Committee Search Without Transfers

October 19, 2017

Short Story

- A group votes repeatedly on an issue until it is resolved.
- In each period, every member observes a value of an independent potential solution.
- What is a mechanism (voting rule) that is,

1. Incentive compatible,
2. Pareto optimal.

Short Answer

- Each member votes: veto (bad), approve (okay), recommend (good),

1. The potential solution is adopted iff no one vetos and at least one member recommends.
2. If not adopted, if only one member vetoes, she gets less voting power in the next period.

- All incentive compatible Pareto optimal voting rules are of this form.
- All incentive compatible voting rules are equivalent to randomizations between these voting rules.

Hiring example

- A hiring committee of professors (agents) vote repeatedly until a candidate is hired.
- In each period, a candidate presents her job market paper and every professor observes a different, but possibly correlated value for the candidate, say from 0 to 100.
- Tht committee submits the values to department chair (principal) who decides,

1. Hire this candidate,
2. Continue search.

Agent

- Agent i observes $v_{i,t} \in [\underline{v}, \bar{v}]$ in period t
- Independent over time
- Possibly correlated between agents in each period
- Outside option $v_i^\star$

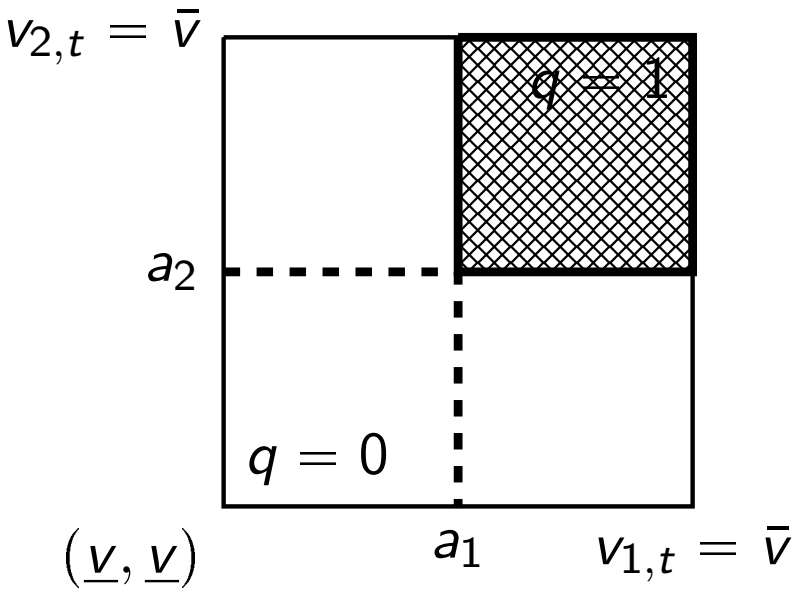
Principal

- Principal designs conditional probability of allocating the good $q\left(v^t\right)$ given:

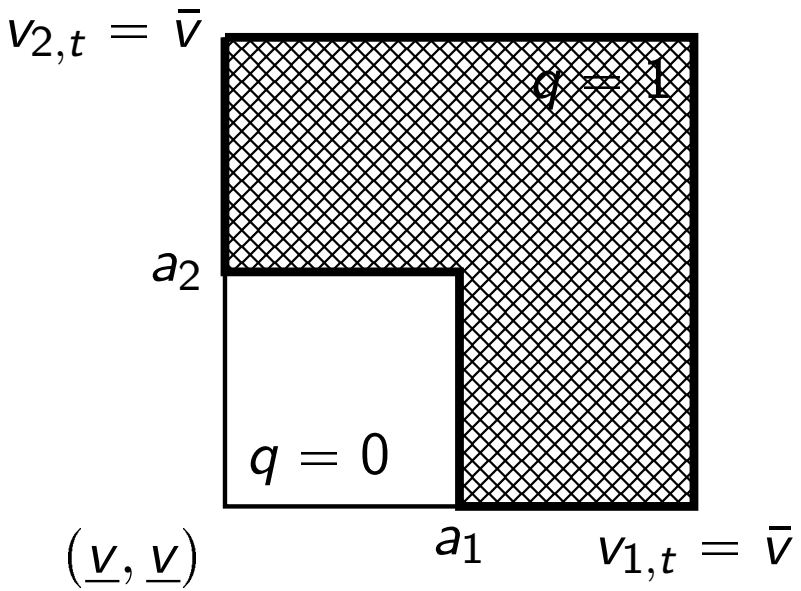
1. The history of reports $v^{t-1} = v_1, v_2, ..., v_{t-1}$
2. The current report v_t

Binary Stage Mechanisms

- In a history-independent mechanism, every stage mechanism is binary
- Vote either yes (recommend) or no (not recommend)



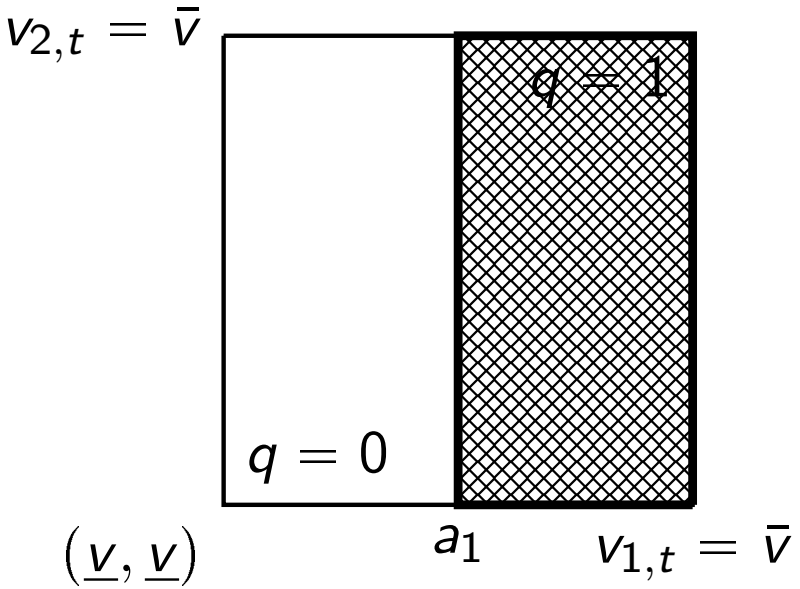
Unanimity



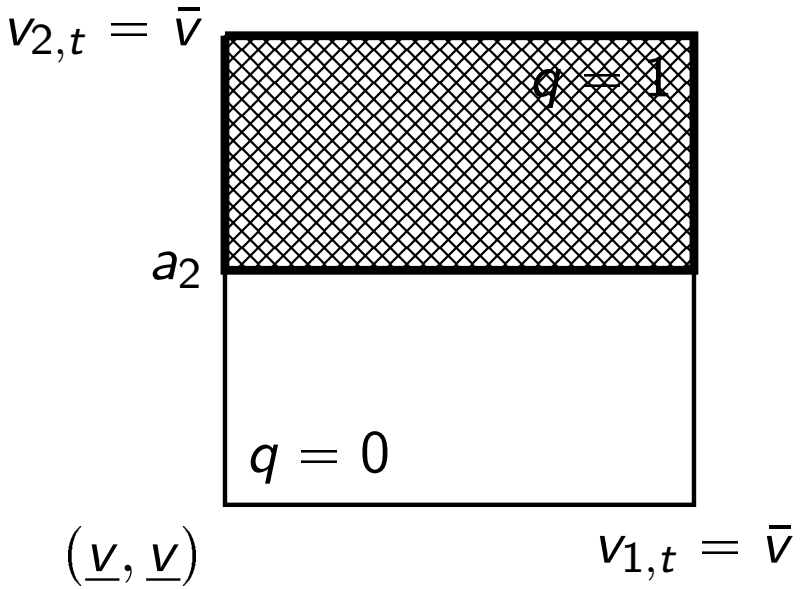
Reverse unanimity

Binary Stage Mechanisms - Dictator

- Dictator mechanisms give the highest payoff to the dictator



Dictator for agent 1



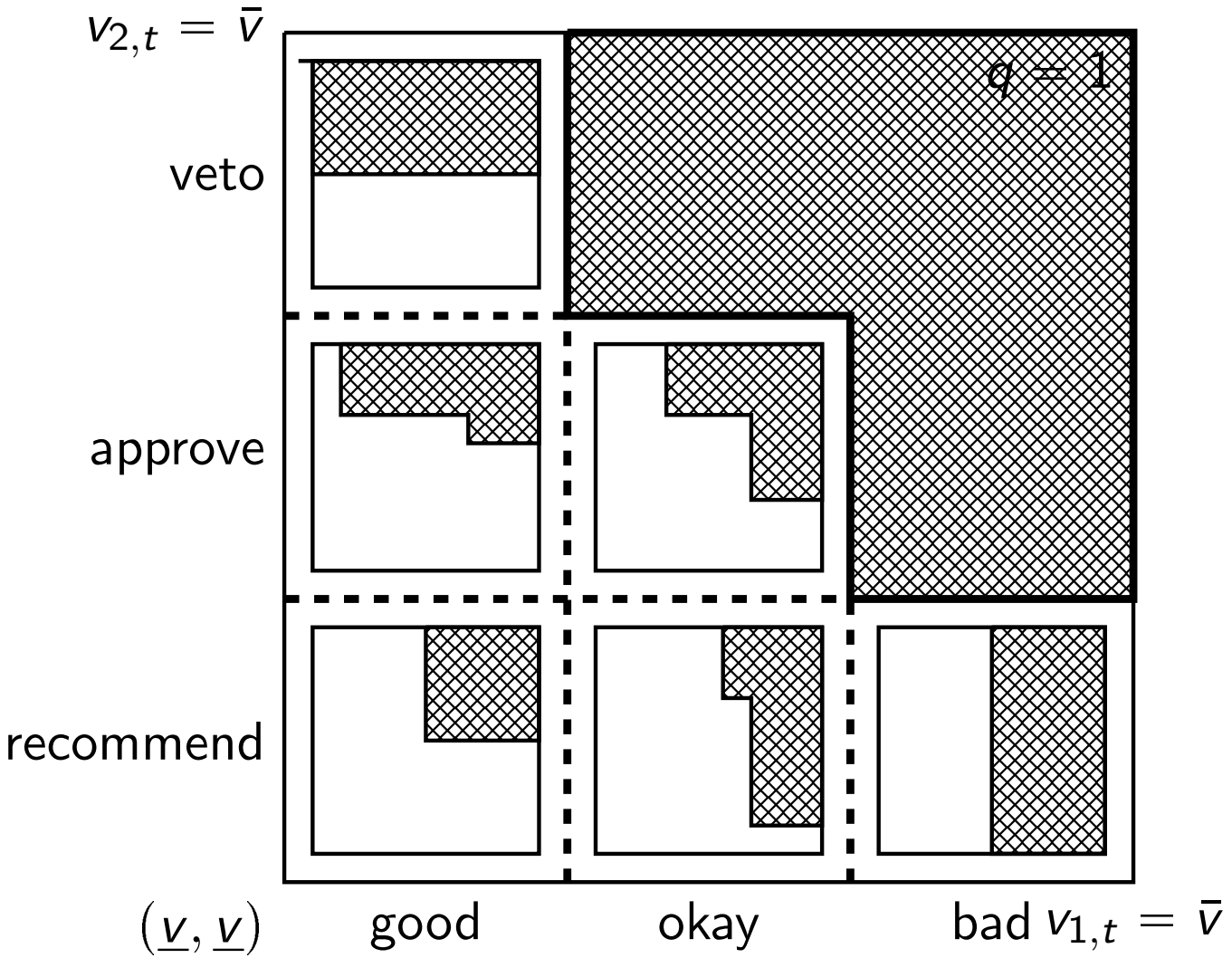
Dictator for agent 2

Ternary Stage Mechanisms

- Every history-dependent mechanism pay-off equivalent to on where every stage mechanism is ternary
- In particular, the Pareto optimal mechanisms are ternary
- Vote no (veto) or okay (approve) or good (recommend)
- Principal allocates the good if no one vetoes and at least one person recommend

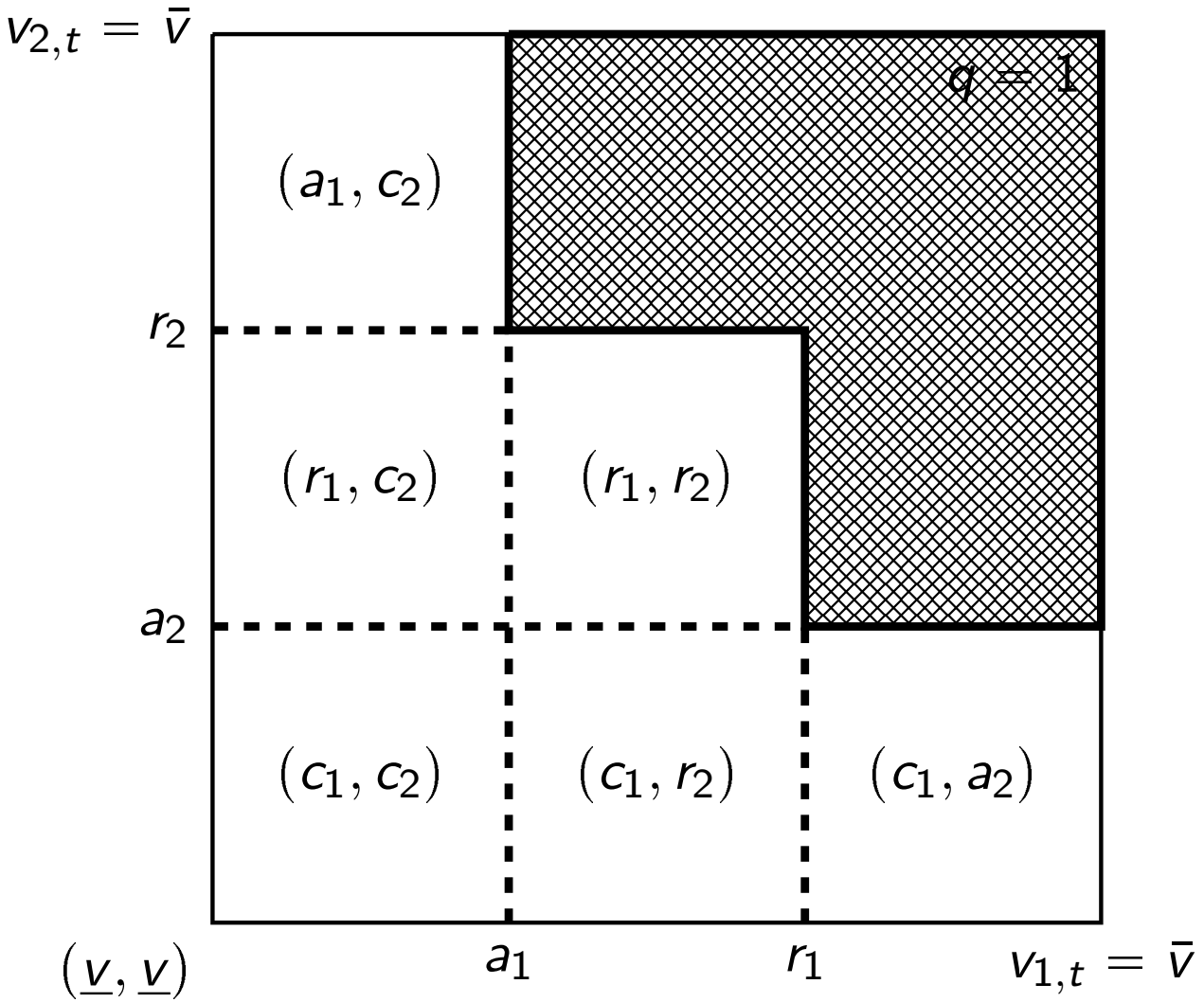
Ternary Stage Mechanisms - Diagram

- Continuation mechanism drawn in each region



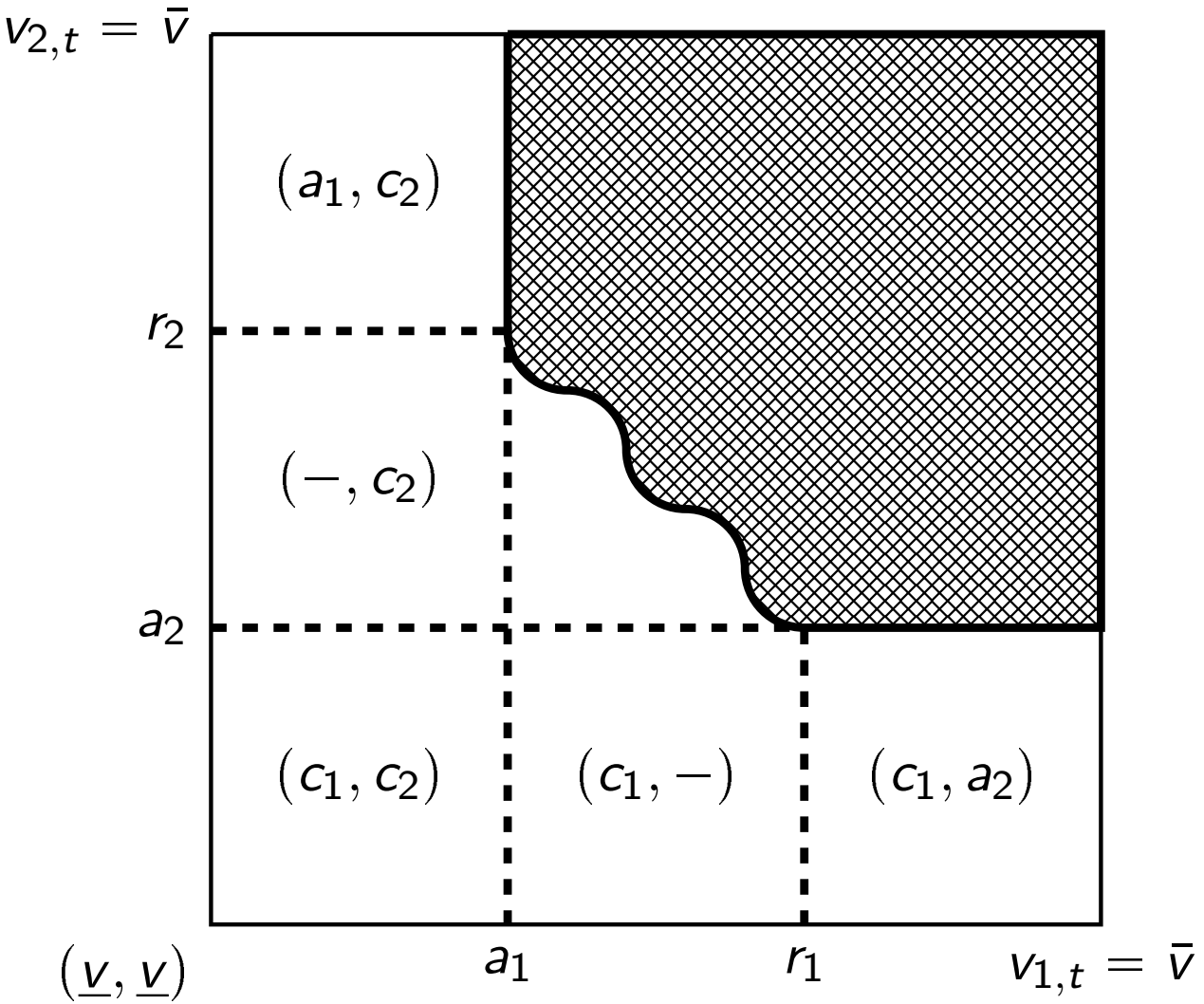
Ternary Stage Mechanisms - Diagram

- Continuation value pairs written in each region



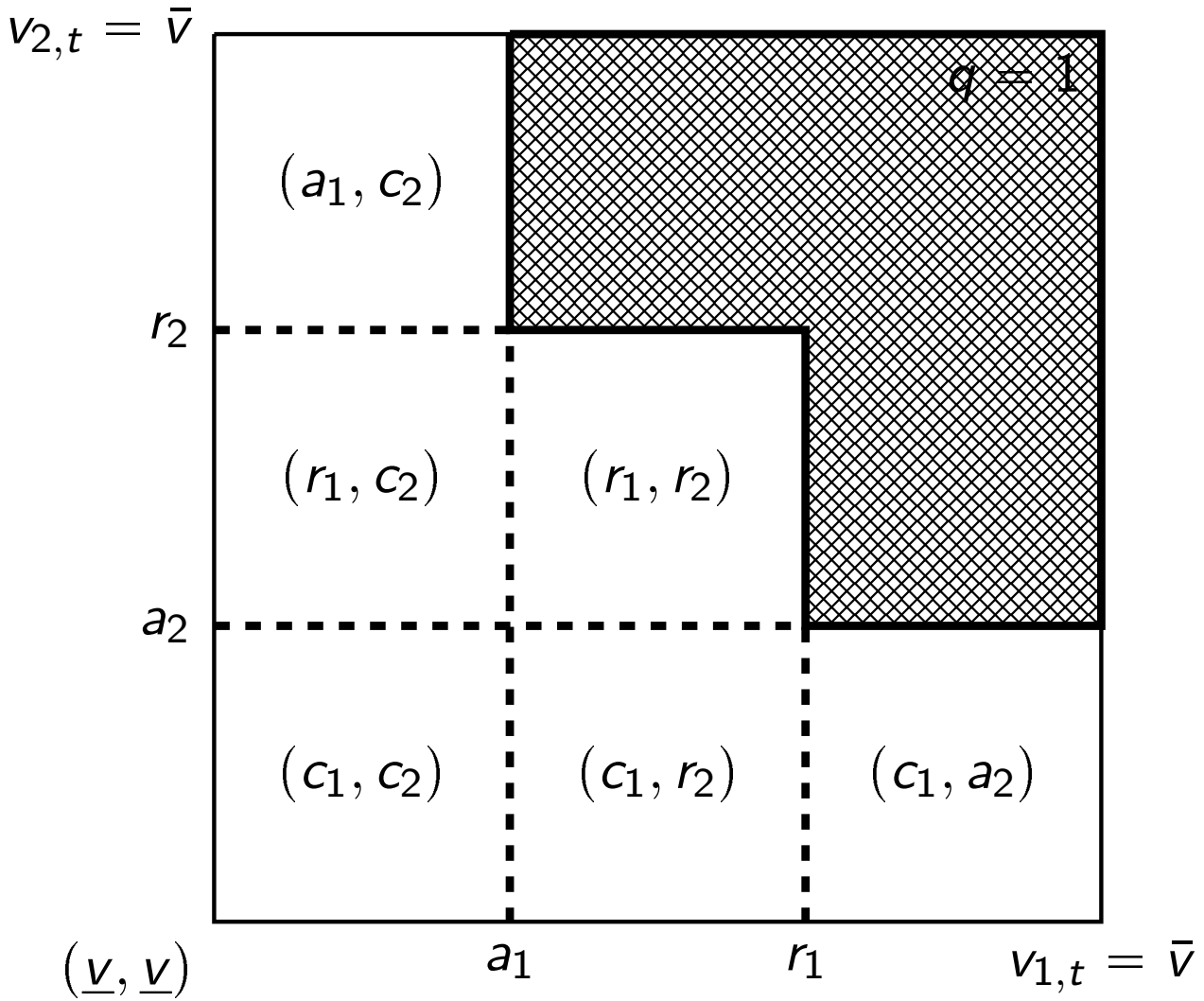
Proof of Main Result - Part 0

- Start with an arbitrary stage mechanism



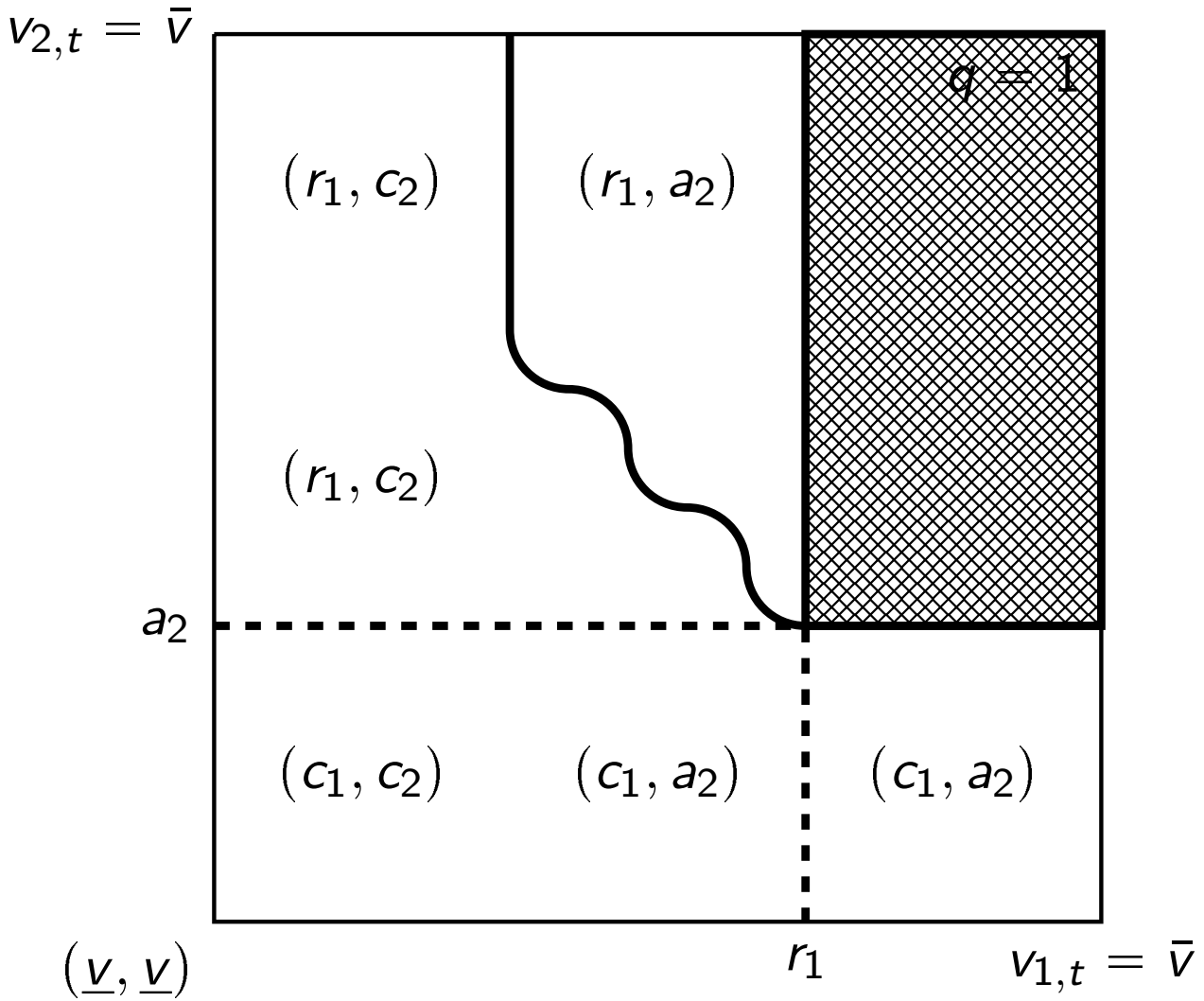
Proof of Main Result - Part 1

- A ternary mechanism that is better for both agents



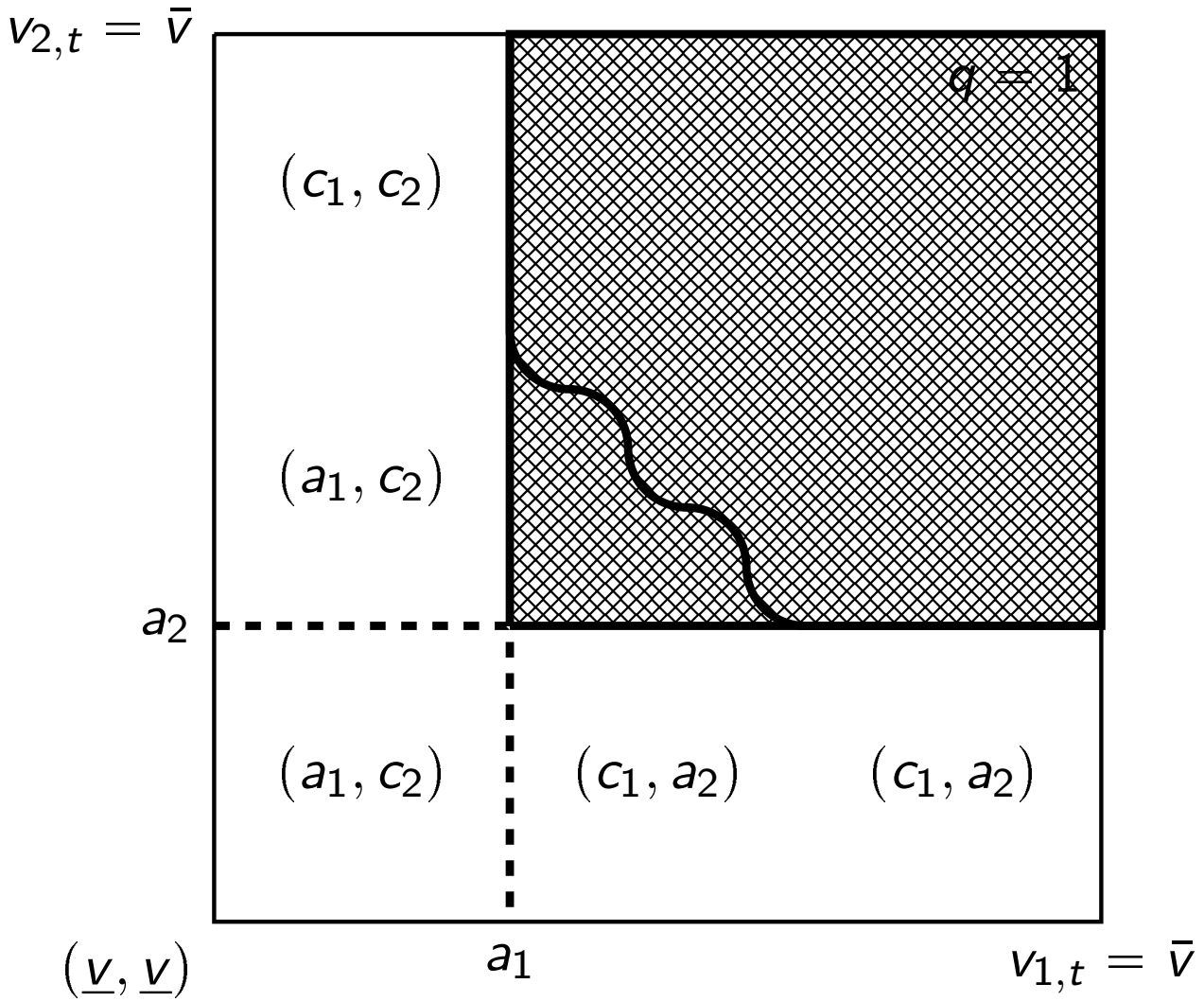
Proof of Main Result - Part 2

- A ternary mechanism that is better for only one agent



Proof of Main Result - Part 3

- A ternary mechanism that is worse for both agents



Proof of Main Result - Part 4

- Everything on the boundary is ternary.