

Frameworks to study collusion/cooperation¹

Here are a few questions that determine from which angle (theory) collusive arrangements are studied in the Economics literature. ●● denote topics that have received little or no attention.

1 Which criteria (axioms) to divide gains or losses from cooperation?

- Nash Bargaining: either cooperation or the outcome is a threat point (see notes on bargaining).
- Shapley value. A coalition of players cooperates which gives rise to a payoff. The contribution to the payoff may be different across agents. How should the payoff be distributed? Assuming that cooperation is always profitable, the Shapley value defines how the payoff can be distributed fairly. Basically, each agent is rewarded according to his marginal contribution to the group. The Shapley value has several properties. In particular, every agent gets at least as much as he would obtain by not cooperating and the total payoff is distributed (efficiency).

2 How can economic agents reach a cooperative outcome in the absence of contracts?

- Repeated prisoner's dilemma. Literature explores how cooperation can be achieved conditional on what is observable. For instance, players may be reassigned to partners every period and not all moves in the past may be revealed to all players.

3 How agreements between a subset of players affect economic performance?

- Contract theory and side contracting within a grand contract. The Principal designs a contract for a pool of agents but those can decide to sign a side contract, agree on reports and transfer wealth.
- Hierarchies and (corrupted) supervision. Typically, a Principal delegates supervision to an intermediary who reports about what he observes from an agent. This is a hierarchy with

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three levels.

4 What type of agreement can be reached between collusive agents?

It depends on the game:

- Delegation to a third party: used in contract theory to study side contracting within grand contracts.
- Bargaining theory: Nash or Rubinstein bargaining games (see notes on bargaining).
- One player with full bargaining power: the agreement is then decided by an informed player with self-interest.