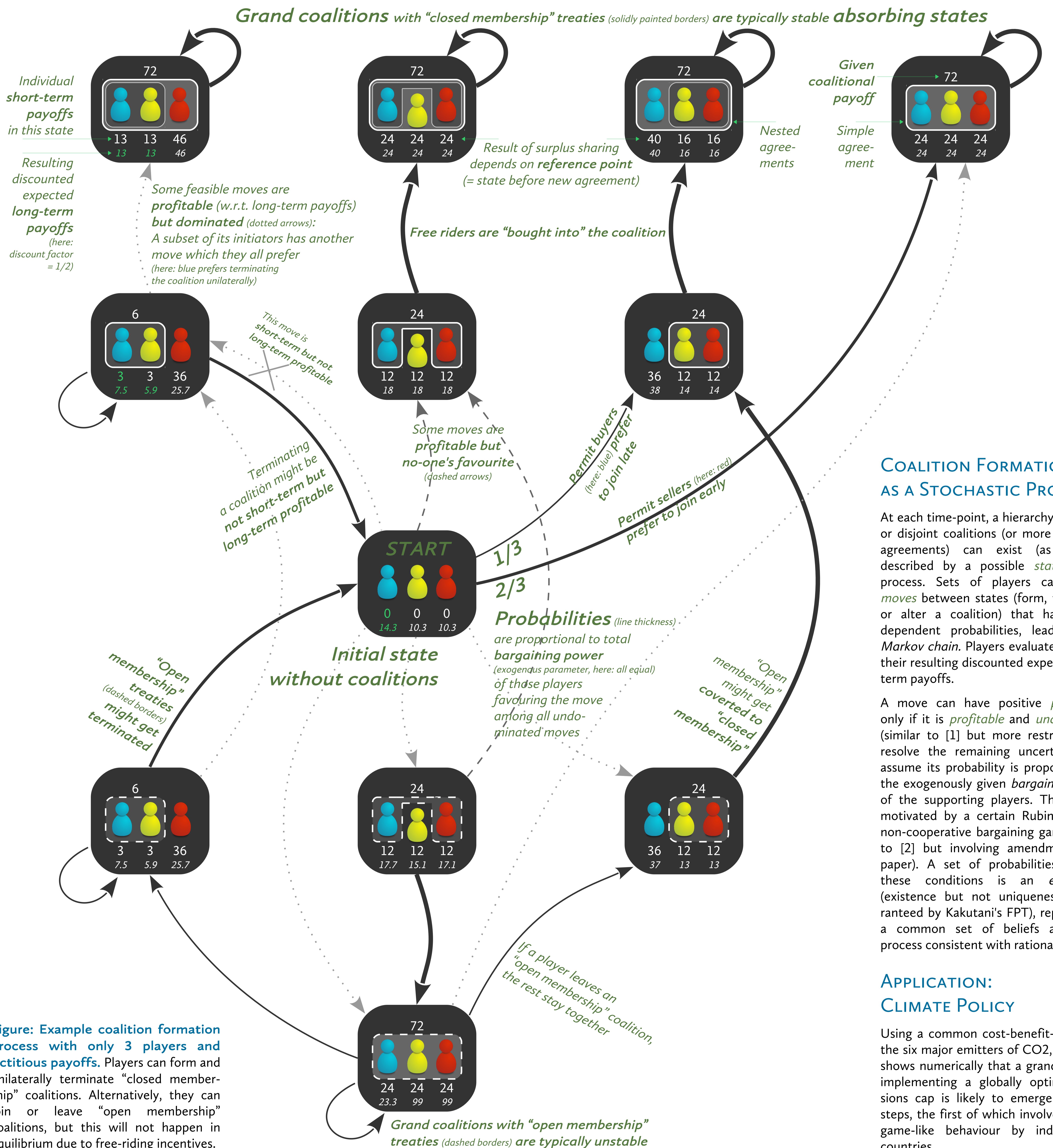


BOTTOM-UP STRATEGIC LINKING OF CARBON MARKETS: WHICH CLIMATE COALITIONS WOULD FARSIGHTED PLAYERS FORM?

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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.

References

- [1] Konishi H, Ray D (2003) Coalition formation as a dynamic process. *J Econ Theory* 110 (1), 1–41
- [2] Hyndman K, Ray D (2007) Coalition formation with binding agreements. *Rev Econ Studies* 74 (4), 1125–47
- [3] Heitzig J (2011) Efficiency in face of externalities when binding hierarchical agreements are possible. *Game Theory & Bargaining Theory eJournal* 3 (40), 1–16