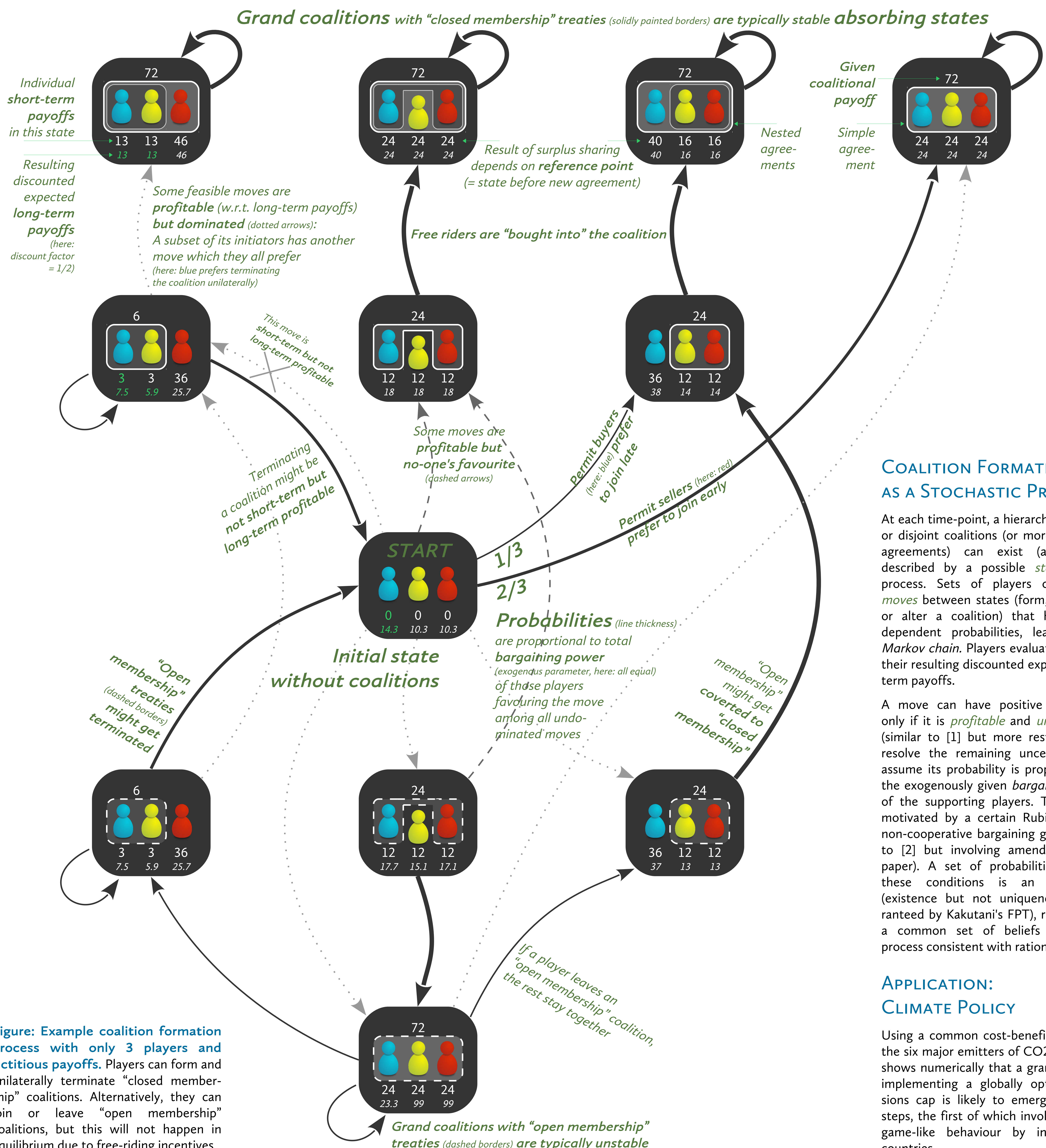


BOTTOM-UP STRATEGIC LINKING OF CARBON MARKETS: WHICH CLIMATE COALITIONS WOULD FARSIGHTED PLAYERS FORM?

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SUMMARY

Climate coalition formation is modelled as a dynamic process similar to [1]. The poster focusses on the general game-theoretical framework. The paper uses this framework to show that a global climate coalition might well arise bottom-up in a few steps involving the linkage of regional carbon markets and coordination of emissions caps in a hierarchy of agreements.



COALITION FORMATION AS A STOCHASTIC PROCESS

At each time-point, a hierarchy of nested or disjoint coalitions (or more generally: agreements) can exist (as in [3]), described by a possible *state* of the process. Sets of players can initiate *moves* between states (form, terminate, or alter a coalition) that have state-dependent probabilities, leading to a *Markov chain*. Players evaluate states by their resulting discounted expected long-term payoffs.

A move can have positive *probability* only if it is *profitable* and *undominated* (similar to [1] but more restricted). To resolve the remaining uncertainty, we assume its probability is proportional to the exogenously given *bargaining power* of the supporting players. This can be motivated by a certain Rubinstein-type non-cooperative bargaining game similar to [2] but involving amendments (see paper). A set of probabilities fulfilling these conditions is an *equilibrium* (existence but not uniqueness is guaranteed by Kakutani's FPT), representing a common set of beliefs about the process consistent with rationality.

APPLICATION: CLIMATE POLICY

Using a common cost-benefit-model for the six major emitters of CO₂, the paper shows numerically that a grand coalition implementing a globally optimal emissions cap is likely to emerge in a few steps, the first of which involve chicken-game-like behaviour by industrialized countries.

Figure: Example coalition formation process with only 3 players and fictitious payoffs. Players can form and unilaterally terminate "closed membership" coalitions. Alternatively, they can join or leave "open membership" coalitions, but this will not happen in equilibrium due to free-riding incentives.

References

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- [3] Heitzig J (2011) Efficiency in face of externalities when binding hierarchical agreements are possible. Game Theory & Bargaining Theory eJournal 3 (40), 1–16